20 February 2017

UPDATED MINERAL RESOURCE AND ORE RESERVE STATEMENT

Following the acquisition of Sierra Rutile Limited on 7 December 2016, Iluka Resources Limited is required to report the Ore Reserves and Mineral Resources for this material project. Iluka has also updated the Ore Reserves for all its other material projects, being Jacinth-Ambrosia, Cataby and Tutunup South and its inventory of Mineral Resources as at 31 December 2016.

This reporting is in accordance with the guidelines of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves, 2012 Edition (JORC Code), and the ASX Listing Rules and provides a summary of pertinent information and JORC Code Table 1 attachments to support the updated Mineral Resources Estimates on a domain basis and Ore Reserves Estimates for all material projects for Iluka Resources.

A summary of Iluka Resource's complete Mineral Resource and Ore Reserve inventory as at 31 December 2016 is given below.

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Ore Reserves and Mineral Resources Statement
HM Ore Reserves

ILUKA ORE RESERVE BREAKDOWN BY COUNTRY, REGION AND JORC CATEGORY AT 31 DECEMBER 2016

Summary of Ore Reserves[1,2,3] for Iluka						HM Assemblage[4]		
Country	**Region**	**Ore Reserve Category**	**Ore Tonnes Millions**	**In Situ HM Tonnes Millions**	**HM Grade (%)**	**Ilmenite Grade (%)**	**Zircon Grade (%)**	**Rutile Grade (%)**
Australia	Eucla Basin	Proved	99	3.9	3.9	27	50	4
		Probable	4	0.1	2.1	20	52	4
Total	**Eucla Basin**		**103**	**3.9**	**3.8**	**27**	**50**	**4**
	Murray Basin	Proved	-	-	-	-	-	-
		Probable	-	-	-	-	-	-
Total	**Murray Basin**		**-**	**-**	**-**	**-**	**-**	**-**
	Perth Basin	Proved	90	5.8	6.5	60	9	4
		Probable	92	7.0	7.5	60	8	4
Total	**Perth Basin[5]**		**182**	**12.8**	**7.0**	**60**	**9**	**4**
USA	Atlantic Seaboard	Proved	-	-	-	-	-	-
		Probable	-	-	-	-	-	-
Total	**Atlantic Seaboard**		**-**	**-**	**-**	**-**	**-**	**-**
Total	**Proved**		**189**	**9.7**	**5.1**	**47**	**26**	**4**
Total	**Probable**		**96**	**7.0**	**7.3**	**60**	**9**	**4**
	Grand Total		**286**	**16.7**	**5.9**	**52**	**19**	**4**

Notes:

(1) Competent Persons - Ore Reserves: C Lee (MAusIMM(CP)). The Ore Reserves in this table have been estimated in accordance with the JORC Code (2012 Edition), other than the Ore Reserves for the IPL North and South West deposits (excluding Tutunup South), which have not materially changed and have been estimated in accordance with the JORC Code (2004 Edition). Iluka Resources is undertaking further work in order to report these estimates in accordance with the JORC Code (2012 Edition).

(2) Ore Reserves are a sub-set of Mineral Resources.

(3) Rounding may generate differences in last decimal place.

(4) Mineral assemblage is reported as a percentage of in situ HM content.

(5) Rutile component in Perth Basin South West operations is sold as a leucoxene product.

Rutile Ore Reserves (Sierra Leone)

ILUKA ORE RESERVE FOR SIERRA RUTILE AND JORC CATEGORY AT 31 DECEMBER 2016

Summary of Ore Reserves[1,2,3] for Iluka					***In situ* Assemblage[4]**		
Country	**Region**	**Ore Reserve Category**	**Ore Tonnes Millions**	**In Situ Rutile Tonnes Millions**	**Rutile Grade (%)**	**Ilmenite Grade (%)[5]**	**Zircon Grade (%)[5]**
Sierra Leone	Sierra Leone	Proved	34	0.5	1.45	-	-
		Probable	271	3.4	1.24	-	-
Total	**Sierra Leone**		**306**	**3.9**	**1.27**	**-**	**-**

Notes:

(1) Competent Persons - Ore Reserves: C Lee (MAusIMM(CP))

(2) Ore Reserves are a sub-set of Mineral Resources.

(3) Rounding may generate differences in last decimal place.

(4) Mineral assemblage is reported as a percentage of in situ material.

(5) Ilmenite and zircon are only considered to be at an Inferred level of confidence in the Mineral Resource estimation, and while present, currently have a low value ascribed in the reserve optimisation process for Sierra Leone.

Ore Reserves are estimated using all available geological and relevant drill hole and assay data, including mineralogical sampling and test work on mineral recoveries and final product qualities. Reserve estimates are determined by the consideration of all of the "Modifying Factors" in accordance with the JORC Code (2004 Edition and 2012 Edition, as the case may be), and for example, may include but are not limited to, product prices, mining costs, metallurgical recoveries, environmental consideration, access and approvals. These factors may vary significantly between deposits.

The Ore Reserves and Mineral Resources for the Sierra Leone rutile deposits are reported separately as there is insufficient information to state the assemblage in terms of a portion of the heavy mineral (HM) content which is traditionally done in reporting heavy minerals. Historical data focussed on the insitu rutile content which is honoured in the reporting of Ore Reserves and Mineral Resources for Sierra Leone. An equivalent comparison of the rutile tonnages contained in Iluka's Ore Reserve inventory for heavy minerals can be calculated using the formula:

[Rutile tonnes = HM tonnes * Rutile %] that is [16.7*(4/100)] = 0.7 Mt of rutile.

HM Mineral Resources

ILUKA MINERAL RESOURCE BREAKDOWN BY COUNTRY, REGION AND JORC CATEGORY AT 31 DECEMBER 2016

Summary of Mineral Resources(1,2,3) for Iluka						HM Assemblage(4)		
Country	Region	Mineral Resource Category	Material Tonnes Millions	In Situ HM Tonnes Millions	HM Grade (%)	Ilmenite Grade (%)	Zircon Grade (%)	Rutile Grade (%)
Australia	Eucla Basin	Measured	227	7.1	3.1	32	44	4
		Indicated	85	8.1	9.5	65	20	2
		Inferred	74	3.7	5.1	60	20	2
Total	**Eucla Basin**		**386**	**18.9**	**4.9**	**52**	**29**	**3**
	Murray Basin	Measured	16	4.4	27.6	62	11	11
		Indicated	88	18.5	21.0	56	11	14
		Inferred	85	10.1	11.9	49	10	14
Total	**Murray Basin**		**189**	**33.0**	**17.5**	**54**	**11**	**13**
	Perth Basin	Measured	497	29.6	6.0	59	10	5
		Indicated	302	15.9	5.2	54	10	5
		Inferred	242	11.6	4.8	55	9	5
Total	**Perth Basin(5)**		**1,041**	**57.0**	**5.5**	**57**	**10**	**5**
USA	Atlantic Seaboard	Measured	59	2.4	4.0	65	12	-
		Indicated	43	2.4	5.6	65	10	-
		Inferred	16	0.5	2.9	61	11	-
Total	**Atlantic Seaboard(6)**		**118**	**5.2**	**4.4**	**65**	**11**	**-**
Sri Lanka	Sri Lanka	Measured	214	22.2	10.4	70	3	4
		Indicated	39	3.4	8.8	69	4	3
		Inferred	437	30.7	7.0	66	4	5
Total	**Sri Lanka(7)**		**690**	**56.3**	**8.2**	**67**	**4**	**4**
Total	**Measured**		**1,012**	**65.7**	**6.4**	**60**	**12**	**5**
Total	**Indicated**		**558**	**48.3**	**8.7**	**58**	**11**	**8**
Total	**Inferred**		**854**	**56.5**	**6.6**	**60**	**7**	**6**
	Grand Total		**2,424**	**170.5**	**7.0**	**59**	**10**	**6**

Notes:

(1) Competent Persons - Mineral Resources: B Gibson (MAIG)

(2) Mineral Resources are inclusive of Ore Reserves.

(3) Rounding may generate differences in last decimal place.

(4) Mineral assemblage is reported as a percentage of *in situ* HM content.

(5) Rutile component in Perth Basin South West operations is sold as a leucoxene product.

(6) Rutile is included in Ilmenite for the Atlantic Seaboard region.

(7) It should be noted that the Sri Lanka resource estimates are based on a 100 per cent ownership basis which applies to the exploration stage. The Sri Lankan Exchange Control Act currently limits the percentage holding of a foreign entity in a Sri Lankan mining company to 40 per cent, although approval for up to 100 per cent may be granted.

The Mineral Resource estimates for the Sri Lankan heavy mineral deposits were previously presented in an announcement to the ASX on the 5th of August 2013. Iluka confirms that it is not aware of any new information or data the materially affects the information included in the original announcement and that all material assumptions and technical parameters underpinning the estimates in the announcement continue to apply and have not materially changed. Iluka confirms that the format and context in which the Competent Person’s findings are presented have not been materially modified from the original market announcement.

Rutile Mineral Resources (Sierra Leone)

ILUKA MINERAL RESOURCES FOR SIERRA LEONE RUTILE AND JORC CATEGORY AT 31 DECEMBER 2016

Summary of Mineral Resources[1,2,3] for Iluka					*In situ* Assemblage[4]		
Country	**Region**	**Mineral Resource Category**	**Material Tonnes Millions**	**In Situ Rutile Tonnes Millions**	**Rutile Grade (%)**	**Ilmenite Grade (%)[5]**	**Zircon Grade (%)[5]**
Sierra Leone	Sierra Leone	Measured	60	0.8	1.26	0.12	0.16
		Indicated	538	5.5	1.02	0.14	0.07
		Inferred	122	1.3	1.06	-	0.01
Total	**Sierra Leone**		**719**	**7.5**	**1.04**	**0.11**	**0.07**

Notes:

(1) Competent Persons - Mineral Resources: B Gibson (MIAG)

(2) Mineral Resources are reported inclusive of Ore Reserves.

(3) Rounding may generate differences in last decimal place.

(4) Mineral assemblage is reported as a percentage of in situ material.

(5) Ilmenite and zircon are included for tabulation purposes under the Measured and Indicated resource categories. The confidence in the estimates for Ilmenite and zircon are only considered to be at an Inferred level of confidence and should not be used in the estimation of Ore Reserves.

Mineral Resources are estimated using all available and relevant geological, drill hole and assay data, including mineralogical sampling and test work on mineral and final product qualities. Resource estimates are determined by consideration of geology, heavy mineral (HM) cut-off grades, mineralisation thickness vs. overburden ratios and consideration of the potential mining and extraction methodology and are prepared in accordance with the 2012 JORC Code. These factors may vary significantly between deposits.

Competent Person Statement

The information in this report that relates to Mineral Resources is based on information compiled by Mr Brett Gibson who is a Member of the Australian Institute of Geoscientists. The information in this report that relates to Ore Reserves is based on information compiled by Mr Chris Lee who is a member of the Australasian Institute of Mining and Metallurgy (AUSIMM).

Mr Gibson and Mr Lee are full time employees of Iluka Resources Limited.

Mr Gibson and Mr Lee have sufficient experience that is relevant to the styles of mineralisation and types of deposits under consideration and to the activity which is being undertaken to qualify as a Competent Persons as defined in the ‘Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves’, the JORC Code (2012 Edition). Mr Gibson and Mr Lee consent to the inclusion in this report of the matters based on his information in the form and context in which it appears.

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Summary of information to support the Atlantic Seaboard Mineral Resource Estimates

This update is reported in accordance with the 2012 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves', (JORC Code) and ASX Listing Rules, and provides a summary of information and JORC Code Table 1 commentary to support the Mineral Resource Estimates for the Atlantic Seaboard HM deposits located on the east coast of the United States of America (USA).

The Mineral Resource inventory attributable to the Atlantic Seaboard HM deposits as at the 31 of December 2016 and broken down by resource category is presented below.

Summary of Mineral Resources the Atlantic Seaboard as at 31 December 2016.

Mineral Resource Category[1]	Material Tonnes (Million)[2]	In Situ HM Tonnes (Millions)	HM (%)	Clay (%)	HM Assemblage[3]		
					Ilmenite *(%)	Zircon (%)	Rutile[4] (%)
Measured	59	2.4	4.0	27	65	12	-
Indicated	43	2.4	5.6	38	65	10	-
Inferred	16	0.5	2.9	30	61	11	-
TOTAL	**118**	**5.2**	**4.4**	**31**	**65**	**11**	**-**

Notes:
1 Mineral Resources are reported inclusive of Ore Reserves.
2 Insitu (dry) metric tonnes.
3 The Mineral Assemblage is reported as a percentage of the HM.
4 Rutile is included in Ilmenite for the Atlantic Seaboard.
5 Rounding may generate differences in the last decimal place.
6 The quoted figures are stated as at the 31 December 2016.

1. Background/Introduction

Iluka Resources Limited (Iluka) is the holder of numerous mining leases on the Atlantic Seaboard of the United States of America. The mining leases lie near the western limits of the upper Atlantic Coastal Plain and adjoining Fall Line crossing the North Carolina / Virginia States. The mineralisation is contained within a zone about 10 km wide (east – west) and 100 km in length (north – south).

The mining leases and HM resources are located on private property where access to mine is administered through agreements with individual landholders.

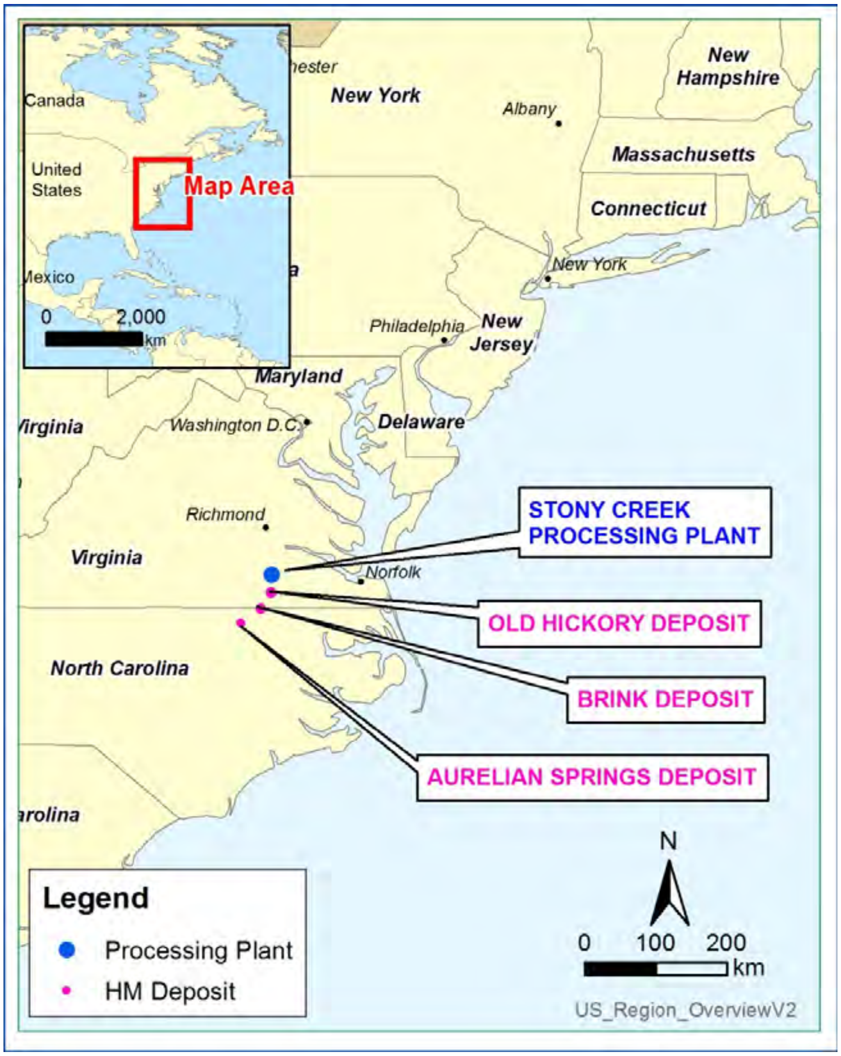


Figure 1.1: Location of Iluka Resources Operations and HM deposits in the Atlantic Seaboard Domain

2. Ownership/Tenure

The ownership of minerals in the USA resides with the land owner. Access for mining is provided by negotiation of a mining agreement with the land holder. The extent of Iluka's mining lease holding in the Atlantic Seaboard is illustrated in Figure 4.1 and Figure 4.2. The mining leases are 100% owned by Iluka, and held through Iluka Resources Ltd.

3. Deposit Geology

The HM deposits which lie along the Atlantic Seaboard are located near the western limits of the upper Atlantic Coastal Plain and adjoining Fall Line, a physiographic boundary between younger Coastal Plain sediments to the east and older Piedmont rocks to the west. The HM deposits located along the Fall line in the US are thought to have been laid down during the Miocene/Pliocene Period. Coastal sediments were deposited at times of elevated sea-level during interglacial periods. Fluvial sedimentary input from the Piedmont was reworked during marine transgressive events and preserved in elevated positions following regression of the Tertiary Seas.

The HM deposits typically represent ancient and fluvio-deltaic and barrier island/beach ridges now comprising deflated layers of silty and clayey sands overlying variably weathered crystalline basement rocks. The deposits contain synchronous and post depositional faulting features which are observed in certain operational areas.

Locally the deposits are contained within lobes of mineralised sediment draped over the saprolite basement. Areas of elevated mineralisation may be up to a 2km in width and 12km in strike length. The mineralised sediments range from a few feet to over 40 feet in thickness. The upper 10 to 15 feet is typically very clayey, recoding slimes levels of 40 to 50%. The underlying material is still quite clayey, averaging 25 to 35% slimes. A stylised stratigraphic representation is given in Figure 3.1.

Significant deflation of the original surface since the time of deposition is apparent and the sediments are heavily incised by the present drainage system.

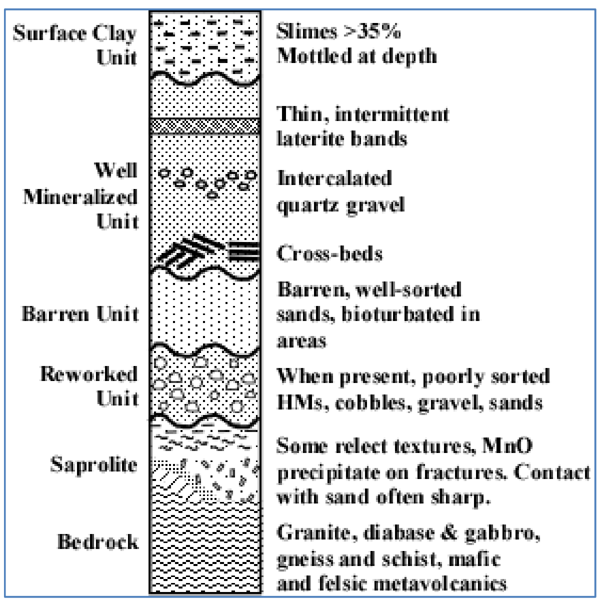


Figure 3.1: Stylised geological cross section column showing interpreted geology for Atlantic Seaboard HM deposits.

4. Data Acquisition

Exploration over the Atlantic Seaboard region commenced in the late 1980s and delineated widespread heavy mineral enrichment on the Atlantic Seaboard coastal plain. The exploration was carried out by Renison Goldfields Consolidated (RGC) which merged with Westralian Sands Limited (WSL) in 1998 to form Iluka Resources Limited. Since the early phases of reconnaissance exploration there have been numerous drilling programs carried out over the most prospective areas.

At Brink, resource auger drilling was completed by Southeast Ti-Sand JV (Consolidated rutile Rutile Limited (RGC) and Becker Minerals) in the late 1980s. Further delineation drilling was completed in the early 1990s by RGC and subsequently in the late 1990s through to 2014 by Iluka resources.

There is no other exploration by other parties relevant to the development or Mineral Resource estimates for the Atlantic Seaboard HM deposits.

4.1 Drilling Summary

Initial exploration drilling and subsequent resource delineation drilling has been carried out by Iluka and predecessor companies predominantly using open flight auger sampling techniques. Approximately 1 to 2kg of sample was collected directly from the auger flights at intervals of 2.5 ft (feet) or 5 ft from surface to the saprolite basement.

Limited NQ diameter Reverse Circulation Air Core (RCAC) holes were also drilled. The RCAC drilling was predominantly done at Old Hickory during the late 1980s and Early 1990s used to obtain a sample from 1 or 1.5 m intervals. The material was presented to a rotary splitter mounted beneath a cyclone which rotates at a regular speed to take a representative one quarter split of 1.5 to 2.5 kg. A check of sample weights is done to ensure the material taken for analysis is within expected limits.

All holes were drilled vertically which is essentially perpendicular to the mineralisation.

The drilling is typically carried out on a regularised grid with the drill spacing closed in to support an increased confidence in the mineral resource estimates as shown in Figures 4.1 and Figure 4.2. The early phases of drilling were typically drilled along local roads at various orientations and density depending on the private land access. Infill drilling to closer spacing of 800/400/200ft x 400/200/100ft was carried out over the areas of significant mineralisation to support feasibility studies and potential mine development as required. A summary of the drilling carried out on each Mineral Resource is presented in Table 4.1.

Table 4.1: Drill statistics and modal drill spacing for each prospect supporting the Atlantic Seaboard HM Resources

Deposit	Holes	Samples	Drill Total ft	X Drill Space ft	Y Drill Space ft	Z Drill Interval ft	Drill Comments
Aurelian Springs	2,470	16,922	19,918.7	200	400	2.5 or 5	Variable spacing from 200'x200' to 400'x800'
Brink	1,973	12,268	12,398.0	200	200	2.5 or 5	Dominant spacing 200'x200' to 400'x800'm some infill to 100'x200'
Old Hickory*	5,784	43,095	46,836.2	200	200	2.5 or 5	Dominant spacing 200'x200' to 400'x800'm some infill to 100'x200'

Notes.

1 Old Hickory includes Hickory Project area.

2 All measures for this table are imperial.

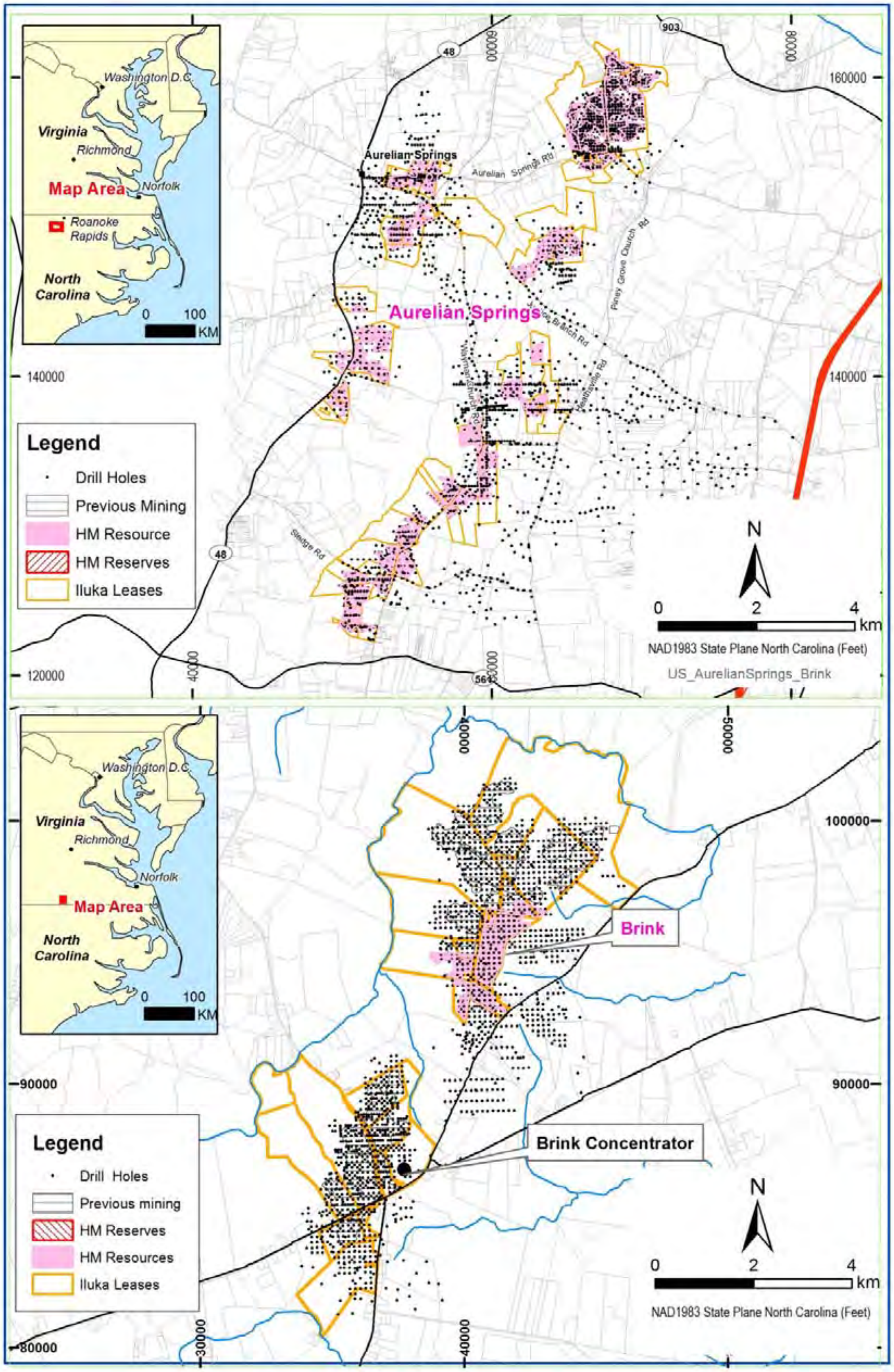


Figure 4.1: Drill hole distribution, Mineral Resources and Mining Lease locations for Aurelian Springs and Brink HM deposit in the Atlantic Seaboard.

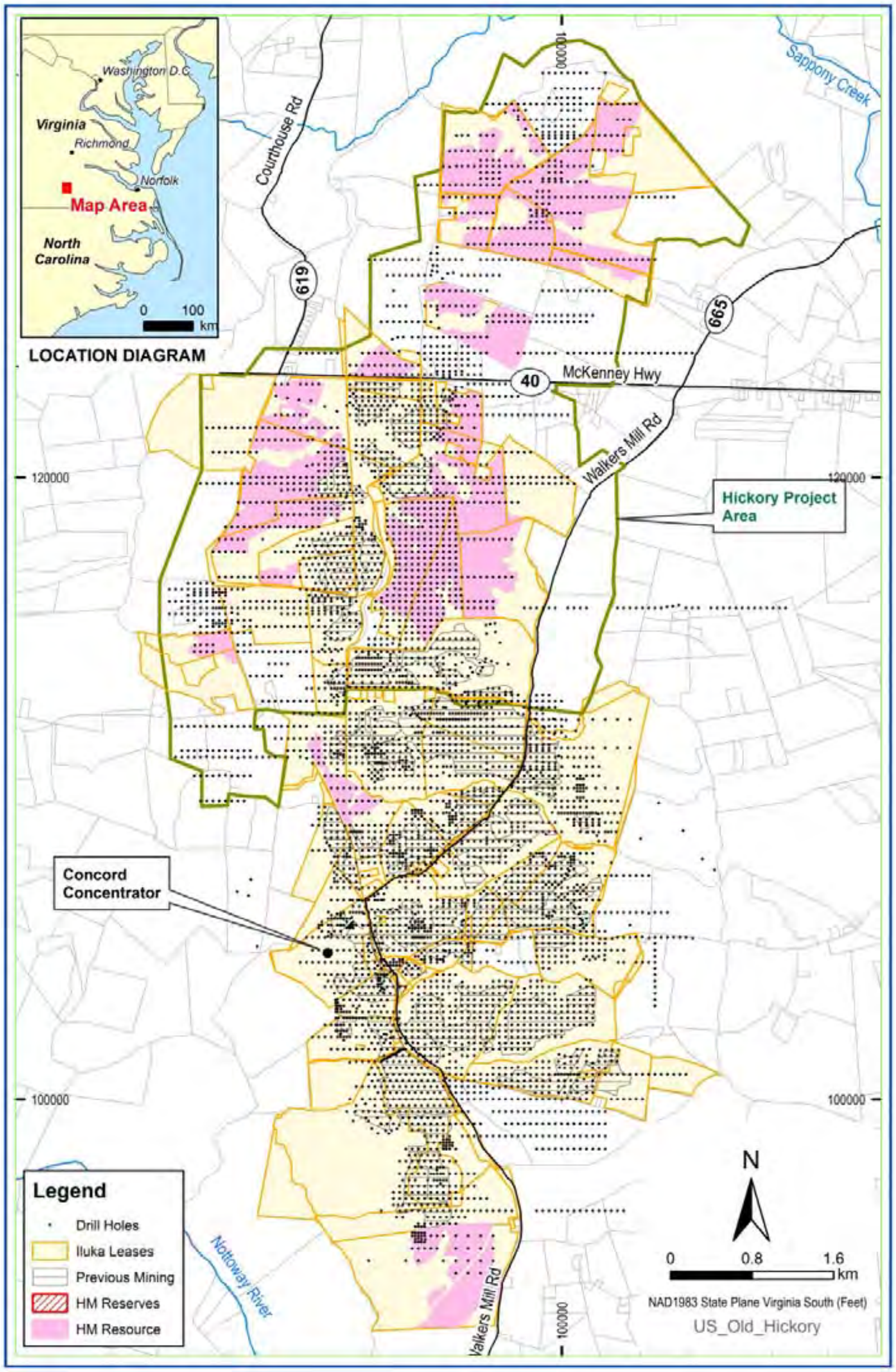


Figure 4.2 Drill hole distribution for the Mineral Resources and Mining Lease locations for the Old Hickory HM deposit in the Atlantic Seaboard.

4.2 Survey

Drill hole locations were holes surveyed in advance by a professional land surveyor using a local coordinate system and datum relative to each deposit. Iluka's drilling to date is based on the North Carolina State Plane system. A local mining system has been developed and all drill collar X/Ys have been converted to this system. The local mining coordinate grid system uses a mathematical shift to derive coordinates that are more intuitive and work better within applications such as Datamine.

The new local coordinates are calculated by subtracting 2,300,000 from the state plane easting and 800,000 from the state plane northing.

Collar elevations were obtained from digital elevation models produced from Light Detection and Ranging (LiDAR) surveys flown by independent contractors. The level of accuracy provided by this survey method is quoted as sub centimetre in the X/Y/Z plane.

Survey datum's for Aurelian Springs HM deposit is a derivative of the North Carolina State Plane North American Datum (NAD) 83 ft. The Brink and Old Hickory HM deposits utilises a derivative of the Virginia State Plane NAD 27 feet.

4.3 Geological Logging

Geological logging has carried out on all Auger / RCAC samples by a qualified geologist or trained geotechnicians. The geological information collected is adequate to support the estimation of Mineral Resources and the JORC Code Classification assigned. All samples were logged on site at the time of drilling. Prior to the year 2000 the majority of geological logs were recorded on paper but later transferred to Excel spreadsheets stored on company servers at Stony Creek. From 2000 the data was entered directly into customised software installed on laptop computers and loaded into MS Excel master files on a weekly basis. The data has since been transferred to an SQL database for longer term secure storage. Logging of Auger / RCAC samples recorded the colour, lithology, dominant grainsize, coarsest grainsize, sorting, induration type, hardness, and an estimate of the percentage of rock, clay and HM. Comments were also recorded in relation to unique features of the sample or if there were sampling issues.

4.4 Sampling and analytical procedures

A quarter split of the sample weighing 1.5 to 2.5 kg was taken from a rotary splitter mounted beneath a cyclone on the RCAC drill rig, an industry standard method for mineral sands exploration. Auger drilling samples were ~1kg in size and were collected directly from the auger flights.

The samples collected were assayed for Heavy Mineral content at Iluka's Stony Creek in Virginia.

Auger and RCAC samples were dried, de-slimed (material <75 μm removed) and then had oversize (material >2mm) removed. A 100 g sub-sample of the 53 to 2000 μm sample was sieved at 710 μm to determine the coarse sand component. The 53-710 μm fraction (Sand) then had a Heavy Mineral (HM) sink performed on it using Tetra-Bromo Ethane (TBE) (SG=2.95 g/cm^3).

The weights recorded during sample analysis were then used to calculate the percentage of slimes, sand, coarse sand, oversize and HM for the entire sample. Backup samples of the oversize and sand fraction plus the separated HM fractions have been retained to allow further analysis.

Composite samples were taken from either the sand residue fractions of exploration samples or HM sink fractions from the HM determinations which also corroborate the validity of the HM mineralisation. The composited samples generate between 0.5 and 2 kg of HM from wet tabling which is then subjected to magnetic separation using an induced roll magnetic separator. The magnetic and non-magnetic fractions then undergo various density separations using thallium malonate solution (TMF) followed by XRF analysis of the fractions to determine the mineral assemblage and mineral quality.

4.5 QA/QC and Data Quality

Prior to 2005, rigorous QA/QC practices were not applied to Atlantic Seaboard HM deposits. After 2005 standard QA/QC practices including the collection of duplicate samples, insertion of blind standards and drilling twinned holes were included as an integral part of the exploration programs. This includes a limited program of Sonic drilling at Old Hickory entailing 6 holes for 206.5 ft.

Assay techniques utilised in the Atlantic Seaboard are appropriate for the style of mineralisation and are supported by reconciliation from mining of deposits delineated using the same or very similar techniques. The mineralogical composite sample evaluation processes are appropriate for the current level of study and applied resource classifications. A summary of the QA/QC submission rates is included in Table 4.3.

Table 4.3: Field standard and duplicate QA/QC summary for the Atlantic Seaboard HM Deposits.

Deposit	% insertion rate	% of data with QA/QC	QA/QC Comments
Aurelian Springs	5	60	no QA/QC prior to 2004.
Brink	5	30	no QA/QC prior to 2004.
Old Hickory*	5	47	no QA/QC prior to 2004.

* Old Hickory includes Hickory Project area

4.6 Verification of Sampling and Assaying

The data was scrutinised prior to use in the estimation of mineral resources. The checks included:

- ensuring analytes summed to 100% within rounding errors;
- there were no duplicated or missing intervals; and
- the data was in spatially valid locations.

It is the opinion of the Competent Person that the data used in the estimation of Mineral Resources for the Atlantic Seaboard is suitable for this purpose.

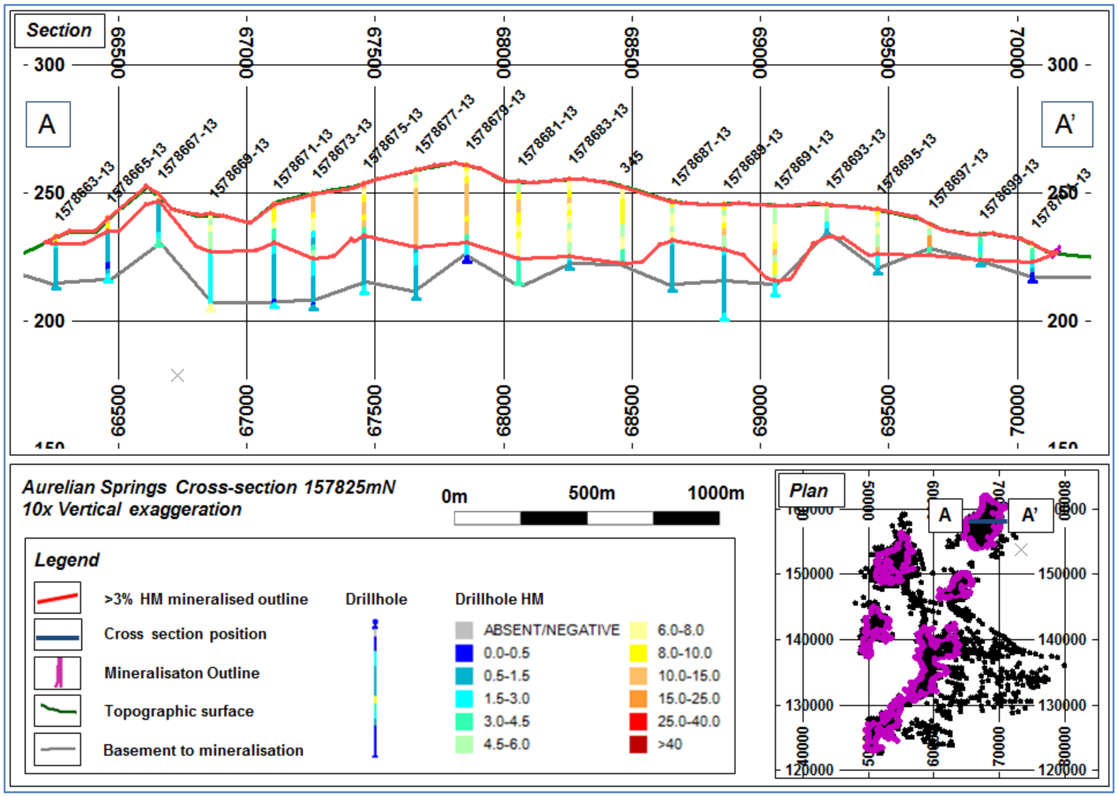


Figure 4.3: Cross-section through the Aurelian Springs Deposit.

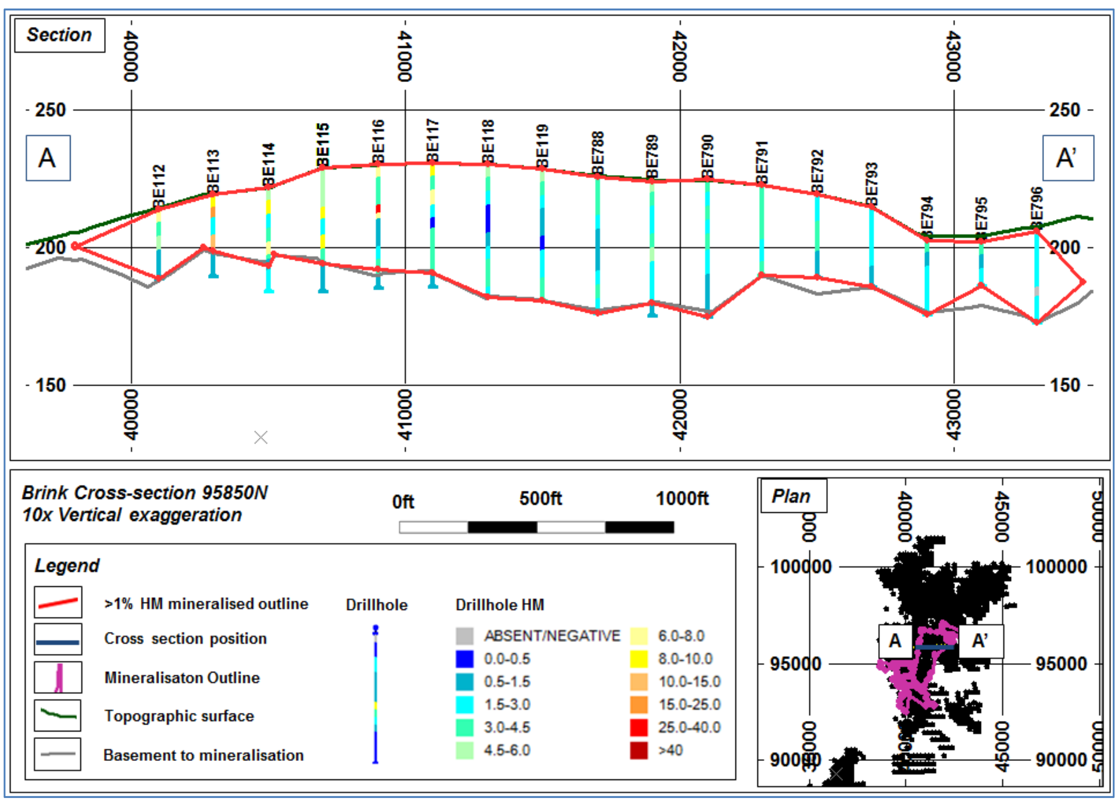


Figure 4.4: Cross-section through the Brink Deposit.

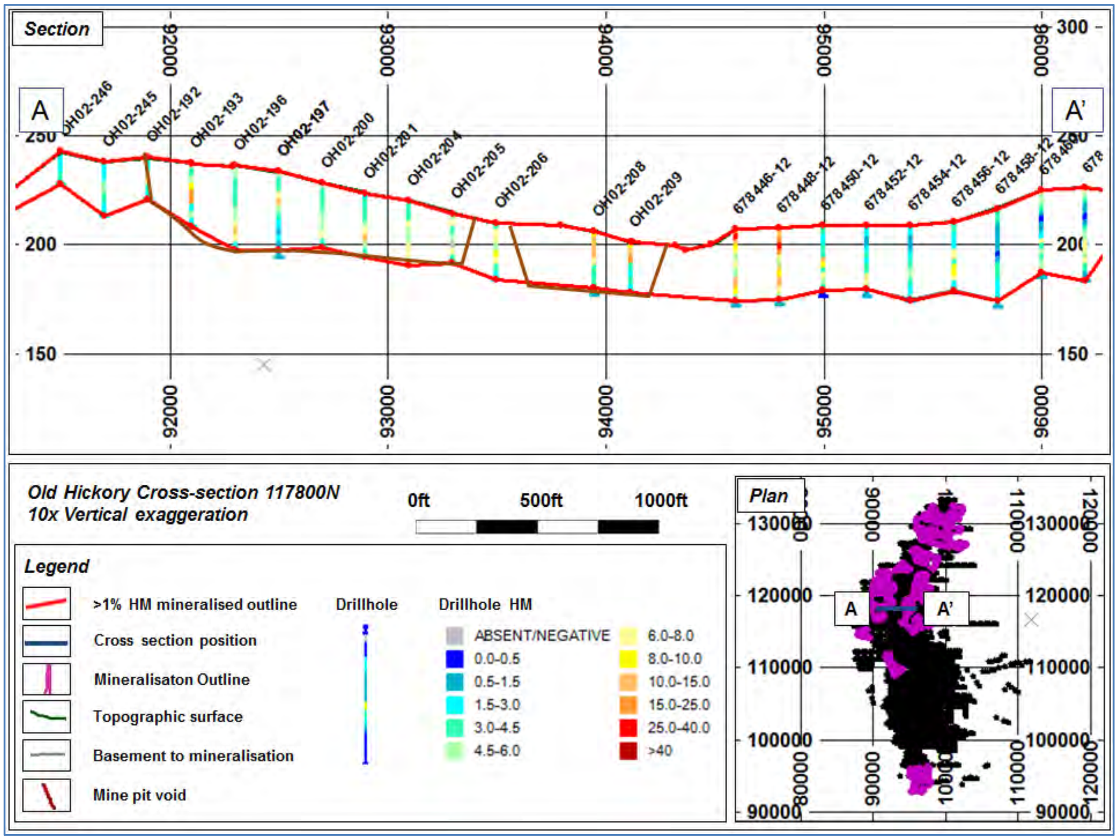


Figure 4.5: Cross-section through the Old Hickory Deposit which has been partly mined.

4.7 Physical parameters

The density used in the estimation of the mineral resource tonnages for the Atlantic Seaboard HM Deposits is based on an Iluka Virginia standard bulk density formula. The formula is based on research done on various HM deposits being mined by Iluka in Western Australia. The formula is considered valid as it takes into account the sand, HM and clay components and it allows for potential “filling” of void space within the sand by the fine clay content. All tonnages are expressed on a dry tonnage basis.

5. Resource Estimation

Resource models have been prepared for the Atlantic Seaboard HM deposits using Datamine Studio™ mining software. Geological interpretations used to constrain the modelling were prepared by geologists employed by Iluka. The resource estimate was derived from a 3 dimensional block model constructed using geological and mineralogical domain constraints as per Iluka internal guidelines. Domains are assigned to the model based on geological interpretations and the assay dataset is correspondingly flagged The assay values were interpolated using Inverse Distance Cubed (ID3) and hardness, sample composite identifiers and mineral quality were interpolated using Nearest Neighbour (NN), which are considered to be industry standard block estimation methods.

Each deposit was assessed in terms of statistical analysis and drill data distribution to apply appropriate interpolation parameters. Traditionally Iluka adopts a block dimension of about a half of the prevailing drill hole spacing in the X and Y direction (horizontal plane) in combination with anisotropic data search volumes about twice the prevailing drill hole spacing. These are adjusted as necessary to honour the individual characteristics of each deposit. In addition algorithms are used to dynamically orientate the optimum search to honour the variation in geological and grade orientation. Sub-celling is used along domain boundaries to ensure appropriate volume representation.

The bulk density for the resource was estimated using the Iluka standard bulk density formula based on operational experience gained from mining this style of mineralisation.

Table 5.1; Summary of the model structure for the Atlantic Seaboard HM deposits.

	Cell Dimensions		
Deposit	East	North	RL
Aurelian Springs	100	200	2.5
Brink	100	100	2.5
Old Hickory	100	100	2.5

Notes.
1 Old Hickory includes Hickory Project area.
2. All distance values in this table are in imperial measurements.

Table 5.2; Summary of the assay attribute interpolation parameters for the Atlantic Seaboard HM deposits.

	Interpolation	Search Ellipse Radius			Search	Search
Deposit	Method	X	Y	Z	Factor 2	Factor 3
Aurelian Springs	ID3	400	600	5	3	5
Brink	ID3	400	600	5	3	5
Old Hickory	ID3	400	600	5	3	5

Notes.
1 Old Hickory includes Hickory Project area.
2. All distance values in this table are in imperial measurements.

Table 5.3; Summary of the Composite data interpolation parameters for the Atlantic Seaboard HM deposits.

	Interpolation	Search Ellipse Radius			Search	Search
Deposit	Method	X	Y	Z	Factor 2	Factor 3
Aurelian Springs	NN	400	600	5	3	5
Brink	NN	400	600	5	3	8
Old Hickory	NN	400	600	3	3	8

Notes.
1 Old Hickory includes Hickory Project area.
2. All distance values in this table are in imperial measurements.

The block models are validated by:

- visually comparing the block model grade attributes against the input grades;
- comparing statistics of the grade attributes for the block model to the input data; and
- comparing the result of a NN grade interpolation to the ID3 interpolation.

6. Mineral Resource Statement

6.1 Resource classification

The Mineral Resource estimate has been classified and reported into the Measured, Indicated and Inferred categories by the Competent Persons in accordance with the guidelines set out in the Australasian Code for the Reporting of Exploration Results, Mineral Resources and Ore Reserves (JORC Code, 2012 Edition.) The resource classification assigned is based on a combination of:

- data provenance and availability;
- drill hole spacing and sampling density;
- level of supporting composite data;
- confidence in analytical data; and
- established geological continuity.

In addition, the potential for eventual economic extraction is taken into consideration when determining Mineral Resources that are valid for reporting under the JORC Code (2012). Factors taken into consideration which allude to the potential for economic extraction include:

- only reporting mineralisation within valid Mining Leases;
- excluding areas that are unlikely to be accessible for mining (e.g. wetlands, roads, infrastructure);
- using a lower HM cut-off grade that is considered to be close to an economic cut-off, taking into consideration the composition of the mineral assemblage and mineral quality attributes; and
- taking into consideration the style of mineralisation and likely mining methods.

As such the lower HM cut-off grade varies from 1% to 3% HM.

The Atlantic Seaboard HM deposits comprise large volume, moderate HM grade sedimentary accumulations with mineralisation presenting to surface. As such, mining is likely to involve large scale earth moving methods like truck and shovel, scraper or dozer trap in an open pit environment.

6.2 Mineral Resources declared for Atlantic Seaboard

A summary of the Mineral Resource estimates for the Atlantic Seaboard HM Deposits is presented in Table 6.1.

6.3 Discussion of relative accuracy

The relative accuracy and therefore confidence of the resource estimate is reflected in the consideration of the underlying influencing factors detailed in Section 6.1 and are also taken into consideration and reflected in the JORC Code classification awarded to the resource estimates by the Competent Person.

Table 6.1: Summary of Mineral Resources for the Atlantic Seaboard as at 31st December 2016.

ATLANTIC SEABOARD MINERAL RESOURCE BREAKDOWN BY DISTRICT, DEPOSIT AND JORC CATEGORY AT 31 DECEMBER 2016										
Summary of Mineral Resources for Atlantic Seaboard				**2016**	**2016**		**HM Assemblage(2,3)**			
District	**Deposit**	**Mineral Resource Category(1)**	**Material Tonnes kt**	**InSitu HMTonnes kt**	**HM Grade (%)**	**Clay Grade (%)**	**Ilmenite Grade (%)**	**Zircon Grade (%)**	**Rutile Grade (%)**	
North Carolina	Aurelian Springs	Measured	12,996	1,020	7.8	33.7	70.1	7.0	-	
		Indicated	24,794	1,826	7.4	38.6	66.7	8.3	-	
		Inferred	3,576	233	6.5	35.2	61.7	6.6	-	
Virginia	Brink	Measured	6,859	227	3.3	29.5	67.9	14.5	-	
Virginia	Old Hickory	Measured	38,750	1,112	2.9	24.5	59.6	16.8	-	
		Indicated	18,434	589	3.2	36.3	59.3	16.5	-	
		Inferred	12,653	235	1.9	27.9	60.4	15.3	-	
	Measured Total		**58,605**	**2,359**	**4.0**	**27.1**	**65.0**	**12.3**	**-**	
	Indicated Total		**43,228**	**2,415**	**5.6**	**37.6**	**64.9**	**10.3**		
	Inferred Total		**16,229**	**468**	**2.9**	**29.5**	**61.1**	**11.0**	**-**	
	Grand Total		**118,062**	**5,242**	**4.4**	**31.3**	**64.6**	**11.3**	**-**	

Notes
1 Mineral Resources are inclusive of Ore reserves.
2 The Mineral assemblage is reported as a percentage of the in HM assemblage.
3 Rutile is included in Ilmenite for the Atlantic Seaboard.
4 All tonnages are dry in situ metric tonnage.
5 Rounding may result in differences in the last decimal place.
6 All figures are stated as at the 31st of December 2016.

7. Independent Review

The block models used for resource estimation are reviewed internally as per Iluka company policy. At the time of reporting, no external reviews of the Atlantic Seaboard Mineral Resource estimates have been undertaken.

8. Further Work

No further exploration has been planned for the Atlantic Seaboard HM deposits at this time.

Atlantic Seaboard HM Deposits - JORC Code 2012 edition. - Table 1 Commentary

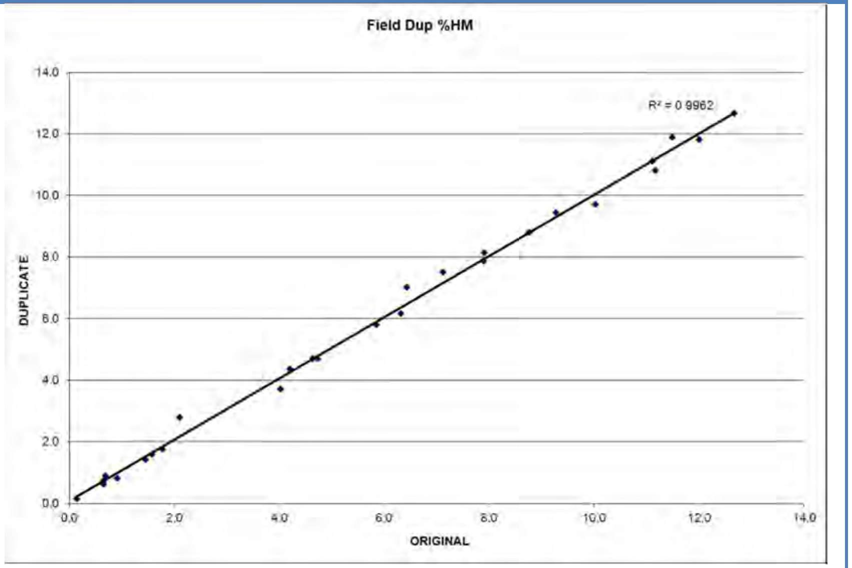
Section 1 Sampling Techniques and Data

(Criteria in this section apply to all succeeding sections.)

Criteria	JORC Code explanation	Commentary
Sampling techniques	*Nature and quality of sampling (e.g. cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc.). These examples should not be taken as limiting the broad meaning of sampling.* *Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.* *Aspects of the determination of mineralisation that are Material to the Public Report.* *In cases where 'industry standard' work has been done this would be relatively simple (e.g. 'reverse circulation drilling was used to obtain 1 m samples from which 3 kg was pulverised to produce a 30 g charge for fire assay'). In other cases more explanation may be required, such as where there is coarse gold that has inherent sampling problems. Unusual commodities or mineralisation types (eg submarine nodules) may warrant disclosure of detailed information.*	The Atlantic Seaboard HM deposits have been sampled with Auger (AU) and reverse circulation/aircore (RCAC) drilling to obtain 2.5 or 5 foot samples (1-3 kg). A total of 10,227 holes were drilled for a total of 251,819.4 ft (79,993 m) on the three HM deposits (Aurelian Springs, Brink and Hickory). All holes were drilled vertically which is essentially perpendicular to the mineralization. Initial field reconnaissance drilling was completed in the late 1980s into the early 1990s. Resource delineation drilling programs were completed in various stages through until 2014 using auger and RCAC methods. A total of 72,193 samples were collected from the drilling for assaying. From the RCAC drilling samples approximately 1-3 kg was collected using a rotary splitter. The sample was dried, de-slimed (material <75µm removed) and then had oversize (material >2mm) removed. About 100 g of the sample was subjected to float/ sink analysis using Tetra-Bromo Ethane (TBE) with a Specific Gravity (SG) of 2.95 g/cm^3. The resulting HM concentrate was then dried and weighed. HM concentrates from similar geological domains were grouped together to form composite samples for more detailed analysis. More recent auger samples comprise about 1kg of sample which is lifted in equal quantities from the auger flights. Currently, samples are de-slimed using a 53 µm screen although a 75 µm screen was used prior to 2001. These composites then underwent a magnetic separation using an induced roll magnetic separator setup. The magnetic and non-magnetic fractions (that come out of the magnetic separator) are then subjected to various SG separations using thallium malonate solution (TMF). This separation identifies the mineralogical assemblage of the HM. The magnetic and non-magnetic fractions are analysed by XRF from which the mineralogy is determined using stoichiometric calculations.

Criteria	JORC Code explanation	Commentary
Drilling techniques	*Drill type (eg core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc) and details (eg core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc).*	Drilling on the Atlantic Seaboard HM deposits utilised both RCAC and Auger drilling methods. Auger drilling was conducted by the "dead stick pull" method whereby small-diameter (6.5 cm) augers are advanced into ground at the same rate as rotation. The augers were then pulled from the ground and samples were collected directly from the auger flights. All holes were drilled vertically.
Drill sample recovery	*Method of recording and assessing core and chip sample recoveries and results assessed.*	For auger samples, recovery was not recorded or assessed, all samples were logged at the time of the drilling and variance from expected sample quality is recorded in comments against the relevant sample.
	Measures taken to maximise sample recovery and ensure representative nature of the samples.	The driller and geologist observed auger advance vs. rotation to minimize/eliminate sample run-up. If sample integrity was compromised, samples were discarded and a new hole was drilled. RCAC samples were visually checked for recovery, moisture and contamination at the time of collection, a consistent rate of penetration was maintained.
	Whether a relationship exists between sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.	The auger drilling method was shown to understate the amount of material greater than 2 mm (oversize). It is not known to what degree this affects the overall Mineral Resource, however, oversize only constitutes a small portion of the resource (2% or less) and it is the opinion of the Competent Person that the impact of this bias on the overall Mineral Resource was insignificant.
Logging	*Whether core and chip samples have been geologically and geotechnically logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and metallurgical studies.*	Geological logging was carried out on all AU/RCAC samples by qualified geologist or trained geotechnicians. The geological information collected is adequate to support the mineral resource estimation and the JORC Code Classification assigned. All samples were panned and estimates made for the percentage of HM and slime.
	Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc) photography.	Logging was both qualitative (hardness, colour, lithology) and quantitative (estimation of percentage of HM and slime) to help support the integrity of the Mineral Resource estimate. Photographs were not typically taken of the auger cores.
	The total length and percentage of the relevant intersections logged.	The total length of the drill holes is logged.
Sub-sampling techniques and sample	*If core, whether cut or sawn and whether quarter, half or all core taken.*	No coring has been done on the Atlantic Seaboard HM deposits, with the exception of some Sonic method drilling at Old Hickory. The slime levels

Criteria	JORC Code explanation	Commentary
preparation	*If non-core, whether riffled, tube sampled, rotary split, etc and whether sampled wet or dry.*	returned for the Sonic core samples was significantly lower. This was attributed to a slurrying effect leading to slimes loss on the samples generated from the Sonic coring.
	For all sample types, the nature, quality and appropriateness of the sample preparation technique.	No sample splitting or sub-sampling was necessary with auger samples due their small (~1 kg) size. For the RCAC samples, a rotary splitter on the rig were used to collect a 25% split of the original sample. Typically samples were presented for sampling dry or wet. Water injection was used to clean the drill stem and splitting equipment to limit any potential contamination.
	Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.	Samples were collected in whole from the auger flights directly to the pre-labelled/pre-tagged sample bags; 100% of the sample was collected. Sample preparation is consistent with industry standard techniques and is deemed to be appropriate for Heavy Mineral determination. Field duplicates were collected at a 5% rate by splitting the sample from the auger into two samples bags. Sample splitting was performed by splitting the auger down the middle with one side going to one split and the remainder into the duplicate split.
	Measures taken to ensure that the sampling is representative of the in situ material collected, including for instance results for field duplicate/second-half sampling. *Whether sample sizes are appropriate to the grain size of the material being sampled.*	Auger based drilling was twinned by Sonic drilling at Aurelian Springs to examine the representativeness of the method with respect to mineralisation and geological boundaries as well as any potential sample bias. The outcome from this study indicated that the auger drilling and sampling method used provides representative samples for the key parameters (HM% and slimes%) but has a low level bias in Oversize (OS). The OS content is generally low and as a result is subject to low precision at the levels within the Atlantic Seaboard HM Deposits. An example of the duplicate results for the HM assays of field duplicate sampling is presented below.

Criteria	JORC Code explanation	Commentary
		 A sample size (1-3 kg) was deemed to be appropriate for the grain size of the material hosting the HM mineralisation. The sampling methodology is considered consistent with industry standard practice and the sample size is considered appropriate in accordance with Gy's sampling theory.
Quality of assay data and laboratory tests	*The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.* *For geophysical tools, spectrometers, handheld XRF instruments, etc, the parameters used in determining the analysis including instrument make and model, reading times, calibrations factors applied and their derivation, etc.* *Nature of quality control procedures adopted (eg standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (ie lack of bias) and precision have been established.*	Industry standard analysis methods are used that are appropriate for the determination of HM. The analytical technique is considered total although the process does not involve any form of material digestion. No geophysical testing was undertaken for exploration purposes and was not used in the assessment of HM mineralisation. For auger / RCAC drilling completed after 2005 QAQC sample insertion rates were ~5%. The percentage of resource data that has associated QAQC for the Atlantic Seaboard HM deposits ranges from 30% to 60%. Acceptable levels of accuracy and precision were demonstrated by the QA/QC data sets. Some laboratory procedural issues were indicated by

Criteria	JORC Code explanation	Commentary
		the QA/QC data which have been rectified. It is the opinion of the Competent Person that the impact of these issues on the overall Mineral Resource estimate is not significant and the data is suitable for supporting the Mineral Resource estimates.
Verification of sampling and assaying	*The verification of significant intersections by either independent or alternative company personnel.*	Significant mineral intersections have been verified by alternative Iluka personnel deemed Competent Persons within Exploration or Mineral Resource estimation.
	The use of twinned holes.	Only limited twinned drilling was undertaken. Analysis of the twin data indicated some variability over short distances but in general the total metal content is equivalent for the twinned dataset.
	Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.	Data was collected in the field using both a field computer and a field notebook. Data was transferred weekly to the company network and verified against the field log book. The data from the weekly files was then added to master files hosted in MS Excel. The data was again checked and verified by the geologist completing the Mineral Resource estimation. Laboratory assay results were verified against the field geologist's visual HM% and SL% estimates. Samples showing disparity and unable to be rectified were removed from the dataset used in the estimation of the Mineral Resource.
	Discuss any adjustment to assay data.	A limited amount of erroneous data was removed based on slimes values that appeared to be out of the normal range for the sediments present and were likely due to errors in laboratory procedure. This has affected < 1% of the sample population and will not have any material impact on the resource estimates.
Location of data points	*Accuracy and quality of surveys used to locate drill holes (collar and down-hole surveys), trenches, mine workings and other locations used in Mineral Resource estimation.*	All drill holes were surveyed by a professional land surveyor using the designated coordinate system and datum. In all cases contemporary survey equipment was used providing accuracy of +/-1 ft in the X/Y/Z. In addition the collar locations were compared to aerial LiDAR surveys which were used to provide detailed topographic information.
	Specification of the grid system used.	The grid system used is a derivative of Virginia State Plane NAD 27 ft, or North Carolina State Plane NAD 83 ft. .
	Quality and adequacy of topographic control.	Topographic control points were placed at an adequate rate to support

Criteria	JORC Code explanation	Commentary
		high-quality collar elevation and X/Y surveys. Survey data was sub-centimetre accuracy for X/Y/Z. LiDAR surveys provided detailed topographic control for the mineral resource estimation, particularly between surveyed collar points. The drill collar points were adjusted to detailed LiDAR topography surfaces which placed the holes in valid RL positions relative to each other and the surficial landform.
Data spacing and distribution	*Data spacing for reporting of Exploration Results.* *Whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied.* *Whether sample compositing has been applied.*	The dominant drill pattern for the HM deposits varies from 200 ft(east-west) x 200 m (north-south) to 400 ft (eat-west) x 800 ft (north-south). In some cases infill drilling to 100 ft x 2000m was completed. Drill samples were collected at regular intervals (2.5 ft, some historic samples were at 6 ft intervals). While drill spacing varies across the orebody, it supports the Mineral Resource and Ore Reserve classifications applied. Compositing of samples downhole and across/along strike was utilized for assemblage and quality parameters.
Orientation of data in relation to geological structure	*Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.* *If the relationship between the drilling orientation and the orientation of key mineralised structures is considered to have introduced a sampling bias, this should be assessed and reported if material.*	The drilling and sampling were orientated to minimize bias introduced into the resource estimate and are designed to represent the style of mineralization present (Fall Zone mineral sands deposit). Drill lines are orientated east/west across the overall strike of the mineralization, which for Old Hickory is variable but trends north/south. Holes are drilled vertically to give a true thickness of the mineralization.
Sample security	*The measures taken to ensure sample security.*	Samples remained in the custody of the field geologist/drill crew from time of collection until time of delivery to the lab. Samples were stored in secure compounds at the laboratory before and after analysis.
Audits or reviews	*The results of any audits or reviews of sampling techniques and data.*	No external reviews were conducted of the auger sampling techniques. Internal verification through twinned hole sampling using alternative methods was performed as well as internal reviews by persons considered to have expertise in drilling/sampling. Industry standard methods are used and the exploration data collected in this manner has reliably supported Iluka's mining operations for several decades.

Section 2 Reporting of Exploration Results

(Criteria listed in the preceding section also apply to this section.)

Criteria	JORC Code explanation	Commentary
Mineral tenement and land tenure status	*Type, reference name/number, location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environmental settings.* *The security of the tenure held at the time of reporting along with any known impediments to obtaining a licence to operate in the area.*	All areas reported are held under mining lease with mineral rights residing with the owner. Negotiations were ongoing to secure other parcels within the deposit, primarily within the Hickory Project area. At Brink negotiations were ongoing to secure other parcels within the deposit. There are no known impediments to obtaining a license to operate. License to operate is based on obtaining land access through mining leases with individual landowners as well acquiring local, state, and federal permits. These are already in-place for the operational areas of the deposit.
Exploration done by other parties	*Acknowledgment and appraisal of exploration by other parties.*	The data used for this estimate were collected by RGC from 1989 through the late 1990s as well as by Iluka from the early 2000s to 2016. No exploration from any other companies has been used in the preparation of the Mineral Resource estimates for the Atlantic Seaboard.
Geology	*Deposit type, geological setting and style of mineralisation.*	The HM deposits are hosted in Miocene/Pliocene Fall aged sediments consisting of fluvial-deltaic deposits of re-worked sands, silts, and clays. The deposits typically unconformably overlay a basement of weathered meta-volcanic saprolite. The deposits contain syngenetic and post-depositional faulting that has been observed in some of the open mine pits within the operational areas.
Drill hole Information	*A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all Material drill holes:* *easting and northing of the drill hole collar* *elevation or RL (Reduced Level – elevation above sea level in metres) of the drill hole collar* *dip and azimuth of the hole* *down hole length and interception depth* *hole length.*	The HM resource dataset comprises in excess of 250,000 ft of auger / RCAC drilling and results for more than 70,000 samples. Due to the large number of drill holes it is impractical to list all the mineralised intercepts and this information is deemed to be largely superseded by the presentation of the Mineral Resource estimate. Plans showing the drill hole distribution and typical cross sections are presented in the preceding text in support of the mineral resource estimates. All holes were drilled vertically and range in depth from 2.5 ft to over 40 ft, averaging 25 ft. Plans showing the drill hole locations in relation to the mineralisation and typical cross sections through the Atlantic Seaboard are presented in the accompanying text.

Criteria	JORC Code explanation	Commentary
	If the exclusion of this information is justified on the basis that the information is not Material and this exclusion does not detract from the understanding of the report, the Competent Person should clearly explain why this is the case.	
Data aggregation methods	*In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (eg cutting of high grades) and cut-off grades are usually Material and should be stated.* *Where aggregate intercepts incorporate short lengths of high grade results and longer lengths of low grade results, the procedure used for such aggregation should be stated and some typical examples of such aggregations should be shown in detail.* *The assumptions used for any reporting of metal equivalent values should be clearly stated.*	No top-cuts were applied to the assay data for the Atlantic Seaboard and is not typically done for the estimation of HM. A nominal 1 per cent HM lower cut-off was used for reporting the Old Hickory and Brink Mineral Resources while a 3% lower HM cut-off was used for Aurelian Springs. No data aggregation was done for the Atlantic Seaboard HM Deposits. No metal equivalent values are used in this report.
Relationship between mineralisation widths and intercept lengths	*These relationships are particularly important in the reporting of Exploration Results.* *If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported.* *If it is not known and only the down hole lengths are reported, there should be a clear statement to this effect (e.g. 'down hole length, true width not known').*	The geology, geometry and mineralisation of this style of deposit is well understood. All exploration drill holes were drilled vertically which is perpendicular to the mineralisation. As such all down-hole intersections represent the true width (thickness) of the mineralisation.
Diagrams	*Appropriate maps and sections (with scales) and tabulations of intercepts should be included for any significant discovery being reported These should include, but not be limited to a plan view of drill hole collar locations and appropriate sectional views.*	Representative plans and cross sections depicting the location of the drill holes in relation to the mineralisation and licences are presented in the attached text.
Balanced reporting	*Where comprehensive reporting of all Exploration Results is not practicable, representative reporting of both low and high grades and/or widths should be practiced to avoid misleading reporting of Exploration Results.*	This is not considered applicable as the resource estimation process considers all data values.
Other substantive exploration	*Other exploration data, if meaningful and material, should be reported including (but not limited to): geological observations; geophysical survey results; geochemical survey results; bulk samples – size and*	Logging of the samples includes visually estimating the HM present, the results of which corroborate the presence of HM mineralization. Composite samples were taken either from the sand fraction residue of

Criteria	JORC Code explanation	Commentary
data	*method of treatment; metallurgical test results; bulk density, groundwater, geotechnical and rock characteristics; potential deleterious or contaminating substances.*	exploration samples or the HM sink fractions from the HM determinations. These corroborate the validity of the HM mineralisation. The composited samples generate between approximately 0.1 and 2 kg of HM which is then subjected to a process of magnetic, electrostatic and heavy liquid separation followed with XRF (X-ray Fluorescence) analysis of the fractions to determine the mineral assemblage and mineral quality. The bulk density applied is the Iluka standard bulk density formula applied to all resource models in the Atlantic Seaboard. The calculation of the density takes into account the weight percentage of HM, sand and slimes. The formula used accounts for the ratio of HM and Quartz present in a sample and the weight percentage of clay which can be added to that sample without changing the volume that sample occupies to allow for variable void space replacement.
Further work	*The nature and scale of planned further work (eg tests for lateral extensions or depth extensions or large-scale step-out drilling).* *Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.*	No further resource drilling is required at this stage for the Atlantic Seaboard HM deposits. Further drilling will be conducted in a timely manner to improve the confidence in these Mineral Resources and support development as required.

Section 3 Estimation and Reporting of Mineral Resources

(Criteria listed in section 1, and where relevant in section 2, also apply to this section.)

Criteria	JORC Code explanation	Commentary
Database integrity	*Measures taken to ensure that data has not been corrupted by, for example, transcription or keying errors, between its initial collection and its use for Mineral Resource estimation purposes.* *Data validation procedures used.*	Data collected during initial programs in late 1980s and early 1990s involved detailed paper drill logs. It is assumed that this data was transferred at some point in the 1990s to a Microsoft Excel spreadsheet. The data collected since 2004 was entered in the field directly into a Panasonic Toughbook (or similar) laptop computers and then subsequently transferred to the project's database in Excel; all data for the project is currently stored in this Excel database. A comparison of data records in historical files and datasets corroborates the current data. Assay data post-2004 was also captured and entered into Iluka's CCLAS laboratory database at the time of analysis. The results were then transferred to the project Excel database. The historical drill data was compared to the drill data in the current Iluka database. Drill data used for resource estimation was reviewed to ensure: • there were no duplicate records or missing intervals; • the sum of the analytes added to 100% or within rounding limits; • results were within valid ranges; and • the data was in spatially valid locations.
Site visits	*Comment on any site visits undertaken by the Competent Person and the outcome of those visits.* *If no site visits have been undertaken indicate why this is the case.*	Several Competent Persons employed by Iluka Resources have been based in the Atlantic Seaboard Region or visited the location of the mineral deposits. The Mineral Resource estimates for the Atlantic Seaboard were compiled by an Iluka employed Competent Person (Adam Karst) who acted as the Senior Mine Geologist for seven years at the Concord and Old Hickory operations. He is familiar with the deposit geology and site conditions.
Geological interpretation	*Confidence in (or conversely, the uncertainty of) the geological interpretation of the mineral deposit.* *Nature of the data used and of any assumptions made.*	The geological interpretation is appropriate for the amount and distribution of the drill data available. The geological style of mineralisation is generally regarded as being predictable and is well understood from over 30 years of exploration and mining. Geological interpretations were improved over a period of time as multiple

Criteria	JORC Code explanation	Commentary
	The effect, if any, of alternative interpretations on Mineral Resource estimation. *The use of geology in guiding and controlling Mineral Resource estimation.The factors affecting continuity both of grade and geology.*	generations of exploration has been carried out, but remain largely consistent. No other interpretations have been considered as the geology and style of mineralisation are well understood. Appropriate geological domaining and corresponding flagging of drill data has been used to control grade interpolation during Resource Estimation. Grade continuity may be affected by the undulating nature of the saprolite basement in some areas that have not had substantial in-fill drilling carried out. This is very limited in terms of the overall deposit.
Dimensions	*The extent and variability of the Mineral Resource expressed as length (along strike or otherwise), plan width, and depth below surface to the upper and lower limits of the Mineral Resource.*	The Atlantic Seaboard HM deposits cover an area ranging from 6 to 11km (north-south) x 3km (east-west). The average thickness is 16 ft (5 m) and the depth to mineralisation varies from less than 1 ft (0.3 m) to 54 ft (17 m). The HM deposits are commonly dissected by the current drainage.
Estimation and modelling techniques	*The nature and appropriateness of the estimation technique(s) applied and key assumptions, including treatment of extreme grade values, domaining, interpolation parameters and maximum distance of extrapolation from data points. If a computer assisted estimation method was chosen include a description of computer software and parameters used.*	The grade interpolation was carried out using the Estima Superprocess within Datamine Studio software. Grade estimation was completed using Inverse Distance Cubed (ID3) which is an Iluka standard and is deemed appropriate for this style of mineralisation. Mineralogical sample composite identifier, composite data and, hardness were interpolated using Nearest Neighbour (NN) method. Drill hole sample data was flagged with domain codes corresponding to the geology of the deposit and the domains imprinted on the block model based on 3-dimensional surfaces generated from geological and mineralisation interpretations. Primary search dimensions used were selected relevant to the style of mineralisation and the drill density. A summary of search parameters used in the resource models for the Atlantic Seaboard is presented in the accompanying text. A primary search dimension of 400*600*5 ft (X*Y*Z) was used for all assay data. Successive search volume factors of 3 and 5 were adopted to interpolate grade in areas of lower data density. Factoring the search ellipse dimensions by multiples of 2 to 7 was done to facilitate grade interpolation if the criteria set for the primary search failed. The Octant search option was used with a minimum of 1 and a maximum

Criteria	JORC Code explanation	Commentary
		of 4 samples per octant and a minimum of 2 octants being estimated to calculate the grade for a block. If insufficient data was found within the first search, secondary and tertiary searches were used based on the search volume factors. In addition a maximum of 2 samples were used from any particular drill hole
	The availability of check estimates, previous estimates and/or mine production records and whether the Mineral Resource estimate takes appropriate account of such data.	For resource estimation carried out after 2005 comparisons were made with the previous estimates to identify areas where discrepancies occurred and whether they were due to additional drilling or changes in the interpretation or modelling methodology. Comparison estimates were undertaken using the Nearest Neighbour interpolation for each deposit which correlated well, with near identical global estimates produced.
	The assumptions made regarding recovery of by-products.	No by-products have been considered as part of this estimate.
	Estimation of deleterious elements or other non-grade variables of economic significance (eg sulphur for acid mine drainage characterisation).	No deleterious elements have been identified or included in the resource estimation process. Mineral quality attributes from the analysis of the composite samples were added to the model to assist in determining mineral saleability.
	In the case of block model interpolation, the block size in relation to the average sample spacing and the search employed.	A parent cell size of 100*100*2.5 ft was used with 2*2 (X*Y) cell splitting. The parent cell dimensions are half the predominant drill hole spacing for the portion of the deposit considered to be Measured. Parent cells are typically centred on the drill holes with a floating cell centred between drill holes along and across strike. Traditionally Iluka uses a parent cell dimension approximately half the drill hole spacing and a search radius that is about twice the drill hole spacing. These are tailored depending on various deposit characteristics.
	Any assumptions behind modelling of selective mining units.	No consideration of mining units was incorporated into the resource estimation. The deposits are large, with no overburden and amenable for open cut mining using the same methods previously employed by Iluka mining in the Atlantic Seaboard region.
	Any assumptions about correlation between variables.	No correlation between variables has been considered. Heavy mineral is a variant.
		Mineralisation was constrained by wireframe surfaces. Drill intervals were given corresponding zone flagging to control interpolation of grade within

Criteria	JORC Code explanation	Commentary
	Description of how the geological interpretation was used to control the resource estimates. *Discussion of basis for using or not using grade cutting or capping.* *The process of validation, the checking process used, the comparison of model data to drill hole data, and use of reconciliation data if available.*	zones. Grade cutting or capping was not required. Validation of the modelling and mineral resource estimation included: • a visual review of the input assay grades compared to the model grade; • comparison statistics for the input assays compared to the model grades on a domain basis; and • generation of a NN grade interpolation for comparison and corroboration purposes.
Moisture	*Whether the tonnages are estimated on a dry basis or with natural moisture, and the method of determination of the moisture content.*	Tonnages were estimated on a dry basis using an Iluka proprietary density formula. The formula was considered appropriate and is used at other Iluka deposits which are geologically similar and currently being mined for HM. It should be noted the formula used for the Atlantic Seaboard uses imperial measurements which are converted a metric equivalents for use in public statements.
Cut-off parameters	*The basis of the adopted cut-off grade(s) or quality parameters applied.*	A nominal grade cut-off of 1.0% HM has been chosen for Hickory and Brink deposits. Aurelian Springs has a nominal grade cut-off grade of 3.0% HM. The cut off grades are considered appropriate for the assemblage and mineral quality characteristics of each deposit.
Mining factors or assumptions	*Assumptions made regarding possible mining methods, minimum mining dimensions and internal (or, if applicable, external) mining dilution. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential mining methods, but the assumptions made regarding mining methods and parameters when estimating Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the mining assumptions made.*	Mining at HM deposits outside current operations is likely to employ selective open cut mining using a mobile mining unit and slurry transport to the concentrator. The nature of the sediments allows for other methods such as dredging and open-cut mining using larger equipment (drag lines), and the dozer-trap method to be considered.
Metallurgical factors or assumptions	*The basis for assumptions or predictions regarding metallurgical amenability. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to*	The metallurgical characteristics of the mineralisation in the Atlantic Seaboard are well understood from previous mining operations. No issues have been identified by the exploration and metallurgical test work carried

Criteria	JORC Code explanation	Commentary
	consider potential metallurgical methods, but the assumptions regarding metallurgical treatment processes and parameters made when reporting Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the metallurgical assumptions made.	out to date in relation to the current Mineral Resources. Further metallurgical testing is will be done on as needs basis to confirm the best methods to maintain optimal mineral recovery.
Environmen-tal factors or assumptions	*Assumptions made regarding possible waste and process residue disposal options. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider the potential environmental impacts of the mining and processing operation. While at this stage the determination of potential environmental impacts, particularly for a greenfields project, may not always be well advanced, the status of early consideration of these potential environmental impacts should be reported. Where these aspects have not been considered this should be reported with an explanation of the environmental assumptions made.*	Regulated wetlands present within the deposit areas have been delineated and excluded from the Mineral Resource estimates. Otherwise the mineral is located on privately owned land that has been extensively cleared for agricultural purposes. If open cut mining takes place all material mined will be returned to the mine void following extraction of the HM component, which is typical for mineral sands mining operations. Overburden would be removed and stockpiled. The ore would be processed and returned to the mine void and the overburden would then be replaced. The site would then be rehabilitated to a land use consistent with that prior to mining.
Bulk density	*Whether assumed or determined. If assumed, the basis for the assumptions. If determined, the method used, whether wet or dry, the frequency of the measurements, the nature, size and representativeness of the samples.* *The bulk density for bulk material must have been measured by methods that adequately account for void spaces (vugs, porosity, etc), moisture and differences between rock and alteration zones within the deposit.* *Discuss assumptions for bulk density estimates used in the evaluation process of the different materials.*	This density calculation used was developed through research at various Iluka's sites in Western Australia. It is considered valid to use this formula as the material composition of the Atlantic Seaboard HM deposits is very similar to those on which the formula was developed. The Iluka Virginia Standard Bulk Density formula has been modified from Iluka's bulk density formula to cater for imperial measurements. The formula used accounts for void space and variable material composition. It is the same formula used at current Iluka mine sites which mine geologically similar material.
Classification	*The basis for the classification of the Mineral Resources into varying confidence categories.* *Whether appropriate account has been taken of all relevant factors (ie relative confidence in tonnage/grade estimations, reliability of input data, confidence in continuity of geology and metal values, quality, quantity and distribution of the data).*	The resource classification applied to the Atlantic Seaboard HM deposits is based on various factors including but not limited to: • data density of primary HM assays; • degree of continuity of mineralisation and geological units; • distribution of Mineralogical bulk data; • assessment of the integrity of the data; and

Criteria	JORC Code explanation	Commentary
	Whether the result appropriately reflects the Competent Person's view of the deposit.	• the level of QA/QC support It is the view of the Competent Person that the frequency and integrity of data, and the Resource Estimation methodology are appropriate for this style of mineralisation and support the Resource Classifications applied.
Audits or reviews	*The results of any audits or reviews of Mineral Resource estimates.*	A review of the current Mineral Resource estimation has been completed by the Competent Person as well as peer-reviewed internally. No issues with the current resource estimates have been noted. No external reviews of the current HM resources have been completed. Internal audit processes within Iluka have assisted in the development of all the resource estimates for the Atlantic Seaboard HM Deposits.
Discussion of relative accuracy/ confidence	*Where appropriate a statement of the relative accuracy and confidence level in the Mineral Resource estimate using an approach or procedure deemed appropriate by the Competent Person. For example, the application of statistical or geostatistical procedures to quantify the relative accuracy of the resource within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors that could affect the relative accuracy and confidence of the estimate.* *The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnages, which should be relevant to technical and economic evaluation. Documentation should include assumptions made and the procedures used.* *These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.*	Measured, Indicated, and Inferred Resource classifications have been assigned to the deposit as per the guidelines set out in the 2012 JORC code. These have used various parameters to assess the confidence in the resource estimate as discussed above. It is the view of the Competent Person that the frequency and integrity of data, and the Mineral Resource estimation methodology are appropriate for this style of mineralisation and support the resource classifications applied. The statement relates to the global estimate of tonnes and grade. Mining has been undertaken at Brink and Hickory deposits in the Atlantic Seaboard. Monthly and yearly reconciliations have been completed. Geological model reconciliation to production data has been conducted since 2003 to the knowledge of the Competent Person. There is some granularity in the mine reconciliation on a monthly basis with a mine overcall varying from 85 to 110% when comparing the modelled HM tonnage against the metallurgical recovery from material mined. Overall, the correlation on an annual basis is reasonably consistent with a mine call factor of about 105%. This is typical for Iluka's mineral sand mining operations.

Summary of information to support the Australian Eucla Basin Mineral Resource and Ore Reserves Estimates

This update is reported in accordance with the 2012 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves', (JORC Code) and ASX Listing Rules, and provides a summary of information and JORC Code Table 1 commentary to support the Mineral Resource and Ore reserve Estimates for the Eucla Basin HM deposits.

The Mineral Resource and Ore Reserve inventory attributable to the Eucla Basin HM deposits as at the 31 December 2016 and broken down by JORC Code category is presented below.

Mineral Resource Summary for the Eucla Basin at December 31st 2016.

Mineral Resource Category[1]	**Material Tonnes (Million)[2]**	**In Situ HM Tonnes (Millions)**	**HM (%)**	**Clay (%)**	**HM Assemblage[3]**		
					Ilmenite (%)	Zircon (%)	Rutile (%)
Measured	227	7.1	3.1	13.6	32	44	4
Indicated	85	8.1	9.5	9.0	65	20	2
Inferred	74	3.7	5.1	9.5	60	20	2
TOTAL	**386**	**18.9**	**4.9**	**11.8**	**52**	**29**	**3**

Notes:
1 Mineral Resources are reported inclusive of Ore Reserves.
2 Material is reported as insitu (dry) metric tonnes.
3 The Mineral Assemblage is reported as a percentage of the HM.
4 Rounding may generate differences in the last decimal place.
5 The quoted figures are stated as at the 31st of December 2016.

Ore Reserve Summary for the Eucla Basin at December 31st 2016.

Ore Reserve Category[1]	Material Tonnes (Million)[2]	In Situ HM Tonnes (Million)	HM (%)	Clay (%)	HM Assemblage[3]		
					Ilmenite (%)	Zircon (%)	Rutile (%)
Proved	99	3.9	3.9	12.9	27	50	4
Probable	4	0.1	2.1	11.7	20	52	3
TOTAL	**103**	**4.0**	**3.8**	**12.8**	**27**	**50**	**4**

Notes:
1 Ore Reserves are a sub-set of Mineral Resources.
2 Material is reported as insitu (dry) metric tonnes.
3. Mineral assemblage is reported as a percentage of the HM.
4 Rounding may generate differences in the last decimal place.
5 The quoted figures are stated as at the 31st of December 2016.

1. Background/Introduction

Iluka Resources Limited (Iluka) is the holder of numerous tenements in the Eastern Eucla Basin region of South Australia. These tenements cover an aggregate area of ~7,830 square kilometres (Figure 1.1) and extend for some 200km in a north-west direction from Ceduna. Iluka initially applied for tenure in 2002 and the first on ground activities commenced in 2004.

The tenements and HM resources are located within the Yellabinna Regional Reserve and activities require specific approvals and reporting requirements with the Department of Environment, Water and Natural Resources.

2. Ownership/Tenure

A summary of Iluka's tenement holding in the Eucla Basin is presented in Table 2.1. The tenements are 100% owned by Iluka, and held through Iluka Resources Limited or Iluka Eucla Basin Limited. The Eucla Basin tenements are granted with the option of periodic renewal (replacement licences issued) for further five year periods from grant date.

Table 2.1: Iluka Resources tenement summary for the Eucla Basin

Licence	Project	Status	Applic. Date	Grant Date	Expiry Date	Area	Area Unit
EL 5198	Ooldea	ELA Pending	22/12/2011	18/04/2012	17/04/2017	1597	km^2
EL 5539	Ooldea	Granted	17/07/2014	4/11/2014	3/11/2019	2462	km^2
EL 5685	Ooldea	Granted	28/04/2015	24/08/2015	23/08/2017	1160	km^2
EL 5879	Ooldea	Granted	15/07/2016	19/10/2016	18/10/2018	903	km^2
ELA 2016/00174	Ooldea	Application	9/12/2016			1597	km^2
EML 6316	Jacinth/Ambrosia	Granted	4/12/2005	4/07/2008	3/07/2029	4500	Hectares
EML 6325	Jacinth/Ambrosia	Granted	28/03/2006	13/11/2008	12/11/2022	4	Hectares
EML 6326	Jacinth/Ambrosia	Granted	28/03/2006	13/11/2008	12/11/2022	37.5	Hectares
EML 6330	Jacinth/Ambrosia	Granted	23/04/2008	28/01/2009	27/01/2023	17.9	Hectares
EML 6331	Jacinth/Ambrosia	Granted	23/04/2008	28/01/2009	27/01/2023	9	Hectares
EML 6332	Jacinth/Ambrosia	Granted	23/04/2008	28/01/2009	27/01/2023	9	Hectares
EML 6333	Jacinth/Ambrosia	Granted	23/04/2008	28/01/2009	27/01/2023	9	Hectares
EML 6334	Jacinth/Ambrosia	Granted	23/04/2008	28/01/2009	27/01/2023	9	Hectares
ML 6315	Jacinth/Ambrosia	Granted	4/12/2005	4/07/2008	3/07/2029	4500	Hectares
MPL 110	Jacinth/Ambrosia	Granted	4/10/2007	4/07/2008	3/07/2029	249.3	Hectares
MPL 111	Jacinth/Ambrosia	Granted	4/10/2007	4/07/2008	3/07/2029	117.1	Hectares
RL 125	Tripitaka	Granted	22/12/2008	14/04/2011	13/04/2021	2320	Hectares

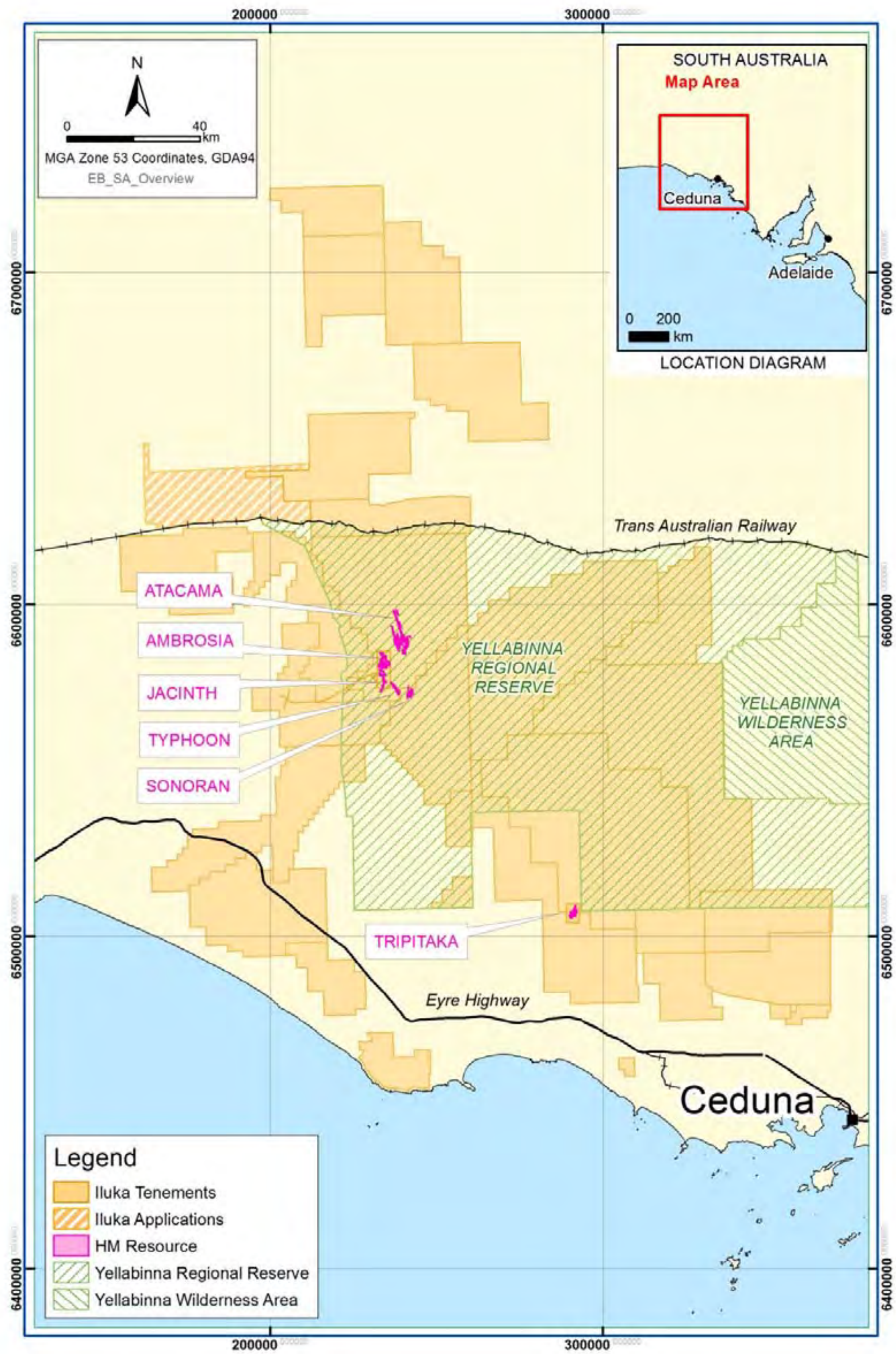


Figure 1.1 Tenement Location Plan for Eucla Basin.

3. Deposit Geology

The HM deposits lie within the Eucla Basin which extends approximately 2,000km from Western Australia to South Australia and contains Tertiary sediments. Archaean to Middle Proterozoic rocks of the Gawler Craton underlie most of the Eastern Eucla Basin. These rocks, together with the Musgrave Block to the north, represent a suitable provenance for the Jacinth and Ambrosia zircon rich heavy mineral deposits.

The Ooldea, Barton and Paling Ranges formed initially as spits and barrier islands during the period of maximum transgression at the end of the Eocene. These dunes have a core of marine Eocene Hampton Sandstone overlain by Aeolian Eocene Ooldea Sandstone.

The Ooldea Range is the dominant topographic feature in the region and extends for many hundreds of kilometres in South Australia and into Western Australia. It forms a barrier between the Nullarbor Limestone and the Great Victoria Desert which is situated directly inland of the Ooldea Range.

The HM deposits typically consist of both beach deposited HM strands and wash-over deposits within back-barrier facies marine sands. The host marine sand unit overlays fluvial / terrestrial sediments and is overlain by aeolian desert dune sands.

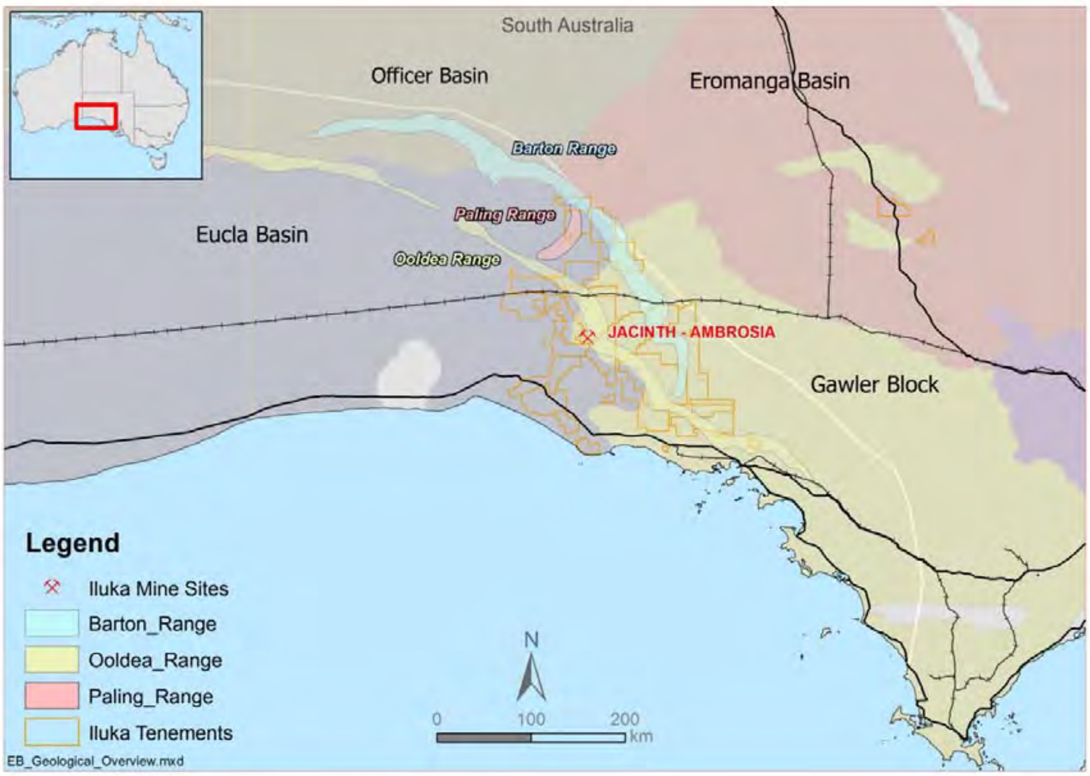


Figure 3.1: Regional Geology Plan for Eucla Basin.

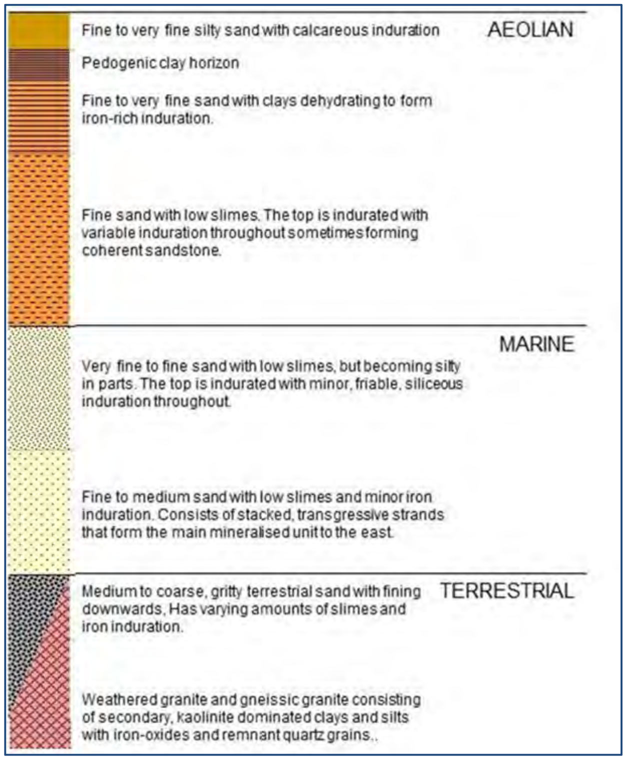


Figure 3.2: Stylised stratigraphic column showing interpreted geology for Eucla Basin HM deposits.

4. Data Acquisition

Exploration in the Eucla Basin region commenced in 2004. As such, the data is of high quality being in a consistent format since work began. There is no exploration data generated by other parties relevant to the development of Mineral Resource estimates for the Eucla Basin HM deposits.

4.1 Drilling Summary

Initial exploration drilling and subsequent resource delineation drilling has been carried out by Iluka using NQ diameter Reverse Circulation Air Core (RCAC) drill holes. All holes were drilled vertically which is essentially perpendicular to the mineralisation.

RCAC drilling was used to obtain a sample from 1 or 1.5 m intervals. Material is presented to a rotary splitter mounted beneath a cyclone which rotates at a regular speed to take a representative one quarter split of 1.5 to 2.0 kg. A check of sample weights is done to ensure the material taken for analysis is within expected limits. A duplicate sample is typically taken at a rate of 1:40 samples in Iluka exploration programs for comparison and QA/QC analysis against the primary sample.

All phases of exploration in the Eucla Basin have utilised the same drilling methodology and assay techniques.

A summary of the drilling carried out on each prospect is presented in Table 4.1.

The drilling is typically carried out on a regularised grid with the drill spacing closed in to support an increased confidence in the mineral resource estimates as shown in Figures 4.1 and Figure 4.2.

Table 4.1: Drill meterage's and modal drill spacing for each prospect supporting the Eucla Basin Resources.

Deposit	Holes	Samples	Drill metres	X Drill Space	Y Drill Space	Z Drill Interval	Drill Comments
Ambrosia	869	26,669	32,319.4	50	200	1	Initial drilling on 400m x 50m, later infilled to 200m x 50m
Atacama	1,134	27,706	81,376.1	50	400	1	Dominant drill density
Jacinth	1,432	45,363	47,002.7	25	100	1	Dominant drill density
Sonoran	641	30,213	34,360.0	50	200	1	Outer margins of the deposit 400m x 100m
Tripitaka	1,172	26,694	29,299.0	50	100	1	Two discrete zones infilled at 100m x 25m
Typhoon	442	18,151	19,048.0	25	200	1	Dominant drill density

The early phases of drilling were typically done on cleared access paths and regional roads. The drill lines were spaced at approximately 1km to 1.2km with holes spaced at about 100 m along the lines. Infill drilling to closer spacing 800 m/400 m/200 m x 50 m/25 m was carried out over significant areas of mineralisation to support feasibility studies and potential mine development as required.

4.2 Survey

The early regional exploration drilling conducted by Iluka was surveyed using Differential Global Positioning System (DGPS) equipment which provided collar positioning with X/Y/Z accuracy of +/-0.5 m. At the commencement of resource delineation drillhole collars were surveyed using Real Time Kinematic (RTK) DGPS methods utilising equipment owned and operated by a licenced Iluka Resources or external surveyor. This equipment provides sub metre accuracy in the X/Y/Z plane.

Collar elevations at Atacama and Jacinth/Ambrosia were obtained from photogrammetric digital elevation models (DEM). Drill hole positions at Jacinth/Ambrosia were also supplemented by data from the Iluka minesite survey personnel. Elevations at Sonoran and Typhoon were obtained from the Advanced Land Observing Satellite (ALOS) DEM.

For resource modelling purposes the surveyed coordinates were transformed into local grid systems based either on single or double point transformations. A summary of the transformations from local to MGA Zone 53 is included in Table 4.2.

Table 4.2: Coordinate system used on the Eucla Basin HM deposits.

		MGA (Zone 53)		LOCAL		
Deposit	**Point**	**Easting**	**Northing**	**Easting**	**Northing**	**Comments**
Ambrosia	2	235,521.2	6,581,352.5	55,520.5	81,351.5	Jacinth Mine Grid
		233,265.9	6,585,646.5	53,266.3	85,643.5	
Atacama	1	237,726.3	6,593,500.0	10,000.0	23,724.6	Atacama Local Grid, -20^{O} rotation
Jacinth	2	235,521.2	6,581,352.5	55,520.5	81,351.5	Jacinth Mine Grid
		233,265.9	6,585,646.5	53,266.3	85,643.5	
Sonoran	2	235,521.2	6,581,352.5	55,520.5	81,351.5	Jacinth Mine Grid
		233,265.9	6,585,646.5	53,266.3	85,643.5	
Tripitaka	2	291,604.7	6,507,694.5	54,198.2	8,751.0	Tripitaka Local Grid
		290,625.5	6,506,183.5	8,847.0	52,400.4	
Typhoon	2	236,123.0	6,576,538.0	5,250.0	63,000.0	Typhoon Local Grid
		238,661.0	6,571,684.0	2,364.2	58,346.8	

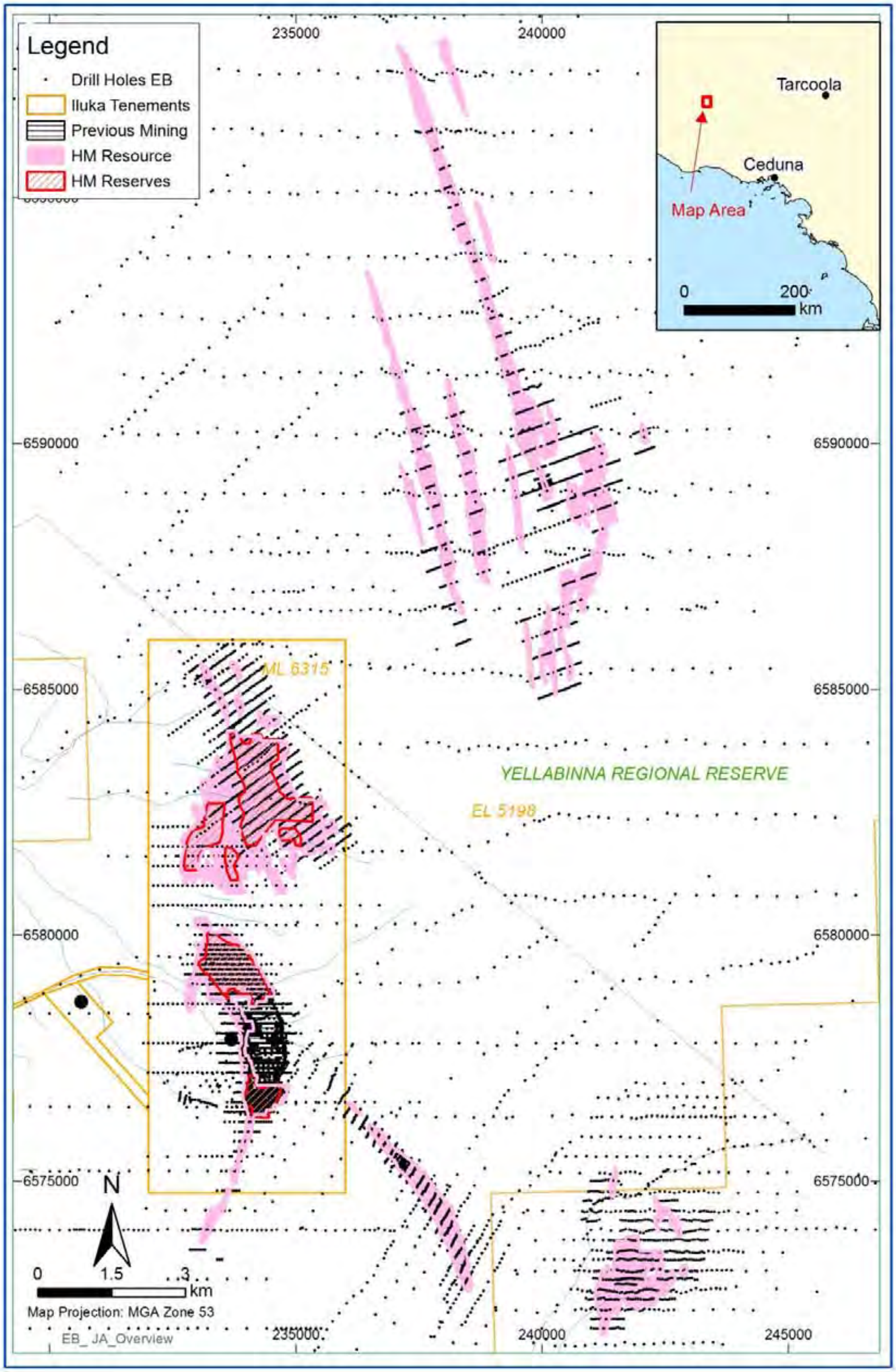


Figure 4.1: Drill hole distribution, Mineral Resource and Ore Reserve outlines for the Ambrosia, Atacama, Jacinth, Sonoran and Typhoon HM Deposit in the Eucla Basin.

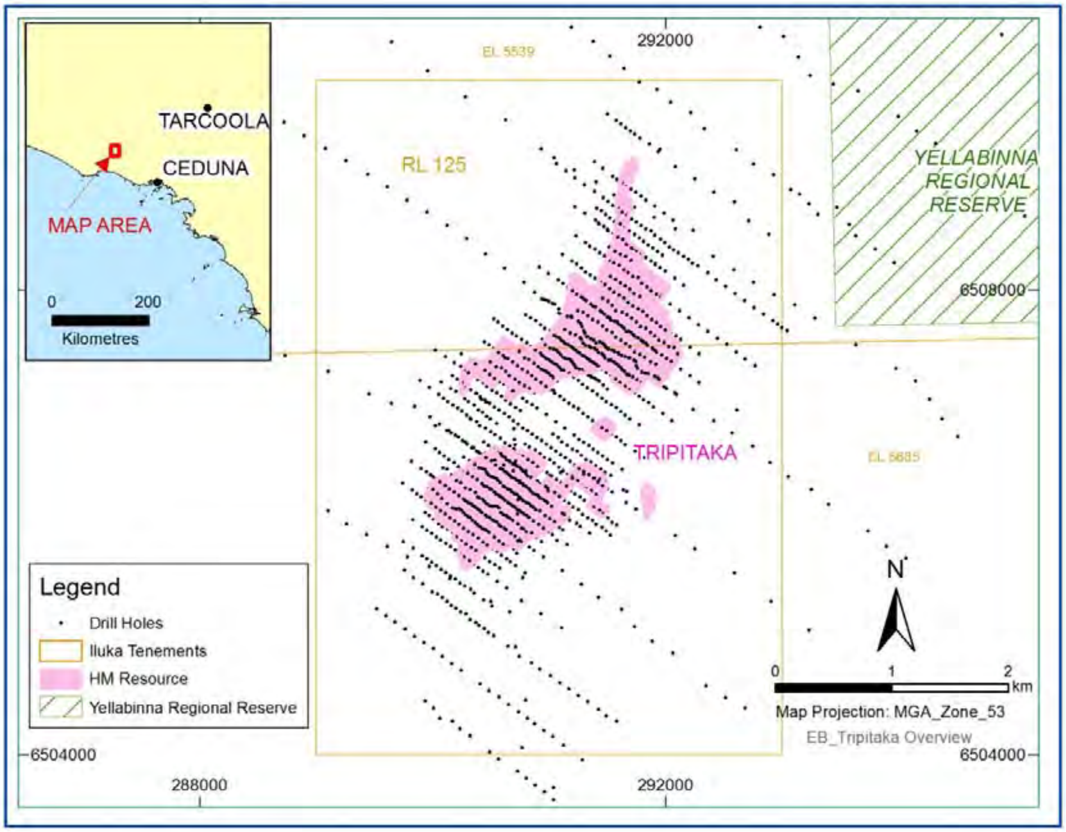


Figure 4.2: Drill hole distribution for the Tripitaka HM Deposit in the Eucla Basin.

4.3 Geological Logging

Geological logging was carried out on all RCAC samples by a qualified geologist or trained geotechnician. The geological information collected is adequate to support the estimation of Mineral Resources and the JORC Code Classification assigned. All samples were logged on site at the time of drilling and the data was entered in to Micromine software installed on laptop computers. Logging of RCAC samples recorded the colour, lithology, dominant grainsize, coarsest grainsize, sorting, induration type, hardness, and an estimate of the percentage of rock, clay and HM. Comments were also recorded in relation to unique features of the sample or if there was sampling issues.

All geological data was then transferred electronically to Iluka's SQL hosted Geology Database Management System (GDMS). The logging software employed validation rules and further checks and rules were imposed on the data at the time of loading into the geological database. Errors encountered at the time of loading result in rejection of the data which then must be rectified by the supervising geologist prior to attempting to reload the data.

4.4 Sampling and analytical procedures

A quarter split of the sample weighing 1.5 to 2.0 kg was taken from a rotary splitter mounted beneath a cyclone on the drill rig which is an industry standard method for mineral sands exploration.

The samples collected were assayed for Heavy Mineral content initially at Iluka's Adelaide based Laboratory and then at Iluka's Laboratory in Hamilton, Victoria after closure of the Adelaide laboratory in 2006.

The samples were dried, de-slimed (material <53 µm removed) and then had oversize (material >2mm) removed. A 100g sub-sample of the 53 to 2000 µm sample was sieved at 710µm to determine the coarse sand component. The 53-710 µm fraction (Sand) then had a Heavy Mineral sink performed on it using Lithium-Sodium-Tungsten (SG=2.85 g/cm^3). The weights recorded during sample analysis were then used to calculate the percent of slimes, sand, coarse sand, oversize and HM for the entire sample. Samples of the oversize and sand fraction plus the separated HM fractions have been retained to allow further analysis if required at a later date.

Both internal and external checks are conducted on random samples for quality assurance purposes. After washing the original sample (~2 kg), the sample is riffled three times from alternate sides to end up with 2 x 1 kg samples. One of the samples is put aside for internal testing which undergoes the same procedure as described above.

Composite samples were taken either from the sand residue fractions of exploration samples or HM sink fractions from the HM determinations which also corroborate the validity of the HM mineralisation. The composited samples generate between 0.5 and 2 kg of HM from wet tabling which is then subjected to a process of magnetic, electrostatic and heavy liquid separation followed with XRF analysis of the fractions to determine the mineral assemblage and mineral quality.

4.5 QA/QC and Data Quality

QA/QC practices were adopted for all Eucla Basin HM deposits as per Iluka Resources Technical Work Instructions and operating protocols. Data sets were used to measure QA/QC; blind field standards and duplicate field samples. Selected drill holes were twinned as part of resource delineation activity to verify the drilling and sampling methods. Assay techniques utilised in the Eucla Basin are appropriate for the mineralisation and are supported by decades of reconciliation of mining of other deposits delineated using the same or very similar techniques. The Mineralogical Bulk Sample evaluation processes are appropriate for the current level of study and applied resource classifications. A summary of the QA/QC data sets is included in Table 4.3.

Table 4.3: QA/QC summary for the Eucla Basin HM Deposits.

Deposit	Duplicates	Standards	Twinned Holes	QA/QC Comments
Ambrosia	355	100	2	Standard insertion rates below recommended insertion rate.
Atacama	1487	1315	21	Standard submission rates were at recommended insertion rates
Jacinth	1205	539	12	Standards were used in all programs with varying insertion rates.
Sonoran	1212	802	18	Standard submission rates were in line with recommended rates
Tripitaka	381	311	10	Standards were used in all programs with varying insertion rates.
Typhoon	726	332	11	Standard submission rates were at recommended insertion rates.

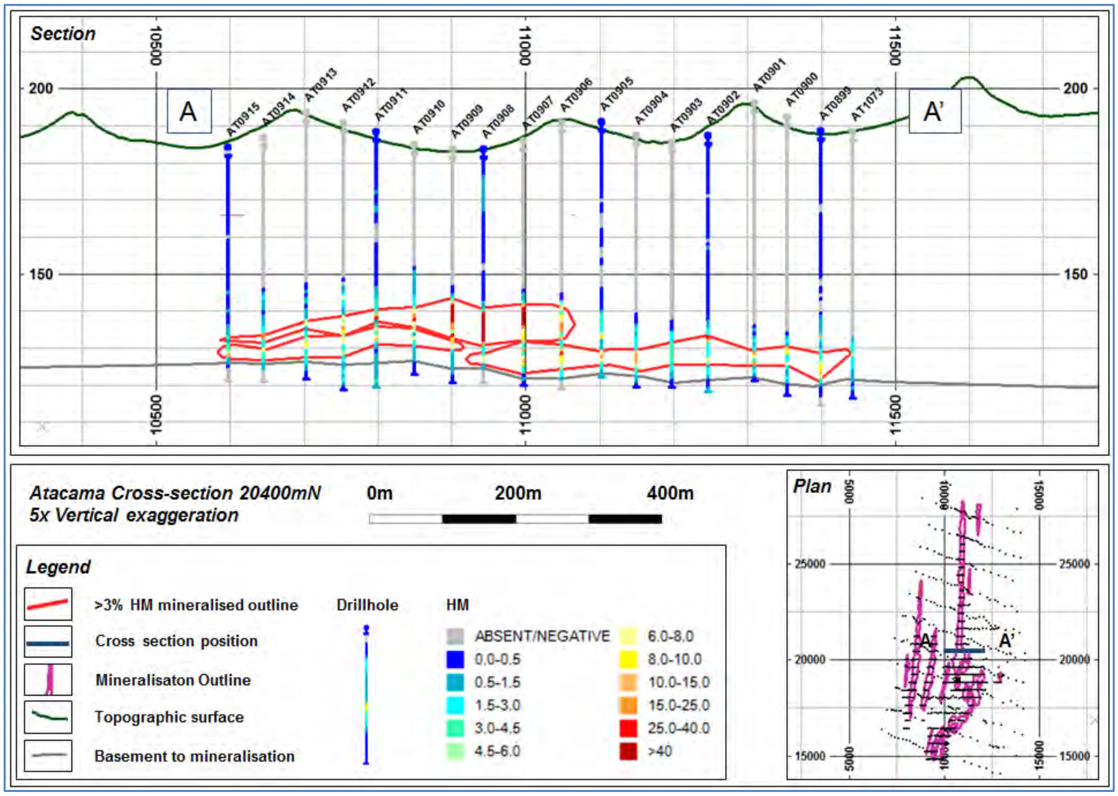


Figure 4.3: Cross-section 20400mN through the Atacama Deposit.

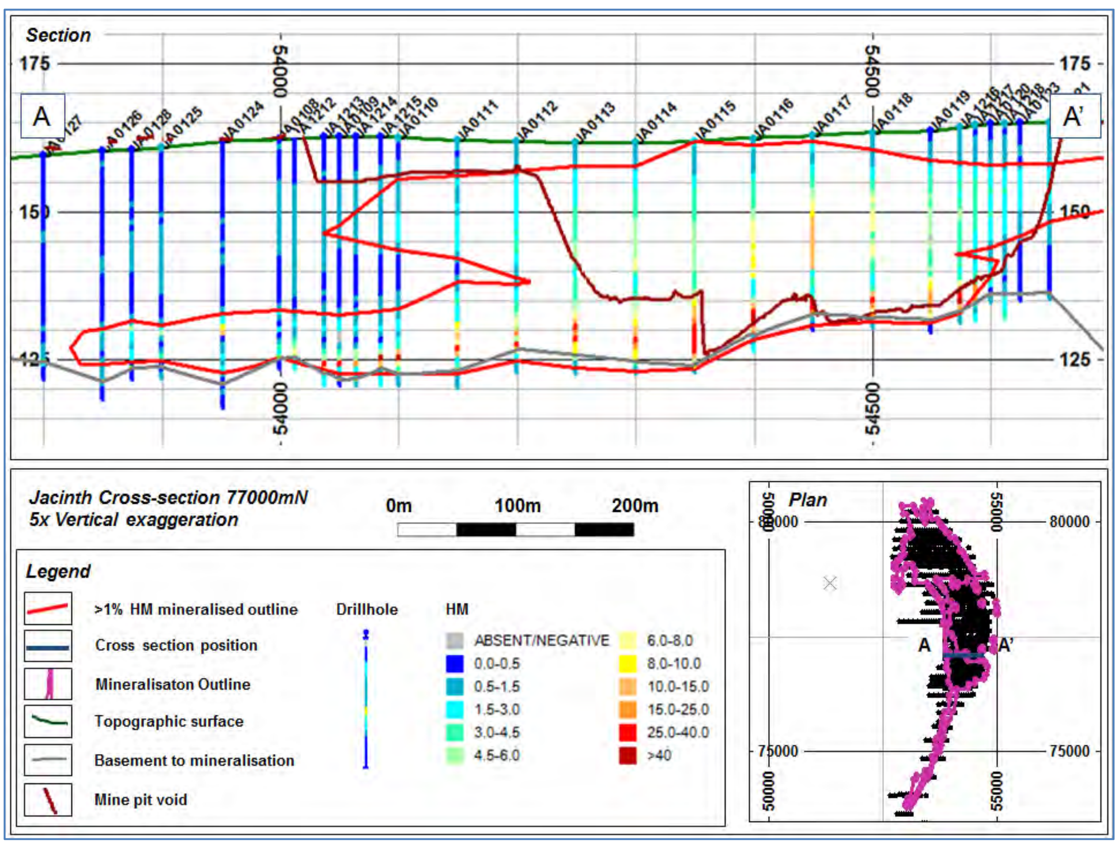


Figure 4.4: Cross-section 77000mN through the Jacinth Deposit.

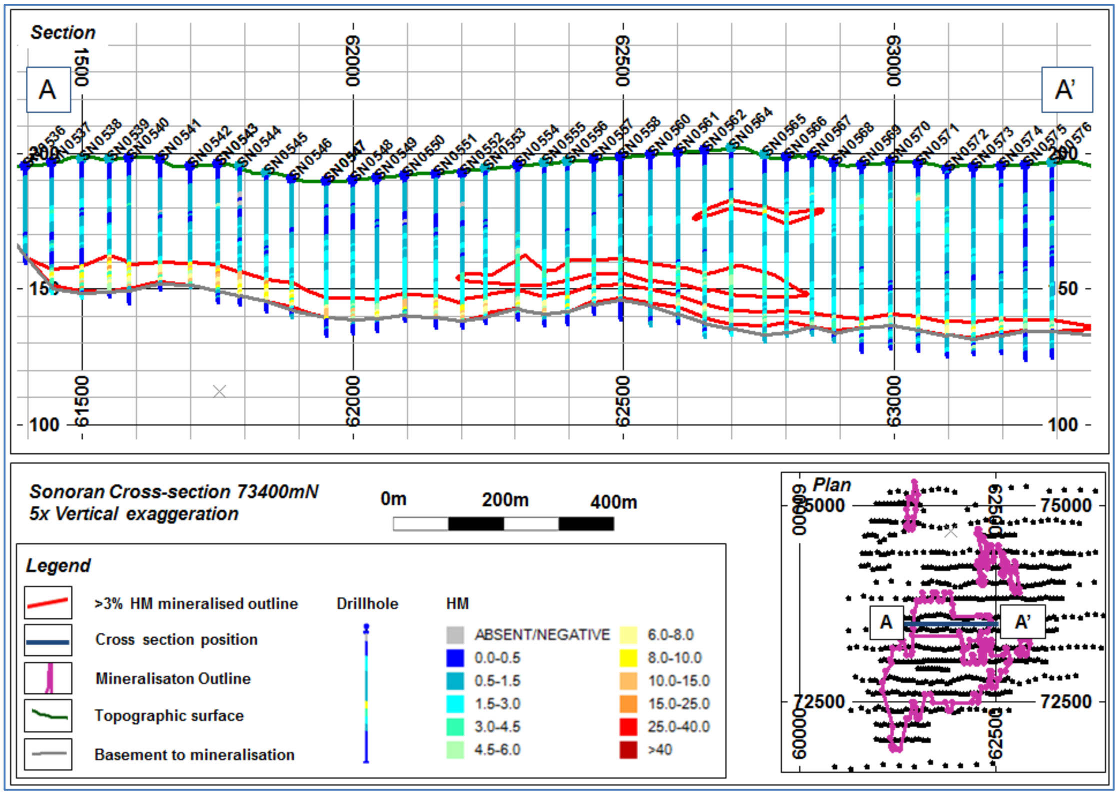


Figure 4.5: Cross-section 73400mN through the Sonoran Deposit.

4.6 Verification of Sampling and Assaying

Checking of the assay data was carried out by way of validation routines during original logging and loading into Iluka's GDMS, an SQL database which is currently interfaced using acQuire^{TM} data management software. Further comprehensive visual validation of the data was done during construction of the geological block models by comparing the information with historical hard copy logs and cross sections. The checks included:

- checking analytes summed to 100% within rounding errors;
- identifying and rectifying duplicated or missing intervals; and
- that thee data was in spatially realistic locations.

It is the opinion of the Competent Person that the data is suitable for the purpose of estimation of Mineral Resources for the Eucla Basin.

4.7 Physical parameters

The density used in the estimation of the mineral resource tonnages for the Eucla Basin HM Deposits is based on an Iluka Standard Bulk Density formula. The formula is based on research done on various HM deposits being mined by Iluka in Western Australia. The formula is considered valid as it takes into account the sand, HM and clay components and it allows for potential "filling" void space within the sand by the fine clay content. All tonnages are expressed as dry tonnage basis.

5. Resource Estimation

Resource models have been prepared for the Eucla Basin HM deposits using Datamine StudioTM mining software. Geological interpretations used to constrain the modelling were prepared by geologists employed by Iluka. The resource estimate was derived from a 3 dimensional block model constructed using geological and mineralogical domain constraints as per Iluka internal guidelines. Domains are assigned to the model based on the geological interpretations and the assay dataset is correspondingly flagged. The assay values were interpolated using inverse distance weighting cubed (ID3) while hardness and sample composite identifiers were interpolated using Nearest Neighbour (NN).These are considered to be industry standard block estimation methods.

Each deposit was assessed in terms of statistical analysis and drill data distribution to apply appropriate interpolation parameters. Traditionally Iluka adopts a block dimension of about a half of the prevailing drill hole spacing in the X and Y direction (horizontal plane) in combination with anisotropic data search volumes about twice the prevailing drill hole spacing. These are adjusted as necessary to honour the individual characteristics of each deposit. In addition algorithms are used to dynamically orientate the optimum search to honour the variation in geological and grade orientation. Sub-celling is used along domain boundaries to ensure appropriate volume representation.

The bulk density for the resource was estimated using the Iluka standard bulk density formula based on operational experience gained from mining this style of mineralisation.

Table 5.1; Summary of the model structure for the Eucla Basin HM deposits.

	Cell Dimensions		
Deposit	East	North	RL
Ambrosia	25	100	1
Atacama	25	100	1.5
Jacinth	25	100	1
Sonoran	25	100	1
Tripitaka	25	50	1
Typhoon	25	100	1

Table 5.2; Summary of the assay attribute interpolation parameters for the Eucla Basin HM deposits.

	Interpolation	Search Ellipse Radius			Search	Search
Deposit	Method	X	Y	Z	Factor 2	Factor 3
Ambrosia	ID3	60	375	2	2	4
Atacama	ID3	75	600	3	4	8
Jacinth	ID3	100	175	2	2	4
Sonoran	ID3	75	300	3	2	3
Tripitaka	ID3	75	150	2	2	3
Typhoon	ID3	75	300	3	2	4

Table 5.3; Summary of the Composite data interpolation parameters for the Eucla Basin HM deposits.

Deposit	Interpolation Method	Search Ellipse Radius X	Y	Z	Search Factor 2	Search Factor 3
Ambrosia	NN	30	375	2.0	4	8
Atacama	NN	300	1,500	3.0	4	8
Jacinth	NN	200	300	5.0	2	4
Sonoran	NN	150	600	6.0	2	3
Tripitaka	NN	150	300	5.0	2	3
Typhoon	NN	100	800	6.0	2	3

The block models are validated by:

- visually comparing the block model grade attributes against the input grades;
- comparing statistics of the grade attributes for the block model to the input data;
- comparing the result of a NN grade interpolation to the ID3 interpolation; and
- reviewing the volume attributable to each composite to ensure it is consistent with the input data expectations.

6. Mineral Resource Statement

6.1 Resource classification

The Mineral Resource estimate has been classified and reported into the Measured, Indicated and Inferred categories by the Competent Persons in accordance with the guidelines set out in the Australasian Code for the Reporting of Exploration Results, Mineral Resources and Ore Reserves (JORC Code, 2012 edition.) The resource classification assigned is based on a combination of:

- data provenance and availability;
- drill hole spacing and sampling density;
- confidence in analytical data; and
- established geological continuity.

In addition the potential for eventual economic extraction is taken into consideration when determining Mineral Resources that are valid for reporting under the JORC Code (2012). Factors taken into consideration which allude to the potential for economic extraction include:

- only reporting mineralisation within granted tenements;
- using a lower HM cut-off grade considered to be close to an economic cut-off taking into consideration the composition of the mineral assemblage;
- taking into consideration the style of mineralisation and likely mining methods;
- excluding deeply buried and /or low grade material that is unlikely to ever be economic using a depth of burial to HM grade/thickness algorithm;
- excluding material that has a high clay content beyond processing limitations; and
- excluding heavily indurated material from which the recovery of mineral is un-feasible.

The Eucla Basin HM deposits comprise large volume, moderate HM grade sedimentary accumulations with mineralisation presenting to surface. As such, mining is likely to involve large scale earth moving methods like truck and shovel, scraper or dozer trap in an open pit environment..

6.2 Mineral Resources declared for Eucla Basin

A summary of the Mineral Resource estimates for the Eucla Basin HM Deposits is presented in Table 6.1.

6.3 Discussion of relative accuracy

The relative accuracy and therefore confidence of the resource estimate is reflected in the consideration of the underlying influencing factors considered in Section 6.1. These are taken into consideration during the classification of the resource estimates by the Competent Person.

Table 6.1: Summary of Mineral Resources for the Eucla Basin as at 31 December 2016.

EUCLA BASIN MINERAL RESOURCE BREAKDOWN BY DISTRICT, DEPOSIT AND JORC CATEGORY AT 31 DECEMBER 2016									
Summary of Mineral Resources for Eucla Basin				2016	2016		HM Assemblage[2]		
District	Deposit	Mineral Resource Category[1]	Material Tonnes kt	InSitu HMTonnes kt	HM Grade (%)	Clay Grade (%)	Ilmenite Grade (%)	Zircon Grade (%)	Rutile Grade (%)
East Eucla	Ambrosia	Measured	101,558	2,683	2.6	14.9	24.5	50	4.7
		Indicated	19,602	300	1.5	13.8	21	48	4.6
		Inferred	28,002	405	1.4	13.3	19.3	49.6	4.5
	Atacama	Indicated	35,649	5,729	16.1	7.9	67.1	18.2	2.1
		Inferred	36,921	3,004	8.1	7.7	68.4	13.3	1.8
	Jacinth	Measured	48,050	1,957	4.1	11.3	31	47.2	4.3
		Indicated	3,150	113	3.6	10.5	20.6	54.9	4.1
		Inferred	8,170	228	2.8	5	32.4	41.3	4.6
	Sonoran	Indicated	26,978	1,943	7.2	6.8	68	18.7	1.4
		Inferred	512	94	18.4	5	51	37.8	3.9
	Tripitaka	Measured	53,677	998	1.9	15.1	11.1	64.8	4.8
	Typhoon	Measured	23,680	1,488	6.3	9.4	62.7	13.2	0.9
East Eucla	**Measured Total**		**226,965**	**7,126**	**3.1**	**13.6**	**32.4**	**43.6**	**3.8**
East Eucla	**Indicated Total**		**85,379**	**8,085**	**9.5**	**9.0**	**65.0**	**19.9**	**2.1**
East Eucla	**Inferred Total**		**73,605**	**3,731**	**5.1**	**9.5**	**60.4**	**19.6**	**2.3**
East Eucla	**Total**		**385,949**	**18,942**	**4.9**	**11.8**	**51.8**	**28.8**	**2.8**

Notes
1 Mineral Resources are inclusive of Ore reserves.
2 The Mineral assemblage is reported as a percentage of the in situ HM content.
3 All tonnages are dry in situ metric tonnage.
4 Rounding may result in differences in the last decimal place.
5 All figures are stated as at the 31st of December 2016.

7. Independent Review

The block models used for resource estimation are reviewed internally as per Iluka company policy. The block models and the associated Mineral Resource estimates supporting inaugural estimates and feasibility studies are externally reviewed. The maiden HM resource estimates for Ambrosia, Atacama, Jacinth, Sonoran and Tripitaka were all independently reviewed by external consultants.

Table 7.1: Summary of Block Model Reviews for the Eucla Basin.

	Internal Review		External Review	
Deposit	Auditor	Date	Auditor	Date
Ambrosia	Iluka	2015	McDonald Speijers	2005
Atacama	Iluka	2014	McDonald Speijers	2011
Jacinth	Iluka	2016	McDonald Speijers	2004
Sonoran	Iluka	2016	Optiro	2012
Tripitaka	Iluka	2014		
Typhoon	Iluka	2014		

Several Competent Persons employed by Iluka Resources have visited the HM deposits in the Eucla Basin from time to time. No issues material to the Mineral Resource estimates were raised during these visits.

8. Further Work

Further resource development of the Eucla Basin HM deposits will be progressed in a timely manner to support ongoing mining operations. Updates to the resource models and associated Mineral Resource estimates will be done as additional exploration data becomes available.

9. Summary of Information to the Ore Reserve

9.1 Reserve Classification

The stated Proved and Probable Ore Reserves correspond with the Measured and Indicated Mineral Resources. There are no Inferred Resources included in the stated reserve numbers.

9.2 Mining and recovery factors

Pit optimisations were conducted using IMS Minemap mine planning software. This is industry standard software and utilises the Lerch-Grossman algorithm. The optimisation parameters used consisted of current costs, revenues and recoveries and other Modifying Factors.

The results of the pit optimisations were used for production scheduling and economic evaluation. The mining methods are truck and excavator for waste mining operations and dozer push for ore.

9.3 Modifying Factors

Modifying factors such as ore recovery have been applied from historical performance. Processing recoveries and operating costs are based primarily on historical performance and updated for current economic conditions.

The price assumptions are internally generated and are based on detailed supply and demand modelling. The price assumptions have also been benchmarked against commercially available consensus price forecasts. The detail of that process is commercially sensitive and is not disclosed.

Iluka's internal modelling indicates that the exploitation of the reported reserves would be expected to generate a positive NPV sufficient to meet Iluka's internally generated investment criteria.

9.4 Cut-off grades

The cut-off grade has been calculated using optimization software and an individual cut-off grade applied to each block within the model. The calculations consider overall heavy mineral (HM) grade and individual assemblage product values, operating costs, recoveries and modifying factors. An economic optimization is performed to determine if a block is viable to mine, and therefore be included in the Ore Reserves.

9.5 Processing

The first stage processing that produces the heavy mineral concentrate (HMC) is a well-tested and proven methodology and currently exists at other mineral sands operations around the world.

The metallurgical separation process also utilises known technology where the performance and recovery of the mineral products has been well established by Iluka in current and past operations.

9.6 Ore Reserves declared

The Jacinth-Ambrosia Ore Reserve estimate is summarised in Table 9.1. The location of the Jacinth-Ambrosia Ore Reserves is shown on Figure 4.1.

Table 9.1: Summary of Ore Reserves for the Eucla Basin as at 31st December 2016.

EUCLA BASIN ORE RESERVE BREAKDOWN BY DISTRICT, DEPOSIT AND JORC CATEGORY AT 31 DECEMBER 2016										
Summary of Ore Reserves for Eucla Basin					**2016**	**2016**		**HM Assemblage[2]**		
District	**Deposit**	**Ore Reserve Category[1]**	**Overburden Volume kbcm**	**Ore Tonnes kt**	**InSitu HMTonnes kt**	**HM Grade (%)**	**Clay Grade (%)**	**Ilmenite Grade (%)**	**Zircon Grade (%)**	**Rutile Grade (%)**
East Eucla	Ambrosia	Proved	20,773	53,908	1,891	3.5	14.4	23.7	52.7	4.8
		Probable	-	2,590	60	2.3	9.7	20.9	48.9	4.7
	Jacinth	Proved	7,776	45,520	1,972	4.3	11.1	31	46.9	4.2
		Probable	-	1359	25	1.8	15.4	19.1	59.2	3.4
	Proved Total		**28,549**	**99,428**	**3,863**	**3.9**	**12.9**	**27.4**	**49.7**	**4.5**
	Probable Total		**-**	**3,949**	**85**	**2.1**	**11.7**	**20.4**	**51.9**	**4.3**
	Grand Total		**28,549**	**103,377**	**3,949**	**3.8**	**12.8**	**27.3**	**49.8**	**4.5**

Notes:
1 Ore Reserves are a sub-set of Mineral Resources.
2 Mineral assemblage is reported as a percentage of the HM.
3 In situ (dry) metric tonnage is reported.
4 Rounding may generate differences in the last decimal place.
5 The quoted figures are stated as at the 31st of December 2016 and have been depleted for all production conducted to this date.

Eucla Basin HM Deposits - JORC Code 2012 edition - Table 1 Commentary

Section 1 Sampling Techniques and Data

(Criteria in this section apply to all succeeding sections.)

Criteria	JORC Code explanation	Commentary
Sampling techniques	*Nature and quality of sampling (e.g. cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc.). These examples should not be taken as limiting the broad meaning of sampling.*	The Eucla Basin heavy mineral deposits were sampled with Reverse circulation air-core (RCAC) drilling NQ diameter (76mm). A total of 5,690 holes were drilled for a total of 243,405 m on the six HM deposits (Ambrosia, Atacama, Jacinth, Sonoran, Tripitaka and Typhoon). All drilling was vertical which is essentially perpendicular to the mineralisation. A 1.5m sample interval was used for broad exploration while 1m intervals are used in resource delineation and development. A total of 174,796 samples were collected from the drilling for assaying. Sample weights were recorded for each sample interval which provided an indication of the sample representivity. Typically sample weights of 1.2 to 1.6 kg were taken and these are reviewed to ensure appropriate sample representivity. Sample weights are typically lower in the upper 1 to 2 m of each drill hole and show a greater variability in zones containing significant induration.
	Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used. *Aspects of the determination of mineralisation that are Material to the Public Report.*	All phases of drilling have utilised the same drilling methodology and assay techniques, RCAC drilling was used to obtain a 1m sample from which approximately 1.2 – 1.6 kg was collected using a rotary splitter. Samples were assayed at Iluka Resources owned and managed laboratories in Adelaide until 2006 and then at Hamilton from 2007 on. The sample was dried, de-slimed (material <53 µm removed) and then had oversize (material >2mm) removed. 100 g of the sample then had a Heavy Mineral (HM) sink performed on it using Lithium-Sodium-Tungsten (SG=2.85 g/cm^3). The resulting HM concentrate was then dried and weighed.
	In cases where 'industry standard' work has been done this would be relatively simple (e.g. 'reverse circulation drilling was used to obtain 1 m samples from which 3 kg was pulverised to produce a 30 g charge for fire assay'). In other cases more explanation may be required, such as where there is coarse gold that has inherent	Sand residue from the HM sample analysis (from similar geological domains) were grouped together to form composite samples which were subject to further metallurgical analysis to determine the assemblage, mineral quality and sizing. These composite samples underwent wet tabling and magnetic separation of the HM concentrate using a Permroll™ magnet. The mineral fractions from various roll speeds were then

Criteria	JORC Code explanation	Commentary
	sampling problems. Unusual commodities or mineralisation types (e.g. submarine nodules) may warrant disclosure of detailed information.	analysed by XRF and stoichiometric calculations were used to estimate the mineral assemblage. About 10grams of the non-magnetic fraction was sent for SG separation using Thallium Malonate Solution (TMF). This separation technique was used to determine grain size and indicative chemistry for Zircon.
Drilling techniques	*Drill type (e.g. core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc) and details (eg core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc.).*	All drilling on the Eucla Basin HM deposits has been done using RCAC with NQ diameter rods All drill holes have been drilled vertically which is essentially perpendicular to the mineralisation.
Drill sample recovery	*Method of recording and assessing core and chip sample recoveries and results assessed.* *Measures taken to maximise sample recovery and ensure representative nature of the samples.* *Whether a relationship exists between sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.*	Indicative sample quality, water content and recovery is supported by the sample weights recorded for the exploration samples prior to analysis at the laboratory. All samples were logged at the time of the drilling and variance from expected sample quality is recorded in comments against the relevant sample. RC-AC samples were visually checked for recovery, moisture and contamination at the time of collection, a consistent rate of penetration was maintained. There is no relationship between sample recovery and heavy mineral grade however samples with induration present usually have lower recovery.
Logging	*Whether core and chip samples have been geologically and geotechnically logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and metallurgical studies.* *Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc) photography.* *The total length and percentage of the relevant intersections logged.*	Geological logging was carried out on all RCAC samples by a qualified geologist or trained geotechnician. The geological information collected is adequate to support the mineral resource estimation and the JORC Code Classification assigned. Logging of RCAC samples recorded, washability, colour, lithology, dominant grainsize, coarsest grainsize, sorting, induration type, hardness, and an estimate of rock, slime and HM Content. Whether the sample was dry or wet and whether water had been injected during drilling was also noted. In addition most of the HM sachets returned from the HM determination were logged to record the portion and attributes of VHM present. With the exception of a very small proportion of samples (<10), all

Criteria	JORC Code explanation	Commentary
		exploration samples were logged in full detail in the field at the time of drilling.
Sub-sampling techniques and sample preparation	*If core, whether cut or sawn and whether quarter, half or all core taken.* *If non-core, whether riffled, tube sampled, rotary split, etc and whether sampled wet or dry.* *For all sample types, the nature, quality and appropriateness of the sample preparation technique.* *Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.* *Measures taken to ensure that the sampling is representative of the in situ material collected, including for instance results for field duplicate/second-half sampling.* *Whether sample sizes are appropriate to the grain size of the material being sampled.*	No core samples have been collected from the Eucla Basin HM deposits. Samples were collected from beneath a rotary splitter mounted on the drill rig. Typically the samples were presented to the splitter as drilled – dry or wet. Approximately 25% of the sample is collected for geological logging and analysis. Water injection was rarely used as the deposits are situated above the water table and the ground is dry. Sample preparation is consistent with industry standard techniques and is deemed to be appropriate for Heavy Mineral determination. Duplicate samples were collected from the rotary splitter at the drill rig at the same time as the primary samples. These field duplicates were collected at a rate of approximately 1:40 samples submitted for assay. Duplicate samples were riffle split at the laboratory at a rate of 1:40 samples. No duplicate samples were collected from Tripitaka during 2006 – 2007 but the 2012 campaign achieved a 1:40 submission rate. Duplicate assay data demonstrates good correlation with primary sample data. The sampling methodology is considered consistent with industry standard practice and the sample size is considered appropriate in accordance with Gy's sampling theory.
Quality of assay data and laboratory tests	*The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.* *For geophysical tools, spectrometers, handheld XRF instruments, etc., the parameters used in determining the analysis including instrument make and model, reading times, calibrations factors*	The assay technique utilised is appropriate for the mineralisation style in the Eucla Basin and is supported by decades of reconciliation of mining of other deposits delineated using the same or very similar techniques. The mineralogical bulk sample evaluation processes are appropriate for the current level of study and applied resource classification. The assay method is considered to be total. The data for the Eucla Basin HM deposits does not contain any results generated by geophysical methods.

Criteria	JORC Code explanation	Commentary
	applied and their derivation, etc. *Nature of quality control procedures adopted (e.g. standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (i.e. lack of bias) and precision have been established.*	Standards were inserted with assayed samples both in the field and in the laboratory for all Eucla Basin HM deposits at varying submission rates. Targeted rates for insertion were 1:40 samples assayed. Submission rates were in line with targeted rates except for the Ambrosia and Tripitaka deposits which were below recommended insertion rates during some programs. Some short periods of bias are evident in the results for HM and Slimes which were quickly addressed by the laboratory. Where a result for HM was returned outside the defined 'action limit' specifications (3 standard deviations from the expected value for HM) a re-split and re-assay of the standard and samples with HM > 1% from the corresponding hole were undertaken. The repeat assays were assessed and if the standard returned HM results within specifications then all the repeat assays replace the original results in the resource estimation process. Slimes results outside of 3SD did not trigger repeat assays, as the Slimes component of the sample is destroyed during initial processing. Duplicate samples were taken both in the field and in the laboratory at an approximate rate of approximately 1:40 samples assayed. Duplicate assay data demonstrates good correlation with primary sample data.
Verification of sampling and assaying	*The verification of significant intersections by either independent or alternative company personnel.* *The use of twinned holes.* *Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.*	Assay results are reviewed by the geologist supervising each respective exploration program. The validity of HM reporting from sample analysis is corroborated by follow up logging of the HM concentrates. Verification of significant and valid mineralisation is undertaken as part of the resource block modelling process. Twinned RCAC holes were completed at all Eucla Basin HM deposits as a routine part of the exploration program. Twin hole locations were selected from throughout the deposits at a targeted rate of 1:40 holes. The twinned drill holes and associated assay results corroborate the original assay data. Logging of RCAC samples was input directly into a laptop computer using Micromine software with data verification routines enabled. Data was then transferred into Iluka's Geology Database (custom tailored geological data management system based on a SQL database) which incorporated further verification routines. All drilling and assaying data was transferred

Criteria	JORC Code explanation	Commentary
		to the current acQuire hosted database.
	Discuss any adjustment to assay data.	No adjustments (including but not limited to bias or top cutting) have been made to any of the assay data. Some of the earlier exploratory drilling that does not coincide with the detailed grid based drilling was excluded from the some datasets used for grade interpolation.
Location of data points	*Accuracy and quality of surveys used to locate drill holes (collar and down-hole surveys), trenches, mine workings and other locations used in Mineral Resource estimation.*	Drill hole collars were surveyed using either Differential GPS or Real Time Kinematic (RTK) DGPS methods owned and operated by Iluka Resources or completed by licenced surveyor. The use of RTK DGPS equipment provided sub metre accuracy in the X/Y/Z plane. In some cases the initial reconnaissance drilling that was surveyed using hand held GPS units with a reduced vertical accuracy were projected to a relevant DEM such as ALOS or SRTM. Collar elevations at Atacama and Jacinth/Ambrosia were obtained from photogrammetric Digital Elevation Models (DEM). Drill hole positions at Jacinth/Ambrosia were also supplemented by data from the Mine Survey Department. Elevations at Sonoran and Typhoon were obtained from the Advanced Land Observing Satellite (ALOS) DEM.
	Specification of the grid system used.	The Eucla Basin HM deposits utilise local grid systems which were generated from either single point transformation incorporating a rotation or two point transformations from the regional MGA (Zone 53) coordinates.
	Quality and adequacy of topographic control.	For the mineral resources supporting mining operations (Jacinth and Ambrosia, and also Atacama), the topographic control is drawn from photogrammetric mapping which provides detailed topography with +/- 0.25 m resolution. For other HM deposits in the Eucla Basin the drill collars were projected to ALOS (Advanced Land Observing Satellite) or SRTM DEM's providing an RL accuracy of +/-2 m. Drill collars were projected to this surface to provide accurate elevation control for the resource estimation. This provided appropriate relational control of the RL's of drill holes relative to each other and place the mineralisation at a correct level with respect to the surface.

Criteria	JORC Code explanation	Commentary
Data spacing and distribution	*Data spacing for reporting of Exploration Results.* *Whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied.* *Whether sample compositing has been applied.*	The dominant drill pattern for the HM deposits varies with some closer spaced drilling completed in selected areas. Broader spaced drilling is 400mx50mx1m at Atacama, with closer spaced drilling 200m/100mx50/25mx1m at the other deposits. Drill spacing is deemed sufficient to conclusively demonstrate continuity of mineralisation and is appropriate for the style of mineralisation and the Resource Classification applied. No compositing of sample grades has been done for the interpolation of HM and Slimes. Samples have been composited for further metallurgical testing to determine mineral assemblage, quality and sizing of geologically determined domains.
Orientation of data in relation to geological structure	*Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.* *If the relationship between the drilling orientation and the orientation of key mineralised structures is considered to have introduced a sampling bias, this should be assessed and reported if material.*	No bias has been identified or expected as drilling has been conducted effectively perpendicular to the mineralisation. No orientation based sampling bias has been identified within the data.
Sample security	*The measures taken to ensure sample security.*	Samples were collected in polyweave bags and transported to the laboratory for analysis with appropriate sample dispatch documentation. The dispatch inventory was audited against the samples delivered to the laboratory. Samples were stored at secure Iluka compounds when not in transport.
Audits or reviews	*The results of any audits or reviews of sampling techniques and data.*	No external reviews were conducted for the drilling and sampling carried out in the Eucla Basin. The method used by Iluka has been reviewed by Snowden Mining Consultants during drilling operations at other Iluka sites.

Section 2 Reporting of Exploration Results

(Criteria listed in the preceding section also apply to this section.)

Criteria	JORC Code explanation	Commentary
Mineral tenement and land tenure status	*Type, reference name/number, location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environmental settings.* *The security of the tenure held at the time of reporting along with any known impediments to obtaining a licence to operate in the area.*	The Eucla Basin HM deposits are located either within Mining Licences (Jacinth / Ambrosia), Exploration Licences (Atacama, Sonoran and Typhoon) or Retention Licence (Tripitaka). All these licences are 100% owned by Iluka Resources Ltd. The licences are located within the Yellabina Regional Reserve except for the Retention Licence over the Tripitaka HM deposit. Iluka has also negotiated agreements with the Far West Coast Native Title claimants for the mining of the Jacinth/Ambrosia HM deposits. Iluka Resources retains 100% ownership of all exploration and mining licences that host the HM deposits. There is no known impediment for any future work, however a Native Title agreement will need to be finalised before mining can be undertaken at other deposits.
Exploration done by other parties	*Acknowledgment and appraisal of exploration by other parties.*	There is no exploration by other parties relevant to the discovery or development of the Eucla Basin HM deposits.
Geology	*Deposit type, geological setting and style of mineralisation.*	The HM deposits are located within the Eucla Basin and consists of both beach deposited HM strands and wash-over deposits within back-barrier facies marine sands. The host marine sand unit overlays older fluvial sediments and is overlain by varying thickness of recent aeolian dessert dune sand.
Drill hole Information	*A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all Material drill holes:* *easting and northing of the drill hole collar* *elevation or RL (Reduced Level – elevation above sea level in metres) of the drill hole collar* *dip and azimuth of the hole* *down hole length and interception depth*	The HM resource dataset comprises in excess of 240,000 m of RCAC drilling and some 170,000 drill assay results. Therefore it is considered impractical to tabulate all the drill results. A summary of representative HM intersections is provided for Atacama, Jacinth and Sonoran in the main text. The significance of the mineralised intercepts is superseded by the estimation of the mineral resources which consider all of the assay data available.

Criteria	JORC Code explanation	Commentary
	hole length. *If the exclusion of this information is justified on the basis that the information is not Material and this exclusion does not detract from the understanding of the report, the Competent Person should clearly explain why this is the case.*	
Data aggregation methods	*In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (eg cutting of high grades) and cut-off grades are usually Material and should be stated.* *Where aggregate intercepts incorporate short lengths of high grade results and longer lengths of low grade results, the procedure used for such aggregation should be stated and some typical examples of such aggregations should be shown in detail.* *The assumptions used for any reporting of metal equivalent values should be clearly stated.*	Not considered applicable, no weighting or cutting of assay data has been undertaken for HM deposits in the Eucla Basin. No aggregation of samples was required for HM deposits in the Eucla Basin. No metal equivalents are used in the reporting of HM mineralisation.
Relationship between mineralisation widths and intercept lengths	*These relationships are particularly important in the reporting of Exploration Results.* *If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported.* *If it is not known and only the down hole lengths are reported, there should be a clear statement to this effect (e.g. 'down hole length, true width not known').*	All exploration holes have been drilled vertically which is perpendicular to the mineralisation. As such all down-hole intersections represent the true width (thickness) of the mineralisation.
Diagrams	*Appropriate maps and sections (with scales) and tabulations of intercepts should be included for any significant discovery being reported These should include, but not be limited to a plan view of drill hole collar locations and appropriate sectional views.*	Representative plans and cross-sections depicting the location of drill holes in relation to the mineralisation and Iluka Tenements are presented in the main text.
Balanced reporting	*Where comprehensive reporting of all Exploration Results is not practicable, representative reporting of both low and high grades and/or widths should be practiced to avoid misleading reporting of Exploration Results.*	This is not considered applicable as the resource estimation process considers all data values.
Other substantive	*Other exploration data, if meaningful and material, should be*	Logging of the samples includes visually estimating the HM present, the

Criteria	JORC Code explanation	Commentary
exploration data	*reported including (but not limited to): geological observations; geophysical survey results; geochemical survey results; bulk samples – size and method of treatment; metallurgical test results; bulk density, groundwater, geotechnical and rock characteristics; potential deleterious or contaminating substances.*	results of which corroborate the presence of HM mineralization. Composite samples have been taken either from the sand residue fractions of exploration samples or HM sink fractions from the HM determinations which also corroborate the validity of the HM mineralisation. The composited samples generate between approximately 0.5 and 2 kg of HM from wet tabling which is then subjected to a process of magnetic, electrostatic and heavy liquid separation followed with XRF analysis of the fractions to determine the mineral assemblage and mineral quality. The bulk density applied is the Iluka Standard Bulk Density formula applied to all resource models in the Eucla Basin. The calculation of the BD takes into account the weight percent of: HM, sand and slimes. The formula used accounts for the ratio of HM and Quartz present in a sample and the weight percentage of clay which can be added to that sample without changing the volume that sample occupies to account for void space. All of the mineralisation within the Eucla Basin HM deposits occurs above the water table No deleterious or potentially deleterious or contaminating substances have been identified in the HM deposits.
Further work	*The nature and scale of planned further work (e.g. tests for lateral extensions or depth extensions or large-scale step-out drilling).* *Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.*	No further resource drilling is required at this stage for the Eucla Basin HM deposits. If future feasibility studies are undertaken then additional infill drilling will be carried out in a timely manner to improve the confidence in these Mineral Resources as required. No extensions to the current mineralisation have been considered, no further drilling is planned at this time.

Section 3 Estimation and Reporting of Mineral Resources

(Criteria listed in section 1, and where relevant in section 2, also apply to this section.)

Criteria	JORC Code explanation	Commentary
Database integrity	*Measures taken to ensure that data has not been corrupted by, for example, transcription or keying errors, between its initial collection and its use for Mineral Resource estimation purposes.* *Data validation procedures used.*	Logging of RCAC samples was input directly into a laptop computer using Micromine software with data verification routines enabled. Data was then transferred into Iluka's Geology Database at the time (custom tailored geological data management system based on a SQL database) which incorporated further verification routines. Assay data was stored in Iluka's CCLAS laboratory database at the time of analysis and transferred electronically to the Geology Database. Drill data was reviewed to ensure: • there were no duplicate records or missing intervals; • the sum of the analytes added to 100% or within rounding limits; • results were within valid ranges; and • the data was in spatially valid locations.
Site visits	*Comment on any site visits undertaken by the Competent Person and the outcome of those visits.* *If no site visits have been undertaken indicate why this is the case.*	Several Iluka Competent Persons including Rohan Cobcroft and Brett Gibson have visited deposits since their discovery. No issues in relation to the visits were noted that would materially impact on the Mineral Resource estimates
Geological interpretation	*Confidence in (or conversely, the uncertainty of) the geological interpretation of the mineral deposit.* *Nature of the data used and of any assumptions made.* *The effect, if any, of alternative interpretations on Mineral Resource estimation.*	The interpreted mineralisation in the Eucla Basin includes narrow strand style and wide wash-over style depositional models. Drill hole spacing at each deposit, while not necessarily definitively resolving individual strand continuity (in all cases), does demonstrate continuity between sections and therefore it can be reasonably assumed for this style of mineralisation. The style of mineralisation is common to many Mineral Sands deposits and style of mineralisation is well understood. All relevant information has been sourced from the drill samples and the interpretations have developed over successive drill campaigns which have included both in-fill drilling within known resources and extensions on the margins of the known deposits. Areas of Atacama were identified where alternative interpretations of mineral orientation could occur. While these will only have a minor impact on the resource estimate, the uncertainty has been taken into account when assigning the JORC Code

Criteria	JORC Code explanation	Commentary
		classification.
	The use of geology in guiding and controlling Mineral Resource estimation.	Appropriate geological domaining and corresponding flagging of drill data has been used to control grade interpolation and distribution during resource estimation.
	The factors affecting continuity both of grade and geology.	No factors are known which might affect the continuity of the geology. Sufficient drilling has been undertaken to confirm the grade continuity and the resource category (as defined in the JORC Code) awarded. Induration is prevalent in some parts of the HM deposits in the Eucla Basin. This has been taken into consideration by applying appropriate penalties to the HM grade based on the severity of the induration.
Dimensions	*The extent and variability of the Mineral Resource expressed as length (along strike or otherwise), plan width, and depth below surface to the upper and lower limits of the Mineral Resource.*	The Eucla Basin HM deposits have a strike length from 3 km to 15 km, a strike width of 1.5 km to 6.5 km and are located at depths of 0 m to 65 m. Invariably the deposits comprise numerous smaller mineral accumulations representing favourable environmental conditions for deposit formation.
Estimation and modelling techniques	*The nature and appropriateness of the estimation technique(s) applied and key assumptions, including treatment of extreme grade values, domaining, interpolation parameters and maximum distance of extrapolation from data points. If a computer assisted estimation method was chosen include a description of computer software and parameters used.*	The grade interpolation was carried out using the Estima Superprocess within Datamine Studio software. Grade estimation was completed using Inverse Distance Cubed (ID3) which is an Iluka standard and is deemed appropriate for this style of mineralisation. Mineralogical bulk sample composite Identifier and Hardness values were interpolated using Nearest Neighbour (NN) method. Drill hole sample data was flagged with domain codes corresponding to the geology of the deposit and the domains imprinted on the block model from 3-dimensional surfaces generated from the geological and mineralisation interpretations. Primary search dimensions used were selected relevant to the style of mineralisation and the drill density (X*Y*Z). Successive search volume factors were also adopted to interpolate grade in areas of lower data density. Search dimensions and search volume factors for each Eucla Basin deposit are included in main text.
	The availability of check estimates, previous estimates and/or mine production records and whether the Mineral Resource estimate takes appropriate account of such data.	Detailed comparisons were made with the previous estimate to identify the areas where discrepancies occurred and whether they were due to additional drilling or changes in the interpretation or modelling methodology. Comparison estimates were undertaken using the Nearest

Criteria	JORC Code explanation	Commentary
		Neighbour interpolation for each deposit which correlated well, with near identical global estimates produced.
	The assumptions made regarding recovery of by-products.	No by products have been considered as part of this estimate. No deleterious elements have been identified or included in the resource estimation process.
	Estimation of deleterious elements or other non-grade variables of economic significance (e.g. sulphur for acid mine drainage characterisation). *In the case of block model interpolation, the block size in relation to the average sample spacing and the search employed.*	The parent cell size used in the block modelling of the Eucla Basin Deposits varied from 25 to 50 m in the X direction, 50 to 200 m in the Y direction and 1 m in the Z direction (vertical) and principally reflects the a parent cell size approximately half the X/Y drill spacing. The search distances adopted reflect the spatial distribution of the exploration data with the dimensions being set to about 2 times the drill hole spacing. The anisotropy of the search distances typically reflect the variation in spacing of data in the X/Y/Z directions and are also supported by geostatistical analysis such as variography. Cell splitting varies with deposit from 1*1*10 (X*Y*Z) to 5*2*10 depending on the predominant drill and sample spacing of the deposit. Subcelling has been used to define boundaries and assist in accurately determining volumes.
	Any assumptions behind modelling of selective mining units.	If the other HM deposits are to be mined on completion of Jacinth it is assumed that bulk open cut mining techniques would continue to be employed.
	Any assumptions about correlation between variables.	No correlation between variables has been considered. Appropriate geological domaining and corresponding flagging of drill data and model cells has been used to control mineralisation estimation during resource estimation.
	Description of how the geological interpretation was used to control the resource estimates.	Drill hole sample data was flagged with domain codes corresponding to the geology of the deposit and the domains imprinted on the model from 3-dimensional surfaces generated from the geological and mineralisation interpretations. Only drill data with the corresponding domain flagging has been used in the interpolation of grades into the respective model domain. A top cut was not deemed necessary for HM assays following evaluation of the sample assay statistics and consideration of the extent and consistency of the relatively high sample grades.

Criteria	JORC Code explanation	Commentary
	Discussion of basis for using or not using grade cutting or capping. *The process of validation, the checking process used, the comparison of model data to drill hole data, and use of reconciliation data if available.*	Validation of the modelling and mineral resource estimation included: • a visual review of the input assay grades compared to the model grade; • comparison statistics for the input assays compared to the model grades on a domain basis; and • generation of a NN grade interpolation for comparison and corroboration purposes. Any issues detected during the validation process were fixed immediately. Mining of the Jacinth Deposit had been in progress for 6 years before idling in April 2016. While mining shows a slight overcall of HM there has been no justification to apply any reconciliation to other deposits at this point in time.
Moisture	*Whether the tonnages are estimated on a dry basis or with natural moisture, and the method of determination of the moisture content.*	The tonnages are estimated on a dry basis using an Iluka proprietary density formula. The formula is considered appropriate and is used at other Iluka deposits which are geologically similar and currently being mined for HM.
Cut-off parameters	*The basis of the adopted cut-off grade(s) or quality parameters applied.*	The cut-off grade for the Eucla Basin HM deposits varies from 0.5% for the high value, zircon dominated assemblage encountered at Tripitaka, to 3% for the lower value Ilmenite dominated deposits of Typhoon, Sonoran and Atacama. The cut-off grade applied is based on the results of optimisation studies and operational experience at current Iluka mine sites. In addition the following factors are used in assessing valid resource mineralisation: • The style and extent of the mineralisation; and • Reasonable prospects for eventual economic extraction by considering grade*thickness to depth of burial ratios.
Mining factors or assumptions	*Assumptions made regarding possible mining methods, minimum mining dimensions and internal (or, if applicable, external) mining dilution. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential mining methods, but the assumptions made regarding*	Mining at HM deposits outside of Jacinth is likely to be by open cut mining using suitable excavation machinery akin to that used at Jacinth. The geometry of the Eucla Basin deposits makes them amenable to bulk open cut mining methods currently employed in other open cut mines operated by Iluka. The unconsolidated nature of the sediments allow for a range of

Criteria	JORC Code explanation	Commentary
	mining methods and parameters when estimating Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the mining assumptions made.	options to be considered including the use of scrapers or large scale truck and shovel, or dozer trap.
Metallurgical factors or assumptions	*The basis for assumptions or predictions regarding metallurgical amenability. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential metallurgical methods, but the assumptions regarding metallurgical treatment processes and parameters made when reporting Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the metallurgical assumptions made.*	Nature and grain size of mineralisation is geologically consistent with mineral sands deposits that are currently being mined by Iluka Resources and is confirmed through mining of the Jacinth Deposit since 2009. No issues have been identified by the exploration and metallurgical testwork carried out to date. Further metallurgical testing is required to confirm the best methods for optimal mineral recovery at the deposits that will be mined in the future.
Environmen-tal factors or assumptions	*Assumptions made regarding possible waste and process residue disposal options. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider the potential environmental impacts of the mining and processing operation. While at this stage the determination of potential environmental impacts, particularly for a greenfields project, may not always be well advanced, the status of early consideration of these potential environmental impacts should be reported. Where these aspects have not been considered this should be reported with an explanation of the environmental assumptions made.*	Preliminary environmental studies have been undertaken and no environmental constraints have been identified. It is envisaged that mining would proceed under an appropriate environmental management plan similar to that imposed at the current Jacinth mine site. A Native Title mining agreement has not yet been secured for the deposits outside Jacinth/Ambrosia mining area. Negotiations with the relevant Native Title groups have been initiated, but mining in these other deposits would be unable to proceed unless an agreement is reached. It is assumed that the potential environmental constraints on mining could be assumed to be similar as for the nearby Jacinth Operations which are also located within the Yellabinna Regional Reserve.
Bulk density	*Whether assumed or determined. If assumed, the basis for the assumptions. If determined, the method used, whether wet or dry, the frequency of the measurements, the nature, size and representativeness of the samples.* *The bulk density for bulk material must have been measured by methods that adequately account for void spaces (vugs, porosity, etc), moisture and differences between rock and alteration zones within the deposit.*	The bulk density values are calculated using an Iluka proprietary density formula. The formula is considered appropriate and is used at other Iluka deposits which are geologically similar and currently being mined for HM. The formula has been developed from studies undertaken in geologically similar HM deposits being mined in Western Australia. The formula is considered valid as it takes into account the sand, HM and clay components. It also allows for potential void space within the sand based on expected "filling" of the void space by the fine clay content. All tonnages are expressed as on dry tonnage basis. It is assumed that the material in the Eucla Basin HM deposits has the

Criteria	JORC Code explanation	Commentary
	Discuss assumptions for bulk density estimates used in the evaluation process of the different materials.	same density relationship that is seen in Iluka deposits that are currently being mined. This assumption is considered valid as the deposit is geologically similar to the nearby Jacinth deposit for which the performance of the density formula has been validated using the Nuclear Density Measurement technique.
Classification	*The basis for the classification of the Mineral Resources into varying confidence categories.* *Whether appropriate account has been taken of all relevant factors (ie relative confidence in tonnage/grade estimations, reliability of input data, confidence in continuity of geology and metal values, quality, quantity and distribution of the data).* *Whether the result appropriately reflects the Competent Person's view of the deposit.*	The resource classification applied to the Eucla Basin HM deposits is based on various factors including but not limited to: • data density of primary HM assays; • degree of continuity of mineralisation and geological units; • Mineralogical bulk data; • assessment of the integrity of the data; and • level of QA/QC support The QA/QC data associated with the Eucla Basin samples demonstrate the high quality of the assay data set which is solely sourced from recent RCAC drilling and using a single assay methodology. The reported resources for each deposit exclude portions of the deposits which are deemed to contain in-sufficient HM to justify the removal of the overburden at foreseeable product prices or may contain significant indurated material. It is the view of the Competent Person that the frequency and integrity of data, and the resource estimation methodology are appropriate for this style of mineralisation and support the Resource Classifications applied to each Eucla Basin HM deposit.
Audits or reviews	*The results of any audits or reviews of Mineral Resource estimates.*	Iluka policy guidelines dictate that Mineral Resources being announced for the first time or being used to support feasibility studies are both internally and externally reviewed. External audits were completed on maiden resource estimates for Ambrosia, Jacinth and Sonoran. No external audits have been deemed necessary for some of the satellite deposits (Atacama, Typhoon, and Tripitaka) at this point in time. No issues of significance were identified by the external reviews that have been carried out to date and the resource

Criteria	JORC Code explanation	Commentary
		estimate and supporting documentation were deemed appropriate. Internal audit processes within Iluka have assisted in the development of all the resource estimates for the Eucla Basin HM Deposits.
Discussion of relative accuracy/ confidence	*Where appropriate a statement of the relative accuracy and confidence level in the Mineral Resource estimate using an approach or procedure deemed appropriate by the Competent Person. For example, the application of statistical or geostatistical procedures to quantify the relative accuracy of the resource within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors that could affect the relative accuracy and confidence of the estimate.* *The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnages, which should be relevant to technical and economic evaluation. Documentation should include assumptions made and the procedures used.* *These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.*	A Measured, Indicated or Inferred Resource Classification has been assigned to the deposits as per the guidelines set out in the Australasian Code for the Reporting of Exploration Results, Mineral Resources and Ore reserves – The JORC Code (2012 Edition). The category applied reflects the confidence in the Mineral Resource estimate. The statement refers to global estimates of tonnage and grade. Mining is currently idled at the Jacinth Deposit in the Eucla Basin. However, when active, monthly or quarterly and yearly reconciliations have been completed. Iluka has considerable experience in reconciliation of its Mineral Resources and Ore Reserves. Actual results generally indicate very good agreement with the geological model and close reconciliation with HM tonnes, ore tonnes and HM percentage head grade. The risk of not achieving good physical Ore Reserve reconciliation is considered to be low.

Section 4 Estimation and Reporting of Ore Reserves

(Criteria listed in section 1, and where relevant in sections 2 and 3, also apply to this section.)

Criteria	JORC Code explanation	Commentary
Mineral Resource estimate for conversion to Ore Reserves	*Description of the Mineral Resource estimate used as a basis for the conversion to an Ore Reserve.* *Clear statement as to whether the Mineral Resources are reported additional to, or inclusive of, the Ore Reserves.*	The 2016 Ore Reserve estimate is based the Mineral Resource model described as Datamine model "mjatot13.dm" which has previously been reviewed and approved by an Iluka Resources Limited (Iluka) Competent Person (CP). Ore Reserves comprise the material reported as a sub-set of the Mineral Resource.
Site visits	*Comment on any site visits undertaken by the Competent Person and the outcome of those visits.* *If no site visits have been undertaken indicate why this is the case.*	Iluka CPs regularly visits the Jacinth Ambrosia mine site to assist in production planning, optimisation and reconciliation. During those visits no matters were observed that would impact the estimation of the Ore Reserves.
Study status	*The type and level of study undertaken to enable Mineral Resources to be converted to Ore Reserves.* *The Code requires that a study to at least Pre-Feasibility Study level has been undertaken to convert Mineral Resources to Ore Reserves. Such studies will have been carried out and will have determined a mine plan that is technically achievable and economically viable, and that material Modifying Factors have been considered.*	A Definitive Feasibility Study (DFS) was completed for the Jacinth-Ambrosia Project in July 2008. Mining and processing commenced on site late in 2009. Additional optimisation work and pit designs were undertaken in February 2014 to update Ore Reserves based on changed Modifying Factors (mainly product prices). The DFS contains a technically achievable mine plan, which also displays attractive financial characteristics on the key metrics that Iluka uses to assess project development decisions, including IRR, NPV and payback. Historic operational factors have been assessed, material Modifying Factors have been considered and a detailed financial analysis completed. As a consequence of supply and demand, mining and concentrating were idled in April 2016 however a heavy mineral concentrate (HMC) stockpile continues to be processed and product sold into the market.
Cut-off parameters	*The basis of the cut-off grade(s) or quality parameters applied.*	The cut-off grade has been calculated using optimization software and an individual cut-off grade applied to each block within the model. The calculations consider overall HM grade and individual assemblage product values, operating costs, recoveries and modifying factors. An economic optimization is performed to determine if a block is viable to mine, and therefore be included in the Ore Reserves.
Mining factors	*The method and assumptions used as reported in the Pre-Feasibility*	Pit Optimisation was conducted by Iluka personnel using MineMap mine

Criteria	JORC Code explanation	Commentary
or assumptions	*or Feasibility Study to convert the Mineral Resource to an Ore Reserve (i.e. either by application of appropriate factors by optimisation or by preliminary or detailed design).* *The choice, nature and appropriateness of the selected mining method(s) and other mining parameters including associated design issues such as pre-strip, access, etc.* *The assumptions made regarding geotechnical parameters (eg pit slopes, stope sizes, etc), grade control and pre-production drilling.* *The major assumptions made and Mineral Resource model used for pit and stope optimisation (if appropriate).* *The mining dilution factors used.* *The mining recovery factors used.* *Any minimum mining widths used.* *The manner in which Inferred Mineral Resources are utilised in mining studies and the sensitivity of the outcome to their inclusion.* *The infrastructure requirements of the selected mining methods.*	planning software assuming the whole deposit was accessible and could be mined. Pit designs were then undertaken and any exclusion areas were removed from the reserve during the design process. As the project has been in operations since 2009 annual reserves have been depleted by mining. Process flow assumptions for optimisation include: ore being fed into in-pit Mining Unit Plant (MUP) to remove oversize and to slurry the remaining ore which is then pumped to the Wet Concentrator Plant (WCP). De-sliming occurs at the WCP and a HMC is produced via wet gravity separation. The mining by products pumped to the pre-mined pit or surface stockpiles. The HMC is stockpiled, dewatered and air dried adjacent to the WCP, before being transported to the Narngulu Mineral Separation Plant (MSP); where wet and dry processing using screening, magnetic, electrostatic and gravity separation circuits to separate valuable from non-valuable minerals and to make different grades of zircon, rutile, leucoxene and ilmenite; ilmenite upgrade through Synthetic Rutile (SR) plant and truck finished products to port. The dozer trap ore mining method used at Jacinth has successfully operated since start of operations in 2009. Overburden is removed using conventional truck and excavator mining methods. Geotechnical parameters for the project have been determined by test work and studies and confirmed during operations. The pit wall is composed of two distinct lithologies, the lower slopes of the pit are located in the tertiary sands which are dominantly low in fines, dry and free running; the upper slopes are in red loams or brown loams that are relatively competent. Pit wall angles have been recommended by geotechnical engineers for 6 different areas in Jacinth and globally in Ambrosia. Recommended wall angles are 26.5 degrees in tertiary sands and 45 to 55 degrees in the upper profiles. A safety berm of three metres is recommended for 5 of the 6 areas. The overall slope angles for the different areas vary from 29 degrees to 31 degrees.

Criteria	JORC Code explanation	Commentary
		The Mineral Resource model used for pit optimisation is mjatot13.dm (Datamine model). No mining dilution factors have been used and reflect Iluka experience in such a thick orebody. Recovery factors have been applied to all stages of mining including: mining unit; concentrator; Mag and Non Mag mineral processing plants. These are based on detailed metallurgical test work, actual data and experience within Iluka. A 50 m minimum mining width has been assumed for pit design purposes. Inferred Mineral Resources are not reported in the Ore Reserve. The DFS considered the infrastructure requirements associated with the mining methods selected including administration buildings, workforce accommodation, power supply, water supply, communications, workshops and stores including fuel and lubrication facilities tails storage facilities, site access roads, weighbridge, light vehicle fleet, contract mining fleet, haulage fleet, port and shipping, MUP's, screen plants, WCP, MSP's and Synthetic Rutile (SR) Plant.
Metallurgical factors or assumptions	*The metallurgical process proposed and the appropriateness of that process to the style of mineralisation.* *Whether the metallurgical process is well-tested technology or novel in nature.* *The nature, amount and representativeness of metallurgical test work undertaken, the nature of the metallurgical domaining applied and the corresponding metallurgical recovery factors applied.* *Any assumptions or allowances made for deleterious elements.* *The existence of any bulk sample or pilot scale test work and the degree to which such samples are considered representative of the orebody as a whole.* *For minerals that are defined by a specification, has the ore reserve estimation been based on the appropriate mineralogy to meet the*	The metallurgical process has been utilized in Iluka operations for many years. The ore slurry is screened initially to remove oversize material, de-slimed through cyclones with the remaining sand pumped over spirals to concentrate the HM. The HMC is transported to a MSP where magnetic minerals are separated from the non-magnetic, and then various electrostatic and gravity separation techniques are used to produce saleable mineral products ilmenite, rutile and zircon. Ilmenite is magnetic and conductive, rutile is non-magnetic and conductive and zircon is non-magnetic and non-conductive. The metallurgical separation process utilizes known technology where the performance and recovery of mineral products has been established by the company. The metallurgical process is well-tested and commonly used in similar operations worldwide. There were two major test work programs completed during the DFS for the MUP and Mining By-Products (MBP). The mineral separation program

Criteria	JORC Code explanation	Commentary
	specifications?	for the WCP was completed in the PFS. Jacinth HMC is washed to release the dried salt before processing. The brine solution is disposed of into evaporative ponds located at the Narngulu SR plant. Metallurgical test work to date and experience since operations began in 2009 has shown that the Jacinth-Ambrosia zircon can be processed to specifications which classify as a premium grade product. The mineral assemblage and metallurgical separation characteristics are regarded as well understood and the mineral is amenable to processing and separation by conventional equipment. The Ore Reserve estimate is based on the appropriate mineralogy to meet all product specifications.
Environmen-tal	*The status of studies of potential environmental impacts of the mining and processing operation. Details of waste rock characterisation and the consideration of potential sites, status of design options considered and, where applicable, the status of approvals for process residue storage and waste dumps should be reported.*	The Jacinth-Ambrosia minesite has been operational since 2009. All environmental, heritage and tenure approvals required under State and Commonwealth legislation were granted prior to operations commencing. In 2015, site environmental regulations were updated in a South Australian government approved Program for Environmental Protection and Rehabilitation (PEPR). This process was undertaken to supercede the Mining and Rehabilitation Plan with learnings gained since operations commenced and to consolidate approved variations.
Infrastructure	*The existence of appropriate infrastructure: availability of land for plant development, power, water, transportation (particularly for bulk commodities), labour, accommodation; or the ease with which the infrastructure can be provided, or accessed.*	The site is located in a remote location approximately 200 kms north-west of Ceduna in South Australia, or 270km from Ceduna by road. Conditions are arid. Twenty mineral claims have been granted for the mining area and one mining lease application over the same area. The Mining Lease Application was registered on 4 December 2005 and covers an area of 4500 Ha. It was not economical to extend the high voltage electrical network to supply the site and therefore energy is produced via a power station centrally located at site. The Jacinth-Ambrosia site includes a borefield (located approximately

Criteria	JORC Code explanation	Commentary
		32km from the minesite) designed to extract and supply water for processing. A portion of the raw water conveyed from the borefield requires pre-treatment before it is suitable for use in processing or as potable water. An existing public road was suitably upgraded for transport of HMC by triple road trains. An unsealed airstrip 2.1 km long was constructed to service the remote site. The Jacinth-Ambrosia Operation encourages employment from the local area. An extensive Native Title Agreement has been developed to ensure the appropriate management of the area and includes employment and training of indigenous persons. A 200 person mining camp/operations village was constructed for the project.
Costs	*The derivation of, or assumptions made, regarding projected capital costs in the study.* *The methodology used to estimate operating costs.* *Allowances made for the content of deleterious elements.* *The source of exchange rates used in the study.* *Derivation of transportation charges.* *The basis for forecasting or source of treatment and refining charges, penalties for failure to meet specification, etc.* *The allowances made for royalties payable, both Government and private.*	Capital costs in the DFS were estimated on the basis of detailed engineering studies. The project is an operating mine and the assumptions made during the DFS have been replaced by an Iluka maintained business model using standard cost centres and cost elements which are used for annual budgeting purposes and monthly reporting. Cost and recovery penalties are applied to deleterious elements. Iluka monitors a range of recognised external forecasters of foreign exchange rates but ultimately the exchange rates applied are an Iluka assessment. Transportation charges have been procured from contractors. Treatment costs are based on actual Iluka operational costs, including overheads. Allowances have been made for royalties payable to Government and private stakeholders. Due to commercial sensitivities payments to private stakeholders are not detailed.

Criteria	JORC Code explanation	Commentary
Revenue factors	*The derivation of, or assumptions made regarding revenue factors including head grade, metal or commodity price(s) exchange rates, transportation and treatment charges, penalties, net smelter returns, etc.* *The derivation of assumptions made of metal or commodity price(s), for the principal metals, minerals and co-products.*	Commodity price assumptions are established internally based on monitoring supply and demand on an ongoing basis. Price assumptions are benchmarked against commercially available price forecasts by industry observers. Revenue factors are used to establish pit sensitivities and to test for robustness of the Ore Reserve. Detailed price assumptions are deemed to be commercially sensitive and are not disclosed.
Market assessment	*The demand, supply and stock situation for the particular commodity, consumption trends and factors likely to affect supply and demand into the future.* *A customer and competitor analysis along with the identification of likely market windows for the product.* *Price and volume forecasts and the basis for these forecasts.* *For industrial minerals the customer specification, testing and acceptance requirements prior to a supply contract.*	The zircon market entered 2016 with demand characteristics similar to 2015. 2016 was the fourth consecutive year Iluka's sales volumes have averaged around 350 thousand tonnes. End demand in 2016 remained variable across sectors and geographical markets. Elevated inventories of zircon sand were held by producers at the commencement of the year and during the first half 2016. However, inventory of zircon sand and opacifier held at the direct customer level was minimal as customers sought to benefit from declining prices. In Iluka's assessment, there was a material destocking of the producer supply chain over the course of 2016, with market information that some zircon suppliers had fully committed their volumes or were having difficulties in filling some customer orders. Market conditions in the latter part of the year provided encouraging indications for 2017 in terms of the potential for demand and/or price recovery. High grade titanium feedstock market conditions for pigment, the main end sector for the high grade feedstocks of rutile, synthetic rutile and slag, improved towards the end of 2015 and continued to improve through 2016. Most of Iluka's rutile and synthetic rutile volumes in 2016 were contracted (volume and price). The weighted average rutile price Iluka received over 2016 remained relatively stable compared with the 2015 average. Ilmenite sales in 2016 were down from 2015 reflecting the idling of the US operations and utilisation of Australian ilmenites as feedstock for SR

Criteria	JORC Code explanation	Commentary
		production. Iluka establishes short, medium and long term contractual agreements with customers and these reflect the pricing and volume forecasts adopted. Contracts and agreements pertaining to the Jacinth-Ambrosia project and the wider company are confidential. Laboratory Southwest provides internal testing for Iluka clients. Clients are provided with reports in accordance with their specifications. Reasonable access is provided at all times to representatives of a customer to verify conformance of service with their requirements.
Economic	*The inputs to the economic analysis to produce the net present value (NPV) in the study, the source and confidence of these economic inputs including estimated inflation, discount rate, etc.* *NPV ranges and sensitivity to variations in the significant assumptions and inputs.*	Macro-economic assumptions used in the economic analysis of the mineral sands reserves such as foreign exchange, inflation and discount rates have been internally generated and determined through detailed analysis by Iluka and benchmarked against commercially available consensus data where applicable. The price assumptions are internally generated and are based on detailed supply and demand modelling. The price assumptions have also been benchmarked against commercially available consensus price forecasts. The detail of that process is commercially sensitive and is not disclosed. Sensitivity analysis is undertaken on key economic assumptions such as price and exchange rates to ensure the reserves remain economic.
Social	*The status of agreements with key stakeholders and matters leading to social licence to operate.*	The Jacinth-Ambrosia minesite has been operational since 2009. All environmental, heritage and tenure approvals required under State and Commonwealth legislation have been achieved. Iluka is committed to ongoing consultation with its stakeholders to achieve sustained mutual benefits for the life of the project. Ongoing consultation has and will continue to occur with Iluka, residents and communities, government (State and Local), development boards, Indigenous groups and local business owners and operators.

Criteria	JORC Code explanation	Commentary
Other	*To the extent relevant, the impact of the following on the project and/or on the estimation and classification of the Ore Reserves:* *Any identified material naturally occurring risks.* *The status of material legal agreements and marketing arrangements.* *The status of governmental agreements and approvals critical to the viability of the project, such as mineral tenement status, and government and statutory approvals. There must be reasonable grounds to expect that all necessary Government approvals will be received within the timeframes anticipated in the Pre-Feasibility or Feasibility study. Highlight and discuss the materiality of any unresolved matter that is dependent on a third party on which extraction of the reserve is contingent.*	No identifiable naturally occurring risks have been identified to impact the Ore Reserves. Legal agreements and government approvals are in place to allow the continued extraction of the remaining Ore Reserves. In July 2008 Iluka was granted a Mineral Lease (ML), Extractive Mineral Lease (EML) and two, Miscellaneous Purposes Licences (MPL) to facilitate the operations of the Jacinth-Ambrosia Mining Project.
Classification	*The basis for the classification of the Ore Reserves into varying confidence categories.* *Whether the result appropriately reflects the Competent Person's view of the deposit.* *The proportion of Probable Ore Reserves that have been derived from Measured Mineral Resources (if any).*	Measured Resources are converted to Proved Reserves and Indicated Resources are converted to Probable Reserves. Inferred Resources are not included in the reported Ore Reserve. The Ore Reserves consist of 97% Proved Reserves and 3% Probable Reserves The Competent Person is satisfied that the stated Ore Reserve classification reflects the outcome of technical and economic studies taking into account depletion due to mining. No Measured Mineral Resources have been converted to Probable Ore Reserves.
Audits or reviews	*The results of any audits or reviews of Ore Reserve estimates.*	Regular internal reconciliations and audits are conducted to reconcile production volumes to reserve depletion. These audits and reconciliations have confirmed the accuracy of the Ore Reserve estimate.
Discussion of relative accuracy/ confidence	*Where appropriate a statement of the relative accuracy and confidence level in the Ore Reserve estimate using an approach or procedure deemed appropriate by the Competent Person. For example, the application of statistical or geostatistical procedures to quantify the relative accuracy of the reserve within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors which could affect the relative*	Jacinth is an on-going operation and as such there is the opportunity to compare the Ore Reserves estimation with actual production data with the monthly reconciliation process. The historical results show that actual HM tonnage estimations are generally within 10% of the block model. The risk of not achieving good physical Ore Reserve reconciliation is considered to be low. This is indicative of a robust estimation process.

Criteria	JORC Code explanation	Commentary
	accuracy and confidence of the estimate. *The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnages, which should be relevant to technical and economic evaluation. Documentation should include assumptions made and the procedures used.* *Accuracy and confidence discussions should extend to specific discussions of any applied Modifying Factors that may have a material impact on Ore Reserve viability, or for which there are remaining areas of uncertainty at the current study stage.* *It is recognised that this may not be possible or appropriate in all circumstances. These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.*	Operational metallurgical experience, relevant test work and Iluka's experience supports the view that metallurgical risk is low. Revenue generation is impacted by pricing forecasts. The company's forward predictions are considered well balanced and supported by external forecasters. Consequently, pricing risk is considered low to moderate. Mining methods selected are not novel and have been demonstrated, and are considered a low risk of impacting Ore Reserves. All costs used in the optimisation and Ore Reserve process are supported by an extended operational history and actual results. Risk of significant underestimation and effect of that underestimation is considered to be low.

Summary of information to support the Mid-west Mineral Resource Estimate and the Ore Reserve Estimate for Cataby

This update is reported in accordance with the 2012 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves', (JORC Code) and ASX Listing Rules, and provides a summary of information and JORC Code Table 1 commentary to support Iluka's Mineral Resource and Ore Reserve Estimate for the Cataby Deposit in the Mid-west Region of the Perth Basin.

The Mineral Resource and Ore Reserve inventory attributable to the Mid-west HM deposits as at the 31st of December 2016 and broken down by JORC Code category is presented in the Tables below.

Mid-west Mineral Resource Summary at December 31 2016.

Mineral Resource Category[1]	Material Tonnes (Million)[2]	In Situ HM Tonnes (Million)	HM (%)	Clay (%)	HM Assemblage[3]		
					Ilmenite (%)	Zircon (%)	Rutile (%)
Measured	394	20.4	5.2	14.8	52	11	6
Indicated	270	12.9	4.8	14.4	49	10	6
Inferred	210	9.0	4.3	13.3	50	9	6
TOTAL	**874**	**42.3**	**4.8**	**14.3**	**50**	**10**	**6**

Notes:
1 Mineral Resources are reported inclusive of Ore Reserves.
2 Insitu (dry) metric tonnage is reported.
3 The mineral assemblage is reported as a percentage of the insitu HM content.
4 Rounding may generate differences in the last decimal place.
5 The Mineral resource estimates are stated as at the 31 December 2016.

Cataby Ore Reserve Summary at December 31 2016.

Ore Reserve Category[1]	Material Tonnes (Million)[2]	In Situ HM Tonnes (Million)	HM (%)	Clay (%)	HM Assemblage[3]		
					Ilmenite (%)	Zircon (%)	Rutile (%)
Proved	88	5.5	6.3	12.0	60	9	4
Probable	33	1.3	4.1	12.0	62	9	4
TOTAL	**120**	**6.9**	**5.7**	**12**	**60**	**9**	**4**

Notes:
1 Ore Reserves are a sub-set of Mineral Resources.
2 In situ (dry) metric tonnage is reported.
3 Mineral assemblage is reported as a percentage of the insitu HM content.
4 Rounding may generate differences in the last decimal place.
5 The Ore Reserve estimates are stated as at the 31 December 2016.

1. Background/Introduction

The Mid-west is a northerly sub region which in combination with the South-west sub-region comprise the greater Perth Basin. It is presented separately to break down a geographically large region. Iluka Resources Limited (Iluka) and its predecessor companies have been exploring and mining for mineral sands in the Mid-west part of the Perth Basin for some 45 years. The remaining HM resources and Ore Reserves are centred on the Eneabba and Cataby locations.

2. Ownership/Tenure

A summary of Iluka's current tenement holding in the Mid-west, which covers the areas hosting the Mineral Resources and Ore Reserves, is presented in Table 2.1. The tenements are 100% owned by Iluka and wholly owned subsidiary companies, which include Iluka Midwest Limited, and Western Titanium Limited.

Table 2.1: Iluka Mid-west Tenement Summary

Licence	Project	Status	Applic. Date	Grant Date	Expiry Date	Area	Area Unit
E 70/2459	Cataby	Granted	5/07/2001	28/03/2007	27/03/2016	1	Blocks
E 70/953	Eneabba	Granted	19/10/1989	7/11/1994	6/11/1999	4.27	Km2
G 70/243	Cataby	Granted	23/03/2010	23/08/2011	22/08/2032	568.2	Hectares
G 70/257	Cataby	Application	27/11/2015			143	Hectares
G 70/258	Cataby	Granted	27/11/2015	2/03/2016	1/03/2037	23.43	Hectares
M 267SA	Eneabba	Granted	31/01/1989	31/01/1989	30/01/2031	21942	Hectares
M 70/1017	Cataby	Granted	28/07/1998	4/01/1999	3/01/2020	472.55	Hectares
M 70/1018	Cataby	Granted	28/07/1998	4/01/1999	3/01/2020	118.8	Hectares
M 70/1039	Eneabba	Granted	15/04/1999	22/09/1999	21/09/2020	334	Hectares
M 70/1061	Eneabba	Application	15/10/1999			427.8	Hectares
M 70/1086	Cataby	Granted	11/08/2000	12/12/2000	11/12/2021	17.325	Hectares
M 70/194	Cataby	Granted	29/12/1983	10/04/1985	9/04/2027	983	Hectares
M 70/195	Cataby	Granted	29/12/1983	10/04/1985	9/04/2027	994.2	Hectares
M 70/196	Cataby	Granted	29/12/1983	10/04/1985	9/04/2027	997	Hectares
M 70/492	Eneabba	Granted	9/02/1989	7/05/1990	6/05/2032	421.2	Hectares
M 70/517	Cataby	Granted	9/05/1989	7/06/1990	6/06/2032	120.05	Hectares
M 70/518	Cataby	Granted	9/05/1989	7/06/1990	6/06/2032	227.25	Hectares
M 70/683	Eneabba	Granted	26/03/1991	11/08/1993	10/08/2035	710.5	Hectares
M 70/684	Eneabba	Granted	26/03/1991	11/08/1993	10/08/2035	836.6	Hectares
M 70/685	Eneabba	Granted	26/03/1991	11/08/1993	10/08/2035	503.25	Hectares
M 70/686	Eneabba	Granted	26/03/1991	11/08/1993	10/08/2035	528.6	Hectares
M 70/687	Eneabba	Granted	26/03/1991	11/08/1993	10/08/2035	394.75	Hectares
M 70/688	Eneabba	Granted	26/03/1991	11/08/1993	10/08/2035	752.2	Hectares
M 70/689	Eneabba	Granted	26/03/1991	11/08/1993	10/08/2035	762.5	Hectares
M 70/696	Cataby	Granted	31/05/1991	23/01/1992	22/01/2034	711.65	Hectares
M 70/760	Cataby	Granted	29/05/1992	5/01/1993	4/01/2035	930.6	Hectares
M 70/791	Cataby	Granted	16/10/1992	1/07/1993	30/06/2035	651.3	Hectares
M 70/821	Eneabba	Granted	12/08/1993	21/02/1994	20/02/2036	32.77	Hectares
M 70/867	Cataby	Granted	15/09/1994	14/02/1995	13/02/2037	7.349	Hectares
M 70/868	Cataby	Granted	15/09/1994	14/02/1995	13/02/2037	261.75	Hectares
M 70/869	Cataby	Granted	15/09/1994	14/02/1995	13/02/2037	811.4	Hectares
M 70/870	Eneabba	Granted	21/09/1994	13/06/1995	12/06/2037	356.15	Hectares
M 70/879	Eneabba	Granted	30/11/1994	25/01/2005	24/01/2026	203.02	Hectares
M 70/984	Eneabba	Granted	27/03/1997	3/09/1997	2/09/2018	618.63	Hectares

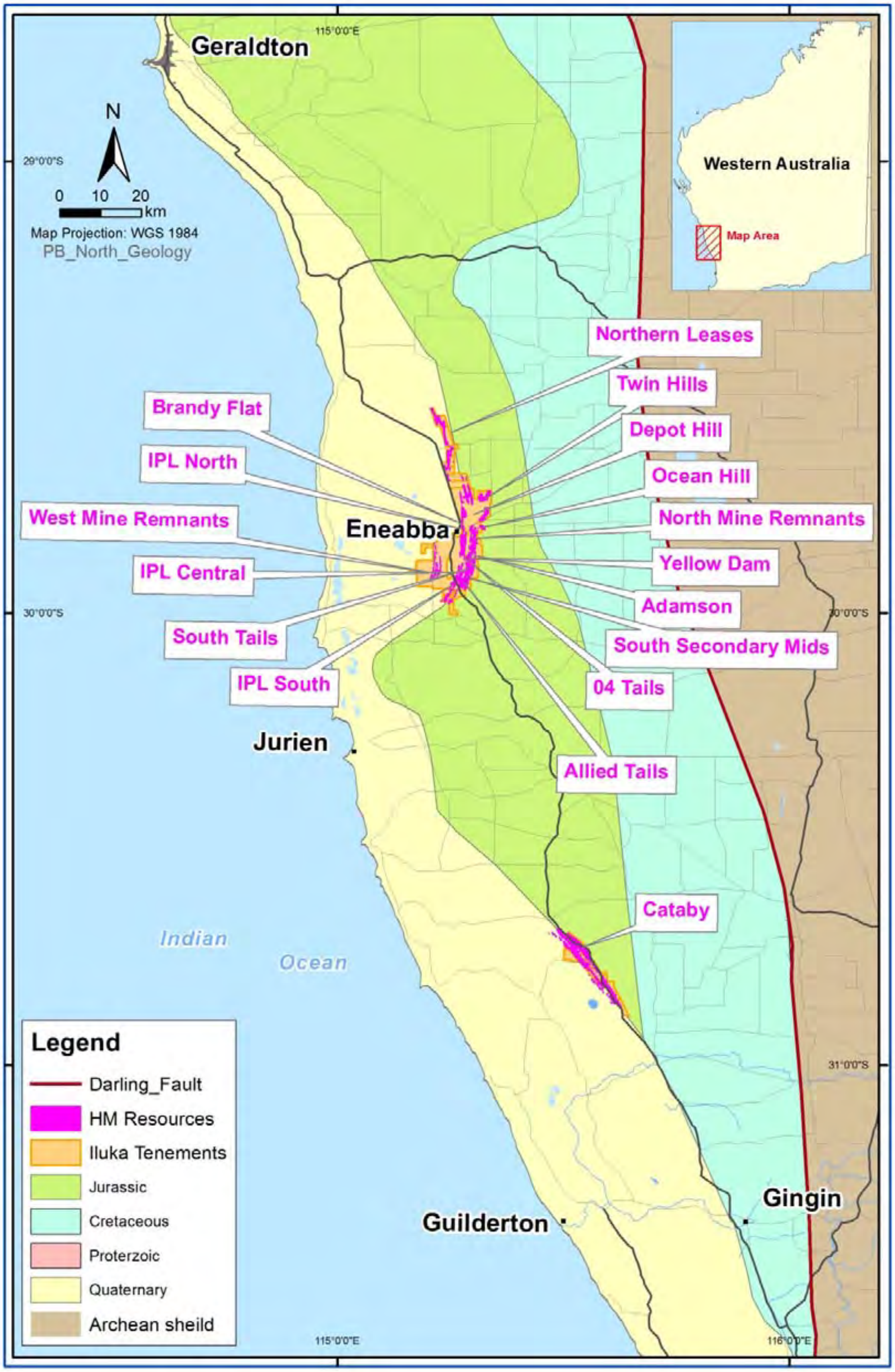


Figure 2.1 Tenement Location Plan for Iluka Mid-west and underlying geological framework for the northern Perth Basin.

3. Deposit Geology

All deposits are located within the Perth Basin which was formed on the downthrown side of a series of normal faults. Contemporaneously, Mesozoic fluvial sediments were deposited within the basin, which were reworked by Tertiary marine transgressions. Subsequent regression following sea level high stand resulted in the progradation of paralic shoreface and aeolian sediments on the marine platform.

This process was repeated many times as a result of marine transgressive events during interglacial periods.

The Exploration Licences cover portions of the present coastal plain, which host the mineralised facies of these Pliocene and Pleistocene age fossil beach barrier sediments and associated dune sands.

4. Data Acquisition

Exploration and drilling supporting the Mineral Resources for the Mid-west District was conducted by several different companies, all of which are predecessor companies or wholly owned subsidiaries of Iluka Resources. These include; Allied Eneabba, AMC, IPL and RGC from the late 1960's to the present.

4.1 Drilling Summary

All drilling used to support the Mineral Resource estimates was completed using vertical RCAC drilling utilising BQ or NQ rods to bore a 56mm or 76mm hole diameter hole respectively. Earlier drilling in the 1970's and 1980's was completed using deadstick auger methods but this has either been mined out or redrilled using RCAC. Drilling was conducted using industry standard techniques with suitably trained and qualified drilling operators. A summary of the drilling carried out on each prospect is presented in Table 4.1.

The drilling is typically carried out on a regularised grid with the drill spacing closed in to support an increased confidence in the mineral resource estimates as shown in Figures 4.1, Figure 4.2 and Figure 4.3.

Table 4.1: Drill meterage's and modal drill spacing for each prospect supporting the Mid-west Mineral Resources.

Deposit	Holes	Samples	Drill metres	X Drill Space	Y Drill Space	Z Drill Interval	Drill Comments
Adamson	3,524	56,627	64,844.2	30	100	1.5	Infill to 15 x 50 where high grade variation
Allied Tails	2,243	22,545	36,141.7	30	50	1.5	
Brandy Flat	1,073	23,426	32,722.5	30	100	1.5	Edge definition drilling to 10m x 50m x 1.5m
Cataby	5,004	146,367	215,357.0	30	100	1.5	Infill to 15 x 50 where high grade variation
Depot Hill East	308	2,704	4,055.0	30	100	1.5	
Depot Hill North	1,202	29,505	41,289.8	30	100	1.5	30m x 100m dominant, 30m x 200m for lower grade areas
IPL Central	1,828	19,287	28,665.8	30	100	1.5	
IPL North	2,117	31,644	45,613.7	30	100	1.5	
IPL South	1,994	17,393	26,064.8	30	100	1.5	
MSP Tails	49	441	458.0	20	20	1	
North Mine Remnants	2,012	35,373	43,964.8	30	100	1.5	
Northern Leases	447	8,537	14,407.6	60	200	1.5	Some areas infilled to 30m x 100m
Ocean Hill	246	2,109	3,160.5	30	100	1.5	
South Secondary Mids	146	2,941	2,941.0	25	25	1	
South Tails	3,177	35,518	48,609.0	30	50	1.5	Infill to 15 x 50 where high grade variation
Twin Hills	773	5,259	7,564.0	60	100	1.5	Some areas were drilled at 100m x 30m by 1m
Western Remnants	594	11,494	15,563.9	30	100	1.5	
Yellow Dam	112	1,140	1,269.0	20	20	1	

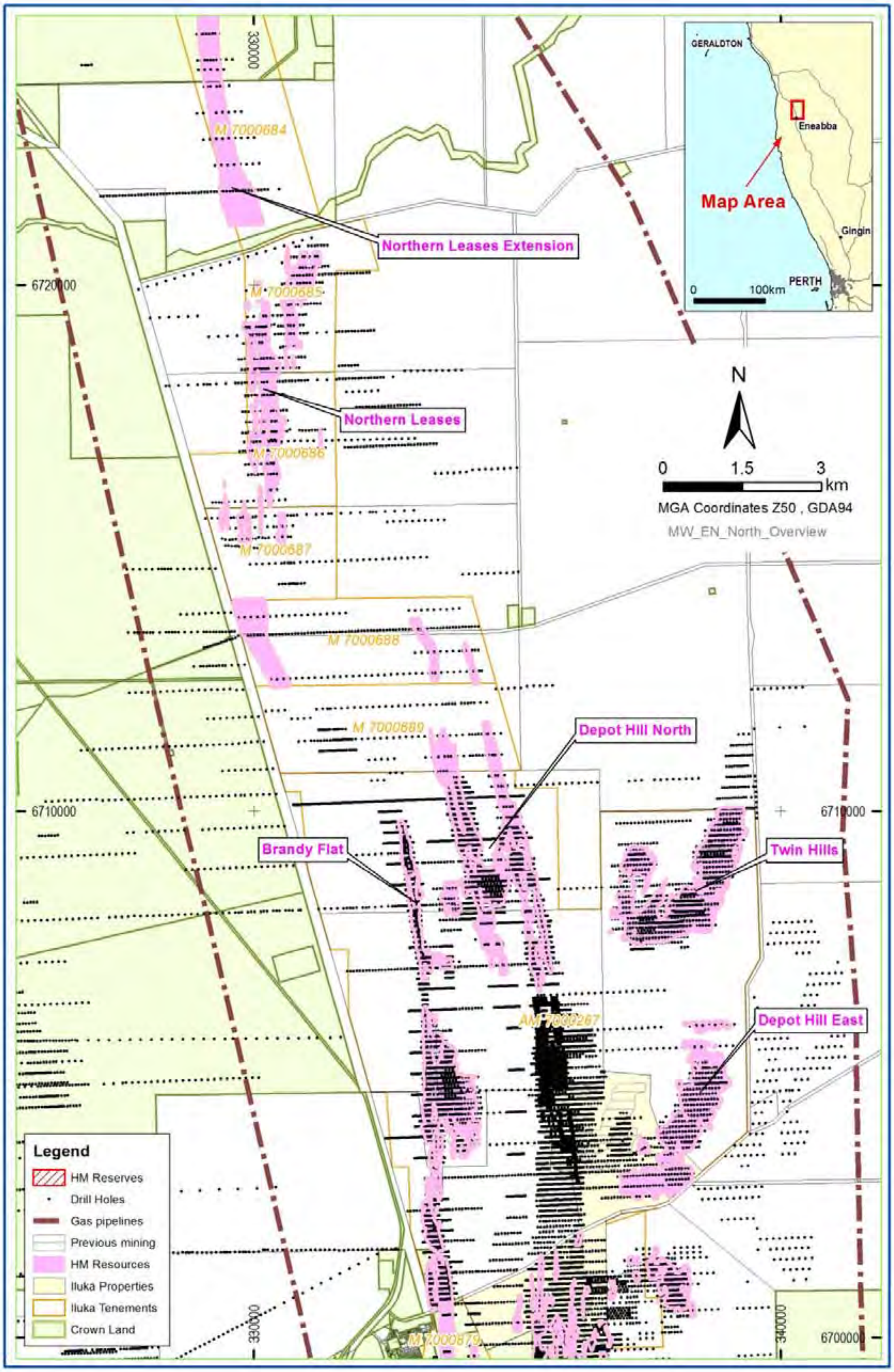


Figure 4.1: Drillhole distribution and Mineral Resource outlines for the Eneabba North portion of the Mid-west Region.

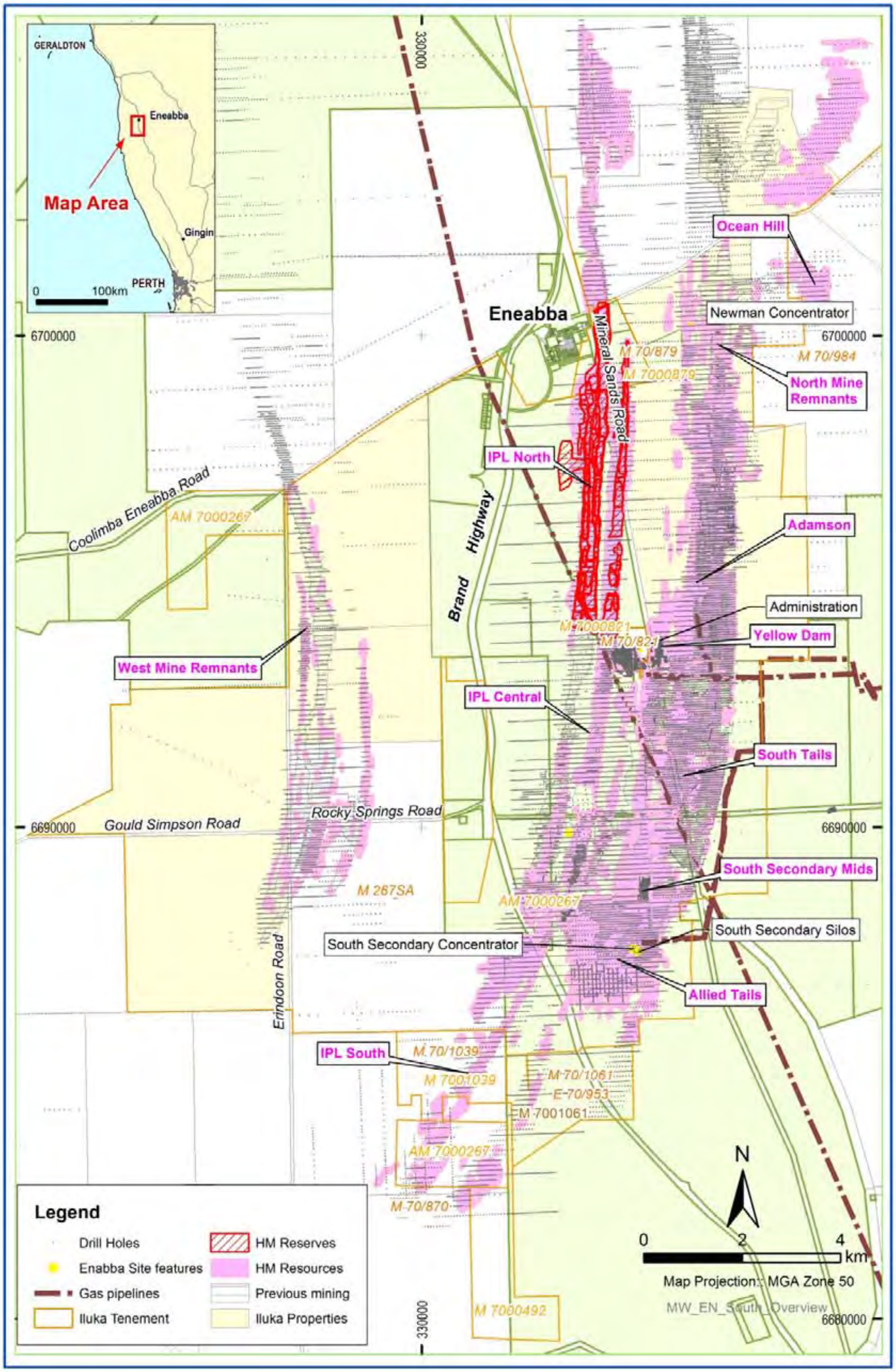


Figure 4.2: Drillhole distribution, Mineral Resource and Ore Reserve outlines for the Eneabba South portion of the Mid-west Region.

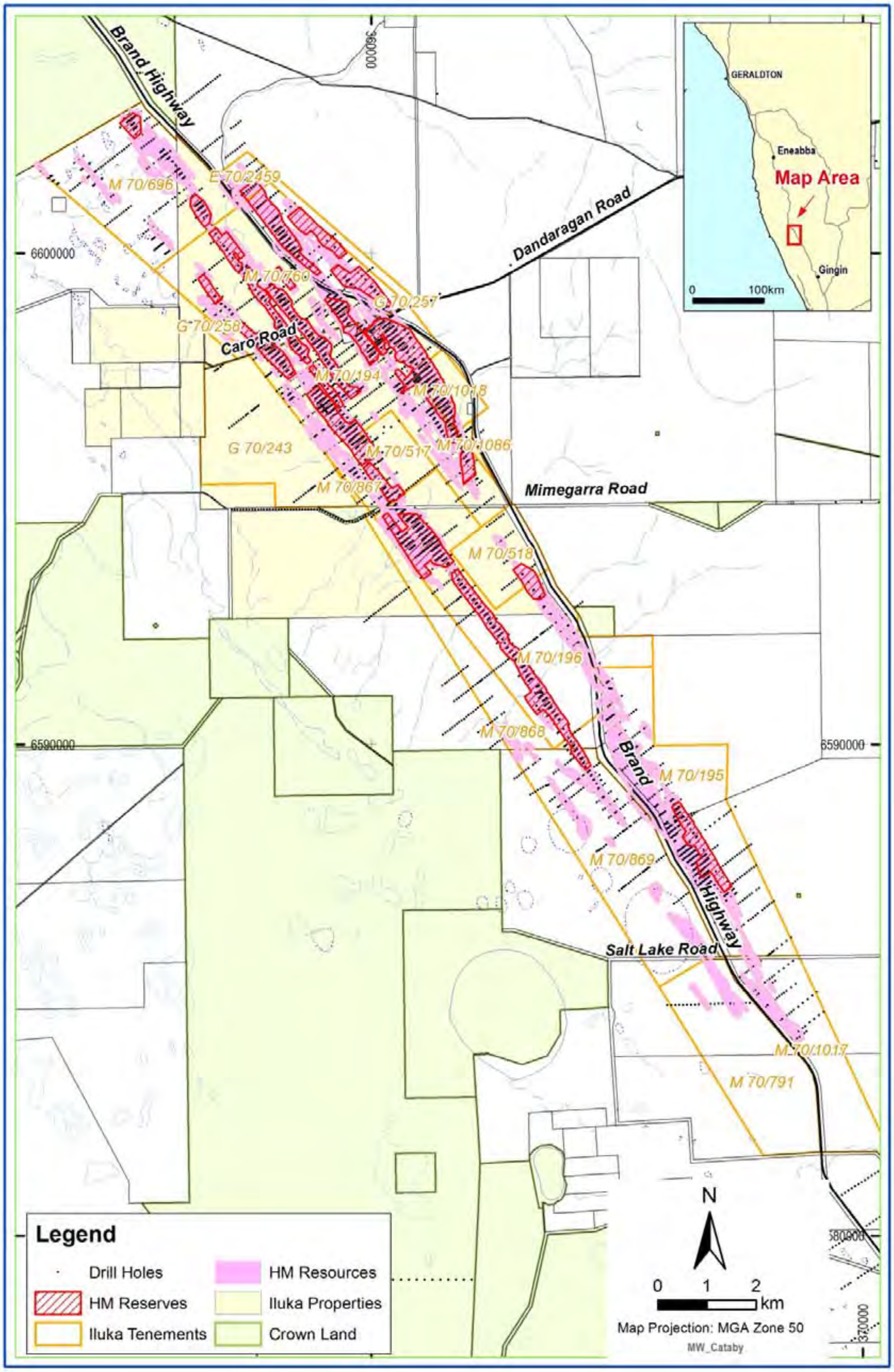


Figure 4.3: Drillhole distribution, Mineral Resource and Ore Reserve outlines for the Cataby portion of the Mid-west Region.

The early phases of drilling were occasionally drilled on roadsides or, alternatively, broadly spaced drilling occurred on private farmland. Infill drilling typically to 30 * 100m was carried out over areas of mineralisation deemed to be economic to support feasibility studies and potential mine development. A summary of the drilling carried out on each Mineral Resource is presented in Table 4.1. The current mineral resources are supported by over 630,000 metres of drilling, completed in 26,849 holes.

4.2 Survey

Drill holes were surveyed in WGS84, Zone 50. The data was then converted to either the Eneabba Local Grid or the Cataby Local Grid using a 2-point transformation (Table 4.2).

All drill holes used to define the Mineral Resources were set out using qualified surveyors. The drill collar positions were set out using contemporary equipment in combination with a network of survey control points giving an accuracy well within +/- 0.2 m.

Topographic control was provided by various means including:

- wireframe files based on photogrammetry;
- wireframe files based on drillhole collars;
- infill detailed survey of crests and toes; or
- areas of GPS and GPS-RTK survey pick up.

Standard practice is to adjust the collar elevations to a common surface generated by one or a combination of the options previously described. This results in the drill holes having RL's correct relative to other drill holes and the mineralisation is correctly located with respect to the surface.

Table 4.2: Coordinate system and grid transformations used for the Mid-west HM deposits.

	LOCAL_N	LOCAL_E	MGA_N	MGA_E	AMG_N	AMG_E
Cataby	6800	11800	6588482	367088.84	6588332	366950.34
Cataby	25000	9960	6601750.5	354500.97	6601601.5	354361.75
ENEABBA	107706.98	99829.8	6696150	334138.91	6696000	334000
ENEABBA	99553.16	103508.1	6688150	338138.91	6688000	338000

4.3 Geological Logging

Drilling has been completed over a protracted period of time in the Midwest District. Geological logs for the older drilling were recorded on paper. The hard copy data for deposits supporting Mineral Resources was entered into digital files over a period from the late 1980's to the mid 1990's. In the late 1980s computerised field logging equipment was introduced in the Mid-west Domain and geological information was recorded and stored in text files. An Oracle Database was introduced for the storage of geological data in the early 2000s. This was superseded by a custom built SQL database solution introduced in 2006 which was in turn superseded by an acQuire™ data management solution.

Most samples have been geologically logged with the exception of some of those drilled in the 1970s. This has been taken into consideration when assigning the JORC Code Resource Classification for the mineral resources supported by this drilling. However, in general, the volume of more recent infill drilling that is supported by geological logging is sufficient to provide adequate deposit coverage and confidence in the geological interpretation. Information recorded included colour, grainsize, lithology, hardness, washability and an estimate of the induration, slimes and HM content. Logging from the 1970's and 1980's typically recorded less detail and some attributes such as grainsize and sorting were not recorded.

Current Iluka procedures dictate that all samples are logged by qualified geologists or trained geotechnicians. Historically company employed drill operators were trained and did the logging for some of the subsidiary companies. In general, the geological information recorded is adequate to support the resource estimate.

4.4 Sampling and analytical procedures

Samples are collected beneath a rotary splitter fed from a cyclone mounted on the drill rig. Approximately 1 to 2 kg representing 25% of the total sample is collected for geological logging and analysis. The mineralisation in the Mid-west District is predominantly above the standing water table so samples drilled were predominantly dry. Water injection was used where the ground was damp or below the water table to assist in sample delivery and prevent contamination. Sample intervals were typically 1 or 1.5 m and all the drill sample is presented for subsampling. All mineralised samples are submitted for assay. Often samples from waste areas are discarded to minimise assay costs.

Samples were assayed at Iluka internal laboratories using industry standard techniques for Heavy Mineral (HM) determination. Due to the age of the drilling several different assay techniques were used to determine HM content. A description of these techniques is provided below.

Prior to 2000 the samples were dried then de-slimed by wet sieving (material <75µm removed). Oversize (material >2mm) was removed. About 100 g of the sand fraction (75 µm – 2 mm) was sieved at 710 µm to determine the coarse sand content. The <710 µm "sand" fraction was then subjected to float/sink analysis using Tetra Bromo Ethane (TBE with SG=2.95 g/cm^3).

After the year 2000 the de-sliming screen was changed to a <53 µm mesh. The use of a finer screen size slightly lowered the slimes values relative to the <75 µm screen. In 2002, TBE was substituted for Lithium Sodium Poly-Tungstate (LST) (SG=2.86g/cm^3). This substitution results in a slight increase in the "light" HM material reporting to the HM fraction. Both of these factors do not have any significant impact on the reported Mineral Resources but were considered when applying the resource classification to each deposit.

Composite samples were taken from either the sand residue fractions of exploration samples or HM sink fractions from the HM determinations which also corroborate the validity of the HM mineralisation.

The composited samples generate between 0.1 and 2 kg of HM which is then subjected to a process of magnetic, electrostatic and heavy liquid separation followed with XRF analysis of the fractions to determine the assemblage and quality of the HM. In addition the composited sand fractions were wet tabled to retrieve the mineral concentrate which provides indicative mineral recovery.

4.5 QA/QC and Data Quality

QAQC protocols including the collection of standards, duplicates and twin hole samples were introduced routinely in 2004. Prior to this, QAQC data was collected sporadically or not collected. As a result there is limited QA/QC supporting the Mineral Resources for the Mid-west District. However the sampling methodology is considered consistent with industry standard practice and appropriate for the mineralisation. The limited QA/QC data tends to undermine the confidence in the datasets; however historic mining in the Midwest District which was supported by assay data using the same techniques provides credibility to the data. The sample size is considered appropriate for the material hosting the mineralisation, which is supported by Gy's sampling theory.

Duplicate samples were taken at the rate of 1:40 samples by attaching a second calico sample bag to a quadrant of the rotary splitter. Where bias or poor precision was noted in duplicate assays, the information is fed back to the drilling team and appropriate measures are taken to ensure sampling representivity.

Blind field standard samples were inserted at the rate of 1:40 samples. For field standards, the accuracy is ascertained via plotting the results of standards against expected results. Where a standard sample returns a result that is in excess of 3 standard deviations beyond the accepted variability (deemed a fail), the samples associated with that batch are reviewed and may be re-analysed at the discretion of the supervising geologist. The slimes value cannot be re-analysed as this material is lost during processing of the original sample. As a result Slimes failures are not investigated.

The level of accuracy and precision from standards and duplicates vary for each deposit. In each case, the QAQC indicates that the data is suitable to support the mineral resource estimates completed and the resource classification applied. The list of QAQC samples for each deposit is provided in Table 4.3.

Table 4.3: QA/QC summary for the Mid-west HM Deposits.

Deposit	Duplicates	Standards	Twinned Holes	QA/QC Comments
Adamson	1492	60	133	All QA/QC is from the 2005-08 drilling
Allied Tails	225	0	0	All Duplicate samples from 2003 drilling
Brandy Flat	380	107	0	All QA/QC is from the 2005-09 drilling
Cataby	290	160	201	The lack of QA/QC is due to the age of the drilling
Depot Hill East	0	0	0	No QA/QC due to the age of all of the drilling
Depot Hill North	148	152	8	All QA/QC is from the 2012 drilling
IPL Central	91	33	0	All QA/QC is from the 2008 drilling
IPL North	267	24	15	All QA/QC is from the 2005 drilling
IPL South	0	0	34	The lack of QA/QC is due to the age of the drilling
MSP Tails	24	12	3	
North Mine Remnants	1382	397	2	
Northern Leases	0	0	0	No QA/QC due to the age of all of the drilling
Ocean Hill	0	0	0	No QA/QC due to the age of all of the drilling
South Secondary Mids	140	71	0	
South Tails	446	176	3	All QA/QC is from the 2007/08/10 drill programs
Twin Hills	0	0	48	The lack of QA/QC is due to the age of the drilling
Western Remnants	250	0	8	The lack of QA/QC is due to the age of the drilling
Yellow Dam	30	6	0	The lack of QA/QC is due to the age of the drilling

4.6 Verification of Sampling and Assaying

Assay data was verified by routines imposed during the loading of the data into Iluka's geology database. Further scrutiny of the data was carried out prior to incorporation into the resource block models. Checks included:

- statistical analysis of the analytes;
- checks for missing and duplicated data; and
- visual validation to confirm the data is in spatially valid locations.

It is the opinion of the Competent Person that the data is suitable for the use in the estimation of the Mineral Resources for the Mid-west District.

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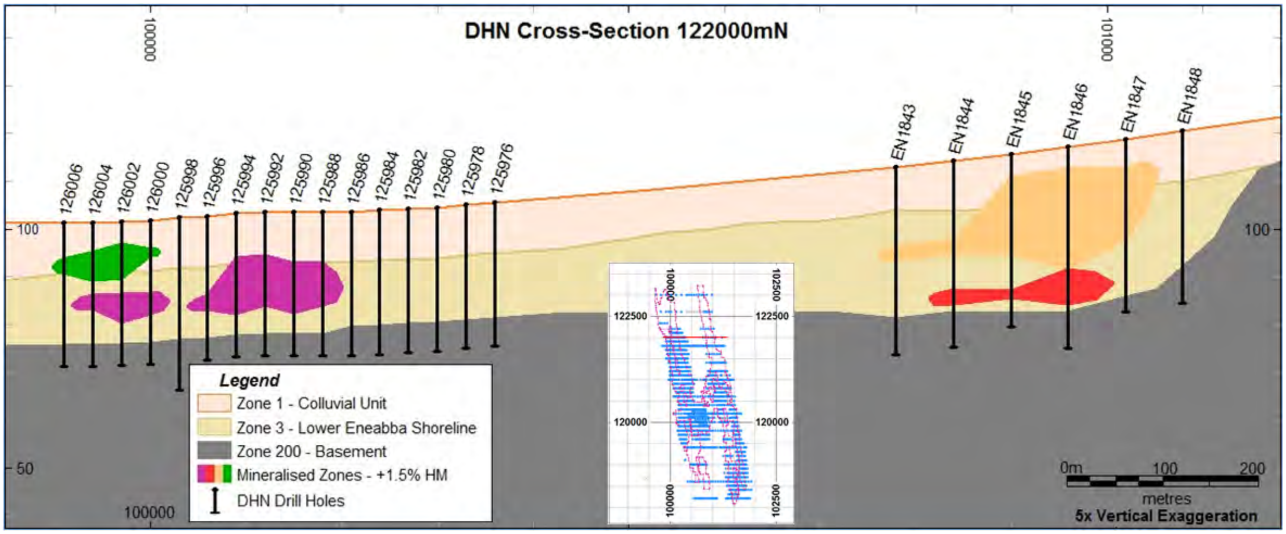


Figure 4.2: Cross section through the Depot Hill North Deposit. The red line on drill plan shows the location of section relative to the mineral resource (magenta outline on the inset drill plan).

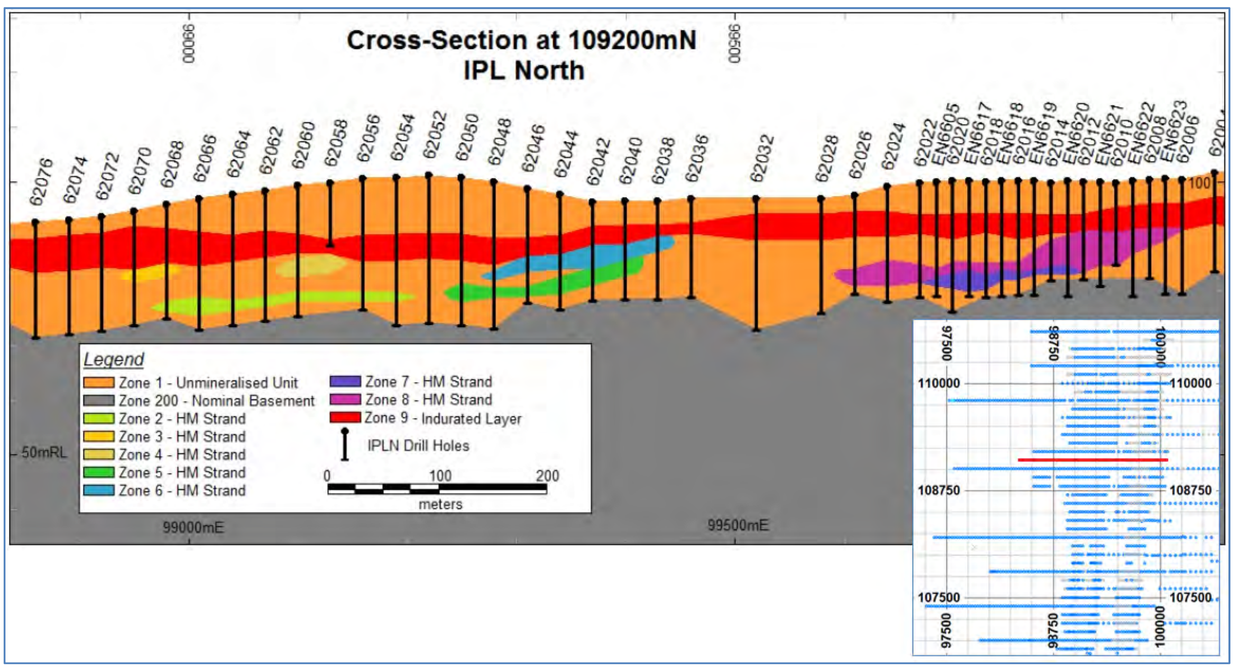


Figure 4.3: Cross-section through the IPL North Deposit, 5 times vertical exaggeration. The red line on the inset plan shows the cross section position.

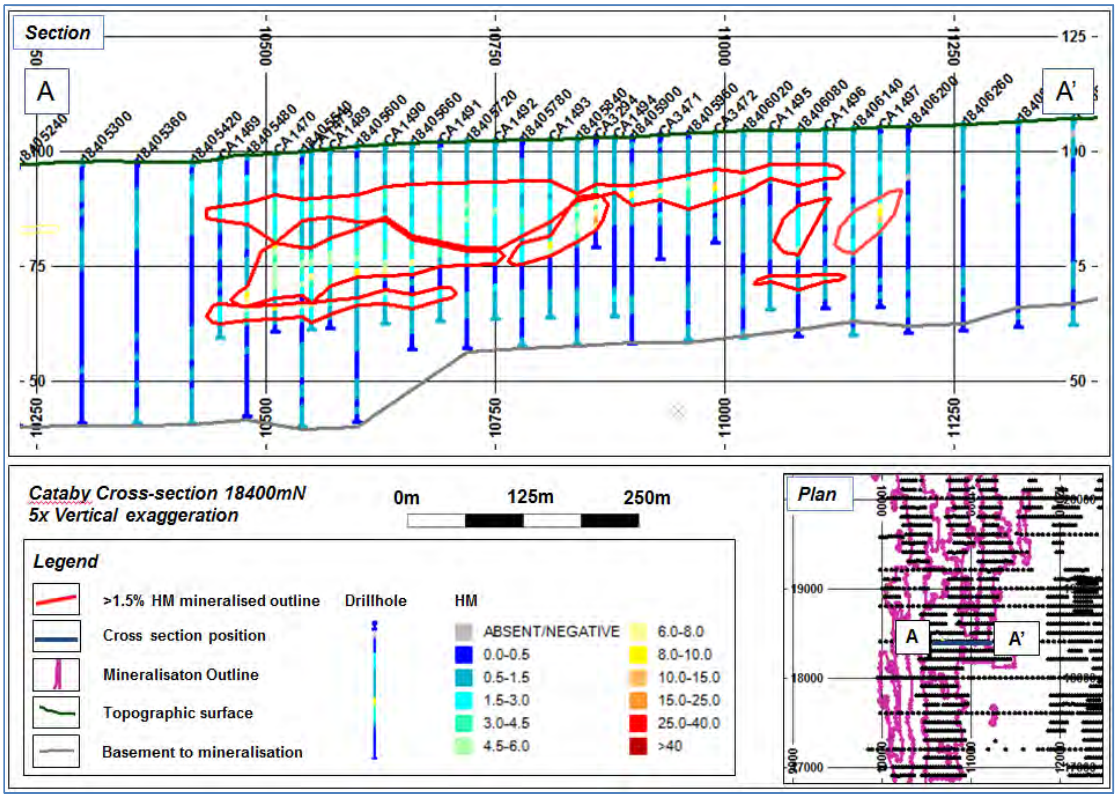


Figure 4.4: Cross-section 18400mN through the Cataby Deposit showing predominant dune "blanket" style mineralisation.

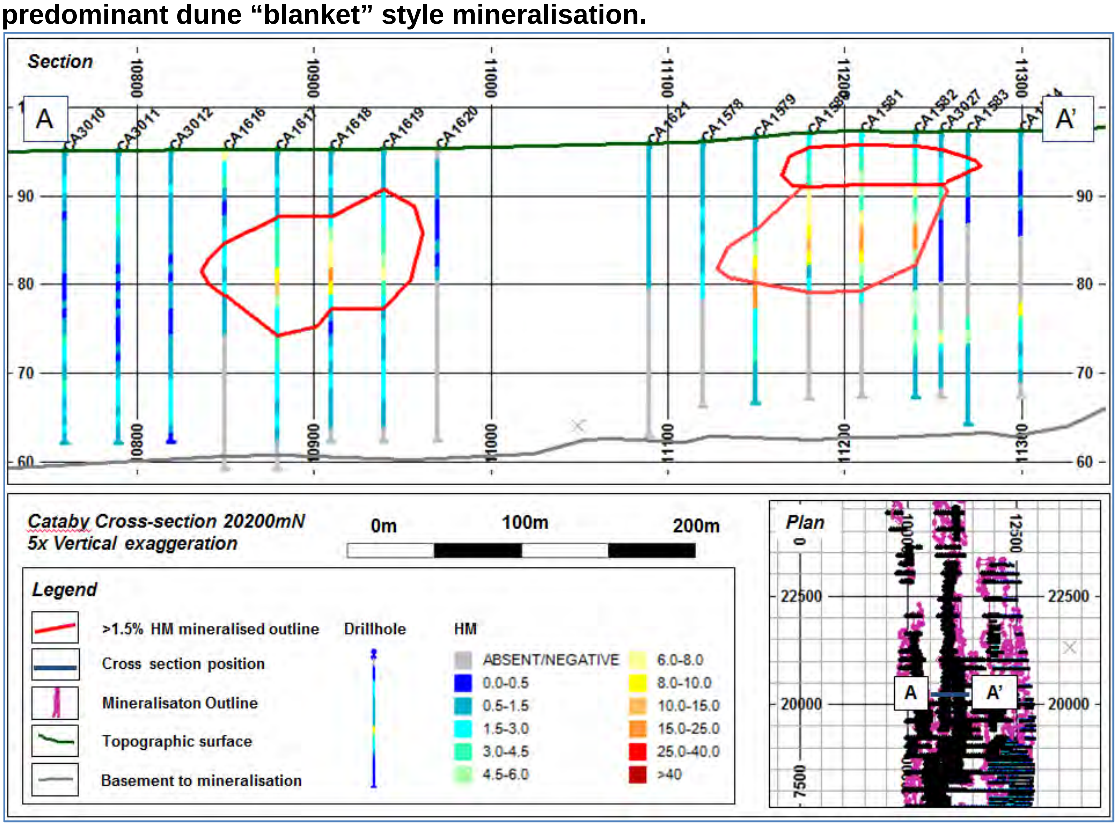


Figure 4.5: Cross-section 20200mN through the Cataby Deposit displaying strand style mineralisation. Note apparent HM mineralisation excluded from mineralised outlines is induration, not heavy mineral.

4.7 Physical parameters

The density used in the estimation of the Mineral Resource tonnages for the Mid-west HM Deposits is based on an Iluka Standard Bulk Density formula. The formula is based on research done on various HM deposits being mined by Iluka in Western Australia. The formula is considered valid as it takes into account the sand, HM and clay components. It allows for potential void space within the sand based on expected "filling" of the void space by the fine clay content. All tonnages for the resource estimates are expressed on a dry tonnage basis.

5. Resource Estimation

Resource block models have been prepared for the Mid-west HM deposits using Datamine Studio™ mining software. Geological interpretations used to constrain the modelling were prepared by geologists employed by Iluka. The resource estimates were derived from a 3 dimensional block model constructed using geological and mineralogical domain constraints as per Iluka internal guidelines. Domains are assigned to the model based on the geological interpretations and the assay dataset is correspondingly flagged. The assay values were interpolated using Inverse Distance Weighting to the power of 3 (ID3) and hardness and sample composite identifiers were interpolated using Nearest Neighbour (NN).

Each deposit was assessed in terms of statistical analysis and drill data distribution to apply appropriate interpolation parameters. Traditionally Iluka adopts a block dimension of about a half of the prevailing drill hole spacing in the X and Y direction (horizontal plane) in combination with anisotropic data search volumes about twice the prevailing drill hole spacing. These are adjusted as necessary to honour the individual characteristics of each deposit. In addition algorithms were used on models created after 2006 to dynamically optimise the search orientation. This allows the interpolation to honour the variation in geological and grade orientation. Sub-celling is used along domain boundaries to ensure appropriate volume representation.

Table 5.1; Summary of the model structure for the Mid-west HM deposits.

Deposit	Cell Dimensions		
	East	North	RL
Adamson	15	50	1
Allied Tails	15	25	1.5
Brandy Flat	15	50	1
Cataby	15	50	1
Depot Hill East	30	50	1.5
Depot Hill North	15	50	1.5
IPL Central	30	50	1.5
IPL North	15	50	1
IPL South	30	50	1.5
MSP Tails	10	10	1
North Mine Remnants	15	50	1
Northern Leases	30	130	1.5
Ocean Hill	15	50	1.5
South Secondary Mids	12.5	12	1
South Tails	30	50	1.5
Twin Hills	15	50	1.5
Western Remnants	10	50	1.5
Yellow Dam	20	20	1

Table 5.2; Summary of the assay attribute interpolation parameters for the Mid-west HM deposits.

Deposit	Interpolation	Search Ellipse Radius			Search	Search
	Method	X	Y	Z	Factor 2	Factor 3
Adamson	ID3	60	100	3	2	3
Allied Tails	ID3	50	150	3	3	9
Brandy Flat	ID3	40	140	3	2	4
Cataby	ID3	45	150	2	2	4
Depot Hill East	ID3	65	110	2	3	4
Depot Hill North	ID3	50	200	3	3	4
IPL Central	ID3	90	200	6	2	3
IPL North	ID3	45	150	3	2	4
IPL South	ID3	45	150	2	3	5
MSP Tails	NN	25	25	2	5	10
North Mine Remnants	ID3	60	150	2	3	6
Northern Leases	ID3	40	350	3	2	4
Ocean Hill	ID3	40	110	6	3	10
South Secondary Mids	ID3	50	50	2	2	4
South Tails	ID3	60	200	2	2	4
Twin Hills	ID3	60	200	3	3	5
Western Remnants	ID3	40	300	2.5	2	3
Yellow Dam	ID3	60	150	3	2	4

Table 5.3; Summary of the Composite data interpolation parameters for the Mid-west HM deposits.

Deposit	Interpolation	Search Ellipse Radius			Search	Search
	Method	X	Y	Z	Factor 2	Factor 3
Adamson	NN	120	250	5	2	3
Allied Tails	NN	130	350	5	3	9
Brandy Flat	NN	40	140	3	2	4
Cataby	NN	90	300	5	2	4
Depot Hill East	NN	130	220	3	3	5
Depot Hill North	NN	50	200	5	3	4
IPL Central	NN	90	300	6	2	3
IPL North	NN	45	150	3	2	4
IPL South	NN	45	150	2	3	5
MSP Tails	NN	25	25	2	5	10
North Mine Remnants	NN	120	300	5	3	6
Northern Leases	NN	150	500	10	2	4
Ocean Hill	NN	100	320	6	3	10
South Secondary Mids	NN	50	50	10	2	4
South Tails	NN	120	400	5	2	4
Twin Hills	NN	90	200	3	3	5
Western Remnants	NN	90	450	3	2	3
Yellow Dam	NN	60	150	3	2	4

The block models are validated by:

- visually comparing the block model grade attributes against the input grades;
- comparing statistics of the grade attributes for the block model to the input data;
- comparing the result of a NN grade interpolation to the ID3 interpolation; and

- reviewing the volume attributable to each composite to ensure it is consistent with the input data expectations.

6. Mineral Resource Statement

6.1 Resource classification

The mineral resource estimates have been classified and reported in accordance with the guidelines of the Australasian Code for Reporting Exploration Results, Mineral Resources and Ore Reserves (the JORC Code, 2012 Ed.). The Resource Category applied (Measured, Indicated or Inferred) is based on a combination of:

- data density of primary HM assays;
- degree of continuity of mineralisation and geological units;
- assessment of the integrity and confidence of the analytical data;
- level and integrity of supporting composite data;
- the characteristics of the mineralised host; and
- the level and results of supporting QA/QC data.

In addition the potential for eventual economic extraction is taken into consideration when determining Mineral Resources that are valid for reporting under the JORC Code (2012). Factors taken into consideration which allude to the potential for economic extraction include:

- only reporting mineralisation within granted tenements;
- using an appropriate lower HM cut-off grade which is considered to be close to an economic cut-off when the style mineralisation and likely mining methods are considered;
- excluding material that has a high clay content beyond processing limitations;
- excluding heavily indurated material from which the recovery of mineral is un-feasible; and
- excluding mineralisation that does not meet a grade*thickness to depth of burial ratio and thus would be unlikely to ever be economic.

The Mid-west HM deposits comprise low volume, moderate HM grade sedimentary accumulations with mineralisation presenting as buried and surface accumulations. As such the mining is likely to be an open pit operation employing large scale earth moving equipment such as truck and shovel, scraper or dozer trap.

6.2 Mineral Resources declared for Mid-west deposits

A summary of the Mineral Resource estimates for the Mid-west deposits HM Deposits is presented in Table 6.1.

Table 6.1: Summary of Mineral Resources for the Mid-west as at the 31 December 2016.

WA-MID-WEST MINERAL RESOURCE BREAKDOWN BY DISTRICT, DEPOSIT AND JORC CATEGORY AT 31 DECEMBER 2016									
Summary of Mineral Resources for WA-Mid-West				**2016**	**2016**		**HM Assemblage[2,3]**		
District	**Deposit**	**Mineral Resource Category[1]**	**Material Tonnes kt**	**InSitu HMTonnes kt**	**HM Grade (%)**	**Clay Grade (%)**	**Ilmenite Grade (%)**	**Zircon Grade (%)**	**Rutile Grade (%)**
Eneabba	Adamson	Measured	10,030	559	5.6	16.1	48.3	12.6	6.9
		Indicated	36,541	1,529	4.2	16.0	44.2	13.0	5.2
		Inferred	5,600	255	4.6	17.0	47.4	11.3	3.6
	Allied Tails	Measured	35,803	1,546	4.3	19.0	39.6	25.3	7.8
		Indicated	24,305	823	3.4	16.4	45.0	13.3	5.7
	Brandy Flat	Measured	39,151	1,977	5.1	20.3	50.3	6.7	8.2
		Indicated	2,860	172	6.0	17.5	53.1	7.7	10.5
		Inferred	1,153	40	3.5	26.5	52.9	8.5	11.8
	Depot Hill Central	Measured	-	-	-	-	-	-	-
		Indicated	-	-	-	-	-	-	-
		Inferred	-	-	-	-	-	-	-
	Depot Hill East	Measured	21,863	480	2.2	13.0	53.2	15.8	11.1
		Indicated	3,541	57	1.6	14.7	52.6	16.0	11.2
		Inferred	354	5	1.4	13.3	53.1	15.9	11.3
	Depot Hill North	Measured	33,366	1,080	3.2	12.3	55.7	9.3	6.6
		Indicated	15,776	427	2.7	11.3	54.5	10.5	7.3
		Inferred	10,334	255	2.5	10.7	54.2	8.7	6.4
	IPL Central	Indicated	25,473	2,723	10.7	19.8	36.6	6.2	6.3
		Inferred	1,052	94	9.0	18.8	45.2	8.3	7.1
	IPL North	Measured	26,711	2,853	10.7	18.6	43.3	7.2	7.1
		Inferred	12,953	1,618	12.5	18.6	38.1	7.0	7.1
	IPL South	Measured	4,814	389	8.1	15.0	49.8	16.0	15.5
		Indicated	11,605	834	7.2	15.5	33.9	12.2	9.8
		Inferred	3,842	192	5.0	17.3	35.5	25.6	15.3
	Monazite Stockpile	Inferred	463	399	86.2	2.0	32.4	23.8	-
	North Mine Remnants	Measured	24,930	1,004	4.0	14.2	55.8	13.5	9.5
		Indicated	15,142	381	2.5	12.1	54.8	12.3	8.7
		Inferred	52,304	1,838	3.5	12.8	53.3	8.1	7.9
	Northern Leases	Indicated	12,150	703	5.8	13.5	55.1	9.9	7.2
		Inferred	8,530	489	5.7	12.3	45.4	9.2	4.6
	Northern Leases Extensions	Inferred	11,870	663	5.6	12.9	47.9	9.0	5.2
	Ocean Hill	Measured	7,943	208	2.6	12.9	51.3	19.7	12.9
	South Secondary Mids	Indicated	1,181	315	26.7	5.0	69.5	8.4	4.9
	South Tails	Measured	29,930	1,329	4.4	15.6	44.9	16.3	5.6
		Indicated	18,405	868	4.7	18.8	45.7	13.5	6.5
		Inferred	13,582	451	3.3	17.9	42.8	11.0	5.3
	Twin Hills	Measured	16,150	399	2.5	15.5	55.0	11.7	10.2
		Indicated	4,910	152	3.1	15.2	56.8	11.3	9.9
	Western Remnants	Measured	17,295	1,350	7.8	19.2	44.9	10.8	7.1
	Yellow Dam	Indicated	177	71	40.1	7.0	26.0	22.1	2.2
WA-Mid-West	Cataby	Measured	138,400	7,540	5.4	11.5	59.9	8.9	4.0
		Indicated	91,800	3,451	3.8	11.6	60.9	8.2	3.9
		Inferred	81,300	2,800	3.4	11.9	59.1	7.5	3.7
	Measured Total		**393,606**	**20,413**	**5.2**	**14.8**	**51.9**	**10.9**	**6.4**
	Indicated Total		**270,033**	**12,914**	**4.8**	**14.4**	**48.7**	**10.0**	**6.0**
	Inferred Total		**209,949**	**8,992**	**4.3**	**13.3**	**50.0**	**9.3**	**5.8**
	Grand Total		**873,588**	**42,318**	**4.8**	**14.3**	**50.5**	**10.3**	**6.1**

Notes
1 Mineral Resources are inclusive of Ore reserves.
2 The Mineral assemblage is reported as a percentage of the in situ HM content.
3 All tonnages are dry in situ metric tonnage.
4 Rounding may result in differences in the last decimal place.
5 All figures are stated as at the 31 December 2016.

6.3 Discussion of relative accuracy

The relative accuracy and therefore confidence of the resource estimate is guided by the underlying influencing factors listed in Section 6.1 above and are taken into consideration during the classification of the resource estimates by the Competent Person.

7. Independent Review

All of the geological models created are reviewed internally by the Competent Person as per Iluka internal Development Geology guidelines. Block models and Mineral Resource estimates which support the inaugural reporting or are required to support feasibility studies typically undergo external review. A number of the Mid-west models pre-date the imposition of the guidelines and have only been reviewed internally.

Table 7.1: Summary of Internal and External Model reviews undertaken On the Iluka Mid-west HM Deposits.

Deposit	Internal Review		External Review	
	Auditor	Date	Auditor	Date
Adamson	Iluka	2006	Snowden	2006
Allied Tails	Iluka	2004		
Brandy Flat	Iluka	2006		
Cataby	Iluka	2014	McDonald Spiejers	2003, 06
Depot Hill East	Iluka	2016		
Depot Hill North	Iluka	2015		
IPL Central	Iluka	2010		
IPL North	Iluka	2007		
IPL South	Iluka	2013		
MSP Tails	Iluka	2014		
North Mine Remnants	Iluka	2008	Snowden	2008
Northern Leases	Iluka	2006		
Ocean Hill	Iluka	2006		
South Secondary Mids	Iluka	2009		
South Tails	Iluka	2006		
Twin Hills	Iluka	2011		
Western Remnants	Iluka	2006		
Yellow Dam	Iluka	2006		

Several Competent Persons employed by Iluka Resources have either been based in the Mid-west or visited the sites on many occasions. The main issue of note identified during site visits relates to areas of remnant vegetation over HM mineralisation, particularly in the southern portion of Eneabba, which may restrict access for mining.

8. Further Work

There is no further work planned for any of the Mid-west HM deposits at this time. Additional exploration will be carried out in a timely manner to support future development as required.

9. Summary of Information to the Ore Reserve

9.1 Reserve Classification

The stated Proved and Probable Ore Reserves correspond with the Measured and Indicated Mineral Resources. There are no Inferred Resources included in the stated reserve numbers.

9.2 Mining and recovery factors

Pit optimisations were conducted using IMS Minemap mine planning software. This is industry standard software and utilises the Lerch-Grossman algorithm. The optimisation parameters used consisted of current costs, revenues and recoveries and other Modifying Factors.

The results of the pit optimisations were used for production scheduling and economic evaluation. The mining methods selected are a combination of truck and excavator and dozer push for waste mining operations and dozer push for ore.

9.3 Modifying Factors

Modifying factors such as ore recovery have been applied from historical performance. Processing recoveries and operating costs are based primarily on historical performance and updated for current economic conditions.

The price assumptions are internally generated and are based on detailed supply and demand modelling. The price assumptions have also been benchmarked against commercially available consensus price forecasts. The detail of that process is commercially sensitive and is not disclosed.

Iluka’s internal modelling indicates that the exploitation of the reported reserves would be expected to generate a positive NPV sufficient to meet Iluka’s internally generated investment criteria.

9.4 Cut-off grades

The cut-off grade has been calculated using optimization software and an individual cut-off grade applied to each block within the model. The calculations consider overall heavy mineral (HM) grade and individual assemblage product values, operating costs, recoveries and modifying factors. An economic optimization is performed to determine if a block is viable to mine, and therefore be included in the Ore Reserves.

9.5 Processing

The first stage processing that produces the heavy mineral concentrate (HMC) is a well-tested and proven methodology and currently exists at other mineral sands operations around the world.

The metallurgical separation process also utilises known technology where the performance and recovery of the mineral products has been well established by Iluka in current and past operations.

9.6 Ore Reserves declared

The Cataby Ore Reserve estimate for the Mid-west region is summarised in Table 9.1. The location of the Cataby Ore Reserve is shown on Figure 4.3.

Table 9.1: Summary of Ore Reserves for Cataby as at the 31 December 2016.

Summary of Ore Reserves for Mid-west Cataby					2016	2016		HM Assemblage(2)		
District	Deposit	Ore Reserve Category(1)	Overburden Volume kbcm	Ore Tonnes kt	InSitu HMTonnes kt	HM Grade (%)	Clay Grade (%)	Ilmenite Grade (%)	Zircon Grade (%)	Rutile Grade (%)
WA-Mid-West	Cataby	Proved	115,280	87,823	5,541	6.3	12.0	59.7	9.3	4.1
		Probable	-	32,603	1,327	4.1	12.0	62.3	9.4	4.3
Cataby	**Proved Total**		**115,280**	**87,823**	**5,541**	**6.3**	**12.0**	**59.7**	**9.3**	**4.1**
Cataby	**Probable Total**		**-**	**32,603**	**1,327**	**4.1**	**12.0**	**62.3**	**9.4**	**4.3**
Cataby	**Total**		**115,280**	**120,426**	**6,868**	**5.7**	**12.0**	**60.2**	**9.3**	**4.1**

Notes:
1 Ore Reserves are a sub-set of Mineral Resources.
2 Mineral assemblage is reported as a percentage of the insitu HM content.
3 In situ (dry) metric tonnage is reported.
4 Rounding may generate differences in the last decimal place.
5 The Ore Reserve estimates are stated as at the 31 December 2016 and have been depleted for all production conducted to this date.

Perth Basin Mid-west HM Deposits and Cataby Ore Reserves- JORC Code 2012 edition - Table 1 Commentary

Section 1 Sampling Techniques and Data

(Criteria in this section apply to all succeeding sections.)

Criteria	JORC Code explanation	Commentary
Sampling techniques	*Nature and quality of sampling (eg cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc). These examples should not be taken as limiting the broad meaning of sampling.* *Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.* *Aspects of the determination of mineralisation that are Material to the Public Report.* *In cases where 'industry standard' work has been done this would be relatively simple (eg 'reverse circulation drilling was used to obtain 1 m samples from which 3 kg was pulverised to produce a 30 g charge for fire assay'). In other cases more explanation may be required, such as where there is coarse gold that has inherent sampling problems. Unusual commodities or mineralisation types (eg submarine nodules) may warrant disclosure of detailed information.*	The Midwest deposits were sampled using BQ or NQ diameter Reverse Circulation Air Core (RCAC) drill holes. A total of 632,692 m has been drilled utilising predominantly 1m and 1.5m sample lengths. Material is presented to a rotary splitter which rotates at a regular speed to take a representative one quarter split of about 1 to 2 kg. depending on the drill diameter and sample length Samples were assayed at Iluka internal laboratories using industry standard techniques for Heavy Mineral (HM) determination. Due to the age of the drilling several different assay techniques were used to determine HM content. RCAC drilling was used to obtain 1 to 2 kg of sample collected using a rotary splitter over sample lengths of 1 or 1.5 m. Prior to the year 2000 the samples were dried then de-slimed by wet sieving (material <75 µm removed). Oversize (material >2mm) was also removed. The sand fraction of the sample (75µm - 2mm) was then riffle split to provide about a 100 g sub-sample which was sieved at 710 µm to determine the coarse sand content. The remaining fine sand (75 µm to 710 µm) was subjected to float/sink analysis using Tetra Bromo Ethane (TBE) (SG=2.95 g/cm^3). After 2000 the 75 µm screen was changed to a 53 µm screen. The use of a finer screen size slightly lowered the Slimes values. In early 2002, TBE was substituted for Lithium Sodium Poly-Tungstate (LST) (SG=2.86 g/cm^3). This substitution results in slightly more "light" HM material reporting to the HM fraction. Composite samples were taken from either the sand residue fractions of exploration samples or the HM sink fractions from the HM determinations which also corroborate the validity of the HM mineralisation. The composited samples generate between 0.1 and 2kg of HM which is

Criteria	JORC Code explanation	Commentary
		then subjected to a process of magnetic, electrostatic and heavy liquid separation followed with XRF analysis of the fractions to determine the mineral assemblage and mineral quality. This information has been used to support the assemblage of the HM present.
Drilling techniques	*Drill type (eg core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc) and details (eg core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc).*	All sampling was based on vertical RCAC drilling utilising BQ or NQ rods to bore a 56mm or 76mm hole diameter hole respectively.
Drill sample recovery	*Method of recording and assessing core and chip sample recoveries and results assessed.* *Measures taken to maximise sample recovery and ensure representative nature of the samples.* *Whether a relationship exists between sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.*	Drilling prior to 1997 did not record any recovery information. For drilling after 1997 the sample quality was recorded in the field logging. Any factors that have affected sample recovery were recorded in the logging comments. Poorer sample recovery was common in near surface and indurated material. Drilling was conducted using industry standard techniques with suitably trained and qualified drilling operators. In some instances, sample recovery in indurated material was poor. The indurated material also frequently reports as elevated HM values due to ground up iron oxides reporting to the HM fraction. This was detected by comparing field estimates to laboratory results. Typically, indurated material was flagged in resource block models and is excluded from resource estimates.
Logging	*Whether core and chip samples have been geologically and geotechnically logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and metallurgical studies.* *Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc) photography.* *The total length and percentage of the relevant intersections logged.*	Samples were logged by qualified geologists or geotechnicians and the geological information recorded is adequate to support the resource estimate. Logging of RCAC samples recorded, colour, lithology, dominant grainsize, coarsest grainsize, sorting, induration type, hardness, and also an estimate of the slimes, rock and HM content. Prior to the early 1990s drill samples outside the mineralised domains were irregularly logged and only basic information such as colour and material type was recorded

Criteria	JORC Code explanation	Commentary
		The logging is considered qualitative and is appropriate for supporting the Mineral Resource estimates of the Mid-west Domain. The geological logging is also used as a guide to the allocation of samples assigned to metallurgical composites for assemblage determination. The quality of the available geological information is considered when determining the JORC resource classification appropriate for each Mineral Resource.
Sub-sampling techniques and sample preparation	*If core, whether cut or sawn and whether quarter, half or all core taken.*	No diamond coring or Sonic drilling has been done in the Midwest District.
	If non-core, whether riffled, tube sampled, rotary split, etc and whether sampled wet or dry.	Samples are collected beneath a rotary splitter fed from a cyclone. Approximately 25% of the sample is collected for geological logging and analysis. The mineralisation in the Mid-west District is predominantly above the standing water table so samples drilled were predominantly dry. Water injection was used where the ground was damp or below the water table to assist in sample delivery and prevent sample contamination. Sample intervals were typically 1 or 1.5 m and all the drill sample is presented for subsampling. All mineralised samples are submitted for assay. Often samples from waste areas are discarded to minimise assay costs.
	For all sample types, the nature, quality and appropriateness of the sample preparation technique.	Sample preparation is consistent with industry standard practice and is deemed to be appropriated for Heavy Mineral determination.
	Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.	The QA/QC completed for each deposit in the Midwest District is presented in the table below. Overall, there is a lack of QA/QC completed for the district. This is largely due to the age of the drilling in the Midwest District and the drilling taking place before the introduction of QA/QC procedures in 2005.
	Measures taken to ensure that the sampling is representative of the in situ material collected, including for instance results for field duplicate/second-half sampling.	The sampling methodology is considered consistent with industry standard practice and appropriate for the mineralisation in the Mid-west District. Since 2005 routine duplicate sampling of the material presented to the rotary splitter at the rate of between 1:20 and 1:40 samples was done. Measurements of the sample weights were also used to track the general quality of the material collected for assay. Increased variance in sample weights can reflect a range factors including variable drilling conditions or poor drilling technique.
	Whether sample sizes are appropriate to the grain size of the	

Criteria	JORC Code explanation	Commentary
	material being sampled.	The sample size is considered appropriate for the material hosting the mineralisation, which is supported by Gy's sampling theory.
Quality of assay data and laboratory tests	*The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.*	The assay techniques utilised are considered to be industry standard or better and appropriate for the mineralisation in the Mid-west District. The Assay data is corroborated by decades of reconciliation of mining in the area. The mineralogical composite evaluation processes are comprehensive and appropriate for the current level of study and applied resource classification.
	For geophysical tools, spectrometers, handheld XRF instruments, etc, the parameters used in determining the analysis including instrument make and model, reading times, calibrations factors applied and their derivation, etc.	No data from the Midwest District contain any results generated by geophysical methods.
	Nature of quality control procedures adopted (eg standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (ie lack of bias) and precision have been established.	The QA/QC completed for each deposit in the Mid-west District is presented in the table below. Quality control was not routinely done prior to 2005 which has resulted in an overall paucity of QA/QC support. The lack of QA/QC data tends to undermine the confidence in the datasets. However, historic mining in and around the Midwest District which were assayed using similar or the same techniques provides credibility to the results.

Criteria	JORC Code explanation	Commentary
		(see table below)
Verification of sampling and assaying	*The verification of significant intersections by either independent or alternative company personnel.*	Assay results are reviewed by the geologist supervising each respective exploration program. The validity of HM reporting from sample analysis is corroborated by follow up logging of the HM concentrates. Verification of significant mineralisation is undertaken as part of the resource block modelling process.
	The use of twinned holes.	Numerous twinned holes have been drilled in the Mid-west deposits since the introduction of rigorous QA/QC protocols in 2005 to confirm in-situ grades and assess in ground variability. True twinned holes (drilled on the same day, with the same method and same analytical techniques) are analysed by comparing the insitu HM content. Typically the HM deposits in the Mid-west show low in ground variability
	Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.	Drilling has been completed over a protracted period of time in the Mid-west. Older drilling was recorded on paper logs. The hard copy data for deposits supporting Mineral Resources was entered into digital files over a period from the late 1980's to the mid 1990's. In the late 1980s computerised field logging equipment was introduced in the Mid-west Domain and geological information was recorded and stored in text files. An Oracle Database was introduced for the storage of geological data in the early 2000s. This was superseded by a custom built SQL database

Deposit	Duplicates	Standards	Twinned Holes	QA/QC Comments
Adamson	1492	60	133	All QA/QC is from the 2005-08 drilling
Allied Tails	225	0	0	All Duplicate samples from 2003 drilling
Brandy Flat	380	107	0	All QA/QC is from the 2005-09 drilling
Cataby	290	160	201	
Depot Hill East	0	0	0	No QA/QC due to the age of all of the drilling
Depot Hill North	148	152	8	All QA/QC is from the 2012 drilling
IPL Central	91	33	0	All QA/QC is from the 2008 drilling
IPL North	267	24	15	All QA/QC is from the 2005 drilling
IPL South	0	0	34	The lack of QA/QC is due to the age of the drilling
Monazite Stockpile	24	12	3	
North Mine Remnants	1382	397	2	
Northern Leases	0	0	0	No QA/QC due to the age of all of the drilling
Ocean Hill	0	0	0	No QA/QC due to the age of all of the drilling
South Secondary Mids	140	71	0	
South Tails	446	176	3	All QA/QC is from the 2007/08/10 drill programs
Twin Hills	0	0	48	The lack of QA/QC is due to the age of the drilling
Western Remnants	250	0	8	The lack of QA/QC is due to the age of the drilling
Yellow Dam	30	6	0	The lack of QA/QC is due to the age of the drilling

Criteria	JORC Code explanation	Commentary
	Discuss any adjustment to assay data.	solution introduced in 2006 which was in turn superseded by an acQuire™ data management solution. For more recent drilling, logging of RCAC samples was input directly into a laptop computer. Data was then transferred into Iluka's Geology Database at the time which incorporated further verification routines to ensure valid entries. Errors in the field logs results in rejection of the data for correction before re-loading is attempted No adjustments to mineral grades was done, however some of the older assays were presented in a slightly different format and were recalculated to provide the sand and coarse sand contents in an equivalent format.
Location of data points	*Accuracy and quality of surveys used to locate drill holes (collar and down-hole surveys), trenches, mine workings and other locations used in Mineral Resource estimation.* *Specification of the grid system used.* *Quality and adequacy of topographic control.*	For much of the older drilling, the method of survey has not been recorded. However, it is known though from the personal experience of the Competent Person, that the drill holes set out for all the drilling supporting the Mid-west mineral resource estimates was done by qualified surveyors (usually company employees), using contemporary equipment at the time of the exploration programs. This provides collar set out accuracy of +/-0.2 m or better in the X/Y/Z directions. Drill holes were surveyed in WGS84 adopting the GDA94 Datum. The coordinates were then converted to MGA Zone 50. The data was then converted to either the Eneabba Local Grid or the Cataby Local Grid using a 2-point transformation (given below).
Data spacing and distribution	*Data spacing for reporting of Exploration Results.*	The drilling has been conducted at various spacing's. The table below shows the various drill spacing's used in each deposit in the Midwest District.

	LOCAL_N	LOCAL_E	MGA_N	MGA_E	AMG_N	AMG_E
Cataby	6800	11800	6588482	367088.84	6588332	366950.34
Cataby	25000	9960	6601750.5	354500.97	6601601.5	354361.75
ENEABBA	107706.98	99829.8	6696150	334138.91	6696000	334000
ENEABBA	99553.16	103508.1	6688150	338138.91	6688000	338000

Criteria	JORC Code explanation	Commentary
	Whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied. *Whether sample compositing has been applied.*	(see drill spacing table below) The drilling is spaced sufficiently to conclusively demonstrate continuity of mineralisation and is appropriate for the style of mineralisation and the Resource Classification applied. No compositing of sample grades has been done for the interpolation of HM and Slimes. Samples have been composited for further metallurgical testing to determine mineral assemblage, quality and sizing of geologically interpreted domains. The results of the mineralogical composites are joined to the resource block models on the basis of the interpolated composite identifiers.
Orientation of data in relation to geological structure	*Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.* *If the relationship between the drilling orientation and the orientation of key mineralised structures is considered to have introduced a sampling bias, this should be assessed and reported if material.*	No bias has been identified or is expected as the drilling orientation is effectively perpendicular to the mineralisation.
Sample security	*The measures taken to ensure sample security.*	Sample security during transportation is unknown for much of the older drilling, however samples were likely stored in drums or crates between the field and laboratories where the sample were assayed. Since the mid 1990s, samples were collected in polyweave bags and transported to

Deposit	X Drill Space	Y Drill Space	Z Drill Interval
Adamson	30	100	1.5
Allied Tails	30	50	1.5
Brandy Flat	30	100	1.5
Cataby	30	100	1.5
Depot Hill East	30	100	1.5
Depot Hill North	30	100	1.5
IPL Central	30	100	1.5
IPL North	30	100	1.5
IPL South	30	100	1.5
Monazite Stockpile	20	20	1
North Mine Remnants	30	100	1.5
Northern Leases	60	200	1.5
Ocean Hill	30	100	1.5
South Secondary Mids	25	25	1
South Tails	30	50	1.5
Twin Hills	60	100	1.5
Western Remnants	30	100	1.5
Yellow Dam	20	20	1

Criteria	JORC Code explanation	Commentary
		the laboratory for analysis with appropriate sample dispatch documentation. The dispatch inventory was audited against the samples delivered to the laboratory.
Audits or reviews	*The results of any audits or reviews of sampling techniques and data.*	No audits of the sampling techniques used are known for the Mid-west area but the same method has been reviewed during drilling operations at other Iluka sites by Snowden Mining Consultants.

Section 2 Reporting of Exploration Results

(Criteria listed in the preceding section also apply to this section.)

Criteria	JORC Code explanation	Commentary
Mineral tenement and land tenure status	*Type, reference name/number, location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environmental settings.* *The security of the tenure held at the time of reporting along with any known impediments to obtaining a licence to operate in the area.*	Iluka retains 100% rights to all Midwest deposits. All deposits are secured under various mining and exploration tenements. Refer to the main text for a full list of tenements in the Midwest District and their associated grant dates. Some deposits are located within Crown Reserves. Iluka has mined and subsequently rehabilitated within a Crown Reserve at Eneabba. Suitable environmental management plans will be produced and approved prior to any mining commencing in similar areas to address any environmental considerations.
Exploration done by other parties	*Acknowledgment and appraisal of exploration by other parties.*	All the exploration and drilling supporting the Mineral Resources in the Midwest District was conducted by Iluka Resources or predecessor companies including; Allied Eneabba, Associated Minerals Consolidated, Ilmenite Proprietary Limited and Renison Gold Consolidated.
Geology	*Deposit type, geological setting and style of mineralisation.*	The deposits of the Midwest District comprise beach strand material, dune sands and tailings material. All Iluka's HM deposits located within the Mid-west District are hosted in beach barrier sediments interpreted to be equivalent to the Yoganup Formation. The mineralisation developed in response to the reworking of Mesozoic sediments deposited on a Proto Swan Coastal Plain during the evolution of the Perth Basin. During the Tertiary Era successive marine transgressions inundated the Perth Basin during interglacial periods and reworked the Mesozoic sediments and contemporaneous sediment input from rivers draining the adjacent landmass. The deposits are now hosted in sediments representing the weathered and deflated remnants of the Tertiary aged beach and dune sediments. In places the Yoganup Formation is interbedded with or overlain by sediments of a Guildford Formation equivalent.
Drill hole	*A summary of all information material to the understanding of the*	A total of 26,849 holes representing 632,692m were drilled on the Mid-

Criteria	JORC Code explanation	Commentary
Information	*exploration results including a tabulation of the following information for all Material drill holes:* *easting and northing of the drill hole collar* *elevation or RL (Reduced Level – elevation above sea level in metres) of the drill hole collar* *dip and azimuth of the hole* *down hole length and interception depth* *hole length.* *If the exclusion of this information is justified on the basis that the information is not Material and this exclusion does not detract from the understanding of the report, the Competent Person should clearly explain why this is the case.*	west HM deposits, from which 452,310 samples have been collected and analysed. It is impractical to list all the mineralised intercepts and this information is deemed to be largely superseded by the Mineral Resource estimates provided which considers all the exploration data. Plans showing the drill hole distribution and typical cross sections are presented in the main text to support the Mineral Resource estimates. All drill holes were drilled vertically which is essentially perpendicular to the mineralisation. The mineralisation was intersected in the drilling from surface to depths of 60m. Mineralised intercepts range from a few metres up to 40 m in thickness.
Data aggregation methods	*In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (eg cutting of high grades) and cut-off grades are usually Material and should be stated.* *Where aggregate intercepts incorporate short lengths of high grade results and longer lengths of low grade results, the procedure used for such aggregation should be stated and some typical examples of such aggregations should be shown in detail.* *The assumptions used for any reporting of metal equivalent values should be clearly stated.*	No weighting has been applied in the reporting of exploration results for the Mid-west District as uniform sample intervals have been used in the drilling of each hole. No top cutting of the HM grades was done and is not deemed appropriate for the reporting of mineral sands. Lower HM cut-off grades have been applied to each deposit. The cut-off grades range from 1.5%-3% HM depending on the deposit style and an understanding of the value of the HM assemblage. No aggregation or metal equivalents have been used.
Relationship between mineralisation widths and intercept lengths	*These relationships are particularly important in the reporting of Exploration Results.* *If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported.* *If it is not known and only the down hole lengths are reported, there should be a clear statement to this effect (eg 'down hole length, true width not known').*	All holes are drilled vertically which is essentially perpendicular to the mineralisation, so all intercepts represent true widths.

Criteria	JORC Code explanation	Commentary
Diagrams	*Appropriate maps and sections (with scales) and tabulations of intercepts should be included for any significant discovery being reported These should include, but not be limited to a plan view of drill hole collar locations and appropriate sectional views.*	Plans indicating the drill hole locations for the Mid-west HM deposits and typical cross sections are presented in the main text.
Balanced reporting	*Where comprehensive reporting of all Exploration Results is not practicable, representative reporting of both low and high grades and/or widths should be practiced to avoid misleading reporting of Exploration Results.*	Mineral Resource estimates are presented, for each deposit, in the main text which supersedes the reporting of significant intercepts. The resource estimation considers all the available data.
Other substantive exploration data	*Other exploration data, if meaningful and material, should be reported including (but not limited to): geological observations; geophysical survey results; geochemical survey results; bulk samples – size and method of treatment; metallurgical test results; bulk density, groundwater, geotechnical and rock characteristics; potential deleterious or contaminating substances.*	Logging of the samples includes visually estimating the HM present the results of which corroborate the presence of HM mineralisation. In addition the HM component of samples recovered from laboratory analyses are visually inspected to confirm the authenticity of the reported HM. Composite samples were taken from either from the sand residue fractions of exploration samples or HM sink fractions from the HM determinations which also corroborate the validity of the HM being reported. The composited samples generate between 0.1 and 2kg of HM depending on the technique being used, which is then subjected to a process of magnetic, electrostatic and heavy liquid separation followed with XRF analysis of the fractions to determine the mineral assemblage and mineral quality. The Iluka standard bulk density formula has been used in the estimation of mineral resource tonnages for the Mid-west HM Deposits. The formula was developed from the study of geologically similar HM deposits throughout Western Australia. The formula takes into account the sand, clay and HM content of the material. The formula also makes an allowance for void space between sand grains with fines filling replacing void space to a point where the clay content results in a matrix supported material. The formula supports the Mineral Resource and Ore Reserve tonnages at Iluka's mining operations. No potential deleterious or contaminating substances have been identified in the Midwest deposits. Routine testing is undertaken for Potential Acid Sulphate Soils (PASS), however, this has not been

Criteria	JORC Code explanation	Commentary
		detected in the Iluka Mid-west HM deposits.
Further work	*The nature and scale of planned further work (eg tests for lateral extensions or depth extensions or large-scale step-out drilling).* *Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.*	No further drilling is planned at this stage for any of the deposits in the Midwest District.

Section 3 Estimation and Reporting of Mineral Resources

(Criteria listed in section 1, and where relevant in section 2, also apply to this section.)

Criteria	JORC Code explanation	Commentary
Database integrity	*Measures taken to ensure that data has not been corrupted by, for example, transcription or keying errors, between its initial collection and its use for Mineral Resource estimation purposes.* *Data validation procedures used.*	Drilling has been completed over a protracted period of time in the Mid-west District. Geological logs were recorded on paper until the introduction of computerised recording systems in the late 1980s. The hard copy data for deposits supporting Mineral Resources was entered into digital files during the late 1980's to mid-1990s. In the late 1980s computerised field logging equipment was introduced in the Mid-west District and geological information was recorded and stored in various text file formats. An Oracle Database was introduced for the storage of geological data in the early 2000s. This was superseded by a custom built SQL database solution introduced in 2006 which was in turn superseded by an acQuire™ data management solution in 2012. The computer based logging software incorporated data verification routines to prevent the entry of incorrect codes. Further verification routines are deployed when newly acquired data is loaded into the Iluka Geology Data Management System (GDMS). Errors result in rejection of the data which must be corrected prior to attempting to reload the data. Assay data was stored in Iluka's CCLASS laboratory database which has been operational since the late 1980s and data was transferred electronically to the Geology Database Prior to this much of the information (geology and assays) was recorded on paper and manually transcribed on hard copy cross sections. Prior to resource estimation the data is reviewed statistically and visually to ensure all results were within acceptable ranges and appear in valid spatial locations. Validation of the drill data included: • checking the collar, sample and hole numbers for duplication; • checking there are no missing assays or below detection limit values in the drill dataset; • checking the assay data (oversize, slimes, sand and coarse sand) totals to 100% or within acceptable rounding limits;

Criteria	JORC Code explanation	Commentary
		• checking the mineralogical data totals 100%; and • completing basic statistical analysis of the drill data to detect outlier values. A review of the spatial location of the drill data was also completed to ensure the drill holes are in valid location and the assay values corroborate with the lithological distribution and in general appear rational.
Site visits	*Comment on any site visits undertaken by the Competent Person and the outcome of those visits.* *If no site visits have been undertaken indicate why this is the case.*	Several Competent Persons employed by Iluka have either been based in the Mid-west or visited the Mid-west HM Deposits on many occasions. It is noted that a number of the HM deposits at Eneabba are either covered by native vegetation or vegetation propagated from extensive rehabilitation of the site. Considerable infrastructure is also present in some areas in the form of power lines, rail lines, water supply pipes and a gas pipeline. These in part supported the South Secondary mineral processing plant infrastructure which is also located on HM mineralisation. These factors have not been taken into consideration in the Mineral Resource estimates as they may be removed in the event of mine development. Any residual infrastructure will be taken into consideration as part of an economic analysis and estimation of Ore Reserves.
Geological interpretation	*Confidence in (or conversely, the uncertainty of) the geological interpretation of the mineral deposit.* *Nature of the data used and of any assumptions made.* *The effect, if any, of alternative interpretations on Mineral Resource estimation.*	The Mid-west HM deposits are hosted in beach barrier sedimentary sequences which is a common geological host environment for mineral sands. A high confidence can be placed in the geological framework supporting the Mineral Resource estimates. The HM placers in the Perth Basin have been the subject of many geological investigations and extensive understanding has been afforded through mining over the past 50 years. The drilling and geological data recorded has adequately defined the geological framework to support the mineral resource estimates for the Mid-west HM Deposits. The geological framework for the HM deposits in the Mid-west is well understood and no alternative interpretations have been considered.

Criteria	JORC Code explanation	Commentary
	The use of geology in guiding and controlling Mineral Resource estimation. *The factors affecting continuity both of grade and geology.*	Appropriate geological domaining and corresponding flagging of drill data has been used to control grade interpolation and distribution during resource estimation. The current exploration is of a sufficient spatial density to be able to identify grade and geological continuity. For those deposits that have been mined, the grade continuity is compromised by the presence of mineralisation in tailings and remnants. However, this confidence in the grade continuity is reflected in the resource classification awarded.
Dimensions	*The extent and variability of the Mineral Resource expressed as length (along strike or otherwise), plan width, and depth below surface to the upper and lower limits of the Mineral Resource.*	The Mid-west HM mineralisation is located in 2 main accumulations centred on Cataby and Eneabba, resulting from a lengthy period of sedimentary deposition. These deposits comprise multiple smaller deposits of beach strand and dune sands which have accumulated in close proximity due to a favourable depositional environment. Individual zones of mineralisation may be as little as 20 m wide by 200 m in length to 200 m wide by 10 km in length and range from 2 m to 40 m in thickness. Overall the Eneabba area covers a strike length of 45 km with strandlines erratically distributed over a strike width of 10 km. Individual strands are 2 to 20m thick and occur on strand positions from 35 to 120 m above current sea level. The Cataby HM deposits are comprised of 2 main zones of economic interest (east and west) with other peripheral zones of mineralisation. Both zones cover a strike length of some 20 km and occur over a strike width of about 50m to 500m. The Cataby mineralisation ranges in thickness from a 3m to over 40 m in places. Deposits vary in size and thickness. The spatial extent of each deposit is presented on the plans in the accompanying text.
Estimation and modelling techniques	*The nature and appropriateness of the estimation technique(s) applied and key assumptions, including treatment of extreme grade values, domaining, interpolation parameters and maximum distance of extrapolation from data points. If a computer assisted estimation method was chosen include a description of computer*	The grade interpolations were carried out using the Estima Superprocess within Datamine Studio^{TM} software, using Inverse Distance Cubed (ID3) which is an Iluka standard and is deemed appropriate for this style of mineralisation. Mineralogical composite identifier and Hardness values were interpolated using Nearest Neighbour (NN) method. No HM top-cut has been used nor deemed

Criteria	JORC Code explanation	Commentary
	software and parameters used.	necessary. The search distances for grade variables for the Mid-west resource block models varied between 40 m to 90 m in the X dimension, 100 m to 350 m in the Y dimension and 2 m to 6 m in the Z dimension. Interpolation of the composite ID employed search distances about double that of the grade analytes. Additional search radius factors of 2 and 10 were used to expand the search dimension should insufficient data be found within the 1st search dimension to fulfil the search criteria. A dynamic search protocol was used to ensure the search ellipse was optimally orientated to honour grade or geological structure for models created after 2006. Tables of the search and estimation parameters for the Mid-west deposits are presented in the accompanying text.
	The availability of check estimates, previous estimates and/or mine production records and whether the Mineral Resource estimate takes appropriate account of such data.	There has been a long history of exploration and mining in the Mid-west District by Iluka. Digital block models have been used to support resource estimation and mining since about 1990. In general the block models have faithfully represented the volume and grade of mineralisation expressed by the drill data and consequently no adjustments or factoring is applied to the models.
	The assumptions made regarding recovery of by-products.	No by-products have been considered as part of these estimates.
	Estimation of deleterious elements or other non-grade variables of economic significance (eg sulphur for acid mine drainage characterisation).	Mineral quality information for ilmenite and zircon is typically incorporated into the models to support the economic analysis. Variables relating to soil acidity have been incorporated into the Tutunup South model.
	In the case of block model interpolation, the block size in relation to the average sample spacing and the search employed.	The parent cell size used in the block modelling of the Mid-west Deposits varied from 15 to 30 m in the X direction, 50 to 100 m in the Y direction and 1 or 1.5 m in the Z direction and principally reflects a parent cell size approximately half the X/Y drill spacing. The search distances adopted reflect the spatial distribution of the exploration data with the dimensions being set to about 2 times the drill hole spacing. The anisotropy of the search distances typically reflect the variation in spacing of data in the X/Y/Z directions but are also supported by geostatistical analysis such as variography. Parent cell and search parameters for the Mid-west resource block models are tabled in the

Criteria	JORC Code explanation	Commentary
		accompanying text. Bulk open cut mining techniques would be employed if any of the deposits in the Midwest District were to be mined.
	Any assumptions behind modelling of selective mining units. *Any assumptions about correlation between variables.*	No assumptions have been made about correlation between variables.
	Description of how the geological interpretation was used to control the resource estimates.	Drill hole sample data was flagged with domain codes corresponding to the geology of the deposit and the domains were imprinted on the model from 3-dimensional surfaces generated from the geological and mineralisation interpretations.
	Discussion of basis for using or not using grade cutting or capping.	A top cut was not deemed necessary for HM assays. Iluka does not use grade cutting in any of its resource estimates. This is verified by the results of reconciliation at active mine sites.
	The process of validation, the checking process used, the comparison of model data to drill hole data, and use of reconciliation data if available.	Validation of the modelling and Mineral Resource estimation included: • a visual review of the input assay grades compared to the model grade; • comparison statistics for the input assays compared to the model grades on a domain basis; and • generation of a NN grade interpolation for comparison and corroboration purposes. For block models created prior to about the year 2000 the use of statistical analysis and NN verification was not done as a standard protocol. The increased scrutiny and validation of the block models and Mineral Resource estimates is done as updating occurs.
Moisture	*Whether the tonnages are estimated on a dry basis or with natural moisture, and the method of determination of the moisture content.*	All tonnages are estimated using dry in-situ density.
Cut-off parameters	*The basis of the adopted cut-off grade(s) or quality parameters applied.*	Nominal lower HM cut-off grades of between 1.5% and 3% HM were chosen for various Mid-west deposits. The HM cut-off grade applied takes into account: • the intrinsic value of the heavy mineral assemblage; • economic assessments carried out using cost information from many years of operational experience; • statistical evaluation of the sample data;

Criteria	JORC Code explanation	Commentary
		• current operational practices for dry mining options; • consideration of the lateral and vertical mineral distribution; and • the potential mining and extraction methodology;
Mining factors or assumptions	*Assumptions made regarding possible mining methods, minimum mining dimensions and internal (or, if applicable, external) mining dilution. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential mining methods, but the assumptions made regarding mining methods and parameters when estimating Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the mining assumptions made.*	Mining of the deposits in the Midwest District are likely to be by bulk open cut mining using suitable excavation machinery. The geometry of the deposits makes them amenable to bulk open cut mining methods currently employed in other open cut mines operated by Iluka. The unconsolidated nature of the sediments allow for a range of options to be considered including the use of scrapers or large scale truck and shovel or dozer trap.
Metallurgical factors or assumptions	*The basis for assumptions or predictions regarding metallurgical amenability. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential metallurgical methods, but the assumptions regarding metallurgical treatment processes and parameters made when reporting Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the metallurgical assumptions made.*	The nature of the mineralisation in the Mid-west is geologically consistent with mineral sands deposits that have historically been mined by Iluka for the past 45 years. The metallurgical amenity of the deposits is reasonably well understood from this historical mining. As a result the metallurgical recoveries are factored on the basis of historical recoveries which are supplemented by ongoing metallurgical investigation to optimise mineral recovery. Mineral Sands products are subject to a multitude of specifications to provide saleable products. In many instances blending of feed trains or product conditioning is required. These are determined at the time of mining and optimisation of mining schedules may be undertaken to assist in generation of a quality product. The mineral characteristics may also determine the end market that a product can be sold into. In other instances the market can flex on the specifications depending on the immediate demand for various products at that time. As a result of this and the fluidity of the mineral sands industry it is difficult to specify assumptions on metallurgical treatment processes.
Environmental factors or assumptions	*Assumptions made regarding possible waste and process residue disposal options. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction*	Current mining practice is to return all waste materials to the mine void as soon as reasonably possible after mining. This is supported by an extensive history of operation and rehabilitation by Iluka in the Mid-west

Criteria	JORC Code explanation	Commentary
	to consider the potential environmental impacts of the mining and processing operation. While at this stage the determination of potential environmental impacts, particularly for a greenfields project, may not always be well advanced, the status of early consideration of these potential environmental impacts should be reported. Where these aspects have not been considered this should be reported with an explanation of the environmental assumptions made.	District. All mining operations will be subject to appropriate environmental management plans.
Bulk density	*Whether assumed or determined. If assumed, the basis for the assumptions. If determined, the method used, whether wet or dry, the frequency of the measurements, the nature, size and representativeness of the samples.* *The bulk density for bulk material must have been measured by methods that adequately account for void spaces (vugs, porosity, etc), moisture and differences between rock and alteration zones within the deposit.* *Discuss assumptions for bulk density estimates used in the evaluation process of the different materials.*	The bulk density values are calculated using an Iluka proprietary density formula. The formula is considered appropriate and is used at other Iluka deposits which are geologically similar and currently being mined for HM. The formula is considered valid as it takes into account the sand, HM and clay components It also allows for potential void space within the sand based on expected “filling” of the void space by the fine clay content. The formula was determined from results of extensive Nuclear Densometer testing at various Iluka mine sites in Western Australia. All tonnages are expressed on dry tonnage basis. It is assumed that the material in the Midwest District has the same density relationship that is seen in Iluka deposits that are currently being mined and have been mined historically.
Classification	*The basis for the classification of the Mineral Resources into varying confidence categories.* *Whether appropriate account has been taken of all relevant factors (ie relative confidence in tonnage/grade estimations, reliability of input data, confidence in continuity of geology and metal values, quality, quantity and distribution of the data).*	The resource classification applied to the HM mineralisation in the Midwest District was based on a number of considerations including: • data density of primary HM assays; • degree of continuity of mineralisation and geological units; • amount and quality of the mineralogical bulk data support; • assessment of the integrity of the data; and • level of QA/QC support. In the case of the drill data a density of ~100 x 30 m typically lends to a Measured Classification, ~200 x 60 m to an Indicated Classification. Wider spaced drill density typically supports Inferred Resource

Criteria	JORC Code explanation	Commentary
	Whether the result appropriately reflects the Competent Person's view of the deposit.	Classifications. There is an overall lack of QA/QC data supporting the exploration data. While this undermines the integrity of the data, the same techniques for acquiring and testing of the data have been used to support historical mining operations completed by Iluka or its predecessor companies. It is the view of the Competent Person that the distribution of data and the resource estimation methodologies applied to the Mid-west District are appropriate for the style of mineralisation and support the Resource Classification applied.
Audits or reviews	*The results of any audits or reviews of Mineral Resource estimates.*	External reviews were completed for Adamson (by Snowden in 2006) and North Mine Remnants (by Snowden in 2008). The Cataby north east and Cataby South areas were reviewed by McDonald Speijers in 2005 and 2006. Commentary in relation to the reviews was taken into consideration and improvements effected as necessary All other resource block models have been reviewed internally and in most cases internal processes within Iluka assisted in the development of resource estimates.
Discussion of relative accuracy/ confidence	*Where appropriate a statement of the relative accuracy and confidence level in the Mineral Resource estimate using an approach or procedure deemed appropriate by the Competent Person. For example, the application of statistical or geostatistical procedures to quantify the relative accuracy of the resource within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors that could affect the relative accuracy and confidence of the estimate.* *The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnages, which should be relevant to technical and economic evaluation. Documentation should include assumptions made and the procedures used.* *These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.*	It is the view of the Competent Persons that the frequency and accuracy of the data and the process in which the Mineral Resources have been estimated and reported are appropriate for the style of mineralisation under consideration. The relative accuracy of the estimates is reflected in the reporting of the Mineral Resources and the Resource Category assigned as per the guidelines set out in the JORC Code (2012 Edition). The statement refers to global estimates of tonnage and grade. Mining in the Eneabba region of the Midwest District was carried out more or less continuously between 1972 and 2013. For those deposits which have been mined, the estimated resource is reconciled against metallurgical production figures on a monthly and annual basis. Actual

Criteria	JORC Code explanation	Commentary
		results generally indicate very good agreement with the geological model and close reconciliation with HM tonnes, ore tonnes and HM percentage head grade. The risk of not achieving good physical Ore Reserve reconciliation is considered to be low.

Section 4 Estimation and Reporting of Ore Reserves (for the Cataby Deposit)

(Criteria listed in section 1, and where relevant in sections 2 and 3, also apply to this section.)

Criteria	JORC Code explanation	Commentary
Mineral Resource estimate for conversion to Ore Reserves	*Description of the Mineral Resource estimate used as a basis for the conversion to an Ore Reserve.* *Clear statement as to whether the Mineral Resources are reported additional to, or inclusive of, the Ore Reserves.*	The 2016 Ore Reserve estimate is based the Mineral Resource model described as Datamine model "mcatot7.dm" which has been reviewed and approved by an Iluka Resources Limited (Iluka) Competent Person (CP). The resource model for the Cataby deposit has been created from individual sub models representing the NW, NE and southern (SE and SW combined) quadrants. All the sub-models have been internally peer reviewed and the Cataby South model has been externally audited. The geological models for the NE and NW quadrants were (re)created during 2013 while the Cataby South model was constructed in 2006. Ore Reserves comprise the material reported as a sub-set of the Mineral Resource.
Site visits	*Comment on any site visits undertaken by the Competent Person and the outcome of those visits.* *If no site visits have been undertaken indicate why this is the case.*	A number of site visits have been completed by various CPs during various drilling, sampling, test-work and study phases. On each occasion the CP was satisfied with the quality of the work being conducted and no matters were observed that would impact the estimation of the Ore Reserves.
Study status	*The type and level of study undertaken to enable Mineral Resources to be converted to Ore Reserves.* *The Code requires that a study to at least Pre-Feasibility Study level has been undertaken to convert Mineral Resources to Ore Reserves. Such studies will have been carried out and will have determined a mine plan that is technically achievable and economically viable, and that material Modifying Factors have been considered.*	The Cataby project has been extensively studied in the PFS stage. These studies led to the completion of a Definitive Feasibility Study (DFS) for the Cataby Mineral Sands Project in Q1 2015. The DFS contains a technically achievable mine plan, which also displays attractive financial characteristics on the key metrics that Iluka uses to assess project development decisions, including IRR, NPV and payback. Operational factors have been assessed, material Modifying Factors were considered and a detailed financial analysis completed. In late 2015, further mine optimisation work was undertaken to update reserves based on Iluka's Corporate Plan 2015 revenue forecasts. This updated Ore Reserve was reported as at December 2015 and is current.

Criteria	JORC Code explanation	Commentary
Cut-off parameters	*The basis of the cut-off grade(s) or quality parameters applied.*	The cut-off grade has been calculated using optimization software and an individual cut-off grade applied to each block within the model. The calculations consider overall HM grade and individual assemblage product values, operating costs, recoveries and modifying factors. An economic optimization is performed to determine if a block is viable to mine, and therefore be included in the Ore Reserves.
Mining factors or assumptions	*The method and assumptions used as reported in the Pre-Feasibility or Feasibility Study to convert the Mineral Resource to an Ore Reserve (i.e. either by application of appropriate factors by optimisation or by preliminary or detailed design).* *The choice, nature and appropriateness of the selected mining method(s) and other mining parameters including associated design issues such as pre-strip, access, etc.* *The assumptions made regarding geotechnical parameters (eg pit slopes, stope sizes, etc), grade control and pre-production drilling.* *The major assumptions made and Mineral Resource model used for pit and stope optimisation (if appropriate).* *The mining dilution factors used.* *The mining recovery factors used.* *Any minimum mining widths used.* *The manner in which Inferred Mineral Resources are utilised in mining studies and the sensitivity of the outcome to their inclusion.* *The infrastructure requirements of the selected mining methods.*	Pit Optimisation was conducted by Iluka personnel using MineMap mine planning software assuming the whole deposit was accessible and could be mined. Exclusion areas were removed from the reserve during pit design process. Due to the various mining methods proposed for Cataby a number of optimisations were run to determine mining method specific reserves for different pits. Volume report outputs, pit shells, optimised models and grade tonnage curve data were generated during the optimisation process to determine an accurate reserve. Process flow assumptions for optimisation include: ore being fed into in-pit Mining Unit Plants (MUP's); initial sizing of ore carried out at in-pit MUP's; pump sized slurried ore to surface screen plants; final sizing at surface screen plants; pump sized slurried ore from screen plants to a centrally located Wet Concentrator Plant (WCP); de-slime ore at concentrator Constant Density (CD) tank; separation of heavy mineral from sand via wet gravity separation and Wet High Intensity Magnetic Separation (WHIMS) plant to produce high-grade Heavy Mineral Concentrate (HMC) stockpiles; mining by products pumped to pre-mined pits or surface stockpiles; HMC is stockpiled, dewatered and air dried adjacent to the WCP, before Magnetic Minerals (Mags) being transported to North Capel Mineral Separation Plant (MSP) and Non-Magnetic Minerals (Non-mags) to Narngulu MSP; where wet and dry processing using screening, magnetic, electrostatic and gravity separation circuits to separate valuable from non-valuable minerals and to make different grades of zircon, rutile, leucoxene and ilmenite; ilmenite upgrade through Synthetic Rutile (SR) plant and truck finished products to port. Mining methods used in Ore Reserve determination are based on existing dozer push methods currently in practice at Iluka sites and also

Criteria	JORC Code explanation	Commentary
		used in the geographical area adjacent to the proposed project location, as well as truck and shovel operations. Geotechnical parameters for the project have been determined by test work and studies carried out by Golder Associates. Recommended overall pit design slopes range between 33º and 47º depending on localized conditions. The Mineral Resource model used for pit optimisation is mcatot7.dm (Datmine model) No mining dilution factors have been used and reflect Iluka experience Recovery factors have been applied to all stages of mining including: MUP; WCP; WHIMS processing; Mag and Non Mag mineral processing plants. These are based on detailed metallurgical test work and experience within Iluka. A 50 metre minimum mining width has been assumed for pit design purposes. No Inferred Resources are included in the Cataby Reserves. Infrastructure requirements for the selected mining methods include: Administration buildings; workforce accommodation; power supply; communications; workshops and stores including fuel and lubrication facilities; site access roads; weighbridge; upgrade to Brand Highway intersection; light vehicle fleet; contract mining fleet; MUP's; screen plants; WCP; MSP's; SR Plant.
Metallurgical factors or assumptions	*The metallurgical process proposed and the appropriateness of that process to the style of mineralisation.* *Whether the metallurgical process is well-tested technology or novel in nature.* *The nature, amount and representativeness of metallurgical test work undertaken, the nature of the metallurgical domaining applied and the corresponding metallurgical recovery factors applied.* *Any assumptions or allowances made for deleterious elements.*	The metallurgical process proposed has been utilized in similar operations. The northern ore body can be broadly described as friable and produces acceptable Heavy Mineral (HM) recovery with minimal MUP processing. The southern ore body contains more clay and requires a more energy intensive MUP to recover HM. Ilmenite previously purchased from adjoining mines (Cataby ore body is the southern extension of that ore body) has been successfully processed through Iluka's processing plants. The metallurgical separation process utilizes known technology where

Criteria	JORC Code explanation	Commentary
	The existence of any bulk sample or pilot scale test work and the degree to which such samples are considered representative of the orebody as a whole. *For minerals that are defined by a specification, has the ore reserve estimation been based on the appropriate mineralogy to meet the specifications?*	the performance and recovery of mineral products has been established by the company. The metallurgical process is well-tested and commonly used in similar operations worldwide. Cataby non-magnetic product will be processed through Narngulu MSP Plant 1. No changes will be required as this material is similar in nature to Iluka's Eneabba product this MSP was designed for. The Cataby mags product will be processed through North Capel Separation Mill (NCSM) and no changes will be required to the magnetic separation circuit in this plant. The ilmenite contained within the Cataby orebody is particularly suitable for the production of SR. SR will be produced via Iluka's SR plant at North Capel. Allowance has been made for a Barite flotation plant to be located at Narngulu MSP to treat any zircon produced from Cataby that contains unacceptably high levels of barite. The Cataby deposit has been subjected to metallurgical test work over a long period of time. The mineral assemblage and metallurgical separation characteristics are regarded as well understood and the mineral is amenable to processing and separation by conventional equipment. Heavy mineral products were produced at laboratory scale zone assessment of HMC in the metallurgical test facility to simulate the NCSM and the Narngulu MSP flow sheets. The products produced were of a quality such that a suitable SR ilmenite can be produced as well as a mag and non-mag reject that can be treated at the Narngulu MSP to produce rutile, leucoxene and zircon products. The Cataby mags product will be processed through the NCSM and no changes will be applied to the magnetic separation circuit in this plant. No additional testwork was performed during the DFS. The ilmenite produced from Cataby is nominally 60% TiO_2 with a low combined SiO_2 and Al_2O_3 in the range of 1.2 - 1.4% making this a stable SR feed plant stock. The Cataby ore body is the southern

Criteria	JORC Code explanation	Commentary
		extension of an adjacent ore body, which has proven to produce an attractive SR ilmenite to which other SR feed stock sources are judged against. All indications therefore confirm that Cataby ilmenite will be in the same category. Based on the Iluka Eneabba rutile general specifications, Cataby rutile meets all specifications based on the Narngulu MSP simulation. Based on the Eneabba premium grade zircon Iluka general specifications, Cataby zircon meets all specifications, apart from barite, based on the Narngulu MSP simulation. The barite floatation circuit as proposed for installation at Narngulu MSP, produces a product that meets all zircon products specification for barium oxide.
Environmen-tal	*The status of studies of potential environmental impacts of the mining and processing operation. Details of waste rock characterisation and the consideration of potential sites, status of design options considered and, where applicable, the status of approvals for process residue storage and waste dumps should be reported.*	Various Environmental Studies (Fauna, Noise, Dust, Dieback, Vegetation and Flora, Mine Closure, Rehabilitation, Radiation, Groundwater Dependent Ecosystems, Soil and PASS, Groundwater, Surface Water) have been completed. Environmental Management Plans have been provided as evidence of management commitment under Works Approvals, Mining Approvals, and licenses to abstract water and mine/transport materials, and have been endorsed by the regulators.
Infrastructure	*The existence of appropriate infrastructure: availability of land for plant development, power, water, transportation (particularly for bulk commodities), labour, accommodation; or the ease with which the infrastructure can be provided, or accessed.*	The mining project area is close to existing infrastructure and similar operations are in production in the project area. Iluka holds 14 mining leases over the project area, owns three properties which cover the majority of the resource and has purchased a fourth property which was required as part of a power line diversion. Power will be obtained from the existing Western Power Corporation (WPC) sub-station located 12 kilometres to the north of Cataby. It will be upgraded by WPC to accommodate the required off-take and to feed the 33 kV power line to site. The main transmission line that feeds this sub-station has been recently upgraded to 330 kV. The Cataby site also includes a borefield designed to extract and inject water to control pit dewatering and supply clean water for processing. This system has been designed to suit the groundwater model and is

Criteria	JORC Code explanation	Commentary
		linked to the process water system via the clean water dam. Non-mags product from Cataby will be transported to the Narngulu MSP by road transport being typically a tri-axle truck towing two trailers. This form of transport has been utilised to deliver feed stock to Narngulu MSP in the past and as such poses no new challenges. Mags product from Cataby will be transported to the North Capel Separation Mill (NCSM) by road transport being typically a pocket road train of two trailers. This form of transport has been utilised to deliver feed stock to NCSM in the past and as such poses no new challenges The Cataby mine will encourage employment from the local area and engage on this basis subject to suitable skills being confirmed. An existing mining camp accommodating employees from an adjacent minesite is located within the project area and it's removal is planned to enable recovery of a portion of the reserve. The project scope therefore includes the partial relocation and new construction of a replacement camp four kilometres away and a separate new camp for Iluka employees. Both camps will be located on Cataby Road two kilometres apart. Accommodation during construction will be provided by both the new Iluka camp and the existing camp which will be demolished once construction has been completed.
Costs	*The derivation of, or assumptions made, regarding projected capital costs in the study.* *The methodology used to estimate operating costs.* *Allowances made for the content of deleterious elements.* *The source of exchange rates used in the study.* *Derivation of transportation charges.* *The basis for forecasting or source of treatment and refining charges, penalties for failure to meet specification, etc.* *The allowances made for royalties payable, both Government and*	The project is classified as a Category B project which requires an expected accuracy level of between +/- 10 to 15%. The estimate has been produced using the "Eclipse" Estimating Software Package and is based on the Iluka Estimate Breakdown Structure (EBS) coding and Iluka's Standard Code of Accounts. Quantities have been derived by the following two methods: derived internally using project drawings, specifications, models, P&ID's, equipment lists and associated schedules; and prepared by the contractors and suppliers. Quantity growth has been applied to the individual line items within the estimate based on the level of design, scope of works and specification completeness, and the risk of these items exceeding those quantities.

Criteria	JORC Code explanation	Commentary
	private.	Whilst budget pricing was obtained for the majority of the work packages, a design and construct tender was received for a package that included site buildings and camp construction and demolition. Pricing for the contractors direct and indirect works has been derived from a combination of the following sources: tendered quotations procured from suppliers and contractors; purchase quotation from suppliers and contractors; budget quotations procured from suppliers and contractors; historical data sourced from previously tendered or estimated projects of a similar nature and location. Where necessary items have been factored to allow for different size/capacity, etc; estimated, factored or built-up rates; and provisional or lump sum allowances where the use of the afore mentioned methods are not possible. Pricing growth has been applied to the individual items, based on the source and accuracy of the prices used for the estimate. The contingency allowance has been calculated in accordance with the Iluka Project Management System Guideline. The determination of the value for contingency is based on a confidence level of the total modelled estimate. The estimate is expressed in Australian dollars based on prices and market conditions as at quarter four of calendar year 2014. Escalation has not been included. Import duties have been included where applicable and the Goods and Services Tax (GST) has been excluded. The operating cost was developed using Iluka's standard cost centres and cost elements. Pricing for the operating cost estimate has been derived from a combination of the following sources: budget quotations procured from suppliers and contractors; estimated, factored or built-up rates; historical data sourced from other Iluka mine sites; and provisional or lump sum allowances where the use of the aforementioned methods are not possible. Cost and recovery penalties have been applied to deleterious elements.

Criteria	JORC Code explanation	Commentary
		Iluka monitors a range of recognised external forecasters of foreign exchange rates but ultimately the exchange rates applied are an Iluka assessment. Transportation charges have been procured from contractors Treatment costs are based on actual Iluka operational costs, including overheads. Actual operating costs are used to benchmark the operating cost estimates. Allowances have been made for royalties payable to Government and private stakeholders. Due to commercial sensitivities payments to private stakeholders are not detailed.
Revenue factors	*The derivation of, or assumptions made regarding revenue factors including head grade, metal or commodity price(s) exchange rates, transportation and treatment charges, penalties, net smelter returns, etc.* *The derivation of assumptions made of metal or commodity price(s), for the principal metals, minerals and co-products.*	Commodity price assumptions are established internally based on monitoring supply and demand on an ongoing basis. Price assumptions are benchmarked against commercially available price forecasts by industry observers. Revenue factors are used to establish pit sensitivities and to test for robustness of the Ore Reserve. Detailed price assumptions are commercially sensitive and are not disclosed
Market assessment	*The demand, supply and stock situation for the particular commodity, consumption trends and factors likely to affect supply and demand into the future.* *A customer and competitor analysis along with the identification of likely market windows for the product.* *Price and volume forecasts and the basis for these forecasts.* *For industrial minerals the customer specification, testing and acceptance requirements prior to a supply contract.*	The zircon market entered 2016 with demand characteristics similar to 2015. 2016 was the fourth consecutive year Iluka's sales volumes have averaged around 350 thousand tonnes, End demand in 2016 remained variable across sectors and geographical markets. Elevated inventories of zircon sand were held by producers at the commencement of the year and during the first half 2016. However, inventory of zircon sand and opacifier held at the direct customer level was minimal as customers sought to benefit from declining prices. In Iluka's assessment, there was a material destocking of the producer supply chain over the course of 2016, with market information that some zircon suppliers had fully committed their volumes or were having difficulties in filling some customer orders. Market conditions in the latter part of the year provided encouraging indications for 2017 in terms of the potential for demand and/or price

Criteria	JORC Code explanation	Commentary
		recovery. Market conditions for pigment, the main end sector for the high grade feedstocks of rutile, synthetic rutile and slag, improved towards the end of 2015 and continued to improve through 2016. Most of Iluka's rutile and synthetic rutile volumes in 2016 were contracted (volume and price). The weighted average rutile price Iluka received over 2016 remained relatively stable compared with the 2015 average. Ilmenite sales in 2016 were down from 2015 reflecting the idling of the US operations and utilisation of Australian ilmenites as feedstock for SR production. Iluka establishes short, medium and long term contractual agreements with customers and these reflect the pricing and volume forecasts adopted. Laboratory Southwest provides internal testing for Iluka clients. Clients are provided with reports in accordance with their specifications. Reasonable access is provided at all times to representatives of a customer to verify conformance of service with their requirements.
Economic	*The inputs to the economic analysis to produce the net present value (NPV) in the study, the source and confidence of these economic inputs including estimated inflation, discount rate, etc.* *NPV ranges and sensitivity to variations in the significant assumptions and inputs.*	Macro-economic assumptions used in the economic analysis of the mineral sands reserves such as foreign exchange, inflation and discount rates have been internally generated and determined through detailed analysis by Iluka and benchmarked against commercially available consensus data where applicable. The price assumptions are internally generated and are based on detailed supply and demand modelling. The price assumptions have also been benchmarked against commercially available consensus price forecasts. The detail of that process is commercially sensitive and is not disclosed. Sensitivity analysis is undertaken on key economic assumptions such as price and exchange rates to ensure the reserves remain economic. Changes in product prices have the potential to increase or decrease the

Criteria	JORC Code explanation	Commentary
		total Ore Reserve.
Social	*The status of agreements with key stakeholders and matters leading to social licence to operate.*	Agreements with external stakeholders deemed critical to project commencement were finalized in 2016.
Other	*To the extent relevant, the impact of the following on the project and/or on the estimation and classification of the Ore Reserves:* *Any identified material naturally occurring risks.* *The status of material legal agreements and marketing arrangements.* *The status of governmental agreements and approvals critical to the viability of the project, such as mineral tenement status, and government and statutory approvals. There must be reasonable grounds to expect that all necessary Government approvals will be received within the timeframes anticipated in the Pre-Feasibility or Feasibility study. Highlight and discuss the materiality of any unresolved matter that is dependent on a third party on which extraction of the reserve is contingent.*	No identifiable naturally occurring risks have been identified to impact the Ore Reserves. Marketing arrangements are commercially sensitive but the Cataby project will be primarily developed to maintain continuity of product supply to existing customers. Iluka holds 14 mining leases over the project area and owns three properties which cover the majority of the resource. Mining Approvals and licenses to abstract water and mine/transport materials have been endorsed by the regulators. The Cataby Ore Reserve contains areas to the north east of the Brand Highway which will require additional approvals above those which apply to the currently planned development. Ore Reserves that are covered by the additional approvals required equate to approximately 10 % of the total Ore Reserve. Given the projected life of the Cataby project, development of the deposit is suited to a two staged approach with subsequent approvals being sought following development and establishment and confirmation of an appropriate operating strategy. Based on the company's experience with previous operations, there is a reasonable expectation that further approvals will be able to be gained.
Classification	*The basis for the classification of the Ore Reserves into varying confidence categories.* *Whether the result appropriately reflects the Competent Person's view of the deposit.* *The proportion of Probable Ore Reserves that have been derived from Measured Mineral Resources (if any).*	Measured Resources are converted to Proved Reserves and Indicated Resources are converted to Probable Reserves. Inferred Resources are not included in the reported Ore Reserve. The results reflect the CP's view of the deposit. Approximately 12% of the Probable Ore Reserves have been derived from Measured Mineral Resources.

Criteria	JORC Code explanation	Commentary
Audits or reviews	*The results of any audits or reviews of Ore Reserve estimates.*	No external audits of the Cataby Ore Reserves estimates were undertaken. However, a cold eyes review of the project along with considerable periodic reviews of optimisation input parameters, assumptions and proposed mining methods has been undertaken internally.
Discussion of relative accuracy/ confidence	*Where appropriate a statement of the relative accuracy and confidence level in the Ore Reserve estimate using an approach or procedure deemed appropriate by the Competent Person. For example, the application of statistical or geostatistical procedures to quantify the relative accuracy of the reserve within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors which could affect the relative accuracy and confidence of the estimate.* *The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnages, which should be relevant to technical and economic evaluation. Documentation should include assumptions made and the procedures used.* *Accuracy and confidence discussions should extend to specific discussions of any applied Modifying Factors that may have a material impact on Ore Reserve viability, or for which there are remaining areas of uncertainty at the current study stage.* *It is recognised that this may not be possible or appropriate in all circumstances. These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.*	Iluka has considerable experience in reconciliation of its Mineral Resources and Ore Reserves. Actual results generally indicate very good agreement with the geological model and close reconciliation with HM tonnes, ore tonnes and HM percentage head grade. The risk of not achieving good physical Ore Reserve reconciliation is considered to be low. Operational metallurgical experience, relevant testwork and Iluka's experience supports the view that metallurgical risk is low. Revenue generation is impacted by pricing forecasts. The company's forward predictions are considered well balanced and supported by external forecasters. Consequently, pricing risk is considered low to moderate. Mining methods selected are not novel and have been demonstrated, and are considered a low risk of impacting Ore Reserves. All costs used in the optimisation and Ore Reserve process are supported by an extended operational history and actual results from Iluka operations. Risk of significant underestimation and effect of that underestimation is considered to be low. Ore Reserves north east of the Brand Highway equates to approximately 10% of the total Ore Reserve. This is the proportion of the Ore Reserve which will be impacted if subsequent approvals are not obtained. There is a reasonable expectation that approvals will be granted in due course and the risk of not gaining these approvals is considered low to moderate. Given the lower grade of the Probable Ore Reserves, the financial impact is considered low.

Summary of information to support the South-west Mineral Resource Estimates and the Ore Reserve Estimate for Tutunup South

This update is reported in accordance with the 2012 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves', (JORC Code) and ASX Listing Rules, and provides a summary of information and JORC Code Table 1 commentary to support Iluka's Mineral Resource and Ore Reserve Estimates for the South-west District of the Perth Basin.

The Mineral Resource and Ore Reserve inventory attributable to the South West HM deposits as at the 31 December 2016 and broken down by JORC Code category is presented in the Tables below.

South-west Mineral Resource Summary at December 31 2016.

Mineral Resource Category[1]	Material Tonnes (Million)[2]	In Situ HM Tonnes (Million)	HM (%)	Clay (%)	HM Assemblage[3]		
					Ilmenite (%)	Zircon (%)	Rutile (%)
Measured	103	9.2	8.9	15.3	74	9	1
Indicated	32	3.0	9.1	12.4	76	8	1
Inferred	32	2.6	8.2	9.5	73	8	1
TOTAL	**167**	**14.7**	**8.8**	**13.6**	**74**	**8**	**1**

Notes:
1 Mineral Resources are reported inclusive of Ore Reserves.
2 Insitu (dry) metric tonnage is reported.
3 The mineral assemblage is reported as a percentage of the insitu HM content.
4 Rounding may generate differences in the last decimal place.
5 The Mineral resource estimates are stated as at the 31st of December 2016.

Tutunup South Ore Reserve Summary at December 31 2016.

Ore Reserve Category[1]	Material Tonnes (Million)[2]	In Situ HM Tonnes (Million)	HM (%)	Clay (%)	HM Assemblage[3]		
					Ilmenite (%)	Zircon (%)	Rutile[4] (%)
Proved	2.2	0.3	12.7	13.5	66	13	1
Probable	0.1	0.0	12.8	29.5	54	10	1
TOTAL	**2.3**	**0.3**	**12.7**	**14.0**	**65**	**13**	**1**

Notes:
1 Ore Reserves are a sub-set of Mineral Resources.
2 In situ (dry) metric tonnage is reported.
3 The mineral assemblage is reported as a percentage of the insitu HM content.
4 The rutile component in WA – South-west operations is sold as leucoxene product.
5 Rounding may generate differences in the last decimal place.
6 The Ore Reserve estimates are stated as at the 31 December 2016 and have been depleted for all production conducted to this date.

1. Background/Introduction

The South-west is the southerly sub region which in combination with the Mid-west sub-region comprise the greater Perth Basin. It is presented separately to break down a geographically large region. Iluka Resources Limited (Iluka) and its predecessor companies have been exploring and mining for mineral sands in the southern part of the Perth Basin for over 60 years.

2. Ownership/Tenure

A summary of Iluka's current tenement holding in the South-west which hosts the Mineral Resources and Ore Reserves is presented in Table 2.1 and displayed on Figure 2.1. The tenements are 100% owned by Iluka and wholly owned subsidiary companies, which include Ilmenite Pty Ltd, Iluka Midwest Limited, and Western Titanium Limited.

3. Deposit Geology

The Exploration Licences cover portions of a coastal plain which hosts HM mineralised Pliocene and Pleistocene age, fossil, beach barrier sediments and associated dune sands. The mineralised sediments comprise yellow and grey sand and clayey sand which form a 1 m to approximately 25 m thick sedimentary package which overlays unconsolidated Cretaceous aged sediments of the Leederville Formation. The heavy mineral is thought to be derived from re-working of the Leederville Formation and contemporaneous input from rivers draining the surrounding crystalline basement.

The sand accumulations are typically sheet like with HM accumulations concentrating in "notches" which are believed to represent the limit of marine transgressive events. Some lateritisation is noted in the upper portions of the mineralised sequence. The clay content is moderately high ranging from 15 to 30%.

HM grades in the reported deposits average from 5 to 10% HM, although historic grades in the deposits that have been mined in the region were commonly of the order of 20% HM. Virtually all of the high HM grade HM mineralisation in the South-west domain has been mined.

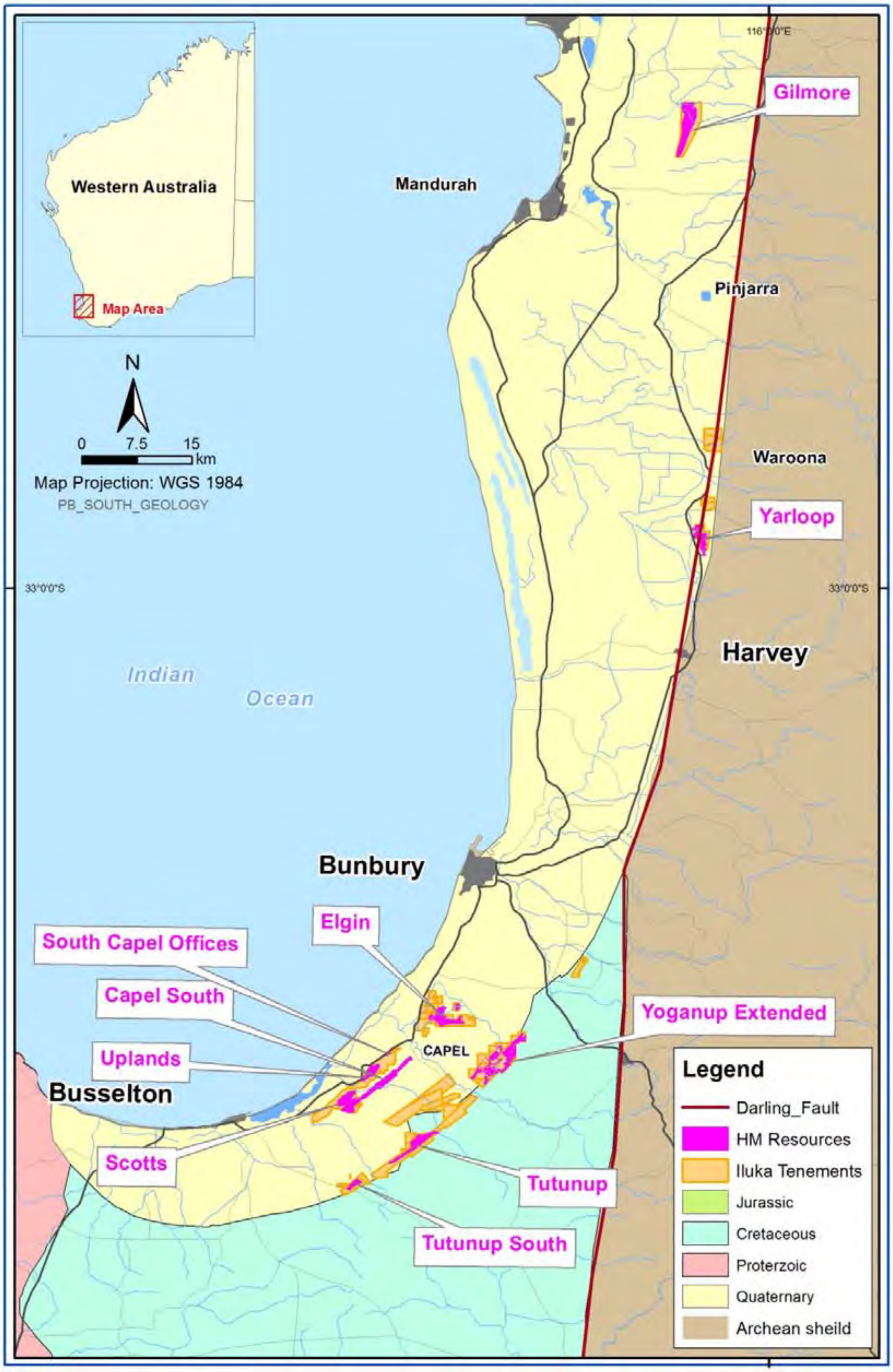


Figure 2.1 Tenement Location Plan for Iluka South-west and underlying geological framework of the southern Perth Basin.

Table 2.1: Tenement Summary

Licence	Project	Status	Applic. Date	Grant Date	Expiry Date	Area	Area Unit
M 70/766	Capel South	Granted	11/08/1993	11/08/1993	10/08/2035	312.55	Hectares
M 70/767	Capel South	Granted	11/08/1993	11/08/1993	10/08/2035	826.4	Hectares
M 70/928	Capel South	Granted	1/01/1999	22/06/1999	21/06/2020	267	Hectares
M 70/1128	Elgin	Granted	24/07/2002	8/08/2003	7/08/2024	112	Hectares
M 70/1244	Elgin	Granted	23/08/2005	12/04/2006	11/04/2027	224	Hectares
M 70/535	Elgin	Granted	1/06/1989	23/01/1992	22/01/2034	60.7	Hectares
M 70/536	Elgin	Granted	1/06/1989	23/01/1992	22/01/2034	375.6	Hectares
M 70/959	Elgin	Granted	26/07/1996	31/07/1997	30/07/2018	312.1	Hectares
M 70/962	Elgin	Granted	30/01/1997	30/01/1997	29/01/2018	41.51	Hectares
R 70/49	Gilmore	Granted	18/01/2013	22/01/2014	21/01/2017	1260	Hectares
M 70/359	Scotts	Granted	3/11/1988	3/11/1988	2/11/2030	39.24	Hectares
M 70/513	Scotts	Granted	21/02/1991	21/02/1991	20/02/2033	36.5	Hectares
M 70/514	Scotts	Granted	21/02/1991	21/02/1991	20/02/2033	29.982	Hectares
M 70/64	Scotts	Granted	23/05/1986	23/05/1986	22/05/2028	462.1	Hectares
M 70/995	Scotts	Granted	13/03/1998	13/03/1998	12/03/2019	1.885	Hectares
R 70/47	Scotts	Granted	3/07/2008	24/01/2013	23/01/2018	208.61	Hectares
M 70/493	South Capel Off	Granted	8/07/1996	8/07/1996	7/07/2017	3.5125	Hectares
M 70/494	South Capel Off	Granted	10/02/1989	3/08/2001	2/08/2022	4.3225	Hectares
M 70/659	South Capel Off	Granted	23/01/1992	23/01/1992	22/01/2034	40.81	Hectares
M 70/880	South Capel Off	Granted	6/07/1995	6/07/1995	5/07/2037	77.19	Hectares
G 70/233	Tutunup	Granted	8/02/2008	26/11/2008	25/11/2029	9.7	Hectares
G 70/240	Tutunup	Granted	19/02/2009	19/08/2009	18/08/2030	0.74	Hectares
G 70/241	Tutunup	Granted	19/02/2009	19/08/2009	18/08/2030	141	Hectares
G 70/254	Tutunup	Granted	4/07/2014	26/11/2015	25/11/2036	64	Hectares
L 70/123	Tutunup	Granted	19/02/2009	22/07/2014	21/07/2035	0.54	Hectares
L 70/131	Tutunup	Granted	11/03/2010	22/06/2010	21/06/2031	3	Hectares
L 70/132	Tutunup	Granted	11/03/2010	22/06/2010	21/06/2031	0.06	Hectares
M 70/1092	Tutunup	Granted	11/12/2000	25/09/2001	24/09/2022	1.8	Hectares
M 70/1243	Tutunup	Granted	23/08/2005	30/03/2007	29/03/2028	116	Hectares
M 70/401	Tutunup	Granted	21/03/1988	28/05/1992	27/05/2034	759	Hectares
M 70/609	Tutunup	Granted	9/02/1990	8/10/1992	7/10/2034	452.2	Hectares
M 70/726	Tutunup	Granted	23/10/1991	5/02/1993	4/02/2035	173.48	Hectares
G 70/244	Tutunup South	Granted	3/05/2010	20/12/2010	19/12/2031	40.42	Hectares
L 70/119	Tutunup South	Granted	4/07/2008	18/02/2009	17/02/2030	0.481	Hectares
M 70/1261	Tutunup South	Granted	24/01/2006	27/11/2006	26/11/2027	120.7	Hectares
M 70/611	Tutunup South	Granted	9/02/1990	8/10/1992	7/10/2034	103.4	Hectares
M 70/612	Tutunup South	Granted	9/02/1990	8/10/1992	7/10/2034	130.45	Hectares
M 70/1120	Uplands	Granted	14/05/2002	20/09/2011	19/09/2032	4	Hectares
M 70/63	Uplands	Granted	22/09/1983	16/02/1988	15/02/2030	890.7	Hectares
M 70/1180	Yarloop	Granted	10/09/2004	11/10/2006	10/10/2027	411	Hectares
M 70/105	Yoganup Ext	Granted	18/11/1983	20/02/1985	19/02/2027	211.65	Hectares
M 70/1073	Yoganup Ext	Granted	24/03/2000	6/02/2001	5/02/2022	7.0405	Hectares
M 70/1106	Yoganup Ext	Granted	10/08/2001	19/09/2001	18/09/2022	0.102	Hectares
M 70/410	Yoganup Ext	Granted	9/05/1988	5/09/1989	4/09/2031	92.88	Hectares
M 70/478	Yoganup Ext	Granted	14/12/1988	12/10/1989	11/10/2031	143.95	Hectares
M 70/670	Yoganup Ext	Granted	29/11/1990	11/03/1992	10/03/2034	127.6	Hectares
M 70/866	Yoganup Ext	Granted	13/09/1994	20/02/1995	19/02/2037	249.2	Hectares
M 70/920	Yoganup Ext	Granted	12/09/1995	6/06/1996	5/06/2017	178.35	Hectares
M 70/93	Yoganup Ext	Granted	1/11/1983	1/09/1986	31/08/2028	960.85	Hectares

4. Data Acquisition

Exploration over the mineralisation was carried out by Iluka and its precursor companies including Renison Goldfields Consolidated (RGC), Associated Minerals Consolidated (AMC), Ilmenite Proprietary Limited (IPL) and Westralian Sands Limited (WSL) from the early 1960s to the present.

4.1 Drilling Summary

The majority of sampling across the district was based on vertical RCAC drilling utilising BQ or NQ rods to bore a 52 mm or 76 mm hole diameter hole respectively. This is in line with industry standard methods for testing mineral sand deposits. A minor number of holes dating back to the early 1970’s were drilled using deadstick auger methods with a Gemco auger drill. There are a small number of holes that have been flagged in the database for which the method is unknown.

The drilling is typically carried out on a regularised grid with the drill spacing closed in to support an increased confidence in the mineral resource estimates as shown in Figures 4.1 and Figure 4.2.

The early phases of drilling were occasionally drilled on roadsides or, alternatively, broadly spaced drilling occurred on private farmland. Infill drilling typically to 20 * 100 m was carried out over areas of mineralisation deemed to be economic to support feasibility studies and potential mine development. A summary of the drilling carried out on each Mineral Resource is presented in Table 4.1.

Table 4.1: Drill meterage and modal drill spacing for each prospect supporting the South-west District Mineral Resources.

Deposit	Holes	Samples	Drill metres	X Drill Space m	Y Drill Space m	Z Drill Interval m	Drill Comments
Capel South	1,356	18,036	19,061.3	25m	100m	1m	Many succssive drill camplagins has resulted in some irregular drill grids in places
Elgin	1,039	4,753	4,805.0	50m	100m	1m	
Gilmore	591	8,252	9,206.0	20m - 80m	200m - 1000m	1m	
Scotts	519	5,025	5,663.7	20m	100m	1m	
South Capel Offices	258	1,364	2,552.1	20m-40m	20m-30m Dominantly 30m	1m	Some older holes have fractions of metre intervals related to imperial conversions
Tutunup	1,702	22,608	23,651.1	20m	100m	1m and 1.5m	Elsewhere drilling is spaced at 200mN X 40mE, 200mN and 20mE and 150mN and 15mE
Tutunup South	772	10,466	10,814.0	20m	100m	1m	
Uplands	697	6,612	7,118.8	25m	100m	1m	Many succssive drill camplagins has resulted in some irregular drill grids in places
Yarloop	1,330	15,636	16,559.5	20m	100m	1m	
Yoganup Extended	12,428	177,375	200,665	15m	75m	1m	

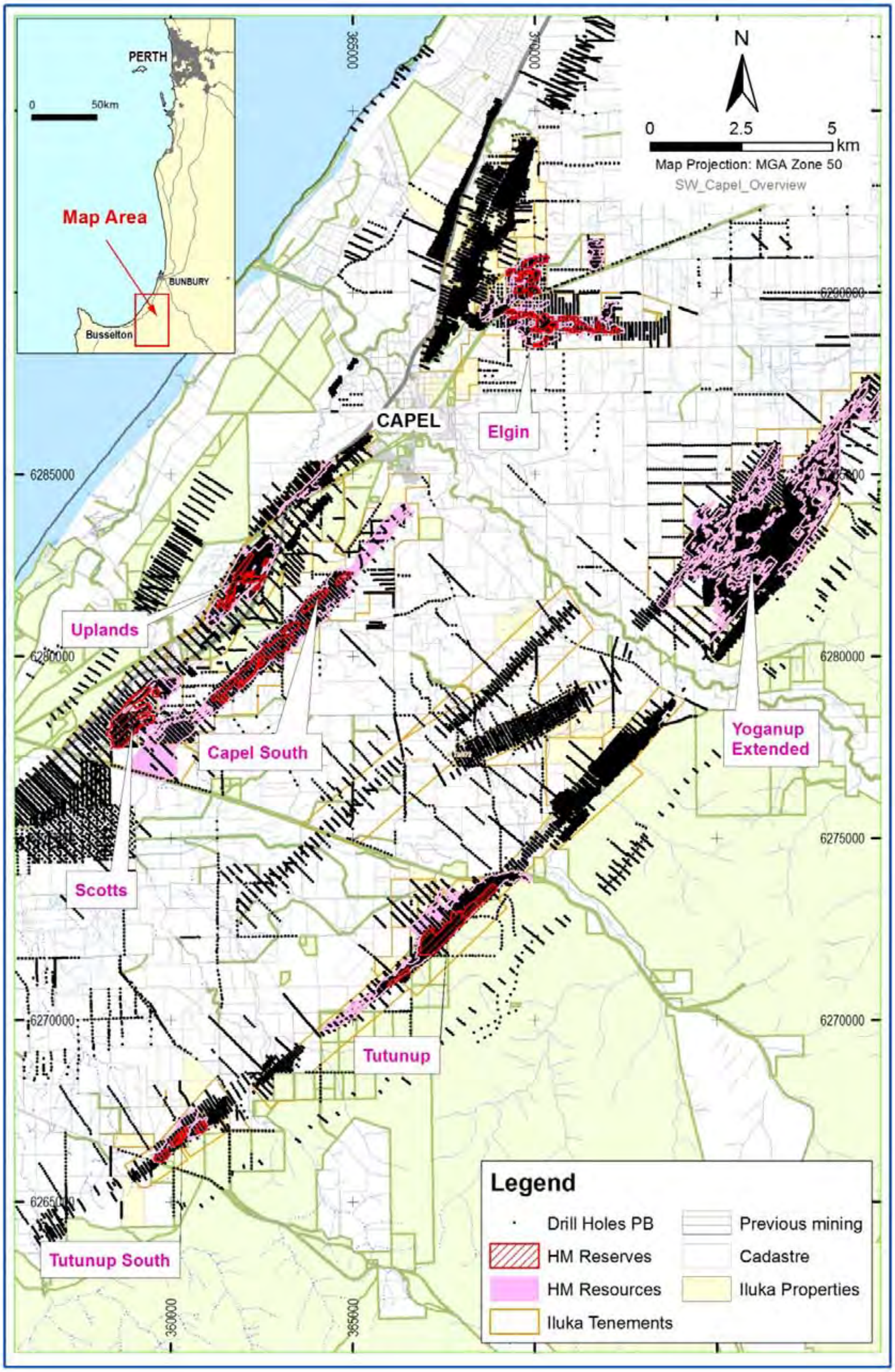


Figure 4.1: Drillhole distribution, Mineral Resource and Ore Reserve Locations for the South-west HM Deposits in the Capel region.

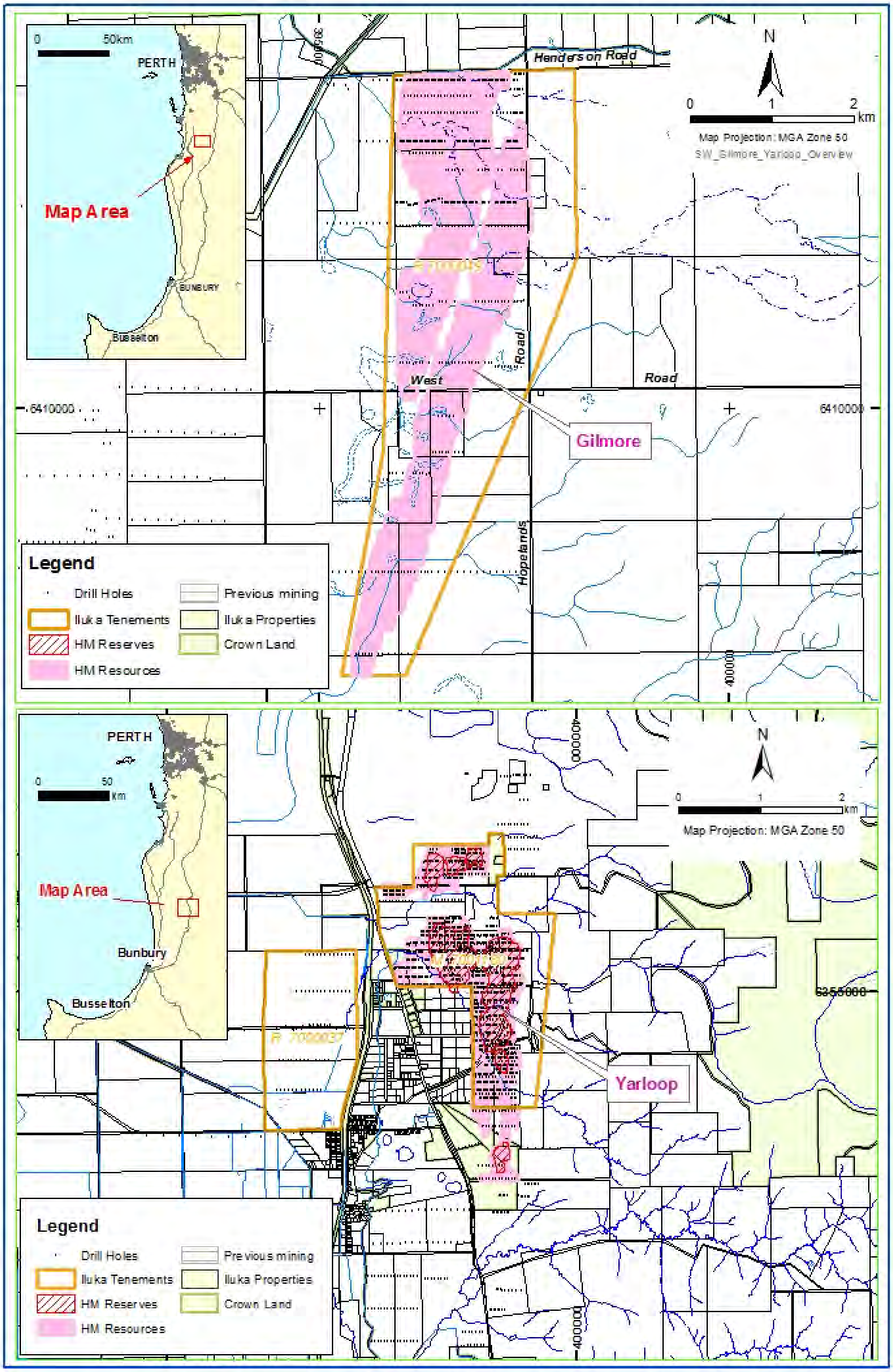


Figure 4.2: Drillhole distribution, Mineral Resource and Ore Reserve Locations for the South-west HM Deposits outside the Capel region.

4.2 Survey

The drill hole set out for all south west drilling supporting the mineral resource estimates was done by qualified surveyors (usually company employees), using contemporary equipment at the time of the exploration programs.

Drill holes were surveyed in MGA94, Zone 50 (for drilling post December 1996) or AMG84 (for drilling pre December 1996). The data was then converted to Local Grid coordinates using various 2 point transformations.

Topographic control was provided by various means including:

- wireframe files based on photogrammetry;
- wireframe files based on drillhole collars;
- infill detailed survey of crests and toes; or
- GPS and GPS-RTK survey pick up.

Standard practice is to adjust the collar elevations to a common surface generated by one or a combination of the options previously described. This results in all the drill holes having RL's correct relative to other drill holes and the mineralisation is correctly located with respect to the surface.

Table 4.2: Coordinate system and grid transformations used for the South-west HM deposits.

Deposit	Grid Name	LOCAL_N	LOCAL_E	MGA_N	MGA_E	AMG_N	AMG_E
Elgin	Elgin	10000.2	21005	6288433	370290.5	6288285	370152
		11324.78	20246.44	6289748.5	369516.41	6289600	369377.91
Hopelands	MGA_94 zone 50	No grid transformation applied					
Uplands	South Capel	33496.82	33790.34	6276160	355378.5	-	-
		33078.55	39166.43	6279634.5	359500.97	-	-
Scotts Capel South South Capel Offices	South Capel New	53166.57	14921.33	6279634.5	359500.97	6279487.5	359363.66
		61600.91	15743.51	6284967.5	366084.88	6284820.5	365947.47
Tutunup	Tutunup	20537	4228.95	6268561	362691.53	6268413	362553
		29377.2	5221.75	6274017	369715.84	6273869	369577
Tutunup South	Tutunup South	100200	50000	6266221	359629.53	6266073	359491
		102400	50000	6267404.5	361483.53	6267256	361345
Yarloop	Yarloop	4121.39	2336.38	6347010	398332.59	6346862	398193.69
		13414.97	1601.7	6356293	397503.38	6356145	397364.41
Yoganup Extended	Yoganup Extended	294.86	339.55	6279938	375077.28	6279790	374938.63
		9210.97	-663.44	6287337	380148.81	6287188.5	380010.09

4.3 Geological Logging

Drilling has been completed over a protracted period of time in the South west. Older drilling had paper based logging completed. The hard copy data for deposits supporting Mineral Resources was entered into digital files over a period from the late 1980s to the mid 1990s. In the late 1980s computerised field logging equipment was introduced in the South-west Domain and geological information was recorded and stored in text files. Information recorded included colour, grainsize, lithology, hardness, washability and an estimate of the induration, slimes and HM content. An Oracle Database was introduced for the storage of geological data in the early 2000s. This was superseded by a custom built SQL database solution introduced in 2006 which was in turn superseded by an acQuire™ data management solution.

Most samples have been geologically logged with the exception of some of those drilled in the 1970s. This has been taken into consideration when assigning the JORC Code Resource Classification for the mineral resources supported by this drilling. However, in general, the volume of more recent infill drilling that is supported by geological logging is sufficient to provide adequate deposit coverage and provide confidence in the geological interpretation.

For more recent drilling, the logging of RCAC samples was input directly into a laptop computer. Data was then transferred into Iluka's Geology Database at the time which incorporated further verification routines to ensure valid entries. Errors in the data logging result in rejection of the data for correction before re-loading is attempted.

4.4 Sampling and analytical procedures

Drilling has occurred over a protracted time in the South-west area and as such subtle variation in the analytical technique and sample collection methods were used. Essentially the process involved desliming and removal of the oversize material. The remaining sand fraction was then subjected to float sink analysis using a heavy liquid to determine the heavy mineral content. Further detail on each variant is provided in the accompanying Table 1 commentary. The assay method for a small number of samples has not been recorded but the time frame in which analysis occurred alludes to the method used.

Sand residue from the HM sample analysis (from similar geological domains) were grouped together to form composite samples which were subjected to further metallurgical analysis to determine the assemblage, mineral quality and sizing. These composite samples underwent wet tabling and magnetic separation of the HM concentrate using either a Rapid™ lift magnet or a PermRoll™ roll magnet. The mineral from various fractions were then analysed by XRF and stoichiometric calculations were used to estimate the mineral assemblage. In some instances about 10grams of the non-magnetic fraction was sent for SG separation using Thallium Malonate Solution (TMF). This separation technique was used to determine grain size and indicative chemistry for Zircon.

4.5 QA/QC and Data Quality

Protocols for routine QAQC including the incorporation of blind field standards, duplicate sampling and the execution of twinned drill holes were introduced in 2004. Prior to this, QA/QC data was sparse and limited to some twinned holes and duplicated samples.

Duplicate samples are taken at the rate of 1:40 samples by attaching a second calico sample bag to a quadrant of the rotary splitter. Where poor precision was noted in duplicate assays, the information is fed back to the field crew and appropriate measures are taken to improve sampling representivity.

Blind field standard samples are inserted at the rate of 1:40 samples. For field standards, the accuracy is ascertained via plotting the results of standards against expected results. Where a standard sample returns a result that is in excess of 3 standard deviations from the expected result (deemed a fail), the samples associated with that batch are reviewed and may be re-analysed at the discretion of the supervising geologist.

The level of accuracy and precision from standards and duplicates vary for each deposit. In each case, the QAQC data is considered along with other factors to confirm the data is suitable to support the mineral resource estimates completed and the resource classification applied. A summary of the QAQC performance of each deposit is listed in Table 4.3.

Table 4.3: QA/QC summary for the South-west HM Deposits.

Deposit	Duplicates	Standards	Twinned Holes	Comments
Capel South	89	0	4	Good correlation between the primary and duplicate samples for HM, with reduced correlation for lower grade samples. Slimes show a strong linear correlation with a more widely spread grade distribution. No standards were submitted.
Elgin	93	18	47	HM precision for duplicates is within acceptable limits. SLIMES precision for the duplicates is poor because average SLIMES values from the deposit are very low. Standards results demonstrate a slight bias present in both SLIMES and HM standard data. HM is being under reported by approximately 3% and SLIMES is being under reported by approximately 4%. However the data set is too small for the apparent bias to be considered significant. Dispite this there may be a slight undercall for slimes in the resource model.
Gilmore	467	151	0	Duplicate precision is poor and is likely due to the fine grained HM in Gilmore. Standard accuracy was within acceptable limits.
Scotts	59	9	0	Results show 3 slimes failures and 2 HM failures (outsite 3 SD) for standard performance. HM and slimes duplicates diplay good performance. However the relative lack of standard insertion means a meaningful assesment of the impact on the resource model cannot be made.
South Capel Offices	0	0	0	
Tutunup	871	240	73	HM and slimes duplicate performance is within acceptable limits. There is a low bias for some HM standards however this is not expected to have an impact on the quality of HM analysis.
Tutunup South	224	34	2	Duplicate assay data demonstrates good correlation with primary sample data as expected. The majority of HM standards show a reasonable level of accuracy and precision in the lab results for HM analysis. There is a low bias in the slimes standard results. As such, it could be expected that the resource model contains slighly lower simes results than expected.
Uplands	0	0	0	A total of 165 holes have one or more corresponding holes within 2m distance of them. However as they were not drilled consecutively they cannot be considered true twins and have not been used for QAQC purposes.
Yarloop	58	0	93	Given such a small data set it can't be concluded if there are any significant QAQC issues.
Yoganup Extended	0	0	0	A total of 2708 holes have one or more corresponding holes within 2m distance of them. However as they were not drilled consecutively they cannot be considered true twins and have not been used for QAQC purposes.

4.6 Verification of Sampling and Assaying

Assay data was verified by routines imposed during the loading of the data into Iluka's geology database. Further scrutiny of the data was carried out prior to incorporation into the resource block models. Checks included:

- statistical analysis of the analytes to ensure analytes summed to 100% or within acceptable rounding limits and data values were within acceptable ranges;
- identifying missing and duplicated data; and
- visual validation to confirm the data is in spatially valid locations

It is the opinion of the Competent Person that the data is suitable for the use in the estimation of the Mineral Resources for the South-west District.

4.7 Physical parameters

The density used in the estimation of the Mineral Resource tonnages for the South-west HM Deposits is based on an Iluka standard bulk density formula. The formula is based on research done on various HM deposits being mined by Iluka in Western Australia. The formula is considered valid as it takes into account the sand, HM and clay components. It also allows for potential void space within the sand based on expected "filling" of the void space by the fine clay content. All tonnages for the resource estimates are expressed on a dry tonnage basis.

Representative cross sections are presented in Figure 4.3, Figure 4.4 and Figure 4.5.

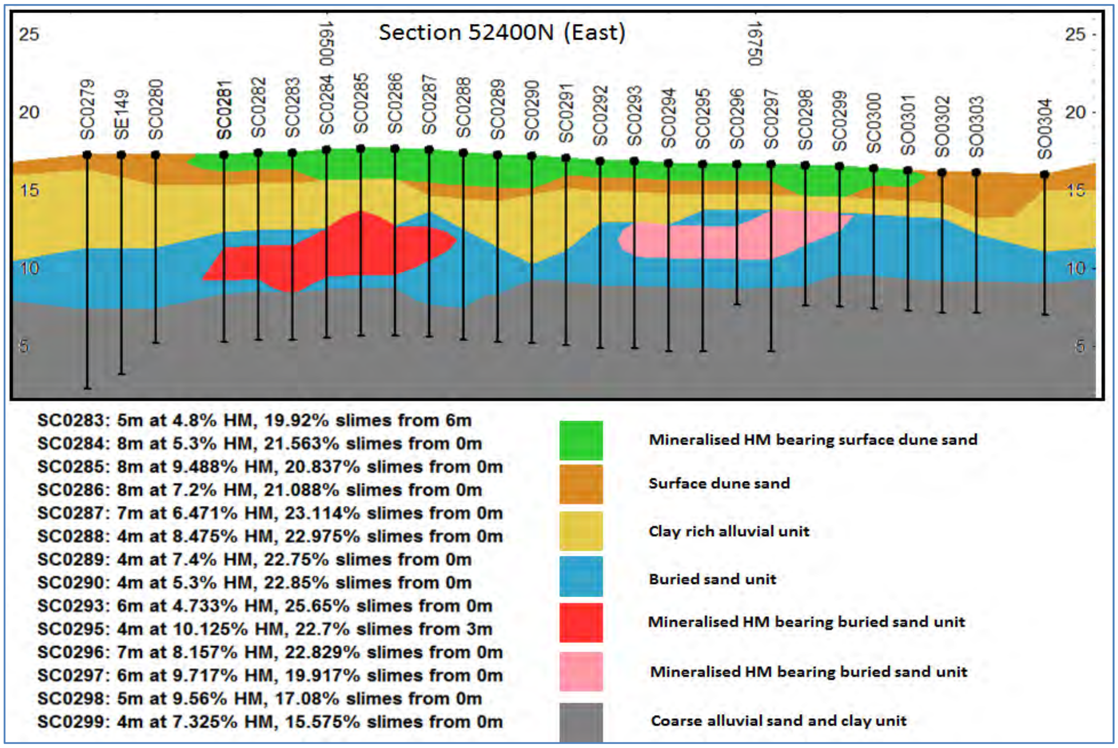


Figure 4.3: Cross-section through the Scotts Deposit. This is a beach placer style of deposit coupled with dune style mineralisation

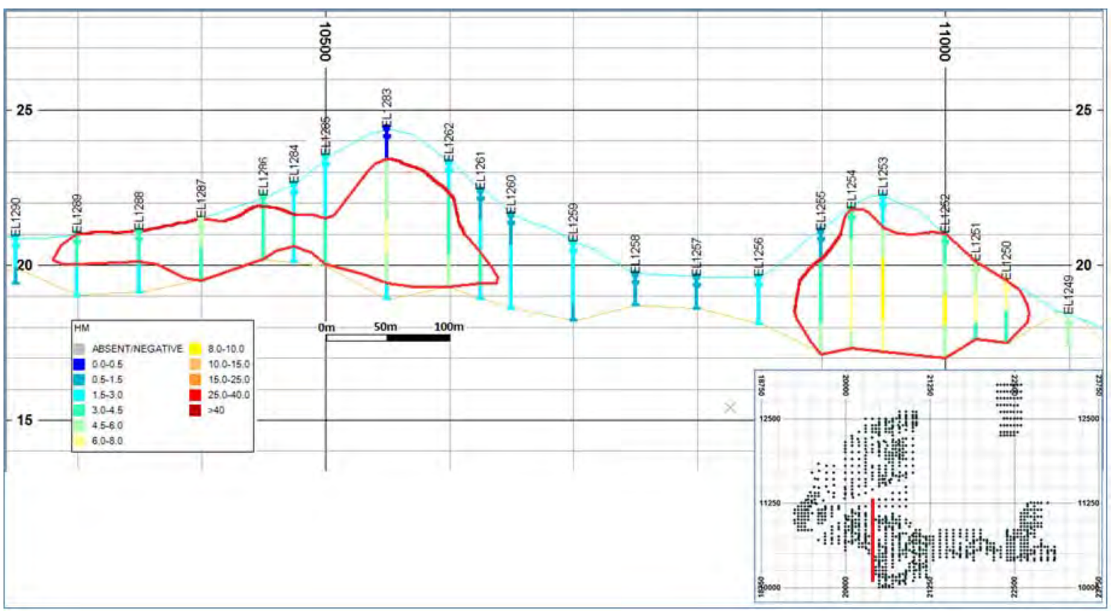


Figure 4.4: Cross-section through the Elgin Deposit. This is a dune style of mineralisation. The red outlines show material with >3% HM. The red line on the inset plan shows the cross section position. Note: 25 times vertical exaggeration.

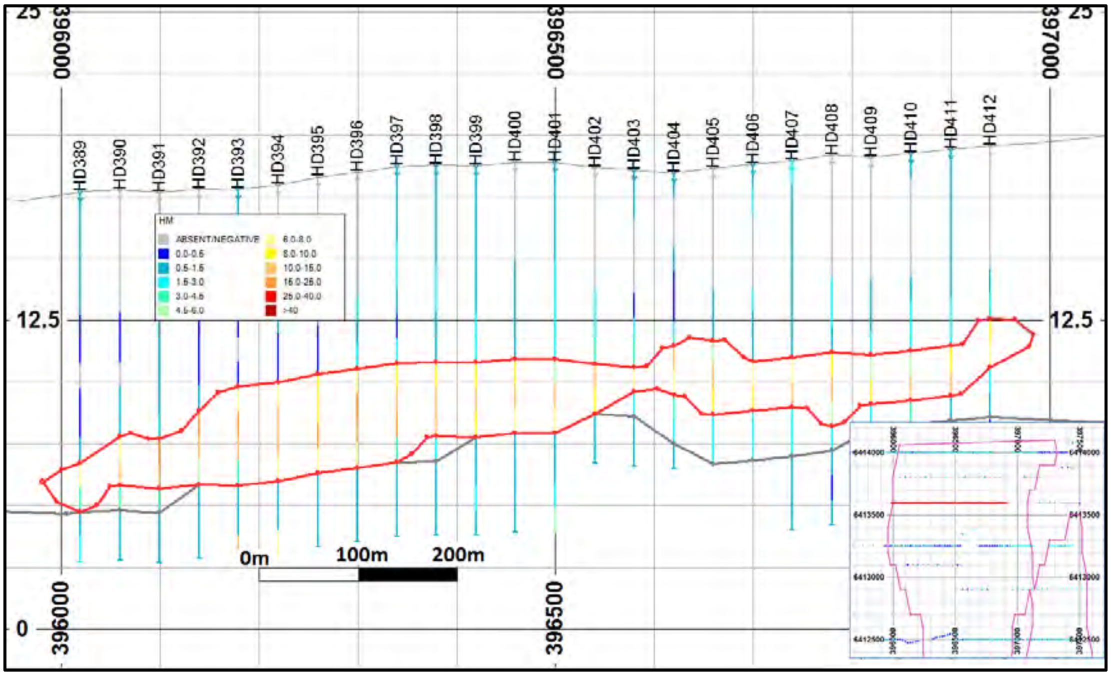


Figure 4.5: Cross-section through the Gilmore Deposit. This is a beach style of mineralisation. The red outlines show material with >4% HM. The red line on the inset plan shows the cross section position. Note: 25 times vertical exaggeration.

5. Resource Estimation

Resource models have been prepared for the South-west HM deposits using Datamine Studio™ Software. Geological interpretations used to constrain the modelling were prepared by Iluka geologists under the supervision of Iluka Competent Persons. The resource estimate was derived from a 3 dimensional block model constructed using geological and mineralogical domain constraints as per Iluka internal guidelines. Domains are assigned to the model based on the geological interpretations and the assay dataset is correspondingly flagged. The assay values were interpolated using Inverse Distance Weighting to the power of 3 (ID3), while the hardness and sample composite identifiers were interpolated using Nearest Neighbour (NN).

Each deposit was assessed in terms of statistical analysis and drill data distribution to apply appropriate interpolation parameters. Traditionally Iluka adopts a block dimension of about a half of the prevailing drill hole spacing in the X and Y direction (horizontal plane) in combination with anisotropic data search volumes about twice the prevailing drill hole spacing. These were adjusted as necessary to honour the individual characteristics of each deposit. In addition algorithms were used on models created after 2006 to dynamically optimise the search orientation. This allows the interpolation to honour the variation in geological and grade orientation. Sub-celling is used along domain boundaries to ensure appropriate volume representation.

The block models are validated by:

- visually comparing the block model grade attributes against the input grades;
- comparing statistics of the grade attributes for the block model to the input data;
- comparing the result of a NN grade interpolation to the ID3 interpolation; and
- reviewing the volume attributable to each composite to ensure it is consistent with the input data expectations.

Table 5.1; Summary of the model structure for the South-west HM deposits.

Deposit	Cell Dimensions		
	East	North	RL
Capel South	25m	50m	1m
Elgin	50m	25m	1m
Gilmore	40m	200m	1m
Scotts	15m	120m	1m
South Capel Offices	15m	15m	1m
Tutunup	10m	50m	1m
Tutunup South	10m	50m	1m
Uplands	50m	12.5m	1m
Yarloop	10m	50m	1m
Yoganup Extended	7.5m	37.5m	1m

Table 5.2; Summary of the assay attribute interpolation parameters for the South-west HM deposits.

	Interpolation	Search Ellipse Radius			Search	Search	
	Method	X	Y	Z	Factor 2	Factor 3	Comment
Capel South	ID3	30	120	1.0	3	5	
Elgin	ID3	40	130	1.0	3	5	
Gilmore	ID3	60	300	2.0	3	5	
Scotts	ID3	60	300	3.0	2	5	
South Capel Offices	ID3	30	110	3.0	2	3	
Tutunup	ID3	30	150	2.0	2	4	
Tutunup South	ID3	40	200	2.0	3	4	
Uplands	ID3	35	75	1.0	2	4	
Yarloop	ID3	30	150	2.0	2	4	
Yoganup Extended	ID3	30	150	2.0	3	5	Some variability for sub areas

Table 5.3; Summary of the Composite data interpolation parameters for the South-west HM deposits.

	Interpolation	Search Ellipse Radius (m)			Search	Search	
	Method	X	Y	Z	Factor 2	Factor 3	Comment
Capel South	NN	90	360	3	5	10	
Elgin	NN	40	130	1	5	10	
Gilmore	NN	120	600	4	3	5	
Scotts	NN	120	600	4	2	5	
South Capel Offices	NN	100	220	3	2	3	
Tutunup	NN	50	250	2	2	4	
Tutunup South	NN	40	200	2			
Uplands	NN	100	200	2	2	4	
Yarloop	NN	50	250	2	2	4	
Yoganup Extended	NN	30 - 100	150 - 500	2 - 5			Some variability for sub areas

6. Mineral Resource Statement

6.1 Resource classification

The mineral resource estimates have been classified and reported in accordance with the guidelines of the JORC Code (2012 Edition). The resource category applied (Measured, Indicated or Inferred) is based on a combination of:

- data density of primary HM assays;
- degree of continuity of mineralisation and geological units;
- assessment of the integrity and confidence of the analytical data;
- level and integrity of supporting composite data;
- the characteristics of the mineralised host; and
- the level and results of supporting QA/QC data.

In addition the potential for eventual economic extraction is taken into consideration when determining Mineral Resources that are valid for reporting under the JORC Code (2012). Factors taken into consideration which allude to the potential for economic extraction include:

- only reporting mineralisation within granted tenements;
- using a 3 or 4% HM lower cut-off grade which approximates an economic cut-off when the style of mineralisation and mineral assemblage characteristics are considered;
- excluding material that has a high clay content beyond processing limitations;
- excluding heavily indurated material from which the recovery of mineral is un-feasible; and
- excluding mineralisation that does not meet a grade*thickness to depth of burial ratio and thus would be unlikely to ever be economic.

6.2 Mineral Resources declared for South-west deposits

A summary of the Mineral Resource estimates for the South-west deposits HM Deposits is presented in Table 6.1.

6.3 Discussion of relative accuracy

The relative accuracy and therefore confidence of the resource estimate is guided by the underlying influencing factors listed in Section 6.1 above and are taken into consideration during the classification of the resource estimates by the Competent Person.

7. Independent Review

All of the geological models created are reviewed internally by the Competent Person as per Iluka internal Development Geology guidelines. Block models and Mineral Resource estimates which support the inaugural reporting or are required to support feasibility studies undergo external review.

Several Competent Persons employed by Iluka Resources have either been based in the South-west or visited the sites from time to time.

Table 6.1: Summary of Mineral Resources for the South-west as of the 31 December 2016.

WA-SOUTH-WEST MINERAL RESOURCE BREAKDOWN BY DISTRICT, DEPOSIT AND JORC CATEGORY AT 31 DECEMBER 2016										
Summary of Mineral Resources for WA-South-West				**2016**	**2016**		**HM Assemblage(2,3)**			
District	**Deposit**	**Mineral Resource Category(1)**	**Material Tonnes kt**	**InSitu HMTonnes kt**	**HM Grade (%)**	**Clay Grade (%)**	**Ilmenite Grade (%)**	**Zircon Grade (%)**	**Rutile Grade (%)**
WA-South-West	Capel South	Measured	14,437	1,268	8.8	16.2	82.4	5.9	1.0
		Indicated	2,962	198	6.7	13.7	77.4	6.0	1.0
		Inferred	290	22	7.4	19.2	81.4	5.8	1.0
	Elgin	Measured	9,273	597	6.4	4.8	75.0	6.5	1.3
	Gilmore	Indicated	14,320	1,410	9.8	8.0	72.9	6.9	1.6
		Inferred	21,200	1,700	8.0	6.2	73.2	8.5	1.2
	Scotts	Measured	5,484	464	8.5	10.2	75.8	7.1	1.1
		Inferred	2,957	180	6.1	12.1	59.9	8.9	1.2
	South Capel Offices	Indicated	1,144	206	18.0	9.5	82.2	8.9	1.3
		Inferred	1,546	329	21.3	15.6	82.5	7.1	1.3
	Tutunup	Measured	26,700	2,940	11.0	17.0	70.0	10.0	1.0
		Indicated	1,000	60	6.0	13.0	39.0	10.0	1.0
		Inferred	1,900	110	5.8	14.0	50.0	10.0	1.0
	Tutunup South	Measured	4,401	436	9.9	14.7	67.3	13.1	1.5
		Indicated	515	45	8.7	17.4	72.7	12.1	1.2
		Inferred	86	5	5.8	15.4	41.3	15.2	2.3
	Uplands	Measured	5,660	400	7.1	9.7	83.3	7.3	0.9
		Indicated	3,088	220	7.1	10.7	83.0	7.7	0.9
		Inferred	752	44	5.9	4.6	83.1	6.9	0.9
	Yarloop	Measured	15,573	1,266	8.1	20.0	78.1	7.4	1.0
		Indicated	2,406	274	11.4	19.4	84.6	7.4	0.8
		Inferred	2,073	159	7.7	24.4	77.3	5.5	0.6
	Yoganup Extended	Measured	21,732	1,816	8.4	16.6	69.5	9.7	1.6
		Indicated	6,995	526	7.5	19.4	80.0	9.4	0.6
		Inferred	784	46	5.8	25.7	70.7	13.0	0.8
WA-South-West	**Measured Total**		**103,259**	**9,187**	**8.9**	**15.3**	**74.3**	**8.6**	**1.1**
WA-South-West	**Indicated Total**		**32,430**	**2,939**	**9.1**	**12.4**	**76.3**	**7.7**	**1.2**
WA-South-West	**Inferred Total**		**31,588**	**2,594**	**8.2**	**9.5**	**72.9**	**8.3**	**1.2**
WA-South-West	**Total**		**167,277**	**14,721**	**8.8**	**13.6**	**74.4**	**8.4**	**1.1**

Notes
1 Mineral Resources are inclusive of Ore reserves.
2 The Mineral assemblage is reported as a percentage of the in situ HM content.
3 All tonnages are dry in situ metric tonnage.
4 Rounding may result in differences in the last decimal place.
5 All figures are stated as at the 31 December 2016.

8. Further Work

There is no further work planned for any of the Mid-west HM deposits at this time. Additional exploration will be carried out in a timely manner to support future development as required.

9. Summary of Information to the Ore Reserve

9.1 Reserve Classification

The stated Proved and Probable Ore Reserves correspond with the Measured and Indicated Mineral Resources. There are no Inferred Resources included in the stated reserve numbers.

9.2 Mining and recovery factors

Pit optimisations were conducted using IMS Minemap mine planning software. This is industry standard software and utilises the Lerch-Grossman algorithm. The optimisation parameters used consisted of current costs, revenues and recoveries and other Modifying Factors.

The results of the pit optimisations were used for production scheduling and economic evaluation. The mining methods are truck and shovel for both waste and ore mining operations.

9.3 Modifying Factors

Modifying factors such as mining dilution and ore recovery have been applied from historical performance. Processing recoveries and operating costs are based primarily on historical performance and updated for current economic conditions.

The price assumptions are internally generated and are based on detailed supply and demand modelling. The price assumptions have also been benchmarked against commercially available consensus price forecasts. The detail of that process is commercially sensitive and is not disclosed.

Iluka's internal modelling indicates that the exploitation of the reported reserves would be expected to generate a positive NPV sufficient to meet Iluka's internally generated investment criteria.

9.4 Cut-off grades

The cut-off grade has been calculated using optimization software and an individual cut-off grade applied to each block within the model. The calculations consider overall HM grade and individual assemblage product values, operating costs, recoveries and modifying factors. An economic optimisation is performed to determine if a block is viable to mine, and therefore be included in the Ore Reserves.

9.5 Processing

The first stage processing that produces the HMC is a well-tested and proven methodology and currently exists at other mineral sands operations around the world.

The metallurgical separation process also utilises known technology where the performance and recovery of the mineral products has been well established by Iluka in current and past operations.

9.6 Ore Reserves declared

The Tutunup South Ore Reserve estimate is summarised in Table 9.1. The location of the Tutunup South Ore Reserves is shown on Figure 4.1.

Table 9.1: Summary of Ore Reserves for the Tutunup South Deposit.

Summary of Ore Reserves for Tutunup South					2016	2016		HM Assemblage[2]		
District	Deposit	Ore Reserve Category[1]	Overburden Volume kbcm	Ore Tonnes kt	InSitu HMTonnes kt	HM Grade (%)	Clay Grade (%)	Ilmenite Grade (%)	Zircon Grade (%)	Rutile[3] Grade (%)
WA-South-West	Tutunup South	Proved	270	2,187	278	12.7	13.5	65.7	13.3	1.0
		Probable	-	66	8	12.8	29.5	53.5	10.2	0.8
Tutunup South	**Total**		**270**	**2,253**	**286**	**12.7**	**14.0**	**65.4**	**13.2**	**1.0**

Notes

1 Ore Reserves are a sub-set of Mineral Resources.

2 The Mineral assemblage is reported as a percentage of the in situ HM content.

3 The rutile component in WA – South-west operations is sold as leucoxene product.

4 All tonnages are dry in situ metric tonnage

5 Rounding may result in differences in the last decimal place

6 All figures are stated as at the 31 December 2016

Perth Basin South-west HM Deposits and Tutunup South Ore Reserve- JORC Code 2012 edition - Table 1 Commentary

Section 1 Sampling Techniques and Data

(Criteria in this section apply to all succeeding sections.)

Criteria	JORC Code explanation	Commentary
Sampling techniques	*Nature and quality of sampling (eg cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc). These examples should not be taken as limiting the broad meaning of sampling.*	The South Western deposits were sampled using either BQ or NQ diameter Reverse Circulation Air Core (RCAC) drill holes. There are a small number of holes that have been flagged in the database for which the method is unknown. All drill hole samples were collected from a rotary splitter and were drilled vertically which is essentially perpendicular to the mineralisation.
	Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.	Material is presented to a rotary splitter which rotates at a regular speed to take a representative one quarter split. A check of sample weights is done to ensure the material taken for analysis is within expected limits. Several duplicate samples have been taken which are listed in the attached document.
	Aspects of the determination of mineralisation that are Material to the Public Report.	Sample lengths are typically 1 to 1.5 m intervals and all the drill sample is presented for subsampling. Selected samples are submitted for assay.
	In cases where 'industry standard' work has been done this would be relatively simple (eg 'reverse circulation drilling was used to obtain 1 m samples from which 3 kg was pulverised to produce a 30 g charge for fire assay'). In other cases more explanation may be required, such as where there is coarse gold that has inherent sampling problems. Unusual commodities or mineralisation types (eg submarine nodules) may warrant disclosure of detailed information.	The HM mineralisation is determined by both visual inspection of panned sample and laboratory assays. No geophysical methods have been used in the determination of the South West mineral resources. Samples have been analysed by industry typical methods for heavy minerals at Iluka's internal laboratories and those of its predecessors. Drilling has occurred over a protracted time in the South West area and as such different laboratory methods were used. Each technique is described below. 1: RCAC drilling was used to obtain a 1m sample from which approximately 3-4 kg was collected of the whole sample. The sample was split using a rotary splitter to produce a quarter sized sub-sample. The sample was dried, de-slimed using wet sieving (material <53 μm removed)

Criteria	JORC Code explanation	Commentary
		and then had oversize (material +2mm) removed. About 100g of the remaining sand fraction was sieved at 710µm to determine the coarse sand component. The fine sand (<710 µm) was then subjected to float/sink analysis using Lithium-Sodium-Tungsten (LST with SG=2.85g/cm^3). The resulting heavy sinks were then dried and weighed and the HM content of the sample was calculated. 2: RCAC drilling was used to obtain a 1 to 3m sample from which approximately 3-4 kg was collected of the whole sample and split by cone and quarter. The sample was then de-slimed by mixing the sample in a bucket and decanting the suspended sediment. Oversize and coarse sand (material +500µm) was removed., About a 100gm split of the sample was then subjected to a float/sink analysis using Tetra Bromo Ethane (TBE with SG=2.95g/cm^3). The resulting heavy sinks were then dried and weighed and the HM content of the sample was calculated. This method has shown a tendency to overstate the slimes and understate HM content. The reliance on this method in the estimation of mineral resources has been negated through infill and replacement drilling using more rigorous analytical methods Many of the mineral resources and Ore Reserves supported by this analysis method have been mined out. 3. RCAC drilling was used to obtain a 1m sample from which approximately 3-4 kg was collected (whole sample) and split by cone and quarter. The sample was dried and then de-slimed by wet sieving (material <53µm removed). Oversize and coarse sand (material +500 µm) was removed. About a 100gm split of the sand fraction (53 to 500µm) was subjected to float/sink separation using TBE (SG=2.95 g/cm^3). The resulting heavy sinks were then dried and weighed and the HM content of the sample was calculated 4. RCAC drilling was used to obtain sample over 1 to 1.5 metre interval from which approximately 1-2kg kg was collected via a rotary splitter mounted on the drill rig. The sample was dried then de-slimed by wet sieved to remove the slime (material <75µm) and oversize (+2mm). The sand fraction of the sample (75 to 2mmm) was then split to about a 100g sample which was sieved at 710um to determine the coarse sand content. The fine sand (<710um) was subjected to float/sink separation using TBE

Criteria	JORC Code explanation	Commentary
		(SG=2.95 g/cm^3). The resulting heavy sinks were then dried and weighed and the HM content of the sample was calculated The assay method for a small number of samples has not been recorded but the time frame in which analysis occurred generally indicates the method used. Sand residue from the HM sample analysis (from similar geological domains) were grouped together to form composite samples which were subject to further metallurgical analysis to determine the assemblage, mineral quality and sizing. These composite samples underwent wet tabling and magnetic separation of the HM concentrate using either a Rapid™ lift magnet or a PermRoll™ roll magnet. The mineral from various fractions were then analysed by XRF and stoichiometric calculations were used to estimate the mineral assemblage. In some instances about 10grams of the non-magnetic fraction was sent for SG separation using Thallium Malonate Solution (TMF). This separation technique was used to determine grain size and indicative chemistry for Zircon.
Drilling techniques	*Drill type (eg core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc) and details (eg core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc).*	The majority of sampling across the district was based on vertical RCAC drilling utilising BQ or NQ rods to bore a 52mm or 76mm hole diameter hole. This is an industry standard method for testing mineral sand deposits. There are a small number of holes that have been flagged in the database for which the method is unknown but are likely to be Gemco auger holes given their age.
Drill sample recovery	*Method of recording and assessing core and chip sample recoveries and results assessed.* *Measures taken to maximise sample recovery and ensure representative nature of the samples.*	Drilling completed by Iluka Resources recorded sample quality in the field logging. Any factors that have affected sample recovery were recorded in the logging comments. Poor sample recovery is evident in near surface and indurated samples for some deposits. Drilling before the year 2000 did not record sample quality during drilling. Sample representivity is maintained by the use of a rotary splitter attached to the drill rig, in line with company standard procedures. The drill rigs are constantly supervised by Iluka staff to ensure sample quality is maintained, or attend to any issues immediately as they become apparent. Sample weights are monitored to ensure optimal representivity. Drilling was conducted to industry standards with suitably trained and

Criteria	JORC Code explanation	Commentary
		qualified drilling operators.
	Whether a relationship exists between sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.	In some deposits, the sample recovery was lower for indurated sample intervals which record elevated HM assays. Otherwise no relationship was identified between recovery and sample grades.
Logging	*Whether core and chip samples have been geologically and geotechnically logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and metallurgical studies.* *Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc) photography.* *The total length and percentage of the relevant intersections logged.*	Most samples have been geologically logged with the exception of some of those drilled in the 1970s. In these instances the more recent infill drilling and re-drilling of older holes is sufficient to provide confidence in the geological interpretation. For samples that have been logged, the quality of logging varies with the age of the drilling. Irrespective of the age, the logging of RCAC samples has recorded colour, dominant grainsize, lithology, sorting and hardness. The logging of other attributes such as washability and estimated slime and HM content has been done in relation to about 30% of the samples. The logging is considered qualitative and is appropriate for supporting the Mineral Resource estimates of the South-west Domain. The geological logging is also used as a guide to the allocation of samples assigned to metallurgical composites for assemblage determination.
Sub-sampling techniques and sample preparation	*If core, whether cut or sawn and whether quarter, half or all core taken.* *If non-core, whether riffled, tube sampled, rotary split, etc and whether sampled wet or dry.* *For all sample types, the nature, quality and appropriateness of the sample preparation technique.* *Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.*	No diamond coring or Sonic drilling has been done that are represented in any resource models for the current South-west Mineral Resources. Samples are collected beneath a rotary splitter fed from a cyclone. Approximately 25% of the sample is collected for geological logging and analysis. For a period during 2005, 50% of the sample was collected for geological logging and analysis, primarily in relation to drilling of historical tailings. Much of the RCAC drilling conducted in the South-west used water injection to assist with the sample return and clearing the sample tubes to reduce contamination. Sample preparation is consistent with industry standard practice and is deemed to be appropriate for Heavy Mineral determination. The current method processes the whole sub-sample although cone and quarter of unsplit samples was carried out in the lab historically. Many duplicate samples have been taken in the South-west District. This became procedural practise after 2004. Duplicate samples are taken at

Criteria	JORC Code explanation	Commentary
	Measures taken to ensure that the sampling is representative of the in situ material collected, including for instance results for field duplicate/second-half sampling. *Whether sample sizes are appropriate to the grain size of the material being sampled.*	the rate of 1:40 samples by attaching a second calico sample bag to a quadrant of the rotary splitter. Prior to 2004 there were no QA/QC protocols in place and QA/QC information is limited. Where bias or poor precision was noted in duplicate assays, the information is relayed back to the drilling team and appropriate measures are taken to ensure sampling representivity. The sample size is considered appropriate for the material hosting the mineralisation, which is supported by Gy's sampling theory.
Quality of assay data and laboratory tests	*The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.* *For geophysical tools, spectrometers, handheld XRF instruments, etc, the parameters used in determining the analysis including instrument make and model, reading times, calibrations factors applied and their derivation, etc.* *Nature of quality control procedures adopted (eg standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (ie lack of bias) and precision have been established.*	The assay technique utilised is appropriate for the mineralisation in the South West and is supported by decades of reconciliation for the mining of similar deposits delineated using the same or very similar techniques. The mineralogical composite sample evaluation processes are appropriate for the current level of study and the JORC Code Resource Classifications applied of each deposit. The assay method is considered total. The data does not contain any results generated by geophysical methods. QA/QC became integral to exploration programs after 2004. For field standards, the accuracy is ascertained via plotting the results of standards against expected results. Where a standard sample returns a result that is in excess of 3 standard deviations from the expected result (deemed a fail), the samples associated with that batch are re-analysed. The slimes value cannot be re-analysed as this material is lost during processing of the original sample. As a result Slimes failures are not investigated. The level of accuracy and precision from standards and duplicates vary for each deposit. The QAQC data available for each deposit is reviewed and an assessment is made whether the data is suitable to support the mineral resource estimation and contributes to the resource classification applied. The QAQC performance of each deposit is listed in the table in the accompanying text.
Verification of sampling and	*The verification of significant intersections by either independent or alternative company personnel.*	Assay results are reviewed by the geologist supervising each respective exploration program. Verification of the drill data is also undertaken during

Criteria	JORC Code explanation	Commentary
assaying		the resource estimation process by visually reviewing the assay data on screen using appropriate software such as Datamine Studio. During drilling, field technicians generated panned estimates of HM and these were used to cross check against laboratory assays.
	The use of twinned holes.	Numerous twinned holes have been drilled in the South-west deposits to confirm in-situ grades. In addition, a large amount of re-drilling of older holes has occurred to replace unreliable assays and as part of programs to collect sample for metallurgical investigations. Although these re-drilled holes are coincident with the older un-reliable holes, they cannot be considered true twins due to the different drill rigs in use, different timing of the drilling and different assay methods used.
	Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.	Drilling has been completed over a protracted period of time in the South-west. Older drilling was recorded on paper logs. The hard copy data for deposits supporting Mineral Resources was entered into digital files over a period from the late 1980s to the mid-1990s. In the late 1980s computerised field logging equipment was introduced in the South-west Domain and geological information was recorded and stored in text files. An Oracle Database was introduced for the storage of geological data in the early 2000s. This was superseded by a custom built SQL database solution introduced in 2006 which was in turn superseded by an acQuire™ data management solution. For more recent drilling, logging of RCAC samples was input directly into a laptop computer. Data was then transferred into Iluka's Geology Database at the time which incorporated further verification routines to ensure valid entries. Errors in the field logs results in rejection of the data for correction before re-loading is attempted.
	Discuss any adjustment to assay data.	Minor adjustments have been made to the data set to account for poor assays as a result of out-dated historic assay methods. The old holes for the Uplands resource (drilled prior to 2000) were entered from imperial drill logs from the early 1970s. Due to the different assay method used, the assays demonstrated a bias towards higher slimes values (and lower HM) and as such the slimes assays of this period are consistently higher than holes drilled from 2000 onwards. All assays from the 1970s

Criteria	JORC Code explanation	Commentary
		exploration over the Uplands Deposit have had the slimes value cut by 25% to more accurately reflect the likely modern equivalent assay. The HM grades were not adjusted.
Location of data points	*Accuracy and quality of surveys used to locate drill holes (collar and down-hole surveys), trenches, mine workings and other locations used in Mineral Resource estimation.* *Specification of the grid system used.* *Quality and adequacy of topographic control.*	For much of the older drilling, the method of survey has not been recorded. It is known though from the personal experience of the Competent Person, that the drill holes set out for all the drilling supporting the South-west mineral resource estimates was done by qualified surveyors (usually company employees), using contemporary equipment at the time of the exploration programs. This provides collar set out accuracy of +/-0.5m or better in the X/Y/Z directions. Drill holes were surveyed in MGA94, Zone 50 (for drilling post December 1996) or AMG84 (for drilling pre December 1996). The data was then converted to Local Grid coordinates using various 2 point transformations. Topographic control was provided by various means including: • points from surveyed drill hole collars; • wireframe files based on photogrammetry; • wireframe files based on drillhole collars ; • infill detailed survey of crests and toes; or • GPS and GPS-RTK survey pick up. Standard practice is to adjust the collar elevations to a common surface generated by the means above using appropriate software. This results in the drill holes having correct RL's relative to other drill holes and the mineralisation is correctly located with respect to the surface.
Data spacing and distribution	*Data spacing for reporting of Exploration Results.* *Whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied.*	Drill spacing varies from 15m to 80m in the across strike direction and 100 m to 200 m along strike in conjunction with sample intervals of 1 m or 1.5 m downhole. The drilling was adequately spaced to conclusively demonstrate continuity of mineralisation. It is appropriate for the style of mineralisation and the spacing of the drilling is taken into consideration when applying the Resource Classification for each deposit. Typically a drill grid spacing of

Criteria	JORC Code explanation	Commentary
		40m * 200 m or less supports an Indicated Resource classification, while drilling from 20m * 100 m spacing supports a Measured Resource classification. Note that other factors are also considered when allocating a JORC Code Resource Classification.
	Whether sample compositing has been applied.	No compositing of sample grades has been done as the sample length is uniform, however samples have been composited to determine mineral assemblage, quality and sizing of geologically determined domains.
Orientation of data in relation to geological structure	*Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.* *If the relationship between the drilling orientation and the orientation of key mineralised structures is considered to have introduced a sampling bias, this should be assessed and reported if material.*	No bias has been identified or is expected as the drilling orientation is effectively perpendicular to the mineralisation.
Sample security	*The measures taken to ensure sample security.*	Samples were stored at secure Iluka compounds when not in transport.
Audits or reviews	*The results of any audits or reviews of sampling techniques and data.*	An audit of the sampling techniques was completed by Snowden, during drilling at the Tutunup Deposit. No issues were raised during the review and the method was considered to be in line with industry standard practice. The same sampling and assay processes have supported Iluka's current and historic mining operations at other deposits within the Perth Basin.

Section 2 Reporting of Exploration Results

(Criteria listed in the preceding section also apply to this section.)

Criteria	JORC Code explanation	Commentary
Mineral tenement and land tenure status	*Type, reference name/number, location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environmental settings.* *The security of the tenure held at the time of reporting along with any known impediments to obtaining a licence to operate in the area.*	The mineral tenement and land tenure status for each deposit is listed in the main text. All the tenements are wholly owned by Iluka or 100% owned subsidiary companies. The South West deposits lie within environmentally and culturally sensitive areas. Significant flora, vegetation, conservation significant wetlands and environmentally sensitive areas occur to varying extents in relation to the South-west Mineral Resources. These will require further studies to determine appropriate management, and may impact mining activities. In each case, suitable management plans will be developed as a part of supporting feasibility studies and proposed mine plans to curtail any adverse environmental and social consequences as a result of mining prior to its commencement. Other constraints on future mining operations specific to individual deposits include; • the Elgin deposit is cut by a rail line and a 60 m buffer is in effect; • a significant portion of the South Capel Offices resource is located under the current Bussell Highway which would need relocation to facilitate mining; and • high voltage power lines and gas pipelines traverse the Gilmore deposit which will result in sterilisation of a portion of the mineral resource dependant on any buffer imposed. There is no native title determination; however there is a native title application by the Noongar under a single claim over the entire area encompassing the reported resources. Iluka's resources in the South-west are predominantly located on private property, under which native title is extinguished.
Exploration done by other parties	*Acknowledgment and appraisal of exploration by other parties.*	All drilling has been completed either by Iluka or its predecessor companies. No exploration work by other companies has been used in the estimation of the Mineral Resources and Ore Reserves for the South-west

Criteria	JORC Code explanation	Commentary
		District.
Geology	*Deposit type, geological setting and style of mineralisation.*	The HM deposits within the South-west District lay within the southern portion of the Perth Basin and were formed in an accretionary depositional environment which has received terrestrial and marine sedimentation. The southern Perth Basin forms a 20 km wide coastal strip which extents for a distance of 300 km from Perth to Augusta. A veneer of unconsolidated surface sediments has been progressively deposited in littoral and beach barrier environments as a result of multiple marine incursions with in the Perth Basin during the Tertiary and Quaternary eras. Heavy mineral is thought to be sourced from a combination of re-working of the older Mesozoic sediments and the sediment load from rivers draining the Archean and Proterozoic Complexes adjacent to the Perth Basin. The re-working results in concentration of the HM in the sediments deposited in ancient shorelines. Mineralisation is hosted in beach, dune and sub littoral sedimentary facies. The HM deposits are typically 5-10 m thick, 100-1000 m wide and 1 to 10 km long. The wider deposits are usually an agglomeration of multiple mineralising events. HM grades average from 5 to 10%, although historic grades that have been mined were commonly of the order of 20% HM. Virtually all of the high HM grade mineralisation with in the South-west domain has been depleted as a result of mining over the past 60 years. A list of each deposit and style of mineralisation is given below, and typical cross sections of each deposit style are given in the attached diagrams.

Criteria	JORC Code explanation	Commentary
		<table><tr><th>Deposit</th><th>Deposit Style</th></tr><tr><td>Capel South</td><td>beach and dune</td></tr><tr><td>Elgin</td><td>dune</td></tr><tr><td>Gilmore</td><td>beach</td></tr><tr><td>Scotts</td><td>beach and dune</td></tr><tr><td>South Capel Offices</td><td>beach and dune with HM in remnants</td></tr><tr><td>Tutunup</td><td>beach</td></tr><tr><td>Tutunup South</td><td>beach</td></tr><tr><td>Uplands</td><td>beach and dune with HM in remnants and mine tailings</td></tr><tr><td>Yarloop</td><td>beach</td></tr><tr><td>Yoganup Extended</td><td>beach and dune with HM in remnants and mine tailings</td></tr></table>
Drill hole Information	*A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all Material drill holes:* *easting and northing of the drill hole collar* *elevation or RL (Reduced Level – elevation above sea level in metres) of the drill hole collar* *dip and azimuth of the hole* *down hole length and interception depth* *hole length.* *If the exclusion of this information is justified on the basis that the information is not Material and this exclusion does not detract from the understanding of the report, the Competent Person should clearly explain why this is the case.*	It is impractical to provide a tabulation of all the significant intercepts for the exploration from the South-west District. This is in part superseded by the presentation of Mineral Resource estimates which consider all the data. Representative cross sections and drill hole location plans in respect of the mineralisation styles are presented in the accompanying text for the South-west District. All the drill holes are vertical and vary from 3 to 27m in length. The average hole depth is about 13 m.
Data aggregation methods	*In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (eg cutting of high grades) and cut-off grades are usually Material and should be stated.* *Where aggregate intercepts incorporate short lengths of high grade results and longer lengths of low grade results, the procedure used*	No weighting has been applied in the reporting of exploration results for the HM deposits in the South-west district and is not considered appropriate for reporting in mineral sands. A 4% lower HM cut-off grade has been employed for the reporting of significant mineralisation the South-west district. This is considered appropriate for the style of mineralisation and represents an approximate lower economic cut-off grade which is corroborated by the result of various economic analyses

Criteria	JORC Code explanation	Commentary
	for such aggregation should be stated and some typical examples of such aggregations should be shown in detail. *The assumptions used for any reporting of metal equivalent values should be clearly stated.*	and feasibility studies. No metal equivalents have been used in the reporting of Exploration Results, Mineral Resources or Ore Reserves for the HM deposits in the South-west District.
Relationship between mineralisation widths and intercept lengths	*These relationships are particularly important in the reporting of Exploration Results.* *If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported.* *If it is not known and only the down hole lengths are reported, there should be a clear statement to this effect (eg 'down hole length, true width not known').*	The geology and geometry of the HM deposits in the South-west District is well understood from numerous studies and mining for the past 60 years. The drilling is all done vertically which is perpendicular to the mineralisation orientation, and as a result the mineralisation intercepts represent true thickness of the mineralisation.
Diagrams	*Appropriate maps and sections (with scales) and tabulations of intercepts should be included for any significant discovery being reported These should include, but not be limited to a plan view of drill hole collar locations and appropriate sectional views.*	Type cross sections of the principal styles of mineralisation are given in the attached text along with plans indicating the drill hole density.
Balanced reporting	*Where comprehensive reporting of all Exploration Results is not practicable, representative reporting of both low and high grades and/or widths should be practiced to avoid misleading reporting of Exploration Results.*	The significant intercepts presented in the associated text are typical of the mineralisation under consideration. This is superseded to some extent as the estimation of the Mineral Resources considers all assay data.
Other substantive exploration data	*Other exploration data, if meaningful and material, should be reported including (but not limited to): geological observations; geophysical survey results; geochemical survey results; bulk samples – size and method of treatment; metallurgical test results; bulk density, groundwater, geotechnical and rock characteristics; potential deleterious or contaminating substances.*	All deposits have sufficient density to support the resource classification applied. Logging of the samples includes visually estimating the HM present, the results of which corroborate the presence of HM mineralisation. In addition the HM component of samples recovered from laboratory analyses are visually inspected to confirm the authenticity of the reported HM. Composite samples have been taken either from the sand residue fractions of exploration samples or HM sink fractions from the HM determinations which also corroborate the validity of the HM mineralisation. The composited samples generate about 0.5 to 2 kg of HM from wet tabling which is then subjected to a process of magnetic, electrostatic and heavy liquid separation followed with XRF analysis of the

Criteria	JORC Code explanation	Commentary
		fractions to determine the mineral assemblage and mineral quality. The Iluka standard bulk density formula has been used in the estimation of mineral resource tonnages for the South-west HM Deposits. The formula was developed from the study of geologically similar HM deposits throughout Western Australia. The formula takes into account the sand, clay and HM content of the material. The formula also makes an allowance for void space between sand grains with fines filling replacing void space to a point where the clay content results in a matrix supported material. The formula supports the Mineral Resource and Ore Reserve tonnages at Iluka's mining operations. Potential Acid Sulphate Soils (PASS) were identified at the Tutunup South Mine in the South-west District. Testing and identification of PASS is carried out during feasibility studies with the appropriate mitigation employed pending the results of the testing. Induration is prevalent in some of the HM deposits in the South-west district. Iluka uses several methods to assess the degree of induration and penalises the mineral resources by either excluding indurated material or applying penalties during economic optimisations.
Further work	*The nature and scale of planned further work (eg tests for lateral extensions or depth extensions or large-scale step-out drilling).* *Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.*	No further drilling is planned at this stage for any of the deposits in the South West Mineral Field. Additional exploration will be carried out in a timely manner to support any future development of the Mineral Resources.

Section 3 Estimation and Reporting of Mineral Resources.

(Criteria listed in section 1, and where relevant in section 2, also apply to this section.)

Criteria	JORC Code explanation	Commentary
Database integrity	*Measures taken to ensure that data has not been corrupted by, for example, transcription or keying errors, between its initial collection and its use for Mineral Resource estimation purposes.* *Data validation procedures used.*	Geological logs were initially recorded on paper until the advent of computerised systems in the late 1980's. The hard copy data for deposits supporting Mineral Resources was entered into digital files during the late 1980's to mid-1990's. In the late 1980s computerised field logging equipment was introduced in the South-west Domain and geological information was recorded and stored in various text file formats. An Oracle Database was introduced for the storage of geological data in the early 2000s. This was superseded by a custom built SQL database solution introduced in 2006 which was in turn superseded by an acQuire™ data management solution in 2012. The computer based logging software incorporated data verification routines to prevent the entry of incorrect codes. Further verification routines are deployed when newly acquired data is loaded into the Iluka Geology Data Management System (GDMS). Errors result in rejection of the data which must be corrected prior to attempting to reload the data. Assay data is stored in Iluka's laboratory database (CCLAS) at the time of analysis and transferred electronically to the GDMS. . At the time of constructing digital block models, the data is reviewed statistically and visually to ensure all results were within acceptable ranges and the data is in spatially valid locations. Checks include: • collar and sample interval duplication; • missing assays and sample intervals; • verification the sum of analytes adds to 100%; • data values are within expected ranges; • drill holes are in spatially valid locations; and • assay values are coherent with geological expectations and supported by the field visual HM estimates There are some instances of analytes such as the percentage of sand and coarse sand not being recorded for some older assays in the South-west deposits. In these instances the analytes do not add to 100% and data is

Criteria	JORC Code explanation	Commentary
		reviewed to ensure the integrity of the remaining analytes has not been compromised and is valid for use in resource estimation.
Site visits	*Comment on any site visits undertaken by the Competent Person and the outcome of those visits.* *If no site visits have been undertaken indicate why this is the case.*	Several Competent Persons employed by Iluka have either been based in the South-west or visited the site of the South-west HM Deposits on many occasions. The main issue of note relates to remnant vegetation which may restrict access to portions of some deposits.
Geological interpretation	*Confidence in (or conversely, the uncertainty of) the geological interpretation of the mineral deposit.* *Nature of the data used and of any assumptions made.* *The effect, if any, of alternative interpretations on Mineral Resource estimation.* *The use of geology in guiding and controlling Mineral Resource estimation.* *The factors affecting continuity both of grade and geology.*	The South-west HM deposits are hosted in beach barrier sedimentary sequences which is a common geological host environment for mineral sands. A high confidence can be placed in the geological framework supporting the Mineral Resource estimates. The drilling and geological data recorded has adequately defined the geological framework to support the mineral resource estimates for the South-west HM Deposits. All relevant information has been sourced from the drill samples and interpretations have developed over successive drill campaigns and from the mining of existing deposits. No viable alternative interpretations are known or have been considered for the South-west HM deposits. Appropriate geological domaining and corresponding flagging of drill data has been used to control grade interpolation and distribution during resource estimation. The current exploration data for each deposit is of a sufficient spatial density to be able to identify grade and geological continuity. For those deposits that have been mined (Uplands and Yoganup Extended) the grade continuity is compromised by the presence of mineralisation in tailings and remnants. However confidence in the grade continuity is reflected by the resource classification awarded.
Dimensions	*The extent and variability of the Mineral Resource expressed as length (along strike or otherwise), plan width, and depth below surface to the upper and lower limits of the Mineral Resource.*	The extent and variability of each reported resource in the South West Mineral Field is provided in the table below.

<table>
<tr><th>Criteria</th><th>JORC Code explanation</th><th>Commentary</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Deposit</th><th>Dimensions</th></tr>
<tr><td>Capel South</td><td>The mineral resource component occurs over a strike length of around 5.06km, with an across-strike width of up to 670m. Low grade dune mineralisation occurs at surface, with the buried high grade strands occurring from approximately 7m below surface for both mineralised strands and varies between 1m and 5m in thickness.</td></tr>
<tr><td>Elgin</td><td>The mineral resource incorporates a number of mineralised dune placers which occur over an area 4.5km by 3km and between depths of 0m and 22.5m below surface.</td></tr>
<tr><td>Gilmore</td><td>The mineral resource is located over a strike length of 8km, with an across-strike width of approximately 800m. On average, the mineralisation is 5 m thick and is typically located between 7 and 12m below the surface.</td></tr>
<tr><td>Scotts</td><td>The mineral resource incorporates a number of mineralised placers which occur over an area 2.3km (across strike) by 2.8km (along strike) and between depths of 0m and 15m below surface.</td></tr>
<tr><td>South Capel Offices</td><td>The mineral resource comprises tailings and remnant mineralised material. The area covered by the resource is ~2km (NE-SW) by 300m (NW-SE). The mineralisation averages about 8m in thickness.</td></tr>
<tr><td>Tutunup</td><td>The mineral resource is approximately 7km long, up to 1.5km wide at its widest point (but is generally approximately 250 to 400m wide) and approximately 5-20m thick. In certain parts of the deposit the orebody crops out at surface and has been eroded at localised points, but generally there may be anywhere up to 2 to 10m of waste material overlying the mineralisation.</td></tr>
<tr><td>Tutunup South</td><td>The mineral resource is located over a strike length of 3.5km, with an across-strike width of up to 1km.</td></tr>
<tr><td>Uplands</td><td>The mineral resource is located over a strike length of around 2.8km, with an across-strike width of up between 300km and 900m.</td></tr>
<tr><td>Yarloop</td><td>The mineral resource incorporates a number of mineralised placers which occur over an area 1.4km (across strike) by 4km (along strike) and between depths of 0m and 24m below surface.</td></tr>
<tr><td>Yoganup Extended</td><td>The mineral resource constitutes tailings and remanant mineralisation over a strike length of approximately 8.2km and is approximately 2.5km wide at its widest point. It is approximately 320m wide at its narrowest point, where the resource is truncated by the tenement boundary. The mineral resource is highly discontinuous within these dimensiton due to the nature of the mineralation hosted by mine tailings and remnants. The mineral resource is between 8m and 25m thick</td></tr>
</table>
</td></tr>
<tr><td>Estimation and modelling techniques</td><td>The nature and appropriateness of the estimation technique(s) applied and key assumptions, including treatment of extreme grade values, domaining, interpolation parameters and maximum distance of extrapolation from data points. If a computer assisted estimation method was chosen include a description of computer software and parameters used.</td><td>The grade interpolations were carried out using the Estima Superprocess within Datamine Studio™ software, using Inverse Distance Cubed (ID3) which is an Iluka standard and is deemed appropriate for this style of mineralisation. Mineralogical composite identifier and hardness values were interpolated using Nearest Neighbour (NN) method. No HM topcut has been used nor deemed necessary.

The search distances for grade variables varied between 30m to 60m in the X dimension, 100m to 300m in the Y dimension and 2m to 3m in the Z dimension. Interpolation of the composite ID employed search distances double that of the grade analytes. Additional search radius factors of 2 or 3 and 3 or 5 were used to expand the search dimension should insufficient</td></tr>
</table>

Criteria	JORC Code explanation	Commentary
		data be found within the 1st search dimension to fulfil the search criteria. A dynamic search protocol was used to ensure the search ellipse was optimally orientated to honour grade or geological structure for models created after 2006.
	The availability of check estimates, previous estimates and/or mine production records and whether the Mineral Resource estimate takes appropriate account of such data.	There has been a long history of exploration and mining in the South-west District by Iluka. Digital block models have been used to support resource estimation and mining since about 1990. In general the block models have faithfully represented the volume and grade of mineralisation expressed by the drill data and consequently no adjustments or factoring is made to the models.
	The assumptions made regarding recovery of by-products.	No by products have been considered as part of these estimates.
	Estimation of deleterious elements or other non-grade variables of economic significance (eg sulphur for acid mine drainage characterisation).	Mineral quality information for ilmenite and zircon is typically incorporated into the models to support the economic analysis. Variables relating to soil acidity have been incorporated into the Tutunup South model.
	In the case of block model interpolation, the block size in relation to the average sample spacing and the search employed.	The parent cell size used in the block modelling of the South-west Deposits varied from 7.5 to 25m in the X direction, 35 to 100m in the Y direction and 1m in the Z direction and principally reflects a parent cell size approximately half the X/Y drill spacing. The search distances adopted reflect the spatial distribution of the exploration data with the dimensions being set to about 2 times the drill hole spacing. The anisotropy of the search distances typically reflect the variation in spacing of data in the X/Y/Z directions and are also supported by geostatistical analysis such as variography.
	Any assumptions behind modelling of selective mining units.	No assumptions have been made in relation to the modelling of selective mining units.
	Any assumptions about correlation between variables.	No assumptions have been made about correlation between variables.
	Description of how the geological interpretation was used to control	Drill hole sample data was flagged with domain codes corresponding to the geology of the deposit and the domains imprinted on the model from 3-dimensional surfaces generated from the geological and mineralisation interpretations.
		A top cut was not deemed necessary for HM assays. Iluka does not use grade cutting in any of its resource estimates and this is supported by the

Criteria	JORC Code explanation	Commentary
	the resource estimates. *Discussion of basis for using or not using grade cutting or capping.* *The process of validation, the checking process used, the comparison of model data to drill hole data, and use of reconciliation data if available.*	results of reconciliation at active mine sites. Validation of the modelling and Mineral Resource estimation included: • a visual review of the input assay grades compared to the model grade; • comparison statistics for the input assays compared to the model grades on a domain basis; and • generation of a NN grade interpolation for comparison and corroboration purposes. For block models created prior to about the year 2000 the use of statistical analysis and NN verification was not done as a standard protocol. The increased scrutiny and validation of the block models and Mineral Resource estimates is done as the block models are updated.
Moisture	*Whether the tonnages are estimated on a dry basis or with natural moisture, and the method of determination of the moisture content.*	All tonnages are estimated using dry in-situ density.
Cut-off parameters	*The basis of the adopted cut-off grade(s) or quality parameters applied.*	A nominal grade cut-off of 4 per cent HM has been chosen for the South-west HM deposits. This is considered appropriate for Ilmenite dominated deposits of this magnitude and geological style. The 4% cut off grade has been chose considering the following: • the intrinsic value of the heavy mineral assemblage; • economic assessments carried out using cost information from many years of operation experience; • statistical evaluation of the sample data; • current operational practices for dry mining options; • consideration of the lateral and vertical mineralisation distribution; and • the potential mining and extraction methodology.
Mining factors or assumptions	*Assumptions made regarding possible mining methods, minimum mining dimensions and internal (or, if applicable, external) mining dilution. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential mining methods, but the assumptions made regarding*	Mining of the South-west Deposits is likely to be by open cut mining using suitable excavation machinery, as has been for the past 60 years. The geometry of the deposits make them amenable to bulk open cut mining methods currently employed in other open cut mines operated by Iluka. The unconsolidated nature of the sediments allow for a range of options to

Criteria	JORC Code explanation	Commentary
	mining methods and parameters when estimating Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the mining assumptions made.	be considered including the use of scrapers or large scale truck and shovel, or dozer trap.
Metallurgical factors or assumptions	*The basis for assumptions or predictions regarding metallurgical amenability. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential metallurgical methods, but the assumptions regarding metallurgical treatment processes and parameters made when reporting Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the metallurgical assumptions made.*	The nature of the mineralisation in the South-west is geologically consistent with mineral sands deposits that have historically been mined by Iluka for the past 60 years. The metallurgical amenity of the deposits is well understood from this historical mining. As a result the metallurgical recoveries are factored on the basis of historical recoveries which are supplemented by ongoing metallurgical investigation to optimise mineral recovery.
Environmen-tal factors or assumptions	*Assumptions made regarding possible waste and process residue disposal options. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider the potential environmental impacts of the mining and processing operation. While at this stage the determination of potential environmental impacts, particularly for a greenfields project, may not always be well advanced, the status of early consideration of these potential environmental impacts should be reported. Where these aspects have not been considered this should be reported with an explanation of the environmental assumptions made.*	Current mining practice is to return all waste materials to the mine void as soon as reasonably possible after mining. This is supported by an extensive history of operation and rehabilitation by Iluka in the South-west District. All mining operations will be subject to appropriate environmental management plans.
Bulk density	*Whether assumed or determined. If assumed, the basis for the assumptions. If determined, the method used, whether wet or dry, the frequency of the measurements, the nature, size and representativeness of the samples.* *The bulk density for bulk material must have been measured by methods that adequately account for void spaces (vugs, porosity, etc), moisture and differences between rock and alteration zones within the deposit.*	The bulk density values are calculated using an Iluka proprietary density formula. The formula is considered appropriate and is used at other Iluka deposits which are geologically similar and currently being mined for HM. The Iluka Standard Bulk Density formula used accounts for void space and variable material composition. It is the same formula used at current Iluka mine sites which mine similar material. It accounts for variability in HM, Slimes and sand content. The formula was determined from results of extensive Nuclear Densometer testing at various Iluka Minesites in Western Australia. All Iluka assay grades and Resource Estimates are based on dry tonnage. It is assumed that the material in the remaining South-west Deposits have

Criteria	JORC Code explanation	Commentary
	Discuss assumptions for bulk density estimates used in the evaluation process of the different materials.	the same density relationship that is seen in Iluka deposits that are currently being mined and have been mined historically in this district.
Classification	*The basis for the classification of the Mineral Resources into varying confidence categories.* *Whether appropriate account has been taken of all relevant factors (ie relative confidence in tonnage/grade estimations, reliability of input data, confidence in continuity of geology and metal values, quality, quantity and distribution of the data).* *Whether the result appropriately reflects the Competent Person's view of the deposit.*	The mineral resource estimates have been classified and reported in accordance with the guidelines of the JORC Code (2012 edition). The resource category applied (Measured, Indicated or Inferred) is based on a combination of: • data density of primary HM assays; • degree of continuity of mineralisation and geological units; • assessment of the integrity and confidence of the analytical data • level and integrity of supporting composite data; • the characteristics of the mineralised host; and • the level and results of supporting QA/QC data. QA/QC protocols were typically only adopted and routinely incorporated into Iluka's exploration programs after 2004. As a result QA/QC data is absent for the data from some deposits. While this undermines the perceived integrity of the data, the same techniques for acquiring and testing of the data have been used to support historical mining operations successfully in the South-west District for many years. Virtually all of the older data which is considered less reliable has lost relevance as a result of mining progressing or has been tested or replaced with updated exploration data. It is the view of the Competent Person that the distribution of data and the resource estimation methodologies are appropriate for the South-west HM deposits and support the Resource Classifications applied to each deposit.
Audits or reviews	*The results of any audits or reviews of Mineral Resource estimates.*	All of the geological models created are reviewed internally by the Competent Person as per the internal company policy and procedures. Internal audit processes within Iluka assisted in the development of these resource estimates. Block models and Mineral Resource estimates which support the inaugural reporting or are required to support feasibility studies undergo external review.
Discussion of	*Where appropriate a statement of the relative accuracy and*	It is the view of the Competent Person that the frequency and accuracy of

Criteria	JORC Code explanation	Commentary
relative accuracy/ confidence	*confidence level in the Mineral Resource estimate using an approach or procedure deemed appropriate by the Competent Person. For example, the application of statistical or geostatistical procedures to quantify the relative accuracy of the resource within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors that could affect the relative accuracy and confidence of the estimate.* *The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnages, which should be relevant to technical and economic evaluation. Documentation should include assumptions made and the procedures used.* *These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.*	the data and the process in which the Mineral Resources have estimated and reported are appropriate for the style of mineralisation under consideration. The relative accuracy of the estimates is reflected in the reporting of the Mineral Resources and the Resource Category assigned as per the guidelines set out in the JORC Code (2012 Ed.). The statement of Mineral Resources for the South-west HM deposits refers to global estimates of tonnage and grade. For those deposits which have been mined, the estimated resource is reconciled against metallurgical production figures on a monthly and annual basis. Actual results generally indicate very good agreement with the geological model and close reconciliation with HM tonnes, ore tonnes and HM percentage head grade. The risk of not achieving good physical Ore Reserve reconciliation is considered to be low.

Section 4 Estimation and Reporting of Ore Reserves (for the Tutunup South Deposit)

(Criteria listed in section 1, and where relevant in sections 2 and 3, also apply to this section.)

Criteria	JORC Code explanation	Commentary
Mineral Resource estimate for conversion to Ore Reserves	*Description of the Mineral Resource estimate used as a basis for the conversion to an Ore Reserve.* *Clear statement as to whether the Mineral Resources are reported additional to, or inclusive of, the Ore Reserves.*	The 2016 Ore Reserve estimate is based the Mineral Resource model described as Datamine model "tspas07c.dm" which has previously been reviewed and approved by an Iluka Resources Limited (Iluka) Competent Person. Ore Reserves comprise the material reported as a sub-set of the Mineral Resource.
Site visits	*Comment on any site visits undertaken by the Competent Person and the outcome of those visits.* *If no site visits have been undertaken indicate why this is the case.*	Iluka CPs regularly visits the Tutunup South mine site to assist in production planning, optimisation and reconciliation. During those visits no matters were observed that would impact the estimation of the Ore Reserves.
Study status	*The type and level of study undertaken to enable Mineral Resources to be converted to Ore Reserves.* *The Code requires that a study to at least Pre-Feasibility Study level has been undertaken to convert Mineral Resources to Ore Reserves. Such studies will have been carried out and will have determined a mine plan that is technically achievable and economically viable, and that material Modifying Factors have been considered.*	The project has been operational since 2011 and operations are expected to cease during the first half of 2018. A Definitive Feasibility Study (DFS) was completed for the Tutunup South Project in January 2009. Mining and processing commenced on site in 2011. The DFS contained a technically achievable mine plan that has been successfully followed during operations apart from minor operational adjustments. The mine plan displays attractive financial characteristics on the key metrics that Iluka uses to assess project development decisions, including IRR, NPV and payback. Historic operational factors have been assessed, material Modifying Factors have been considered and updated as operations have progress and detailed financial analysis completed.
Cut-off parameters	*The basis of the cut-off grade(s) or quality parameters applied.*	The cut-off grade has been calculated using optimization software and an individual cut-off grade applied to each block within the model. The calculations consider overall HM grade and individual assemblage product values, operating costs, recoveries and modifying factors. An economic optimization is performed to determine if a block is viable to mine, and therefore be included in the Ore Reserves.

Criteria	JORC Code explanation	Commentary
Mining factors or assumptions	*The method and assumptions used as reported in the Pre-Feasibility or Feasibility Study to convert the Mineral Resource to an Ore Reserve (i.e. either by application of appropriate factors by optimisation or by preliminary or detailed design).*	Pit Optimisation was conducted by Iluka personnel using MineMap mine planning software assuming the whole deposit was accessible and could be mined. Pit designs were then undertaken and any exclusion areas were removed from the reserve during the design process. As the project has been in operations since 2011 annual reserves have been depleted by mining.
	The choice, nature and appropriateness of the selected mining method(s) and other mining parameters including associated design issues such as pre-strip, access, etc.	Process flow assumptions for optimisation include: ore being fed into in-pit Mining Unit Plant (MUP) to remove oversize and to slurry the remaining ore which is then pumped to the Wet Concentrator Plant (WCP). De-sliming occurs at the WCP and a Heavy Mineral Concentrate (HMC) is produced via wet gravity separation. The mining by-products are pumped to the pre-mined pit or temporary surface storage facilities. The HMC is stockpiled, dewatered and air dried adjacent to the WCP, before being transported to the North Capel and Narngulu Mineral Separation Plants (MSP); where wet and dry processing using screening, magnetic, electrostatic and gravity separation circuits to separate valuable from non-valuable minerals and to make different grades of zircon, rutile, leucoxene and ilmenite; ilmenite upgrade through Synthetic Rutile (SR) plant and truck finished products to port. The ore is mined using conventional truck and excavator mining method and placed on the Run-of-Mine (ROM) stockpile before being fed by a front-end loader into the MUP hopper. This mining method has been used at Tutunup South successfully since start of operations in 2011. Overburden is removed using conventional truck and excavator mining methods.
	The assumptions made regarding geotechnical parameters (eg pit slopes, stope sizes, etc), grade control and pre-production drilling.	Geotechnical parameters for the project have been determined by test work and studies. Pit wall angles have been recommended by geotechnical engineers to be 45 degrees. This has been validated during operations as being appropriate. A safety berm of 5 metres is used.
	The major assumptions made and Mineral Resource model used for pit and stope optimisation (if appropriate).	The Mineral Resource model used for pit optimisation is tspas07c.dm (Datamine model).
	The mining dilution factors used.	
	The mining recovery factors used.	
	Any minimum mining widths used.	

Criteria	JORC Code explanation	Commentary
	The manner in which Inferred Mineral Resources are utilised in mining studies and the sensitivity of the outcome to their inclusion. *The infrastructure requirements of the selected mining methods.*	No mining dilution factors have been used and reflect Iluka experience Recovery factors have been applied to all stages of mining including: mining unit; concentrator; Mag and Non Mag mineral processing plants. These are based on detailed metallurgical test work, actual data and experience within Iluka. A 50 metre minimum mining width has been assumed for pit design purposes. Inferred Mineral Resources are not used in the reported Ore Reserve. The DFS considered the infrastructure requirements associated with the mining operation including administration buildings, power supply, water supply, communications, workshops and stores including fuel and lubrication facilities, tails storage facilities, site access roads, light vehicle fleet, contract mining fleet, haulage fleet, port and shipping, MUP's, screen plants, WCP, MSP's and SR Plant.
Metallurgical factors or assumptions	*The metallurgical process proposed and the appropriateness of that process to the style of mineralisation.* *Whether the metallurgical process is well-tested technology or novel in nature.* *The nature, amount and representativeness of metallurgical test work undertaken, the nature of the metallurgical domaining applied and the corresponding metallurgical recovery factors applied.* *Any assumptions or allowances made for deleterious elements.* *The existence of any bulk sample or pilot scale test work and the degree to which such samples are considered representative of the orebody as a whole.* *For minerals that are defined by a specification, has the ore reserve estimation been based on the appropriate mineralogy to meet the*	The metallurgical process has been utilized in Iluka operations for many years. The ore slurry is screened initially to remove oversize material, pumped over spirals to concentrate heavy minerals. A HMC is transported to a MSP. At the MSP magnetic minerals are separated from the non-magnetic, and then various electrostatic and gravity separation techniques are used to produce saleable mineral products, ilmenite rutile and zircon. Ilmenite is magnetic and conductive, rutile is non-magnetic and conductive and zircon is non-magnetic and non-conductive. The metallurgical separation process utilizes known technology where the performance and recovery of mineral products has been established by the company. The metallurgical process is well-tested and commonly used in similar operations worldwide. The Tutunup South deposit has been subjected to metallurgical test work over its operating life. The mineral assemblage and metallurgical separation characteristics are regarded as well understood and the mineral is amenable to processing and separation by conventional equipment. The Ore Reserve estimate is based on the appropriate mineralogy to

Criteria	JORC Code explanation	Commentary
	specifications?	meet all product specifications.
Environmen-tal	*The status of studies of potential environmental impacts of the mining and processing operation. Details of waste rock characterisation and the consideration of potential sites, status of design options considered and, where applicable, the status of approvals for process residue storage and waste dumps should be reported.*	The Tutunup South minesite has been operational since 2011. All environmental, heritage and tenure approvals required under State and Commonwealth legislation were granted prior to operations commencing. No waste rock has been or will be produced during mining or processing activities. Overburden exists on the deposits and does not create any environmental risks when stockpiled. Waste produced from the MSP tails stream will at times contain naturally occurring radioactive material (NORM) and will be managed as per Iluka practices of blending back into the mine tails during the life of mine.
Infrastructure	*The existence of appropriate infrastructure: availability of land for plant development, power, water, transportation (particularly for bulk commodities), labour, accommodation; or the ease with which the infrastructure can be provided, or accessed.*	The site is located approximately 50 kms south-west of Bunbury in Western Australia. 3 mining leases application cover the area; M70/612, M70/611 and M70/1261. All three tenements cover an area of approximately 350 Ha. A mains high voltage electrical network is supplied to site from local infrastructure. Process water is supplied to site from via bores while potable water trucked to site. An existing public road was suitably upgraded for transport of HMC. The majority of the workforce live locally and commute on a daily basis from the surrounding towns.
Costs	*The derivation of, or assumptions made, regarding projected capital costs in the study.* *The methodology used to estimate operating costs.* *Allowances made for the content of deleterious elements.* *The source of exchange rates used in the study.*	Capital costs in the DFS were estimated on the basis of detailed engineering studies. The project is an operating mine and the assumptions made during the DFS are no longer relevant. Iluka maintains a detailed business model using standard cost centres and cost elements which are used for annual budgeting purposes. Cost and recovery penalties are applied to deleterious elements. Iluka monitors a range of recognised external forecasters of foreign exchange rates but ultimately the exchange rates applied are an Iluka

Criteria	JORC Code explanation	Commentary
	Derivation of transportation charges. *The basis for forecasting or source of treatment and refining charges, penalties for failure to meet specification, etc.* *The allowances made for royalties payable, both Government and private.*	assessment. Transportation charges have been procured from contractors. Treatment costs are based on actual Iluka operational costs, including overheads. Allowances have been made for royalties payable to Government and private stakeholders. Due to commercial sensitivities payments to private stakeholders are not detailed.
Revenue factors	*The derivation of, or assumptions made regarding revenue factors including head grade, metal or commodity price(s) exchange rates, transportation and treatment charges, penalties, net smelter returns, etc.* *The derivation of assumptions made of metal or commodity price(s), for the principal metals, minerals and co-products.*	Commodity price assumptions are established internally based on monitoring supply and demand on an ongoing basis. Price assumptions are benchmarked against commercially available price forecasts by industry observers. Revenue factors are used to establish pit sensitivities and to test for robustness of the Ore Reserve. Detailed price assumptions are commercially sensitive and are not disclosed.
Market assessment	*The demand, supply and stock situation for the particular commodity, consumption trends and factors likely to affect supply and demand into the future.* *A customer and competitor analysis along with the identification of likely market windows for the product.* *Price and volume forecasts and the basis for these forecasts.*	The zircon market entered 2016 with demand characteristics similar to 2015. 2016 was the fourth consecutive year Iluka's sales volumes have averaged around 350 thousand tonnes, End demand in 2016 remained variable across sectors and geographical markets. Elevated inventories of zircon sand were held by producers at the commencement of the year and during the first half 2016. However, inventory of zircon sand and opacifier held at the direct customer level was minimal as customers sought to benefit from declining prices. In Iluka's assessment, there was a material destocking of the producer supply chain over the course of 2016, with market information that some zircon suppliers had fully committed their volumes or were having difficulties in filling some customer orders. Market conditions in the latter part of the year provided encouraging indications for 2017 in terms of the potential for demand and/or price recovery. High grade titanium feedstock market conditions for pigment, the main

Criteria	JORC Code explanation	Commentary
		end sector for the high grade feedstocks of rutile, synthetic rutile and slag, improved towards the end of 2015 and continued to improve through 2016. Most of Iluka's rutile and synthetic rutile volumes in 2016 were contracted (volume and price). The weighted average rutile price Iluka received over 2016 remained relatively stable compared with the 2015 average. Ilmenite sales in 2016 were down from 2015 reflecting the idling of the US operations and utilisation of Australian ilmenites as feedstock for SR production Iluka establishes short, medium and long term contractual agreements with customers and these reflect the pricing and volume forecasts adopted. Contracts and agreements pertaining to the Tutunup South project and the wider company are confidential.
	For industrial minerals the customer specification, testing and acceptance requirements prior to a supply contract.	Laboratory Southwest provides internal testing for Iluka clients. Clients are provided with reports in accordance with their specifications. Reasonable access is provided at all times to representatives of a customer to verify conformance of service with their requirements.
Economic	*The inputs to the economic analysis to produce the net present value (NPV) in the study, the source and confidence of these economic inputs including estimated inflation, discount rate, etc.* *NPV ranges and sensitivity to variations in the significant assumptions and inputs.*	Macro-economic assumptions used in the economic analysis of the mineral sands reserves such as foreign exchange, inflation and discount rates have been internally generated and determined through detailed analysis by Iluka and benchmarked against external sources where applicable. The price assumptions are internally generated and are based on detailed supply and demand modelling. The price assumptions have also been benchmarked against commercially available consensus price forecasts. The detail of that process is commercially sensitive and is not disclosed. Sensitivity analysis is undertaken on key economic assumptions such as price and exchange rates to ensure the reserves remain economic.
Social	*The status of agreements with key stakeholders and matters leading to social licence to operate.*	The Tutunup South minesite has been operational since 2011. All environmental, heritage and tenure approvals required under State and

Criteria	JORC Code explanation	Commentary
		Commonwealth legislation have been achieved. Iluka is committed to ongoing consultation with its stakeholders to achieve sustained mutual benefits for the life of the project. Ongoing consultation has and will continue to occur with Iluka, residents and communities, government (State and Local), development boards, Indigenous groups and local business owners and operators. Consultation is an integral part of Iluka's social licence to operate.
Other	*To the extent relevant, the impact of the following on the project and/or on the estimation and classification of the Ore Reserves:* *Any identified material naturally occurring risks.* *The status of material legal agreements and marketing arrangements.* *The status of governmental agreements and approvals critical to the viability of the project, such as mineral tenement status, and government and statutory approvals. There must be reasonable grounds to expect that all necessary Government approvals will be received within the timeframes anticipated in the Pre-Feasibility or Feasibility study. Highlight and discuss the materiality of any unresolved matter that is dependent on a third party on which extraction of the reserve is contingent.*	No identifiable naturally occurring risks have been identified to impact the Ore Reserves. The Tutunup South minesite has been operational since 2011. Legal agreements and government approvals are in place to allow the continued extraction of the remaining reserves. All required leases and licenses were in place before the commencement of mining and processing at Tutunup South.
Classification	*The basis for the classification of the Ore Reserves into varying confidence categories.* *Whether the result appropriately reflects the Competent Person's view of the deposit.* *The proportion of Probable Ore Reserves that have been derived from Measured Mineral Resources (if any).*	Measured Resources are converted to Proved Reserves and Indicated Resources are converted to Probable Reserves. Inferred Resources are not included in the reported Ore Reserve. The Ore Reserves consist of 97% Proved Reserves and 3% Probable Reserves The Competent Person is satisfied that the stated Ore Reserve classification reflects the outcome of technical and economic studies taking into account depletion due to mining. No Measured Mineral Resources have been converted to Probable Ore Reserves.
Audits or reviews	*The results of any audits or reviews of Ore Reserve estimates.*	Regular internal reconciliations and audits are conducted to reconcile production volumes to reserve depletion. These audits and

Criteria	JORC Code explanation	Commentary
		reconciliations have confirmed the accuracy of the Ore Reserve estimate.
Discussion of relative accuracy/ confidence	*Where appropriate a statement of the relative accuracy and confidence level in the Ore Reserve estimate using an approach or procedure deemed appropriate by the Competent Person. For example, the application of statistical or geostatistical procedures to quantify the relative accuracy of the reserve within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors which could affect the relative accuracy and confidence of the estimate.* *The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnages, which should be relevant to technical and economic evaluation. Documentation should include assumptions made and the procedures used.* *Accuracy and confidence discussions should extend to specific discussions of any applied Modifying Factors that may have a material impact on Ore Reserve viability, or for which there are remaining areas of uncertainty at the current study stage.* *It is recognised that this may not be possible or appropriate in all circumstances. These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.*	Tutunup South is an on-going operation and as such there is the opportunity to compare the Ore Reserves estimation with actual production data with the monthly reconciliation process. The historical results show that actual HM tonnage estimations are generally within 10% of the block model. The risk of not achieving good physical Ore Reserve reconciliation is considered to be low. This is indicative of a robust estimation process. Operational metallurgical experience, relevant test work and Iluka's experience supports the view that metallurgical risk is low. Revenue generation is impacted by pricing forecasts. The company's forward predictions are considered well balanced and supported by external forecasters. Consequently, pricing risk is considered low to moderate. Mining methods selected are not novel and have been demonstrated, and are considered a low risk of impacting Ore Reserves. All costs used in the optimisation and Ore Reserve process are supported by an extended operational history and actual results. Risk of significant underestimation and effect of that underestimation is considered to be low.

Summary of information to support the Australian Murray Basin Mineral Resource Estimates

This update is reported in accordance with the 2012 Edition of the ‘Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves’, (JORC Code) and ASX Listing Rules, and provides a summary of information and JORC Code Table 1 commentary to support the Mineral Resource Estimates for the Murray Basin HM deposits.

The Mineral Resource inventory attributable to the Murray Basin HM deposits as at the 31 December 2016 and broken down by resource category is presented below in Table 1.1.

Summary of Mineral Resources the Murray Basin as at 31 December 2016.

Mineral Resource Category[1]	**Material Tonnes (Million)[2]**	**In Situ HM Tonnes (Millions)**	**HM (%)**	**Clay (%)**	**HM Assemblage[3]**		
					Ilmenite *(%)	Zircon (%)	Rutile (%)
Measured	16	4.4	27.6	9.3	62	11	11
Indicated	89	18.5	21.0	10.2	56	11	14
Inferred	85	10.1	11.9	12.8	49	10	14
TOTAL	**189**	**33.0**	**17.5**	**11.3**	**55**	**11**	**13**

Notes:
1 Mineral Resources are reported inclusive of Ore Reserves.
2 Insitu (dry) metric tonnes.
3 The Mineral Assemblage is reported as a percentage of the HM.
4 Rounding may generate differences in the last decimal place.
5 The quoted figures are stated as at the 31 December 2016 and have been depleted for production to this date.

1. Background/Introduction

Iluka Resources Limited (Iluka) is the holder of numerous tenements in the Murray Basin covering an aggregate area of ~2,300 square kilometres in Victoria and New South Wales (Figure 1.1). The Murray Basin HM deposits are spread over a large area straddling the New South Wales – Victoria border, stretching about 375 km north-south and 200 km east west. Iluka has been actively exploring in the Murray Basin since 1996 and successfully mined HM deposits in the Douglas and Ouyen regions.

The tenements and HM resources contained within the Murray Basin mostly cover privately held land where native title has either been extinguished or excluded from the grant.

2. Ownership/Tenure

A summary of Iluka's tenement holding in the Murray Basin is presented in Table 2.1 and shown on Figure 2.1. The tenements are 100% owned by Iluka, and held through Iluka Resources Ltd, Basin Minerals Holdings Pty Ltd or Iluka Mid-West Ltd. The Murray Basin exploration tenements in New South Wales are granted with the option of periodic renewal for further two year periods from grant date. In Victoria the exploration tenements are in the process of being replaced with Retention Licences as the tenements reach maturity.

Table 2.1: Iluka Resources tenement summary for the Murray Basin

Licence	Project	Status	Applic. Date	Grant Date	Expiry Date	Area	Area Unit
EL6407	Euston	Granted	16/09/2004	3/05/2005	2/05/2017	39	Unit
EL7296	Euston	Renew Pending	12/12/2008	16/02/2009	15/02/2017	63	Unit
EL7450	Balranald	Granted	9/10/2009	8/02/2010	7/02/2018	369	Unit
EL7626	Balranald	Renew Pending	5/05/2010	11/10/2010	10/10/2016	89	Unit
ML 1736	Balranald	Granted	10/11/2015	9/05/2016	9/05/2037	3123	Hectares
EL3903	Ouyen Region	Granted	15/02/1996	4/10/1996	3/10/2017	336	Blocks
EL4191	Sea Lake Region	Granted	19/06/1997	20/08/1997	19/08/2015	175	Blocks
EL4282	Douglas	Granted	18/02/1998	30/04/1998	11/02/2017	342	Blocks
MIN5367	Douglas	Granted	19/04/2002	24/05/2002	23/05/2022	2574.64	Hectares
MIN5458	Ouyen Region	Granted	22/05/2006	9/08/2006	8/08/2026	4930.41	Hectares
MIN5506	Douglas	Granted	18/09/2008	17/12/2008	16/12/2028	647.2	Hectares
MIN5525	Ouyen Region	Granted	3/12/2009	2/03/2010	1/03/2030	3582.7	Hectares

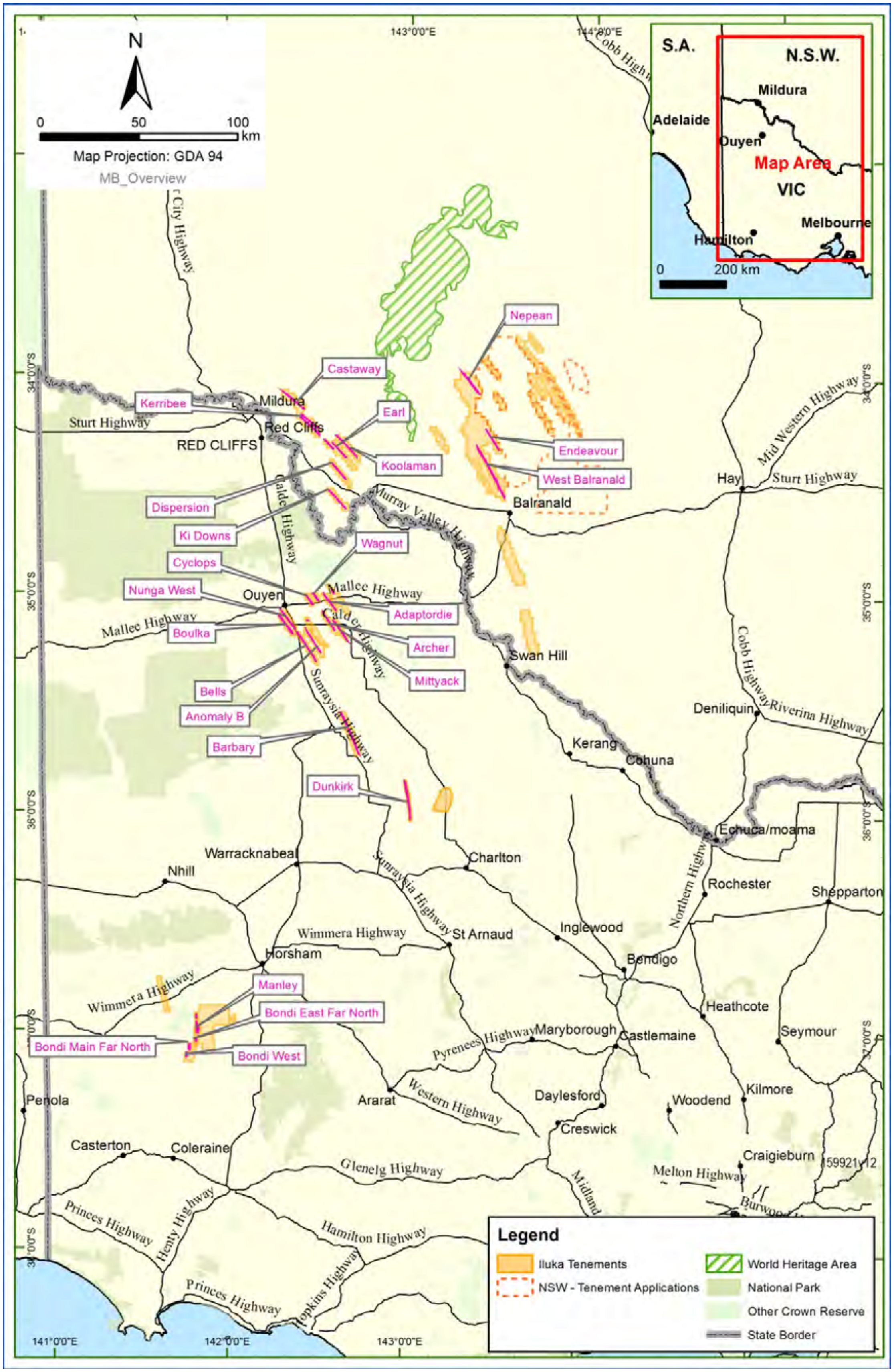


Figure 2.1 Tenement Location Plan for Murray Basin.

3. Deposit Geology

The HM deposits lie within the Murray Basin which has been described as a shallow, intra-cratonic Cainozoic basin covering an area of 300,000 km^2 in south eastern South Australia, south western New South Wales and north western Victoria. The Murray Basin is flanked by low mountain ranges of Proterozoic and Palaeozoic rocks to the south, east and west.

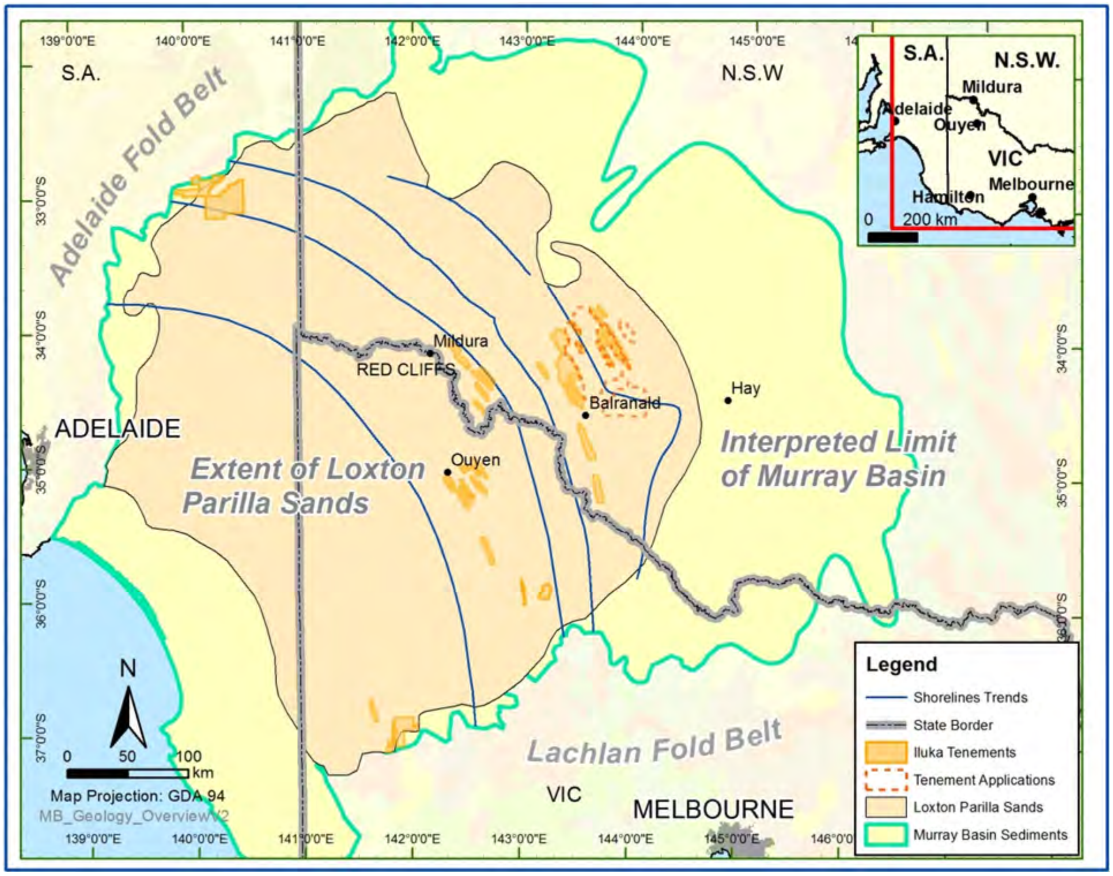


Figure 3.1: Regional Geology Plan for Murray Basin.

Much of the sedimentary sequence within the basin is the result of repeated marine incursions from the southwest reworking fluvial input from the surrounding mountain ranges, with the latest transgressive-regressive event resulting in deposition of the Late Miocene to Late Pliocene Loxton Parilla Sands. These sediments were deposited in shallow-marine, littoral and fluvial conditions and comprise of fine to coarse-grained, generally well-sorted sand, with minor clay, silt and gravel and host the Murray Basin mineral sand deposits.

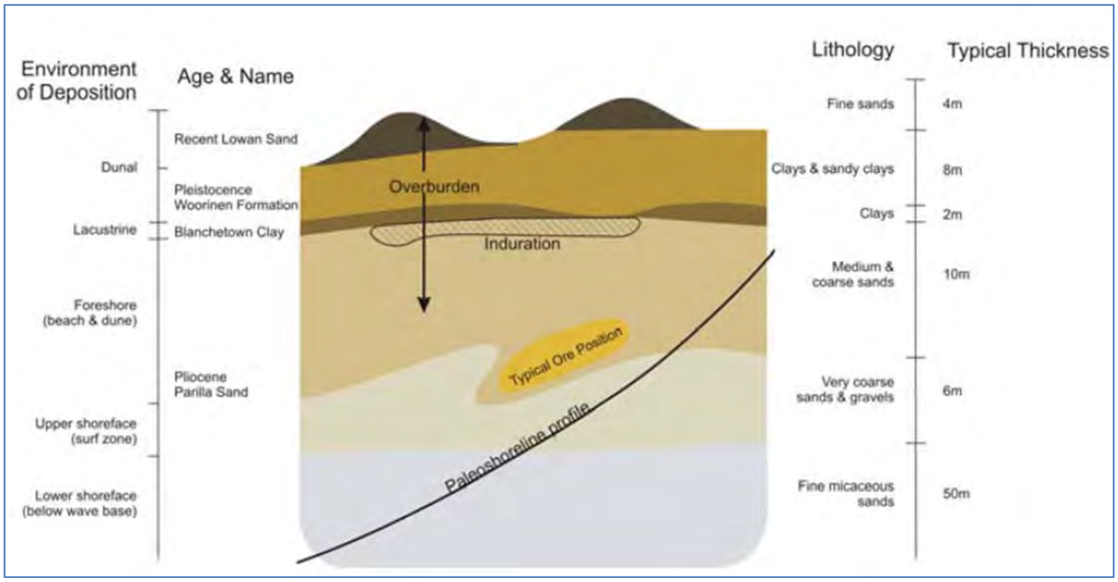


Figure 2.2: Stylised geological cross section column showing interpreted geology for Murray Basin HM deposits.

4. Data Acquisition

xploration in the Murray Basin region commenced in the mid 1990's and has continued through to the present. As such the method of data collection and analysis is well understood, being essentially the same format as currently used. In 2001 Iluka Resources acquired the assets of Basin Minerals Holding (BMH) through a takeover and exploration data generated by BMH over the period of 1995 to 2000 was used to support the Mineral Resource estimates for the HM deposits in the Douglas Region. The BMH data has since lost most of its relevance having either been the subject of mining, or diluted by exploration data generated by Iluka. The data is still used in combination with the more recent Iluka data to support the Mineral Resource estimates for the Douglas and Sea Lake deposits.

There is no other exploration by other parties relevant to the Mineral Resource estimates for the Murray Basin HM deposits.

4.1 Drilling Summary

Initial exploration drilling and subsequent resource delineation drilling has been carried out by Iluka using both BQ and NQ diameter Reverse Circulation Air Core (RCAC) drill holes. All holes were drilled vertically which is essentially perpendicular to the mineralisation.

RCAC drilling was used to obtain sample from 1 or 1.5 m intervals.

All phases of exploration in the Murray Basin have utilised the same drilling methodology and have been completed by a combination of contracted drilling operators or Iluka owned and operated drill rigs. Over 266,000 m of RCAC drilling have been completed on the deposits representing the current Murray Basin HM resources.

The drilling is typically carried out on a regularised grid with the drill spacing closed in to support an increased confidence in the mineral resource estimates as shown in Figures 4.1, 4.2, 4.3, 4.4 and 4.5.

The early phases of drilling were typically drilled along regional roads and on private property at about 80m hole spacing with the drill lines spaced at about 1.6km. Infill drilling to closer spacing 800m/400m/200m x 40m/20m was carried out over the significant areas of mineralisation to improve confidence in the mineralisation and support feasibility studies and potential mine development. A summary of the drilling carried out on each Mineral Resource is presented in Table 4.1. The strong anisotropy in the drill grid spacing for the Murray Basin HM deposits reflects the long, narrow high HM grade character of the deposits.

A total of 33 Sonic core holes have been drilled on the West Balranald and Nepean Prospects as a test of this drilling method and to corroborate the results of the RCAC drilling. The results of the Sonic drilling have been inconclusive to date due to erratic sample recovery.

Table 4.1: Drill meterage's and modal drill spacing for each prospect supporting the Murray Basin Resources.

Deposit	Holes	Samples	Drill metres	X Drill Space (m)	Y Drill Space (m)	Z Drill Interval (m)	Drill Comments
Adaptordie	167	5,656	10,739	20	800	1	Predominantly 800m x 20m, 1150m x 50m at extremities.
Anom B	207	2,637	6,777	20	1600	1	Predominantly 1600m x 20m.
Archer	126	2,633	3,696	20	1600	1	Predominantly 1600m x 20m.
Barbary	398	6,421	8,605	25	1000	1 and 1.5	Predominantly 800m x 25m.
Bells	204	2,238	6,026	20	1000	1	Predominantly 1200m x 20m.
Bondi East Far North	336	4,754	5,452	20	300	1	Predominantly 300m x 20m, ranges from 275m to 600m in areas.
Bondi Main Far North	120	2,105	3,073	40	800	1.5	Predominantly 1200m x 20m, ranges from 200m to 1550m in areas.
Bondi West	521	7,968	8,933	20	100	1 and 1.5	Predominantly 100m x 20m, infill to 100m/50m x 20m/10m in some areas.
Boulka	131	2,252	5,379	20	1200	1	Predominantly 800m x 20m, 1200m x 80m at extremities.
Castaway	595	23,302	23,914	20	200	1	Predominantly 200m x 20m spacing.
Cyclops	89	2,085	2,905	20	1500	1	Predominantly 1600m x 20m, 2000m x 40m at extremities.
Dispersion	255	3,866	10,424	20	400	1	Predominantly 400m x 20m, 1600m x 30m at northern extremity.
Dunkirk	154	2,632	4,184	20	800	1.5	Predominantly 800m x 20m spacing.
Earl	399	8,962	14,606	20	600	1	Predominantly 600m x 20m, 1600m x 30m eastern side of MNCP.
Endeavour	79	1,311	3,959	20	1600	1	Predominantly 1600m x 20m spacing.
Kerribee	978	17,283	27,139	20	200	1	Predominantly 200m x 20m, 600m/1200m x 20m eastern side of MCNP.
Ki Downs	100	1,278	2,873	30	800	1	Predominantly 800m x 20m, 1600m x 40m at extremities.
Koolaman	281	4,576	11,192	20	400	1	Predominantly 400m x 20m, 1400m/2600 x 20m at southern extremity.
Manly	390	5,911	6,321	20	400	1	Predominantly 400m x 20m, includes areas at 900m x 20m.
Mittyack	183	2,590	4,417	20	800	1	Predominantly 800m x 20m spacing.
Nepean	434	20,823	25,500	20	200	1	Predominantly 200m x 20m, 1200m/600m x 20m at extremities.
Nunga West	140	950	4,396	20	800	1	Predominantly 800m x 20m spacing.
Wagnut	65	1,312	1,947	30	1200	1.5	Predominantly 1200m x 20m spacing.
West Balranald	922	20,288	63,848	20	200	1 and 1.5	Density varies from 1200m x 20m, 400m x 20m to 200m x 20m.

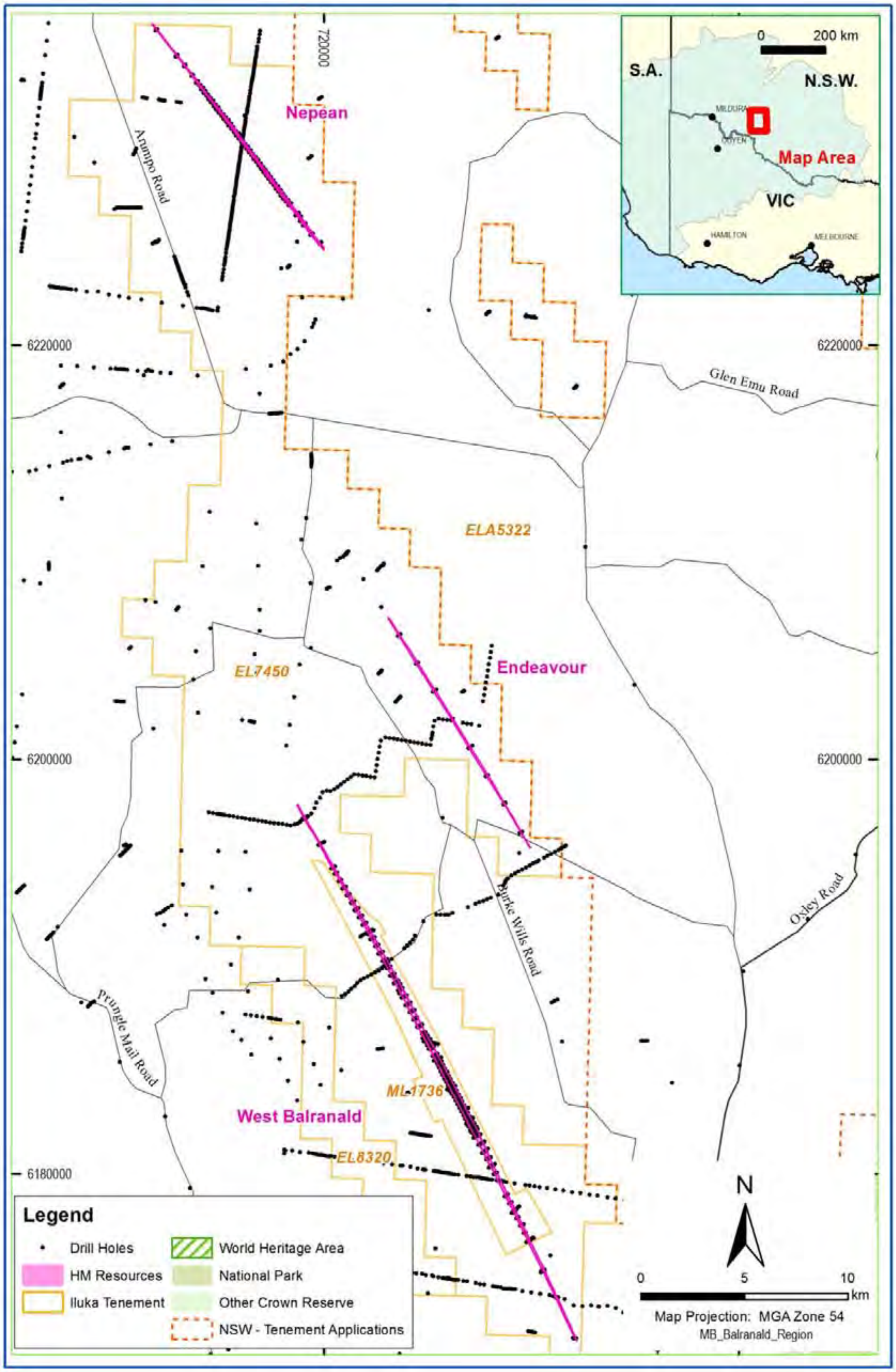


Figure 4.1: Drill hole distribution and mineralised outlines for the Balranald District.

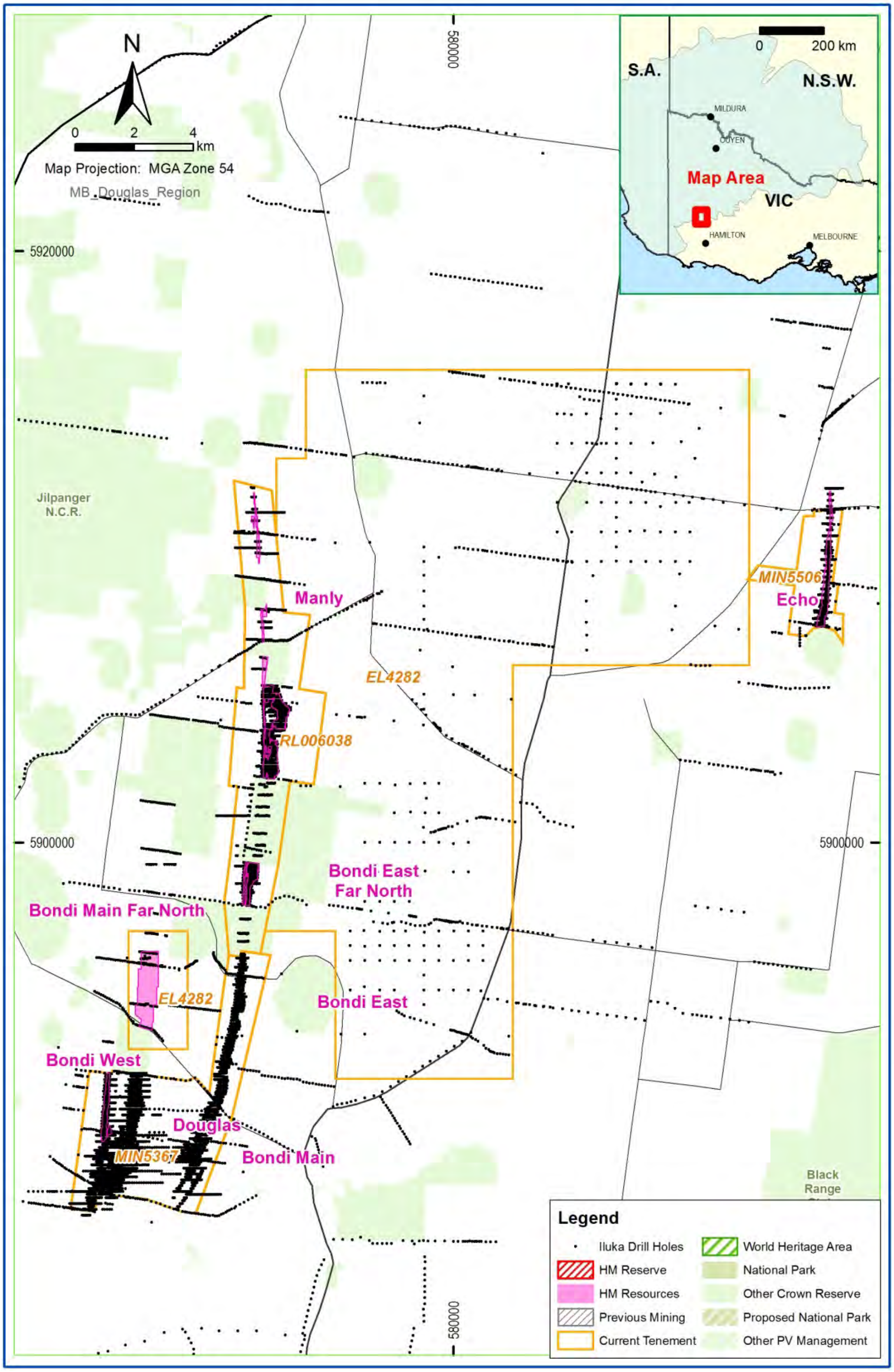


Figure 4.2: Drill hole distribution and mineralised outlines for the Douglas District.

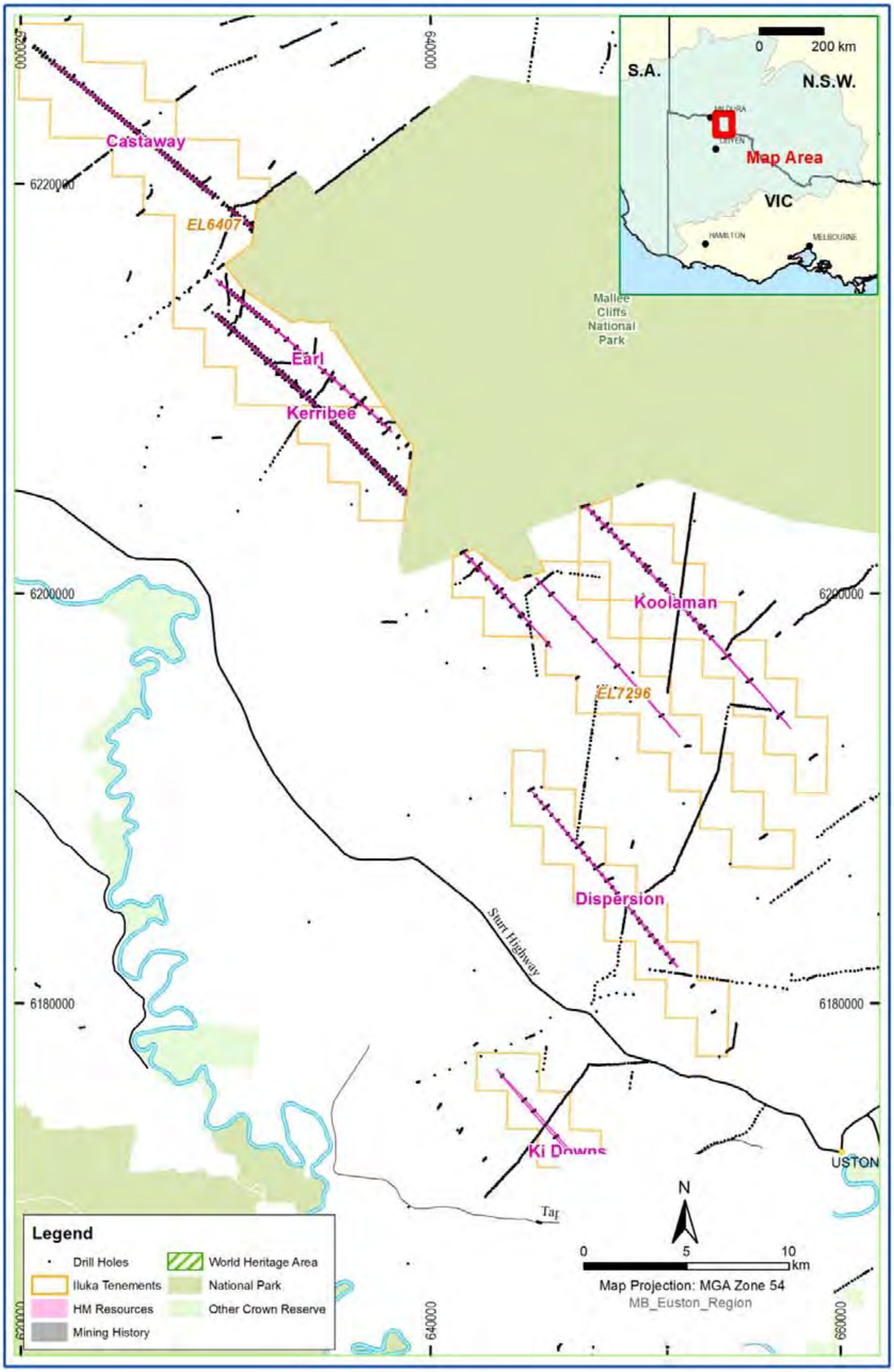


Figure 4.3: Drill hole distribution and mineralised outlines for the Euston District.

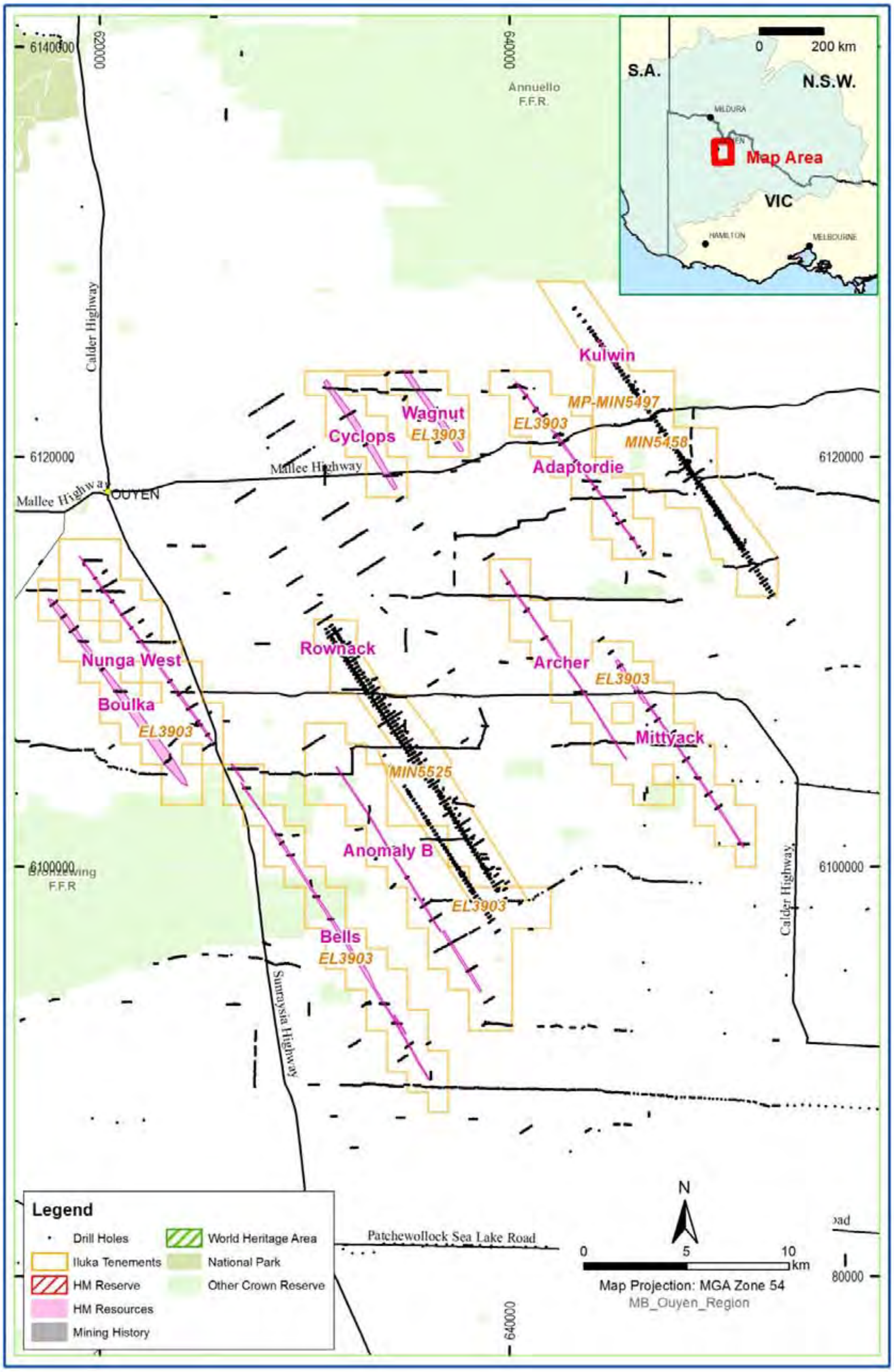


Figure 4.4 Drill hole distribution and mineralised outlines for the Ouyen District.

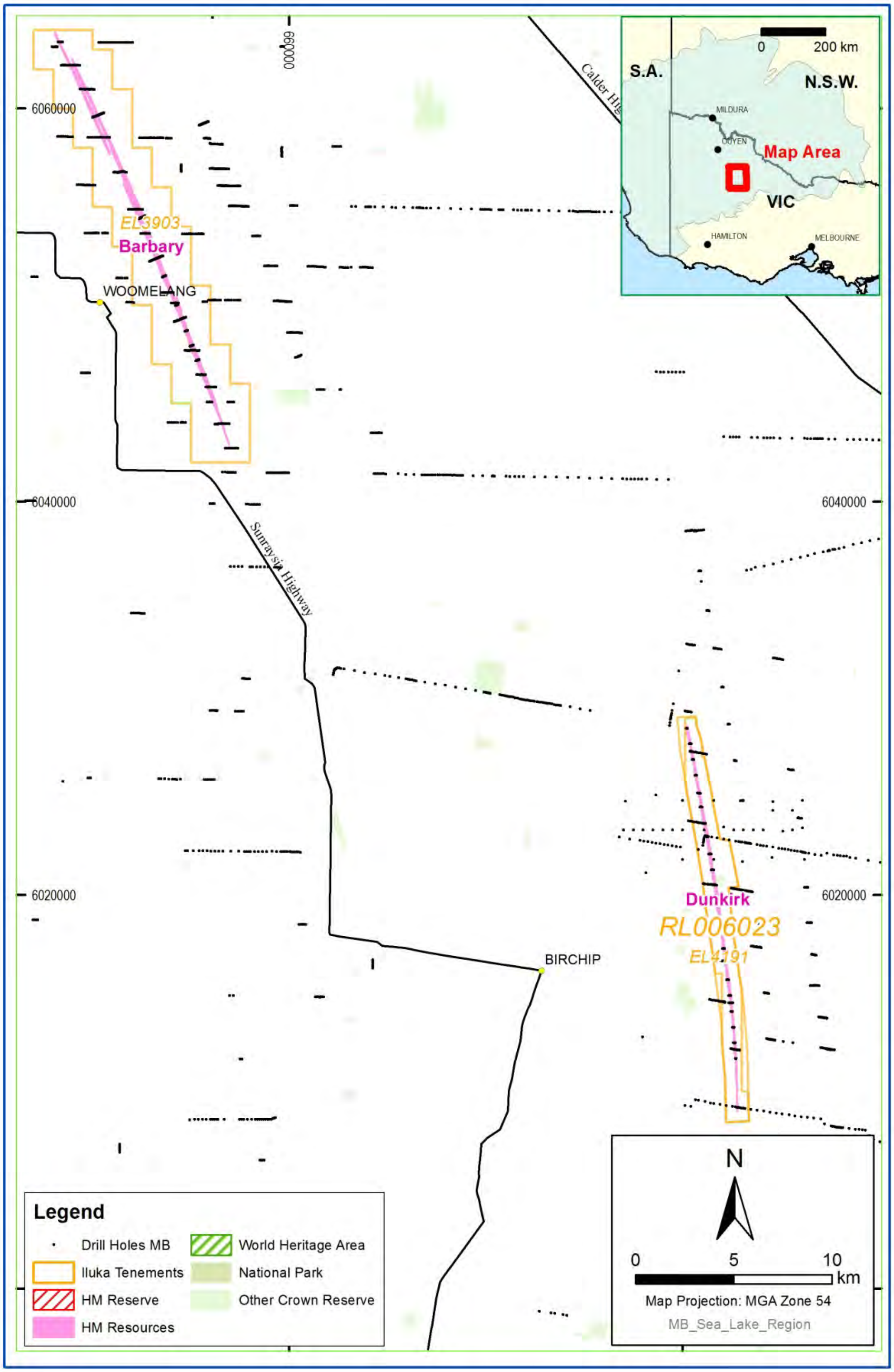


Figure 4.5 Drill hole distribution and mineralised outlines for the Sea lake District.

4.2 Survey

The early regional exploration drilling and initial resource drilling conducted by Iluka prior to 2005 was surveyed using Differential Global Positioning System (DGPS) equipment which provided collar positioning with X/Y/Z accuracy of +/-1m, hand held GPS unit (X/Y/Z accuracy of 2 to 5m) or measured from a surveyed location. After 2005, and with the commencement of significant resource delineation programs, drill hole collars were surveyed using Real Time Kinematic (RTK) DGPS methods utilising equipment owned and operated by Iluka Resources or by a licenced surveyor. This equipment provides sub metre accuracy in the X/Y/Z plane.

Collar elevations for many of the Murray Deposits were obtained from digital elevation models produced from Light Detection and Ranging (LiDAR) surveys flown by independent contractors. The level of accuracy provided by this survey method is + / - 0.5m in the vertical direction.

Coordinates for the holes drilled before the year 2000 were recorded in WGS84 (UTM zone 54) using the AGD84 datum presenting metric coordinates in AMG84 Zone 54. The holes completed after the year 2000 were referenced in WGS 84 using the GDA94 datum presenting metric coordinates in MGA94 Zone 54 reference. For resource modelling the surveyed coordinates were transformed into local grid systems using a transformation based either on single point and a rotation or a two point transformation. A summary of the transformations from local to MGA Zone 54 is included in Table 4.2.

4.3 Geological Logging

Geological logging was carried out on all RCAC samples by qualified geologists or trained geotechnicians. All samples were panned and logged on site at the time of drilling and the data was entered in to handheld palmtop or laptop computers utilising Micromine software. Logging of the RCAC samples recorded the colour, lithology, dominant grainsize, coarsest grainsize, sorting, induration type, hardness, and an estimate of the percentage of rock, clay and HM. Comments were also recorded in relation to unique features of the sample or if there were sampling issues.

Logging data prior to 2006 in the Murray Basin was loaded into Micromine Project files stored on servers in the Murray Basin exploration office. All geological and assay data was then transferred electronically to Iluka's SQL hosted Geology Database Management System (GDMS) in 2006. The logging software employed validation rules and further checks were imposed on the data at the time of loading into the geological database. Errors encountered at the time of loading result in rejection of the data which had to be rectified by the supervising geologist prior to attempting to reload the data.

The geological information collected is adequate to support the estimation of Mineral Resources.

Table 4.2: Summary of the Murray Basin Local Grid Coordinate Transformation parameters.

Deposit	Rotation°	X shift	Y shift
Adaptordie	325	-450000	-5550000
Anom B	327	-450000	-5550000
Archer	326	-450000	-5550000
Barbary	338	-450000	-5550000
Bells	327	-450000	-5550000
Bondi East Far North	0.0016	-540486.45	-5832235.41
Bondi Main Far North	0.0016	-540486.45	-5832235.41
Bondi West	0.0016	-540486.45	-5832235.41
Boulka	327	-450000	-5550000
Castaway	310	-450000	-5550000
Cyclops	327	-450000	-5550000
Dispersion	321	-450000	-5550000
Dunkirk	0.0016	-600121	-6000178
Earl	317	-450000	-5550000
Endeavour	333	-450000	-5550000
Kerribee	317	-450000	-5550000
Ki Downs	319	-450000	-5550000
Koolaman	319	-450000	-5550000
Manly	0.0016	-540486.45	-5832235.41
Mittyack	327	-450000	-6000000
Nepean	333	-450000	-5550000
Nunga West	325	-450000	-5550000
Wagnut	325	-450000	-5550000
West Balranald	333	-450000	-5550000

4.4 Sampling and analytical procedures

A quarter split of the sample weighing 1.5 to 2.0 kg was taken from a rotary splitter mounted beneath a cyclone on the drill rig which is an industry standard method for mineral sands exploration. A check of sample weights is done to ensure the amount of material presented for analysis is within expected limits. A duplicate sample is typically taken at a rate of 1:40 samples in Iluka exploration programs for comparison and QA/QC analysis against the primary sample.

The samples collected were assayed for Heavy Mineral content, initially at Iluka's Mildura based Laboratory and then at Iluka's Laboratory in Hamilton Victoria after closure and relocation of the Mildura laboratory in 2003.

The samples were dried, de-slimed (material <53 μm removed) and then had oversize (material >2 mm) removed. About a 100 g sub-sample of the 53 to 2000 μm sample was sieved at 710 μm to determine the coarse sand component. The 53-710μm fraction (Sand) then had a Heavy Mineral (HM) sink performed on it using Lithium-Sodium-Tungsten (SG=2.85 g/cm^3). The weights recorded during sample analysis were then used to calculate the percent of slimes, sand, coarse sand, oversize and HM for the total sample. Backup samples of the oversize and sand fraction plus the separated HM fractions were retained for a period of time to allow further analysis.

Minor variations to the analysis method include:

- the use of Tetra Bromo Ethane (TBE) as the heavy liquid for the float sink determination prior to 2002;
- the use of <75 μm screen to determine the slimes content prior to the year 2000; and

- the BMH sample procedure used <63 μm screen for slimes determination and material >1 mm was classed as oversize.

Composite samples were generated from either the sand residue fractions or HM sink fractions remaining from the analysis of the exploration samples. The samples composited from the HM sinks provide about 100 to 200 g of HM and this method of compositing was used predominantly prior to 2001. After 2001 the composite samples were predominantly generated from the sand residues. The sand residue composites were wet tabled and provided about 0.5 to 2 kg of HM concentrate and also provided indicative information of mineral recovery. The HM concentrate from these preparation steps is then subjected to a process of magnetic, electrostatic and heavy liquid separation followed by XRF analysis of the fractions to determine the mineral assemblage and indicative mineral quality. This corroborates the validity of the HM mineralisation and provides important information on the metallurgical characteristics.

The mineralogical composite sample evaluation processes are appropriate for the characterisation of the heavy minerals in the Murray Basin Deposits and support the validity of the data for the use in resource estimation and the resource classifications applied.

4.5 QA/QC and Data Quality

Prior to 2005, rigid QA/QC practices were not applied to Murray Basin HM deposits. After 2005 standard protocols for QA/QC were introduced including

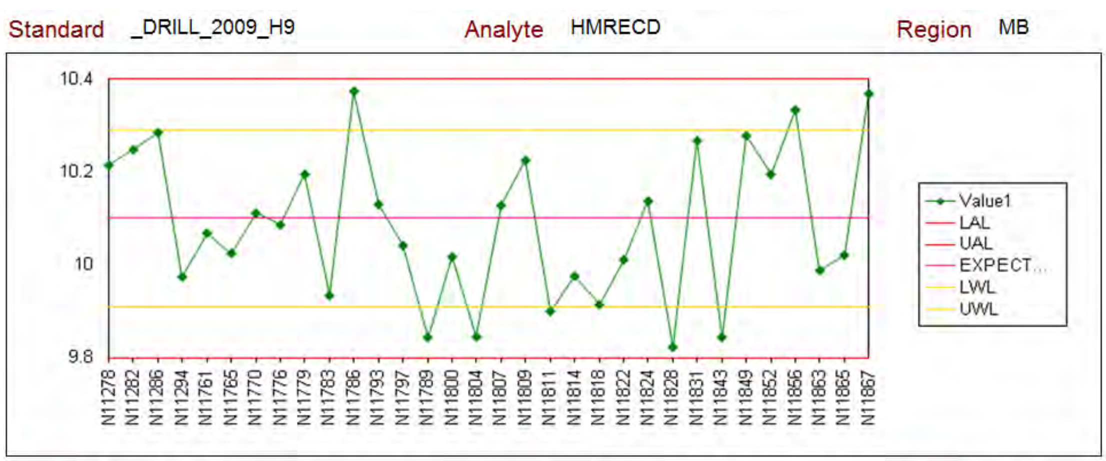
- the incorporation of blind standards at a rate of 1:40 exploration samples;
- taking duplicate field splits at a nominal rate of 1:40 routine samples by collecting a second sample from a quadrant below the rotary splitter; and
- Completing twinned drill holes at the rate of 1:40 exploration drill holes completed.

Data sets were used to measure QA/QC; blind field standards and duplicate field samples. Selected drill holes were twinned as part of resource delineation activity to verify the drilling and sampling methods. Assay techniques utilised in the Murray Basin are appropriate for testing the mineralisation and are verified by decades of reconciliation of mining of deposits delineated using the same method. A summary of the QA/QC data sets supporting the Mineral Resource estimates is included in Table 4.3.

An irregular high slimes bias is prevalent for samples analysed prior to 2005. The bias appears to be a result of the use of inferior screening material used at the Murray Basin Laboratory(s) and was detected as a result of the introduction of the QA/QC program. The bias results in slimes values being overstated by up to 50 percent in some programs. This bias does not affect the HM values or the mineral assemblage and quality information in relation the resource estimates. It is taken into consideration when estimating the mineral resources and in instances where more recent drill data is available, the older slimes values may be excluded from the resource estimation process. As further exploration is carried out the impact of the slimes bias is diluted.

Table 4.3: QA/QC summary for the Murray Basin HM Deposits.

Deposit	Duplicates	Standards	Twinned Holes	QA/QC Comments
Adaptordie	6	0		Pre 2005 dataset, standard insertion rates not applied.
Anom B	0	0	0	Pre 2005 dataset, standard insertion rates not applied.
Archer	0	0	2	Pre 2005 dataset, standard insertion rates not applied.
Barbary	0	0	0	Pre 2005 dataset, standard insertion rates not applied.
Bells	9	27	15	Pre 2005 data set, standard insertion rates not applied, spatial twin holes completed post 2004.
Bondi East Far North	292	76	1	Standard insertion rates applied. Drilling in 2009 submission as per relevant protocols.
Bondi Main Far North	0	0	0	No QA/QC data and model adopted Basin Minerals data.
Bondi West	780	43	0	Standards at varying insertion rates.
Boulka	0	0	0	Pre 2005 dataset, standard insertion rates not applied.
Castaway	0	129	11	Standard insertion rates not applied. Pre 2005 lower rates of submission and pre development of protocols.
Cyclops	0	0	1	Pre 2004 dataset, standard insertion rates not applied.
Dispersion	182	57	5	Limited QA/QC before 2005, after 2005 standard insertion at approximately at mandated rates.
Dunkirk	0	0	0	Pre 2005 dataset, standard insertion rates not applied.
Earl	673	35	2	Limited QA/QC before 2005, after 2005 standard insertion at approximately at mandated rates.
Endeavour	51	29	1	Standard insertion rates as recommeded rates.
Kerribee	1582	36	9	Limited QA/QC before 2005, after 2005 standard insertion generally below mandated rates.
Ki Downs	0	0	0	Pre 2005 dataset, standard insertion rates not applied.
Koolaman	127	80	5	Limited QA/QC before 2005, after 2005 standard insertion at approximately at mandated rates.
Manly	98	57	6	Standard insertion rates as recommeded rates.
Mittyack	0	3	17	Pre 2005 dataset, standard insertion rates not applied.
Nepean	310	238	12	Limited QA/QC data before 2007, after 2007 standard insertion as per recommended rates.
Nunga West	0	0	0	Pre 2005 dataset, standard insertion rates not applied.
Wagnut	26	0	0	Pre 2005 dataset, standard insertion rates not applied.
West Balranald	1074	523	4	Limited QA/QC prior to 2007, after 2007 standard insertion at various rates, approximately at mandated rates.



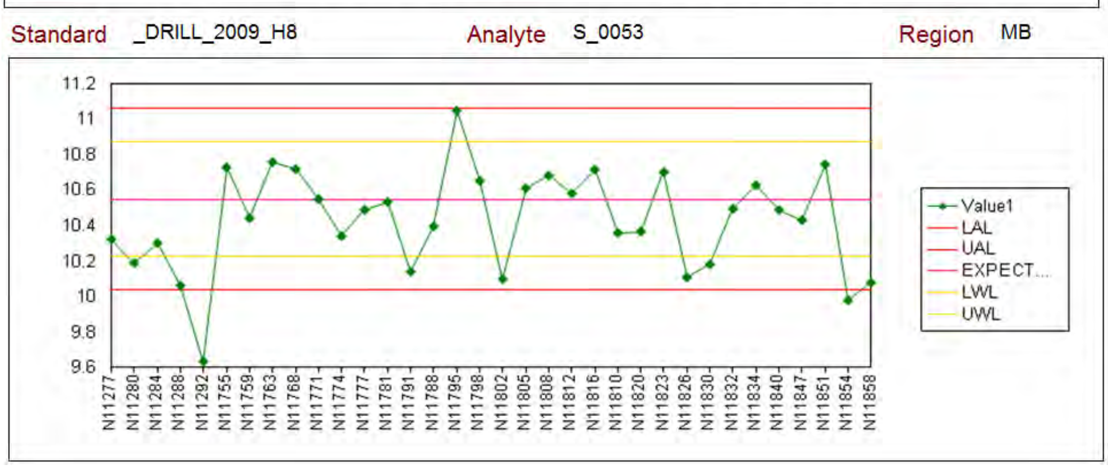


Figure 5.1: Example of QA_QC charts for standard H8 showing HM (HMRECD) and Slime (S_0053) for the drilling at Nepean during 2009.

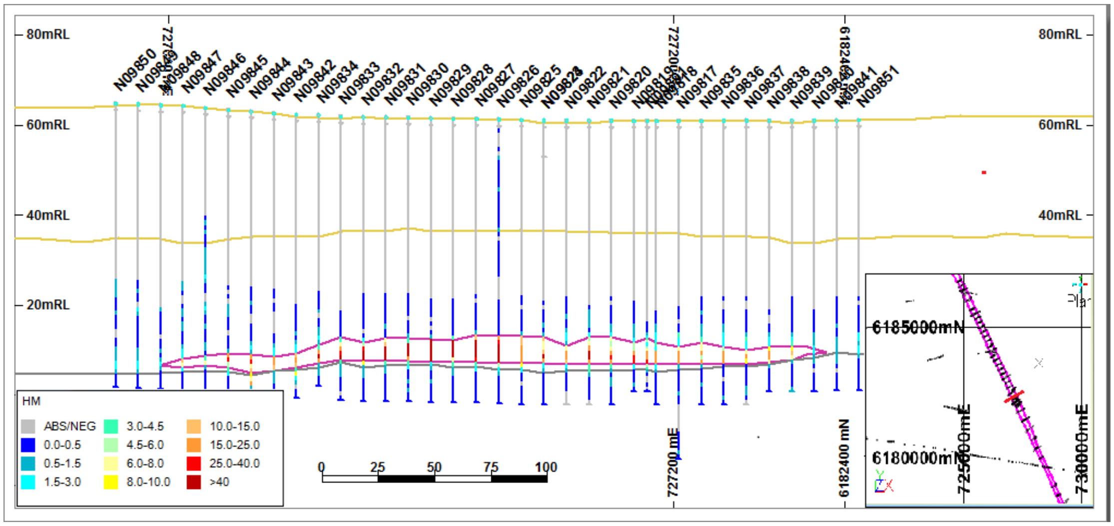


Figure 4.2: Cross-section through the West Balranald Deposit with 2X vertical exaggeration.

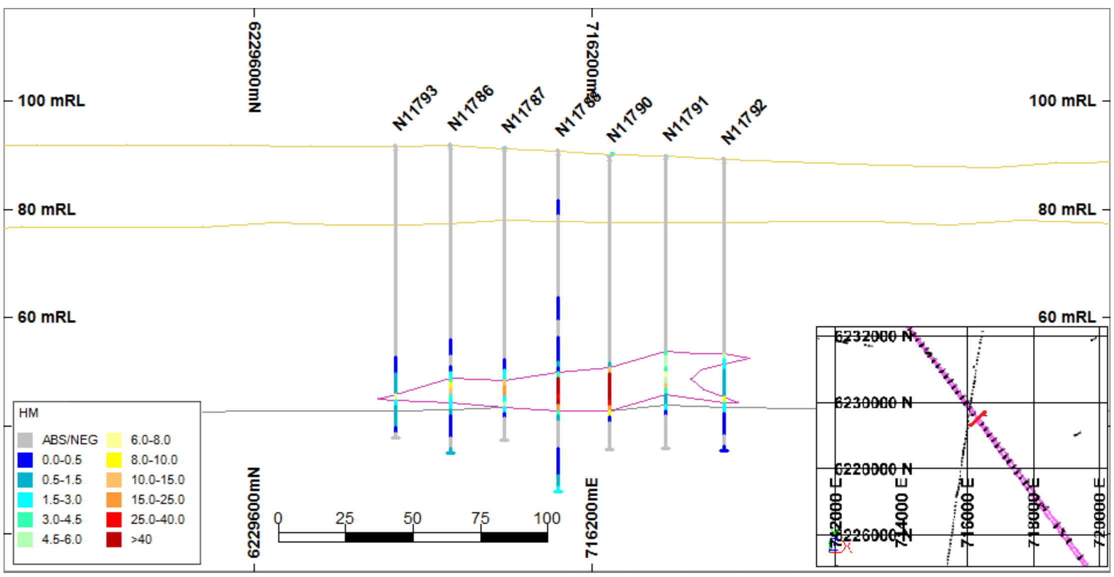


Figure 4.3: Cross-section through the Nepean Deposit with 2X vertical exaggeration.

Verification of Sampling and Assaying

Checking of the assay data was carried out by way of validation routines during original logging and loading into Iluka's GDMS, an SQL database which is currently interfaced using acQuire^{TM} data management software. The checks included:

- visually reviewing the assay data in suitable mining software;
- comparing the magnitude of the laboratory assays against the field HM estimates;
- ensuring analytes summed to 100% within rounding errors;
- verifying there were no duplicated or missing intervals; and
- that the data plotted in spatially realistic locations.

It is the opinion of the Competent Person that the data pertaining to the Murray Basin HM deposits is suitable for the purpose of estimation of Mineral Resources.

4.6 Physical parameters

The density used in the estimation of the mineral resource tonnages for the Murray Basin HM Deposits is based on an Iluka Standard Bulk Density formula. The formula is based on research done on various HM deposits being mined by Iluka in Western Australia. The formula is considered valid as it takes into account the sand, HM and clay components it also allows for potential void space within the sand based on expected “filling” by the fine clay content. All tonnages are expressed as on dry tonnage basis.

5. Resource Estimation

Resource models have been prepared for all except two of the Murray Basin HM deposits using Datamine Studio^{TM} mining software. The other deposits (Anomaly B and Boulka) have Mineral Resource estimates prepared from polygonal area of influence estimations. Geological interpretations used to constrain the modelling were prepared by geologists employed by Iluka. The resource estimates were derived from 3 dimensional block models constructed using geological and mineralogical domain constraints as per Iluka internal guidelines. Domains are assigned to the models based on the geological interpretations and the assay dataset is correspondingly flagged. The assay values were interpolated using Inverse Weighting (power of 3) and hardness and sample composite identifiers were interpolated using Nearest Neighbour (NN), which are considered to be industry standard block estimation methods.

Each deposit was assessed in terms of statistical analysis and drill data distribution to apply appropriate interpolation parameters. Traditionally Iluka adopts a block dimension of about half of the prevailing drill hole spacing in the X and Y direction (horizontal plane) in combination with anisotropic data search volumes about twice the prevailing drill hole spacing. These are adjusted as necessary to honour the individual characteristics each deposit. In addition algorithms are used to dynamically orientate the optimum search to honour the variation in geological and grade orientation. Sub-celling is used along domain boundaries to ensure appropriate volume representation.

Table 5.1; Summary of the model structure for the Murray Basin HM deposits.

	Cell Dimensions		
Deposit	East	North	RL
Adaptordie	10	100	0.5
Anom B	**		
Archer	10	100	1
Barbary	20	400	1
Bells	10	200	1
Bondi East Far North	10	50	1
Bondi Main Far North	10	600	1.5
Bondi West	10	50	1
Boulka	**		
Castaway	10	100	1
Cyclops	20	900	1
Dispersion	10	200	1
Dunkirk	10	200	1
Earl	10	100	1
Endeavour	10	200	1
Kerribee	10	100	1
Ki Downs	20	400	1
Koolaman	10	200	1
Manly	10	200	1
Mittyack	10	100	0.5
Nepean	10	100	1
Nunga West	20	400	1
Wagnut	20	600	1
West Balranald	10	100	1

**Polygonal area of influence estimation only

Table 5.2; Summary of the assay attribute interpolation parameters for the Murray Basin HM deposits.

	Interpolation	Search Ellipse Radius			Search	Search
Deposit	Method	X	Y	Z	Factor 2	Factor 3
Adaptordie	ID3	30	1000	2.5	2	3
Anom B	**					
Archer	ID3	40	2000	2.5	2	4
Barbary	ID3	40	1000	3.0	3	5
Bells	ID3	40	2000	2.5	2	4
Bondi East Far North	ID3	30	125	3.0	2	5
Bondi Main Far North	ID3	130	1200	12.0	3	4
Bondi West	ID3	30	150	2.0	2	5
Boulka	**					
Castaway	ID3	30	350	3.5		
Cyclops	ID3	30	1800	2.5	3	5
Dispersion	ID3	60	700	7.0	2	7
Dunkirk	ID3	30	1000	3.0	2	3
Earl	ID3	60	700	7.0	2	7
Endeavour	ID3	40	1800	4.0	2	5
Kerribee	ID3	30	330	3.5	2	7
Ki Downs	ID3	25	800	2.0	3	5
Koolaman	ID3	60	700	7.0	2	7
Manly	ID3	30	600	3.0	2	5
Mittyack	ID3	30	1200	3.0	2	3
Nepean	ID3	50	500	4.0	2	3
Nunga West	ID3	25	800	2.0	3	5
Wagnut	ID3	30	1300	2.0	3	5
West Balranald	ID3	50	600	3.0	2	3

**Polygonal area of influence estimation only

Table 5.3; Summary of the Composite data interpolation parameters for the Murray Basin HM deposits.

Deposit	Interpolation Method	Search Ellipse Radius X	Y	Z	Search Factor 2	Search Factor 3
Adaptordie	NN	100	1600	6	2	3
Anom B	**					
Archer	NN	80	2000	2.5	2	4
Barbary	NN	60	1500	6.0	3	5
Bells	NN	80	2000	5.0	2	4
Bondi East Far North	NN	100	600	8.0	2	5
Bondi Main Far North	NN	130	1200	12.0	2	4
Bondi West	NN	200	100	10.0	2	5
Boulka	**					
Castaway	NN	200	2000	16.0	2	5
Cyclops	NN	200	2000	16.0	3	5
Dispersion	NN	90	1050	11.0	2	7
Dunkirk	NN	600	1600	3.0	2	3
Earl	NN	200	2000	16.0	2	7
Endeavour	NN	100	1600	30.0	2	5
Kerribee	NN	200	2000	16.0	2	7
Ki Downs	NN	100	800	6.0	3	5
Koolaman	NN	200	2000	16.0	2	7
Manly	NN	200	1000	16.0	2	5
Mittyack	NN	60	2000	5.0	2	3
Nepean	NN	100	1000	10.0	2	3
Nunga West	NN	100	800	5.0	3	5
Wagnut	NN	100	1300	6.0	3	5
West Balranald	NN	100	1000	15.0	3	7

**Polygonal area of influence estimation only

The block models are validated by:

- visually comparing the block model grade attributes against the input grades;
- comparing statistics of the grade attributes for the block model to the input data;
- comparing the result of a NN grade interpolation to the ID3 interpolation; and
- reviewing the volume attributable to each composite to ensure it is consistent with the input data expectations.

6. Mineral Resource Statement

6.1 Resource classification

The Mineral Resource estimate has been classified and reported into the Measured, Indicated and Inferred categories by the Competent Persons in accordance with the guidelines set out in the Australasian Code for the Reporting of Exploration Results, Mineral Resources and Ore Reserves (JORC Code, 2012 Edition.) The resource classification assigned is based on a combination of:

- data provenance and availability;
- drill hole spacing and sampling density;
- confidence in analytical data; and
- established geological continuity.

In addition the potential for eventual economic extraction is taken into consideration when determining Mineral Resources that are valid for reporting under the JORC Code (2012

Edition). Factors taken into consideration which allude to the potential for economic extraction include:

- only reporting mineralisation within granted tenements;
- using a lower HM cut-off grade which is considered to be close to an economic cut-off taking into consideration the composition of the mineral assemblage;
- taking into consideration the style of mineralisation and likely mining methods;
- excluding deeply buried and/or low grade material that is unlikely to ever be economic using a depth of burial to HM grade x thickness algorithm;
- excluding material that has a high clay content beyond processing limitations; and
- excluding heavily indurated material from which the recovery of mineral is un-feasible.

The Murray Basin HM deposits comprise small to medium volume, high HM grade, discrete strand style mineralisation with depths of burial ranging from surface to over 65 m in places. The typical deposit morphology is 40 to 250 m wide, 5 to 25km long and 2 to 8m in thickness. Historical mining in the Murray Basin has adopted open cut mining techniques to access the mineralisation using truck and shovel or scrapers. It is most likely these methods would be used for any future mining operations.

6.2 Mineral Resources declared for the Murray Basin

A summary of the Mineral Resource estimates for the Murray Basin HM Deposits is presented in Table 6.1.

6.3 Discussion of relative accuracy

The relative accuracy and therefore confidence of the resource estimate is reflected in the consideration of the underlying influencing factors considered in Section 6.1 above and are taken into consideration during the classification of the resource estimates by the Competent Person.

1. Independent Review

The block models used for resource estimation are reviewed internally as per Iluka company policy. The block models and the associated Mineral Resource estimates for Endeavour, Kerribee and West Balranald were reviewed by external consultants.

Table 6.1: Summary of Mineral Resources for the Murray Basin as at 31 December 2016.

MURRAY BASIN MINERAL RESOURCE BREAKDOWN BY DISTRICT, DEPOSIT AND JORC CATEGORY AT 31 DECEMBER 2016										
Summary of Mineral Resources for Murray Basin				**2016**	**2016**		**HM Assemblage[2]**			
District	**Deposit**	**Mineral Resource Category[1]**	**Material Tonnes kt**	**InSitu HMTonnes kt**	**HM Grade (%)**	**Clay Grade (%)**	**Ilmenite Grade (%)**	**Zircon Grade (%)**	**Rutile Grade (%)**	
Balranald	Endeavour	Inferred	7,628	1,947	25.5	2.4	58.2	9.1	13.2	
Balranald	Nepean	Indicated	8,408	2,308	27.5	4.3	59.8	14.4	14.5	
		Inferred	792	89	11.2	6.5	57.3	14.6	14	
Balranald	West Balranald	Measured	11,929	3,807	31.9	5.5	64.1	10.8	12.2	
		Indicated	19,874	6,972	35.1	5.7	64.3	11.3	12.2	
		Inferred	4,477	1,186	26.5	6.1	62.4	8.3	9.4	
Douglas	Bondi East Far North	Measured	2,282	421	18.4	20.3	52.6	16.8	5.1	
		Indicated	6,824	610	8.9	21.1	54.8	17.4	6.1	
		Inferred	1,789	80	4.5	27.9	40.0	13.0	5.0	
Douglas	Bondi Main Far North	Inferred	8,246	617	7.5	19.4	32.0	8.1	6.0	
Douglas	Bondi West	Measured	1,688	156	9.2	20.9	36.5	5.8	5.8	
		Indicated	172	13	7.3	18.4	35.4	6.4	4.5	
		Inferred	26	1	4.8	22.8	38.1	8.1	7.2	
Douglas	Manly	Inferred	2,270	506	22.3	17	63	10.1	9.6	
Euston	Castaway	Indicated	4,266	750	17.6	6.0	46.6	11.9	22.7	
Euston	Dispersion	Indicated	4,086	1,238	30.3	3.2	41.6	12.9	24.0	
		Inferred	2,033	107	5.3	3.1	47.4	12.5	16.5	
Euston	Earl	Indicated	4,278	636	14.9	4.5	44.9	9.6	22.5	
		Inferred	4,119	400	9.7	3.9	40.0	14.0	25.6	
Euston	Kerribee	Indicated	9,040	1,350	14.9	7.7	47.0	14.3	16.4	
		Inferred	2,414	266	11.0	15.0	43.8	10.1	17.6	
Euston	Ki Downs	Inferred	9,902	781	7.9	18.3	40.0	10.3	24.1	
Euston	Koolaman	Indicated	3,961	617	15.6	6.0	46.0	14.8	22.5	
		Inferred	2,575	216	8.4	9.9	43.6	11.7	20.4	
Ouyen	Adaptordie	Indicated	3,700	590	15.9	11	52.6	8.9	18.2	
Ouyen	Anomaly B	Inferred	3,751	348	9.3	11	45.5	9.3	14.1	
Ouyen	Archer	Inferred	2,849	307	10.8	14.3	48.2	10.1	19.2	
Ouyen	Bells	Inferred	8,268	980	11.9	12.9	45.4	11	13.7	
Ouyen	Boulka	Inferred	1,762	257	14.6	12	51.3	11.4	17.8	
Ouyen	Cyclops	Inferred	4,192	386	9.2	13.9	40	10.7	18.4	
Ouyen	Mittyack	Indicated	5,854	623	10.6	22	51.1	7.4	12.5	
		Inferred	490	37	7.6	21.3	46.7	7.3	14.4	
Ouyen	Nunga West	Inferred	2,612	341	13.1	11.1	44	11.2	18.3	
Ouyen	Wagnut	Inferred	4,075	348	8.5	12.8	43	9.1	12	
Sea Lake	Barbary	Indicated	8,743	1,139	13.0	14.9	48.6	5.9	9.8	
		Inferred	10,632	863	8.1	14.9	38.6	5.0	3.8	
Sea Lake	Dunkirk	Indicated	8,810	1,680	19.1	16.9	53.1	3.7	4.7	
		Inferred	320	40	12.5	17.0	56.1	11.8	6.8	
	Measured Total		**15,899**	**4,384**	**27.6**	**9.3**	**62.0**	**11.2**	**11.3**	
	Indicated Total		**88,017**	**18,526**	**21.0**	**10.2**	**55.8**	**11.1**	**13.9**	
	Inferred Total		**85,223**	**10,105**	**11.9**	**12.8**	**48.7**	**9.5**	**13.6**	
	Grand Total		**189,140**	**33,015**	**17.5**	**11.3**	**54.5**	**10.6**	**13.4**	

Notes
1 Mineral Resources are inclusive of Ore reserves.
2 The Mineral assemblage is reported as a percentage of the in situ HM content.
3 All tonnages are dry in situ metric tonnage.
4 Rounding may result in differences in the last decimal place.
5 All figures are stated as at the 31 December 2016.

Table 7.1: Summary of Internal External Reviews for the Murray Basin Mineral Resource estimates.

Deposit	Internal Review Auditor	Internal Review Date	External Review Auditor	External Review Date
Adaptordie	Iluka	2016		
Anom B	Iluka	2016		
Archer	Iluka	2016		
Barbary	Iluka	2015		
Bells	Iluka	2016		
Bondi East Far North	Iluka	2002		
Bondi Main Far North	Iluka	2002		
Bondi West	Iluka	2002		
Boulka	Iluka	2016		
Castaway	Iluka	2009		
Cyclops	Iluka	2016		
Dispersion	Iluka	2010		
Dunkirk	Iluka	2015		
Earl	Iluka	2011		
Endeavour	Iluka	2008	McDonald Speijers	2008
Kerribee	Iluka	2004; 2008	Snowdens; AMC	2004; 2008
Ki Downs	Iluka	2016		
Koolaman	Iluka	2010		
Manly	Iluka	2014		
Mittyack	Iluka	2016		
Nepean	Iluka	2012		
Nunga West	Iluka	2016		
Wagnut	Iluka	2016		
West Balranald	Iluka	2011	Golder and Assoc.	2011

2. Further Work

Further resource development of the Murray Basin HM deposits will be progressed in a timely manner to support ongoing or new mining operations. Updates to the resource models and associated Mineral Resource estimates will be done as additional exploration data becomes available.

Murray Basin HM Deposits - JORC Code 2012 edition. - Table 1 Commentary

Section 1 Sampling Techniques and Data

(Criteria in this section apply to all succeeding sections.)

Criteria	JORC Code explanation	Commentary
Sampling techniques	*Nature and quality of sampling (e.g. cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc.). These examples should not be taken as limiting the broad meaning of sampling.* *Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.* *Aspects of the determination of mineralisation that are Material to the Public Report. In cases where 'industry standard' work has been done this would be relatively simple (e.g. 'reverse circulation drilling was used to obtain 1 m samples from which 3 kg was pulverised to produce a 30 g charge for fire assay'). In other cases more explanation may be required, such as where there is coarse gold that has inherent sampling problems. Unusual commodities or mineralisation types (e.g. submarine nodules) may warrant disclosure of detailed information.*	Multiple campaigns were conducted over the 24 Murray Basin heavy mineral prospects. Drilling was carried out from 1996 to 2015 by various contract drilling companies during this time. Reverse Circulation Air Core (RCAC) drilling with BQ or NQ diameter drill rods was used for all exploration in the Murray Basin. A total of 266,304.15 m was drilled utilising 1, 1.5, 2 and 3 m sample lengths. More recent drilling used predominantly one metre sample lengths. A rotary splitter was used to disperse material exiting the cyclone and 25% sub sample splits were collected from quadrants beneath the splitter. Sample weights were recorded and monitored to detect any sample material bias. Sample weights are typically lower in the upper 1 to 2 metres of each drill hole and show a greater variability in zones containing significant induration. The sample was dried, de-slimed by wet sieving (material <53 µm or <75 µm removed depending on the assay technique used) and then had oversize (material +2 mm) removed. 100g of the sample then had a Heavy Mineral (HM) sink performed on it using either Tetra Bromo Ethane (SG=2.95g/cm^3) or Lithium Sodium Polytungstate (SG+2.85g/cm^3). The resulting HM concentrate was then dried and weighed. Sand residue from the HM sample analysis (from similar geological domains) were grouped together to form composite samples which were subject to further metallurgical analysis to determine the assemblage, mineral quality and sizing. These composite samples underwent wet tabling and magnetic separation of the HM concentrate using a permanent roll magnet. The mineral fractions from various roll speeds were then analysed by XRF and stoichiometric calculations were used to estimate the mineral assemblage. About 10 grams of the non-magnetic fraction was sent for SG separation using Thallium Malonate Solution (TMF). This separation technique was used to then determine rutile and zircon grain

Criteria	JORC Code explanation	Commentary
		size distribution and indicative chemistry for zircon.
Drilling techniques	*Drill type (e.g. core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc) and details (eg core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc.).*	All drilling on the Murray Basin HM deposits was carried out using Reverse Circulation Air-Core (RCAC) with a hole diameter of either NQ (76 mm) or BQ (55.5 mm). All drill holes were vertical which is essentially perpendicular to the mineralisation.
Drill sample recovery	*Method of recording and assessing core and chip sample recoveries and results assessed.*	Both sample quality and water content were recorded in the field logging, but only for holes drilled in recent years as this was not routinely recorded during the earlier drilling campaigns. Any factors that have affected sample recovery were recorded in the logging comments. Sub sample weights were recorded for every sample assayed.
	Measures taken to maximise sample recovery and ensure representative nature of the samples.	RCAC samples were visually checked for recovery, moisture and contamination at the time of collection, a consistent rate of penetration was maintained. Material is diverted from the sample during reaming of the hole by switching off the rotary splitter.
	Whether a relationship exists between sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.	Most of the mineralised samples were not adversely affected by the presence of rock or induration and no sample bias is evident as a result of drilling practices. Samples with increased induration have a lower recovery rates. At West Balranald significantly increased sample weights were synonymous with increasing drill depth. This is attributed to “hydraulic” pressure exacerbated by increasing depth below the water table. While some large sample weights were experienced the material returned from the drill bit is deemed to be representative of the drill interval. This is supported by the rapid variation in grades once the drill string has passed through the mineralised zone. This is considered to be a risk and the accuracy of the RCAC results will need to be verified by more sophisticated drilling techniques at some time in the future.
Logging	*Whether core and chip samples have been geologically and geotechnically logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and metallurgical studies.*	Geological logging was carried out on all RCAC samples by a qualified geologist or trained geotechnician. The geological information collected is adequate to support the mineral resource estimation and the JORC Code Classification assigned.
	Whether logging is qualitative or quantitative in nature. Core (or	Logging of RCAC samples recorded, washability, colour, lithology,

Criteria	JORC Code explanation	Commentary
	costean, channel, etc) photography.	dominant grainsize, coarsest grainsize, sorting, induration type, hardness, and an estimate of rock, slime and HM content. Whether the sample was dry or wet and whether water had been injected during drilling was also noted. In addition visual examination of the HM sachets from sample analysis was done to confirm the nature of the HM being reported for the deposits in the Douglas region.
	The total length and percentage of the relevant intersections logged.	With the exception of a very small proportion of samples, all exploration samples were logged in full detail in the field at the time of drilling.
Sub-sampling techniques and sample preparation	*If core, whether cut or sawn and whether quarter, half or all core taken.*	No core samples have been collected from the Murray Basin HM deposits. Sonic drilling has been trialled at West Balranald and Nepean and the "core" from this method of drilling was halved for sampling.
	If non-core, whether riffled, tube sampled, rotary split, etc and whether sampled wet or dry.	Samples were collected from beneath a rotary splitter mounted on the drill rig. Typically the samples were presented to the splitter as drilled – dry or wet. Approximately 25% of the sample was collected for geological logging and analysis. Water injection was used to clean the drill string if required. At West Balranald rotary splitting initially was employed. However due to excessive sample weights, particularly beneath the water table, the adoption of riffle splitting occurred in September 2008 for large samples, typically collected below the water table. For those 25% rotary splits collected after this period that exceeded 2.5 kg, a 2 kg sub sample riffle split on dry samples was done in the laboratory. Samples with elevated slimes which would not disaggregate appropriately for riffle splitting were divided into two sub-samples which were recombined after desliming.
	For all sample types, the nature, quality and appropriateness of the sample preparation technique.	Sample preparation is consistent with industry standard techniques and was deemed to be appropriate for Heavy Mineral determination.
	Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.	Collection of duplicate samples varied from no duplicate samples taken to 1:40 for more recent drilling. Where taken, the original and the duplicate samples are each 25% splits taken simultaneously from the rotary splitter mounted on the drill rig. Routine QA/QC sampling protocols were adopted as a standard part of the exploration programs after 2005.
	Measures taken to ensure that the sampling is representative of the in situ material collected, including for instance results for field	Duplicate assay data demonstrates good correlation with primary sample

Criteria	JORC Code explanation	Commentary
	duplicate/second-half sampling.	data.
	Whether sample sizes are appropriate to the grain size of the material being sampled.	The sampling methodology is considered consistent with industry standard practice and the sample size taken is appropriate for the analysis of Mineral Sands in the style of mineralisation.
Quality of assay data and laboratory tests	*The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.*	The assay technique utilised is appropriate for the mineralisation style in the Murray Basin and is supported by decades of reconciliation of mining of deposits delineated using the same or very similar techniques. The mineralogical composite sample evaluation processes are appropriate for the current level of study and applied resource classification. The assay method is considered to be total.
	For geophysical tools, spectrometers, handheld XRF instruments, etc., the parameters used in determining the analysis including instrument make and model, reading times, calibrations factors applied and their derivation, etc.	The data for the Murray Basin HM deposits does not contain any results generated by geophysical methods.
	Nature of quality control procedures adopted (e.g. standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (i.e. lack of bias) and precision have been established.	Prior to 2004/2005 there were no routine quality control procedures in place. For all later drilling programs, standards were inserted with assayed samples both in the field and in the laboratory a nominal rate of 1 in 40. Depending on the age of the data set, rates of insertion vary from well below targets to in line with recommended procedures. Where the HM result for a standard sample was returned outside the defined 'action limit' specifications of 3 Standard Deviations (SD) from the excepted error limit, a re-split and re-assay of the standard and samples with HM > 1% from the corresponding hole were undertaken. The repeat assays were assessed and if the standard returned HM results within specifications then all the repeat assays replace the original results in the resource estimation process. Slimes results outside of 3 SD did not trigger repeat assays, as the slimes component of the sample is lost during initial processing. Duplicate assay data demonstrates good correlation with primary sample for the Murray Basin samples.
Verification of	*The verification of significant intersections by either independent or*	Significant mineral intersections are verified by the project geologist when

Criteria	JORC Code explanation	Commentary
sampling and assaying	*alternative company personnel.*	sample results are returned from analysis and then again by an Iluka development geologist at the time of resource estimation.
	The use of twinned holes.	Prior to 2005 there were no routine quality control procedures in place and the drilling of twinned holes was done on an irregular basis or not at all. For all later drilling programs, twin drilling was undertaken at a rate of about 1 per 40 routine holes according to procedures.
	Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.	Logging of RCAC samples was input directly into a laptop computer using Micromine software with data verification routines enabled. For drilling done prior to about 2005 in the Murray Basin the logging data was stored in Micromine Project files. After 2005 data was then transferred directly into Iluka's Geology Database (custom tailored geological data management system based on a SQL database) which incorporated further verification routines. All drilling and assaying data was transferred to the current acQuire hosted database.
	Discuss any adjustment to assay data.	No adjustments (including but not limited to bias or top cutting) have been made to any of the assay data. Some of the earlier exploratory drilling that does not coincide with the detailed grid based drilling was excluded from some datasets used for grade interpolation.
Location of data points	*Accuracy and quality of surveys used to locate drill holes (collar and down-hole surveys), trenches, mine workings and other locations used in Mineral Resource estimation.*	The vast majority of drill hole collars drilled after 2005 have been surveyed using a DGPS_RTK unit (+/-10 cm horizontal and +/- 20cm vertical accuracy). Much of the drilling conducted before 2004 was surveyed with a DGPS enabled equipment unit with +/- 1m accuracy, GPS unit or using a tape measure from surveyed location (+/- 5m X/Y/Z accuracy).
	Specification of the grid system used.	Before 2000 the drill collars were surveyed in the AMG84 zone 54 coordinate system. After 2000 drill holes were surveyed in the MGA94 zone 54 coordinate system. The data was then converted to the various local grid coordinates using a spatial shift and rotation. The grid rotation for many deposits varied slightly for most deposits as a result of subtle strike variations. This was deemed necessary due to the long strike extent of the Murray Basin HM deposits.
	Quality and adequacy of topographic control.	The frequency of differences observed between the accurately surveyed drill collar elevations, the air photo topography and LiDAR led to the

Criteria	JORC Code explanation	Commentary
		interpretation of the topographic surface where air photo or LiDAR surveys were available. Topographic strings were created in cross section and snapped to the RTK_DGPS surveyed drill hole collars. Where there were no RTK_DGPS surveyed collars the interpretation was conducted to maintain the shape of the air photo topography or LiDAR surveys in that area. The drill hole collars not surveyed using the DGPS_RTK unit were projected vertically to the topographic wireframe created from more reliable information.
Data spacing and distribution	*Data spacing for reporting of Exploration Results.* *Whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied.* *Whether sample compositing has been applied.*	The dominant drill pattern for the HM deposits varies depending on stage of development and geometry of mineralisation. Broader spaced drilling is 1200mx40mx1m with closer spaced drilling at 200mx20mx1m. Drill spacing is deemed sufficient to conclusively demonstrate continuity of mineralisation and is appropriate for the style of mineralisation and the Resource Classification applied. No compositing of sample grades has been done because the sample length is uniform within the mineralised units with exception of: • a 1m composite length was used for Kerribee resource estimation due to the presence of 1.0, 1.5 and 0.5m length samples. • sample compositing has been applied at Barbary due to drill hole intervals of 1m, 1.5m and 2m. Samples selected by geological/grade domains were composited for further metallurgical testing to determine mineral assemblage, quality and sizing of geologically determined domains.
Orientation of data in relation to geological structure	*Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.* *If the relationship between the drilling orientation and the orientation of key mineralised structures is considered to have introduced a sampling bias, this should be assessed and reported if material.*	No bias has been identified or expected as drilling has been conducted effectively perpendicular to the mineralisation. No orientation based sampling bias has been identified within the data.
Sample security	*The measures taken to ensure sample security.*	Samples were collected in polyweave bags and transported to the laboratory for analysis with appropriate sample dispatch documentation.

Criteria	JORC Code explanation	Commentary
		The dispatch inventory was audited against the samples delivered to the laboratory. Samples were stored at secure Iluka compounds when not in transport. For earlier and non-Iluka (i.e RGC or BMH) drilling sample security during transportation is unknown due to the age of the drilling and lack of records. However samples were likely stored in drums or crates between the field and laboratories where the sample was assayed. No issues in relation to sample security are apparent.
Audits or reviews	*The results of any audits or reviews of sampling techniques and data.*	External reviews were completed at selected Murray Basin HM deposits to examine use of RCAC drill methods and determination appropriate drill hole/sample density for the reporting of resources. The reviews were completed by Snowden and Associates, Optiro and McDonald Speijers.

Section 2 Reporting of Exploration Results

(Criteria listed in the preceding section also apply to this section.)

Criteria	JORC Code explanation	Commentary
Mineral tenement and land tenure status	*Type, reference name/number, location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environmental settings.*	The Murray Basin HM deposits are spread over a large area straddling the New South Wales – Victoria border, stretching about 375 km north-south and over 200 km east-west. The mineral resources occur on Exploration Licenses (3 in NSW, 3 in Victoria) and one mining lease in NSW and a Retention Licence in Victoria (under application), mostly granted over privately held land where native title has either been extinguished or excluded from the grant. In NSW the Mallee Cliffs National Park and Mallee Cliffs Salt Water Interception Scheme occupies the area between two tenements, and in Victoria the Toolondo Forrest reserve overlies mineralisation. In such cases the relevant areas were excluded from Mineral Resource estimates.
	The security of the tenure held at the time of reporting along with any known impediments to obtaining a licence to operate in the area.	Iluka Resources retains 100% ownership of all exploration and mining licences that host the HM deposits. There is no known impediment for any future work, however a Native Title agreement will need to be finalised before mining at other deposits can be undertaken.
Exploration done by other parties	*Acknowledgment and appraisal of exploration by other parties.*	All drilling was carried out by Iluka Resources or its predecessor companies Renison Goldfield Consolidated (RGC) with exception of: • Bondi Main Far North and Bondi West - All drilling over the BMFN mineralisation was completed by Basin Minerals during 1999/2000. • Dunkirk, Barbary – Most of the exploration data used for resource modelling was acquired by Basin Minerals between 1998 and 2002. In 2002 Iluka Resources acquired the assets of Basin Minerals Holdings which encompassed several HM deposits in the Douglas area.
Geology	*Deposit type, geological setting and style of mineralisation.*	The HM deposits are located within the Murray Basin. The Murray Basin is a shallow, intra-cratonic Cainozoic basin. Much of the sedimentary sequence within the basin is the result of repeated marine incursions with the last major transgressive-regressive event resulting in the deposition of the Late Miocene to Late Pliocene Loxton Parilla Sands (LPS), a beach

Criteria	JORC Code explanation	Commentary
		sand facies that hosts the vast majority of the Murray Basin deposits.
Drill hole Information	*A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all Material drill holes:* *easting and northing of the drill hole collar* *elevation or RL (Reduced Level – elevation above sea level in metres) of the drill hole collar* *dip and azimuth of the hole* *down hole length and interception depth* *hole length.* *If the exclusion of this information is justified on the basis that the information is not Material and this exclusion does not detract from the understanding of the report, the Competent Person should clearly explain why this is the case.*	A total of 7,274 holes representing 266,304.15m of drilling with 153,833 samples with HM assays and/or geological logging comprise the Murray Basin datasets. It is impractical to list all the mineralised intercepts and this information is deemed to be largely superseded by the mineral resource estimates provided. Plans showing the drill hole distribution and typical cross sections are presented in the supplementary text in support of the mineral resource estimates. All drill holes were drilled vertically which is essentially perpendicular to the mineralisation.
Data aggregation methods	*In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (eg cutting of high grades) and cut-off grades are usually Material and should be stated.* *Where aggregate intercepts incorporate short lengths of high grade results and longer lengths of low grade results, the procedure used for such aggregation should be stated and some typical examples of such aggregations should be shown in detail.* *The assumptions used for any reporting of metal equivalent values should be clearly stated.*	No weighting or cutting of assay data has been done. No aggregation or metal equivalents have been used although de-compositing of variable assay lengths to a uniform 1m equivalent was done for the Barbary resource modelling. No metal equivalents are used in this report.
Relationship between mineralisation widths and intercept lengths	*These relationships are particularly important in the reporting of Exploration Results.* *If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported.* *If it is not known and only the down hole lengths are reported, there should be a clear statement to this effect (e.g. 'down hole length, true*	The geology, geometry and mineralisation of this style of deposit is well understood. All exploration drill holes were drilled vertically which is perpendicular to the mineralisation. As such all down-hole intersections represent the true width (thickness) of the mineralisation. The strand mineralisation of Iluka's Murray Basin HM deposits is typically 2 to 6 m in thickness and as a result all exploration on the known

Criteria	JORC Code explanation	Commentary
	width not known').	mineralisation has adopted a 1m sample interval
Diagrams	*Appropriate maps and sections (with scales) and tabulations of intercepts should be included for any significant discovery being reported These should include, but not be limited to a plan view of drill hole collar locations and appropriate sectional views.*	Representative plans and cross-sections depicting the location of drill holes in relation to the mineralisation and Iluka Tenements are presented in the accompanying supplementary text.
Balanced reporting	*Where comprehensive reporting of all Exploration Results is not practicable, representative reporting of both low and high grades and/or widths should be practiced to avoid misleading reporting of Exploration Results.*	This is not considered applicable as the resource estimation process considers all data values.
Other substantive exploration data	*Other exploration data, if meaningful and material, should be reported including (but not limited to): geological observations; geophysical survey results; geochemical survey results; bulk samples – size and method of treatment; metallurgical test results; bulk density, groundwater, geotechnical and rock characteristics; potential deleterious or contaminating substances.*	Logging of the samples includes visually estimating the HM present, the results of which corroborate the presence of HM mineralization. Composite samples have been taken either from the sand residue fractions of exploration samples or HM sink fractions from the HM determinations which also corroborate the validity of the HM mineralisation. The composited samples generate between approximately 0.1 and 2Kg of HM which is then subjected to a process of magnetic, electrostatic and heavy liquid separation followed with XRF analysis of the fractions to determine the mineral assemblage and mineral quality. The bulk density applied is the Iluka Standard Bulk Density formula applied to all resource models in the Murray Basin. The calculation of the density takes into account the weight percent of each of the major components of a typical mineral sands sample: HM, SAND and SLIMES. The formula used accounts for the ratio of HM and Quartz present in a sample and the weight percentage of clay which can be added to that sample without changing the volume that sample occupies. Some of the Murray Basin deposits are either fully or partially located below the water table. The nature and portion of induration is captured in the logging of exploration samples. Attributes alluding to Induration are incorporated in the resource models. These include the OS from laboratory assays, and the hardness and a visual estimate of rock content from geological

Criteria	JORC Code explanation	Commentary
		logging. No deleterious or contaminating substances have been identified in the HM deposits.
Further work	*The nature and scale of planned further work (e.g. tests for lateral extensions or depth extensions or large-scale step-out drilling).* *Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.*	No further resource drilling is required at this stage for the Murray Basin HM deposits. If future feasibility studies are undertaken then additional infill drilling will be carried out in a timely manner to improve the confidence in these Mineral Resources as required. No extensions to the current mineralisation have been considered.

Section 3 Estimation and Reporting of Mineral Resources

(Criteria listed in section 1, and where relevant in section 2, also apply to this section.)

Criteria	JORC Code explanation	Commentary
Database integrity	*Measures taken to ensure that data has not been corrupted by, for example, transcription or keying errors, between its initial collection and its use for Mineral Resource estimation purposes.*	Logging of RCAC samples was input directly into a laptop computer using Micromine software with data verification routines enabled. Data was then transferred into Iluka's Geology Database at the time (custom tailored geological data management system based on a SQL database) which incorporated further verification routines. Assay data was stored in Iluka's CCLAS laboratory database at the time of analysis and transferred electronically to the Geology Database.
	Data validation procedures used.	Drill data used for resource estimation was reviewed to ensure: • there were no duplicate records or missing intervals; • the sum of the analytes added to 100% or within rounding limits; • results were within valid ranges; and • data was in spatially valid locations..
Site visits	*Comment on any site visits undertaken by the Competent Person and the outcome of those visits.* *If no site visits have been undertaken indicate why this is the case.*	Several Competent Persons employed by Iluka Resources have been based in the Murray Basin or visited the location of the mineral deposits. No factors material to the resource estimate have been noted. Native vegetation in varying states of preservation is present in the Douglas area. Mineral Resources under areas of significant native vegetation have been excluded from the current estimates.
Geological interpretation	*Confidence in (or conversely, the uncertainty of) the geological interpretation of the mineral deposit.*	The geological interpretation is appropriate for the amount and distribution of the drill data. The geological style of mineralisation (strand) is generally regarded as being consistent and predictable and well understood from over 20 years of exploration and exposures afforded by mining of some of the deposits in the Ouyen and Douglas Districts.
	Nature of the data used and of any assumptions made.	All relevant information has been sourced from the drill samples and the interpretations have developed over successive drill campaigns which have included both in-fill drilling within known resources and extensions on the margins of the known deposits.
	The effect, if any, of alternative interpretations on Mineral Resource estimation.	No other interpretations have been considered due to the well understood geological framework for the Murray Basin HM Deposits.

Criteria	JORC Code explanation	Commentary
	The use of geology in guiding and controlling Mineral Resource estimation.	Appropriate geological domaining and corresponding flagging of drill data has been used to control grade interpolation and distribution during resource estimation.
	The factors affecting continuity both of grade and geology.	No factors are known which might affect the continuity of the geology. Sufficient drilling has been undertaken to confirm the grade continuity and the resource category (as defined in the JORC Code) awarded.
Dimensions	*The extent and variability of the Mineral Resource expressed as length (along strike or otherwise), plan width, and depth below surface to the upper and lower limits of the Mineral Resource.*	General dimensions of the Murray Basin HM deposits are strike length from between 1km to 25km, across strike width of 40m to 250m and a thickness of 2 to 8m. The mineralisation is located at depths between 0m to 65m.
Estimation and modelling techniques	*The nature and appropriateness of the estimation technique(s) applied and key assumptions, including treatment of extreme grade values, domaining, interpolation parameters and maximum distance of extrapolation from data points. If a computer assisted estimation method was chosen include a description of computer software and parameters used.*	The grade interpolation was carried out using the Estima Superprocess within Datamine Studio software. Grade estimation was completed using Inverse Distance Cubed (ID3) which is an Iluka standard and is deemed appropriate for this style of mineralisation. Mineralogical sample composite Identifier and Hardness values were interpolated using Nearest Neighbour (NN) method. Drill hole sample data was flagged with domain codes corresponding to the geology of the deposit and the domains imprinted on the block model from 3-dimensional surfaces generated from the geological and mineralisation interpretations. Primary search dimensions used were selected relevant to the style of mineralisation and the drill density (X*Y*Z). Successive search volume factors were also adopted to interpolate grade in areas of lower data density. Search dimensions and search volume factors for each Eucla Basin deposit are included in main text. A summary of search parameters used in the resource models for the Murray Basin is presented in the accompanying text. The search radii dimension varied depending on the density of supporting data and ranged from 25 to 130m in the X dimension, 125 to 1800m in Y dimension and 2 to 12m in the Z dimension. Factoring the search ellipse dimensions by multiples of 2 to 7 was done to facilitate grade interpolation if the criteria set for the primary search failed.
	The availability of check estimates, previous estimates and/or mine production records and whether the Mineral Resource estimate takes	For resource estimation carried out after 2005 comparisons were made

Criteria	JORC Code explanation	Commentary
	appropriate account of such data.	with the previous estimates to identify the areas where discrepancies occurred and whether they were due to additional drilling or changes in the interpretation or modelling methodology. Comparison estimates were undertaken using the Nearest Neighbour interpolation for each deposit which correlated well, with near identical global estimates produced
	The assumptions made regarding recovery of by-products.	No by products have been considered as part of this estimate.
	Estimation of deleterious elements or other non-grade variables of economic significance (e.g. sulphur for acid mine drainage characterisation).	No deleterious elements have been identified or included in the resource estimation process. Mineral quality attributes from the analysis of the composite samples are added to the model to assist in determining mineral saleability. Where mineralisation is located below the water table there is the potential for sulphide development. Appropriate testing for Potential Acid Sulphate Soils (PASS) is carried out at appropriate times to support feasibility studies.
	In the case of block model interpolation, the block size in relation to the average sample spacing and the search employed.	Parent cell size varies for the HM deposits in the Murray Basin depending on sample density; dimensions of the parent cells for each deposit are included in Table 5.1 in the main report. Typically the parent cells size of 10*100*1.0m to 20*600*1.5 were used. Cell splitting varies between the deposits and was used to define boundaries and assist in accurately representing volumes. Typically the model cell size used is about half the drill spacing while the search radius values are set to around 2 times the drill spacing.
	Any assumptions behind modelling of selective mining units.	No assumptions have been imposed on the modelling in relation to the consideration of selective mining units.
	Any assumptions about correlation between variables.	No correlation between variables has been considered.
	Description of how the geological interpretation was used to control the resource estimates.	Appropriate geological domaining and corresponding flagging of drill data and model cells has been used to control mineralisation estimation during resource estimation. A top cut was not deemed necessary for HM assays following evaluation of the sample assay statistics and consideration of the extent and

Criteria	JORC Code explanation	Commentary
	Discussion of basis for using or not using grade cutting or capping. *The process of validation, the checking process used, the comparison of model data to drill hole data, and use of reconciliation data if available.*	consistency of the relatively high sample grades. Validation of the modelling and mineral resource estimation included: • a visual review of the input assay grades compared to the model grade; • comparison statistics for the input assays compared to the model grades on a domain basis; and • generation of a NN grade interpolation for comparison and corroboration purposes. Any issues detected during the validation process were fixed immediately. No reconciliation data was used in any of the Murray Basin resource estimates.
Moisture	*Whether the tonnages are estimated on a dry basis or with natural moisture, and the method of determination of the moisture content.*	The tonnages are estimated on a dry basis using an Iluka proprietary density formula. The formula is considered appropriate and is used at other Iluka deposits which are geologically similar and currently being mined for HM.
Cut-off parameters	*The basis of the adopted cut-off grade(s) or quality parameters applied.*	A nominal grade cut-off of 3.0 % HM has been chosen for the HM deposits in the Murray Basin. A 3.0% HM cut-off is considered consistent for deposits of this style, mineral assemblage and magnitude. The cut-off grade is also vindicated by the results of optimisation studies and mining carried out in the Douglas and Ouyen areas.
Mining factors or assumptions	*Assumptions made regarding possible mining methods, minimum mining dimensions and internal (or, if applicable, external) mining dilution. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential mining methods, but the assumptions made regarding mining methods and parameters when estimating Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the mining assumptions made.*	The most likely mining option for the Murray Basin deposits by open cut mining using suitable excavation machinery as done by Iluka at other mining operations, with the exception of the Balranald Project area where Iluka is considering an unconventional mining method. The unconsolidated nature of the sediments allow for a range of options to be considered including the use of scrapers or large scale truck and shovel, or dozer trap. A prohibitive aspect of many of the Murray Basin resources is the high strip ratio resulting from depth of burial and the setback imposed by the sloping pit walls. This is compensated for by the high HM grade and lucrative assemblage containing high rutile and zircon credits.
Metallurgical factors or	*The basis for assumptions or predictions regarding metallurgical amenability. It is always necessary as part of the process of*	Nature and grain size of mineralisation is geologically consistent with mineral sands deposits that have been mined by Iluka Resources over the

Criteria	JORC Code explanation	Commentary
assumptions	*determining reasonable prospects for eventual economic extraction to consider potential metallurgical methods, but the assumptions regarding metallurgical treatment processes and parameters made when reporting Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the metallurgical assumptions made.*	past 10 years. No issues have been identified by the exploration and metallurgical test work carried out to date. Further metallurgical testing is will be done on as needs basis to confirm the best methods for optimal mineral recovery.
Environmen-tal factors or assumptions	*Assumptions made regarding possible waste and process residue disposal options. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider the potential environmental impacts of the mining and processing operation. While at this stage the determination of potential environmental impacts, particularly for a greenfields project, may not always be well advanced, the status of early consideration of these potential environmental impacts should be reported. Where these aspects have not been considered this should be reported with an explanation of the environmental assumptions made.*	If open cut mining takes place all material mined will be returned to the mine void following extraction of the HM component, which is typical for mineral sands mining operations. Overburden would be removed and stockpiled. The ore would be processed and returned to the mine void and the overburden would then be replaced. The site would then be rehabilitated to a land use consistent with that prior to mining. Mineralisation that extends below environmentally sensitive areas was excluded from resource estimates.
Bulk density	*Whether assumed or determined. If assumed, the basis for the assumptions. If determined, the method used, whether wet or dry, the frequency of the measurements, the nature, size and representativeness of the samples.* *The bulk density for bulk material must have been measured by methods that adequately account for void spaces (vugs, porosity, etc), moisture and differences between rock and alteration zones within the deposit.* *Discuss assumptions for bulk density estimates used in the evaluation process of the different materials.*	The bulk density values are calculated using an Iluka proprietary density formula. The formula is considered appropriate and is used at other Iluka deposits which are geologically similar and currently being mined for HM. The formula is considered valid as it takes into account the sand, HM and clay components It also allows for potential void space within the sand based on expected “filling” of the void space by the fine clay content. All tonnages are expressed as on dry tonnage basis. It is assumed that the material in the Murray Basin HM deposits has the same density relationship that is seen in Iluka deposits that are currently being mined. The formula is validated at each site with additional testwork. At the Douglas mine the density formula was altered slightly following confirmatory testing.
Classification	*The basis for the classification of the Mineral Resources into varying confidence categories.*	The resource classification applied to the Murray Basin HM deposits is based on various factors including but not limited to: • data density of primary HM assays; • degree of continuity of mineralisation and geological units;

Criteria	JORC Code explanation	Commentary
		• density of supporting mineralogical bulk data; • assessment of the integrity of the data; and • level of QA/QC support
	Whether appropriate account has been taken of all relevant factors (ie relative confidence in tonnage/grade estimations, reliability of input data, confidence in continuity of geology and metal values, quality, quantity and distribution of the data).	There is a lack of QAQC data for drill programs conducted prior to 2004/2005. QAQC programs employed following 2005 have in some cases demonstrated a high slimes bias, perhaps leading to over-reporting of slimes. This has not had any material impact on the HM grade. The exploration work carried out on the Murray Basin Mineral Resources is considered to take into account all pertinent factors including but not limited to: quality of input data, spatial density and reliability of the input data, confidence in the continuity of mineral grade and the controlling geological framework, possible mineral pricing and potential mining scenarios. The residual risk in the estimation of tonnage and grade is expressed in the Resource Classification applied to the resource estimates
	Whether the result appropriately reflects the Competent Person's view of the deposit.	It is the view of the Competent Person that the frequency and integrity of data, and the resource estimation methodology are appropriate for this style of mineralisation and support the Resource Classifications applied to each Murray Basin HM deposit.
Audits or reviews	*The results of any audits or reviews of Mineral Resource estimates.*	Current Iluka policy guidelines dictate that significant Mineral Resources being announced for the first time or being used to support feasibility studies are both internally and externally reviewed. In other cases Internal resource modelling guidelines and processes have been used to support the mineral resource estimates or the block models and associated mineral resource estimates have be internally reviewed.
Discussion of relative accuracy/ confidence	*Where appropriate a statement of the relative accuracy and confidence level in the Mineral Resource estimate using an approach or procedure deemed appropriate by the Competent Person. For example, the application of statistical or geostatistical procedures to quantify the relative accuracy of the resource within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors that could affect the relative accuracy and*	A Measured, Indicated or Inferred Resource Classification has been assigned to the deposits as per the guidelines set out in the Australasian Code for the Reporting of Exploration Results, Mineral Resources and Ore reserves – The JORC Code (2012 Edition). The category applied reflects the confidence in the Mineral Resource estimate.

Criteria	JORC Code explanation	Commentary
	confidence of the estimate. *The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnages, which should be relevant to technical and economic evaluation. Documentation should include assumptions made and the procedures used.* *These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.*	The statement refers to global estimates of tonnage and grade. No production data is available as these deposits are not currently in production. Where mining has taken place in the Murray Basin the reconciliation of the model against the mined volumes is done on a monthly and Annual basis. Actual results generally indicate very good agreement with the geological model and close reconciliation with HM tonnes, ore tonnes and HM percentage head grade. The risk of not achieving good physical Ore Reserve reconciliation is considered to be low.

Summary of Information to support the Mineral Resource and Ore Reserve Estimates for the Sierra Leone Rutile Deposits

This update is reported in accordance with the 2012 edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves', (the JORC Code) and ASX Listing Rules, and provides a summary of information and Table 1 JORC Code commentary to support the Mineral Resource and Ore Reserves estimates for the recently acquired rutile deposits located in Sierra Leone.

The Mineral Resource inventory attributable to the Sierra Leone Rutile deposits as at 31 December 2016 and broken down by resource category is presented below in the table below and a discussion of the background information pertinent to the Sierra Leone rutile inventory is presented in the accompanying summary and as commentary against the JORC Code Table 1 (2012 Edition).

Sierra Leone Rutile Mineral Resource Summary at 31 December 2016.

Mineral Resource Category[1]	Material Tonnes (millions)[2]	In Situ Rutile (%)[3]	In Situ Ilmenite (%)[3,4]	In Situ Zircon (%)[3,4]	Insitu Rutile Tonnes (millions)	Insitu Ilmenite Tonnes (millions)	Insitu Zircon Tonnes (millions)
Measured	60	1.26	0.12	016	0.75	0.07	0.10
Indicated	538	1.02	0.14	0.07	5.46	0.73	0.38
Inferred	122	1.06	0.00	0.01	1.29	0.00	0.01
TOTAL	**719**	**1.04**	**0.11**	**0.07**	**7.51**	**0.80**	**0.49**

Notes:
1 Mineral Resources are reported inclusive of Ore Reserves.
2 In situ (dry) metric tonnage is reported.
3 The mineral assemblage is reported as a percentage of the in situ material.
4 Ilmenite and zircon are included for tabulation purposes under the Measured and Indicated resource categories. The confidence in the estimates for Ilmenite and zircon are only considered to be at an Inferred level of confidence and should not be used in the estimation of Ore Reserves.
5 Rounding may generate differences in the last decimal place.
6 The quoted figures are stated as at 31 December 2016 and have been depleted for all production conducted to this date.

Sierra Leone Rutile Ore Reserve Summary at 31 December 2016.

Ore Reserve Category[1]	Material Tonnes (millions)[2]	In Situ Rutile (%)[3]	In Situ Ilmenite (%)[3,4]	In Situ Zircon (%)[3,4]	Insitu Rutile Tonnes[3] (millions)	Insitu Ilmenite Tonnes (millions)[3]	Insitu Zircon Tonnes (millions)[3]
Proved	34	1.45	-	-	0.50	-	-
Probable	271	1.24	-	-	3.37	-	-
TOTAL	**305**	**1.27**	**-**	**-**	**3.86**	**-**	**-**

Notes:
1 Ore Reserves are a sub-set of Mineral Resources.
2 In situ (dry) metric tonnage is reported.
3 Mineral assemblage is reported as a percentage of the insitu material.
4 The ilmenite and zircon are only considered to be at an Inferred level of confidence in the Mineral Resource estimates, and while present, currently have a low value ascribed in the reserve optimisation process for Sierra Leone.
5 Rounding may generate differences in the last decimal place.
6 The quoted figures are stated as at 31 December 2016 and have been depleted for all production conducted to this date.

1. Background/Introduction

Exploration of the Sierra Leone rutile deposits has been ongoing for many decades. The presence of rutile was first documented by the Gold Coast Geological survey in the 1920's. The rutile occurrences were further investigated by British Titan Product Company and Pittsburg Plate Glass in the 1950's who collectively drilled the Lanti deposits as Sherbro Minerals Limited in 1961. Mining operations commenced in 1967 using a cutter suction dredge and have continued intermittently to now. In 1971 the property was acquired by Sierra Rutile Limited (SRL), as a joint venture between Nord Resource Corporation and Amco Steel, who later sold 85% of the venture to Bethlehem Steel in 1978. SRL commenced mining operations in 1979, but production was curtailed in 1982 due to unfavourable market conditions. In 1983 Nord acquired a 100% interest in the venture and recommenced mining operations in January 1983. Nord sold a 50% interest in the project to Consolidated Rutile Limited in 1993. As a consequence of the civil war in Sierra Leone (1991 – 2002) all production ceased in 1995 and many of the company's records were destroyed. Plans to restart the operation were initiated in 2002 by Titanium Resources Group and commercial mining re-commenced in 2006. The Company was re-structured under "Sierra Rutile Limited" in 2011 after a major shareholder change by PALA Investments in September 2010. Ownership shifted to Iluka Resources Limited following an all-cash offer to acquire the entire issued and to be issued shares of SRL on 1 August 2016. Iluka completed the acquisition of (SRL) by means of a statutory merger with Iluka Investments (BVI), a wholly owned subsidiary of Iluka on the 8 December 2016.

2. Ownership/Tenure

Sierra Rutile Limited holds the right to mine rutile, zircon, ilmenite, monazite, columbite, graphite, garnet and other titanium bearing minerals through Mining Lease and Dredging Licence No. 2134 of 1984. This mineral lease was later ratified through the Sierra Rutile Agreement (Ratification) Act of 2002 and incorporates the seven mining licences included in Table 1.1. Each licence is valid for a period of 33 years from re-commencement of mining operations in 2006 and may be extended by a further (minimum) term of 15 years.

Table 1.1: Tenement Summary

License Name	License Number	Area (km^2)	Date Issued	Expiry Date
ML011/72 – Area 1	2134	290.6	01-Jul-1984	23-Jan-2039
ML012/72 - Gambia	2134	17.5	01-Jul-1984	23-Jan-2039
ML013/72 - Jagbahun	2134	20.65	01-Jul-1984	23-Jan-2039
ML014/72 - Nyandehun	2134	5.64	01-Jul-1984	23-Jan-2039
ML015/72 - Sembehun	2134	73.64	01-Jul-1984	23-Jan-2039
ML015/72 – Sembehun Ext	2134 - Ext	125.1	71-Sep-1991	23-Jan-2039
ML016/72 – Taninahun Boka	2134	12.47	01-Jul-1984	23-Jan-2039
ML017/72 - Mosavi	2134	13.32	01-Jul-1984	23-Jan-2039
Total		**558.91**		

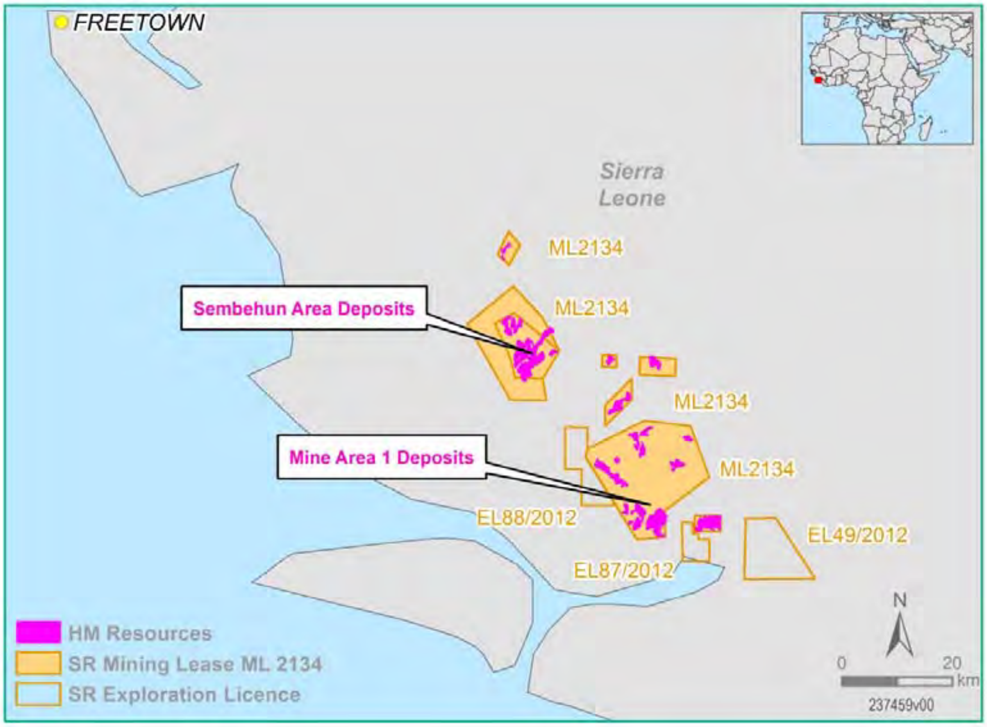


Figure 1.1 Tenement Location Plan for Sierra Leone.

3. Deposit Geology

Sierra Leone is split between two tectono-stratigraphic units; the majority of which covers the eastern side of the country and forms part of the stable Precambrian West African Craton (Figure 2.1). The western unit contains elements of an orogenic belt that was deformed during the Pan-African tectono-thermal event about 550 Ma ago resulting in the development of the Kasila Group Gneiss.

A 20 to 40km wide coastal strip along the west coast of Sierra Leone comprising Tertiary to Recent sediments, known as the Bullom Group, unconformably overlays the crystalline basement rocks. The Bullom Group comprises sediments recognised as having been deposited in alluvial, fluvial, coastal marine and estuarine environments. The deposition of the Bullom Group followed a late Tertiary-age marine regression, which exposed the basement to chemical and mechanical erosion. Rutile and other heavy minerals were liberated in response to the erosion of topographically elevated areas of the Kasila Group and subsequently deposited in structurally controlled channels, erosional valleys or as alluvial fans on a topographically benign coastal plain.

Figure 2.1: Regional Geology Plan for Sierra Leone.

The heavy minerals within the Sierra Leonean Rutile Deposits are typically angular, indicating minimal transport and re-working. The spatial distribution of heavy minerals along the length of the palaeo-channels also reflects this, with mineral grades typically decreasing with distance from the source and increasing in sand content replacing argillaceous material within the matrix.

In the compilation of the Mineral Resource estimates for the Sierra Leone rutile Deposits, information from the following qualified reports has been used and accordingly are acknowledged:

- ACA Howe, 2005; "*Sierra Rutile, Sierra Leone; Scoping Study on the Mogbewmo Wet Plant Tailings and other Satellite Deposits*".
- Author unknown. 1996; "*Mineral Sands Mining in Sierra Leone.*"
- Boli, C., 1982; "*Regional Reconnaissance Exploration*".
- Button, MTG, 2016; "*Competent Persons Report, Mineral Resource Statement November 2016*".
- Mackenzie, DH Dr. 1961; "*Geology and Mineral Resources of Gbangbama Area. Geological Survey of Sierra Leone, Bulletin No. 3*".
- Mining Development Associates (MDA) 2002,"*Resource Estimates of the Lanti, Gangama, Gbeni, and Sembehun Heavy Mineral Sands Deposits*".
- Mining Development Associates (MDA) 2003; "*Sierra Rutile Limited, Resources, Reserves, Mine Plans, Site Observations*".
- Ransome, I., 2010, "*Resource and Reserve Estimates, Sierra Rutile Limited*".

4. Data Acquisition

Exploration over the Sierra Leone rutile deposits has been undertaken sporadically in support of the mining operations since the 1950's. The advent of the civil war in Sierra Leone during January 1995 saw all production cease and the destruction of many records relating to exploration data. Currently the data supporting the Mineral Resource is contained in 3 chronologically separate datasets.

Historical analogue Dataset:-The earliest of all the databases and is comprised of analogue records for reconnaissance drilling completed in the early 1970's. This includes the collar location of a number of Stitz drill holes, with depth and assay data. Limited pitting data is also included within the dataset. Accompanying maps contain inferred resource outlines indicated by the Stitz drilling and supporting ground reconnaissance. This database is the primary geological basis for resource estimates of various satellite ore bodies. Historic boundaries for the purposes of estimating resources for these deposits conform to regional structures, and were located by mapping along roads, footpaths and cut farms.

Historical Digital Database:-This contains information from drilling completed in the ML011/72 and ML015/72 areas up until 1995. This is preserved in text files containing drill hole interval log plus assay data and historic point count data preserved in Lotus 123 spread sheets. The first two numbers represent the deposit identifier, the following three numbers representing the line number, whilst the last three numbers contain the station numbers. Elevation data is expressed in feet relative to sea level for each interval. The accuracy of this database was verified by MDA (2002) through check drilling on the Gbeni and Lanti resources. Both MDA (2002) and ACA Howe (2005) accept the validity of both historic databases.

Current Database:-This represents all drillhole data collected since 2002 and is retained in an audited MSExcel database. All data is or has been converted into the metric system and the coordinates are in the Sierra Leone National Grid. For each deposit, a collar, lithology and assay database exists, with typical information captured including:

- Borehole Identifier;
- Collar Coordinates (reported to the surveyed grid coordinates by SRL to two decimal places);
- Sample Elevation (metres above sea level);
- Sample Length (metres);
- Bore Sample Number;
- Rutile Analysis (rutile in the non-magnetic –16 mesh +250 mesh sand fraction);
- Rutile Content (rutile analysis expressed as a percentage of the whole sample);
- Magnetic Heavy Minerals (Mag - % of heavy minerals in sand fraction that are magnetic);
- +3/8 Material (weight %);
- 3/16 to 3/8 Material (weight %);
- 16 mesh to 3/16 Material (weight %);
- 16 mesh to 42 mesh Material (weight %);
- 42 mesh to 250 mesh Material (weight %);

- Heavy Minerals (HM - % of minerals above 2.86 specific gravity in the sand fraction);
- Fe2O3 (% iron oxide in sand fraction);
- ZrO2 (% zircon in sand fraction);
- Sulphur (% in sand fraction);
- Lithology; and
- Dry Density (based on lithology, reported in lbs/cubic ft)

4.1 Drilling Summary

The SRL mining leases have been explored to varying degrees using several different drilling techniques, namely hand auger, hollow stem auger, aircore and reverse circulation methodologies:

Stitz Drill: The Stitz drill was used for reconnaissance exploration carried out on satellite orebodies in the early 1970's. It had a maximum depth of 6 metres, with sample intervals taken at 1.0 metre intervals through side slots in the rod. The technique had some shortcomings, namely:

- Potential over-estimate of grades due to contamination when drilling through enriched upper sediments.
- Underestimating the true thickness of the deposit, as well as failing to encounter heavy mineral enrichment often observed within the lower sand and gravel sequences resulting from the inability of the drill method to penetrate hard ground (e.g. laterite) as well as the 6 metre depth limitation.

Given these limitations, all areas covered by Stitz drilling (mainly satellite deposits) have been allocated to the Inferred resource category until further confirmatory drilling is completed.

Aluminium Derrick Tripod Rig: This consists of a 76.2mm diameter double tube percussion drill mounted on an aluminium tripod with a 4 hp gasoline engine and cathead combination. The cathead raises and lowers the drill tools and drives the percussive hammer. The split barrel sampler is placed in the drive shoe of the borehole casing, and the casing driven to the new sample level. The sampler is withdrawn and replaced with a new sampler before resuming the next drive.

B53/B54 Hollow Flight Auger Rig: The mobile auger rigs are mounted on 5-tonne trucks and use a Hollow Flight Auger (HFA) with a 51mm split barrel sampler. The sampler is driven into the undisturbed ground ahead of the auger by a 63.5kg hammer. The sampler is withdrawn and replaced by a plug bit, with the augers rotated down to the end of the sample length to case the borehole. The plug is removed and the sampler inserted into the augers to restart the sampling cycle. Samples are collected at 1.5m intervals.

Mechanical Bangka Rig: Bangka drilling has been used for drilling into virgin, water-logged and tailings material. Sampling is undertaken over 0.5 metre intervals using a 63.5 mm core barrel. The Bangka drill rig consists of a motorized winch with a wire rope passing through a pulley attached to a standing tripod. The free end of the wire rope is attached to a sampler which is a two-piece sampler made up of a long, cylindrical hammer connected to a sand pump bailer.

Aircore Rig: Several Reverse Circulation Aircore (RCAC) rigs have been used as the primary sampling tool post 2002 on the Sierra Leone rutile deposits. Sample from the RCAC drilling is fed onto a rotary splitter mounted beneath a cyclone. Samples are collected over 1.5 metre intervals with a quarter split being retained for analysis.

A summary of the drilling carried out on each prospect is presented in Table 4.1.
The drilling is typically carried out on a regularised grid with the drill spacing closed in to support an increased confidence in the mineral resource estimates as shown in Figure 4.1 and Figure 4.2.

Prior to 1995 drilling was generally undertaken at a 240 metre (800 feet) to 488 metre (1,600 feet) spacing. Subsequent infill drilling over some of the deposits was on 122 metre (400 feet) spacing, often with an additional drill hole in the centre of each 122 metre grid block.

After 2002 drilling has mostly honoured this drill configuration, with the exception of the 2007 / 2008 Gangama West drilling campaign, which was undertaken on an anisotropic 30 metres by 60 metres drill grid. Extensions to the Lanti deposit were drilled to a 35 metre by 35 metre drill spacing during 2006 to 2008. The post-2011 drilling campaigns were phased, starting at a 240 metre by 240 metre drill spacing and progressively infilled to a 120 metre by 120 metre drill spacing dependant on mineralisation potential. Select areas of these deposits are drilled to a 60 metre by 60 metre drill spacing, particularly within identified palaeochannels containing higher levels of geological variability. From 2012, grade control drilling in select areas at a 20 to 25 metre by 20 to 25 metre drill spacing has been conducted on areas of the Lanti, Gbeni and Gangama deposits. A summary of the drilling carried out on each Mineral Resource is presented in Table 4.1.

Table 4.1: Drill meterage's and modal drill spacing for each prospect supporting the Sierra Rutile Mineral Resources.

Deposit	Holes	Samples	Drill metres	X Drill Space	Y Drill Space	Drill Comments
Lanti	2,188.0	18,754.0	27,202.5	86	86	35m x 35m extension, 20m x 20m grade control
Gangama	3,049.0	16,969.0	22,123.0	30	60	Some at 90m x 90m and 120m x 90m
Gbeni North	2,058.0	17,496.0	25,741.2	90	90	25m x 25 m grade control in places
Mogbwemo Tails	531.0	3,166.0	4,378.0	60	60	30m x 30m in the high grade areas
Mogbwemo Virgin	531.0	3,166.0	4,378.0	60	60	
Sembehun - Benduma	991.0	8,743.0	12,362.9	122	122	South east portion drilled to 245m x 245m
Sembehun - Kamatipa	499.0	2,383.0	3,349.1	122	122	Centre and North drilled to 245m x 245m
Sembehun - Dodo	107.0	743.0	945.2	245	245	North-east and south-west drilled to 122m x 122m
Sembehun - Kibi	63.0	446.0	547.3	245	245	
Sembehun - Komende	38.0	177.0	630.6	122	122	
Mosavi	288.0	1,464.0	2,181.0	122	245	
Ndendemoia	183.0	1,143.0	1,648.0	120	120	
Taninahun	201.0	1,071.0	1,263.0	60	60	
Gambia	33.0	48.0	112.0	1000	300	Irregular drillhole location
Jagbahun	23.0	37.0	92.0	1000	300	Irregular drillhole location
Nyandehun	10.0	12.0	27.5	500	300	Irregular drillhole location
Gbap	35.0	56.0	140.0	1000	300	Irregular drillhole location
Taninahun Boka	33.0	41.0	98.0	300	300	Irregular drillhole location

4.2 Survey

Each borehole position was surveyed in the field using the SRL owned Leica Viva GS10 GPS equipment, with the X, Y, Z coordinates expressed according to the projection system in Table 4.2. Historically, SRL worked within the Clarke 1880 datum, but has subsequently converted all survey information into the World Geodetic System, 1984 (WGS, 1984). All planned borehole coordinates are determined by the Geology Department in the WGS84 datum and submitted to the Survey department for field survey.

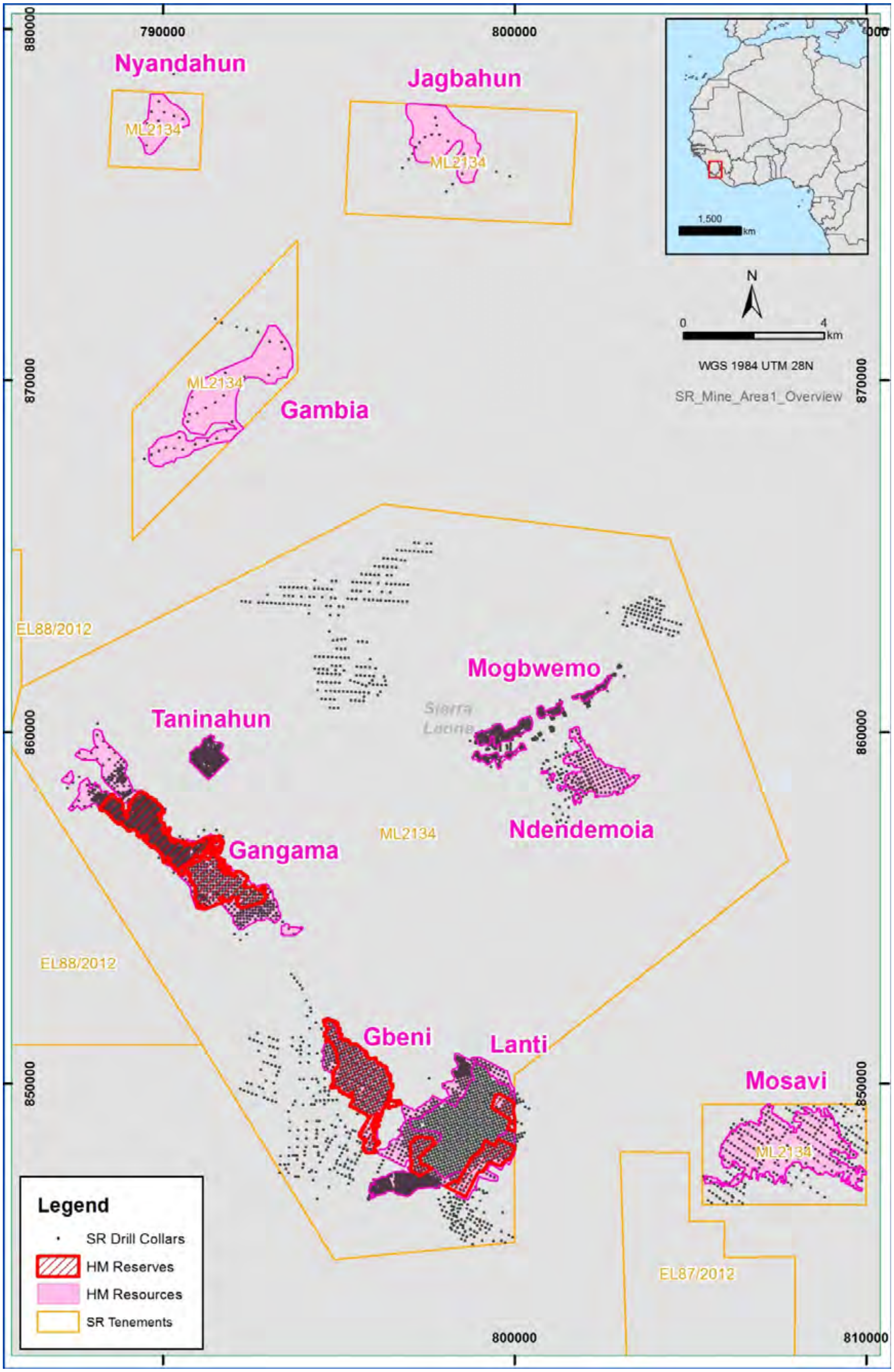


Figure 4.1: Drillhole distribution for the Sierra Leonean rutile deposits – Mine Area 1.

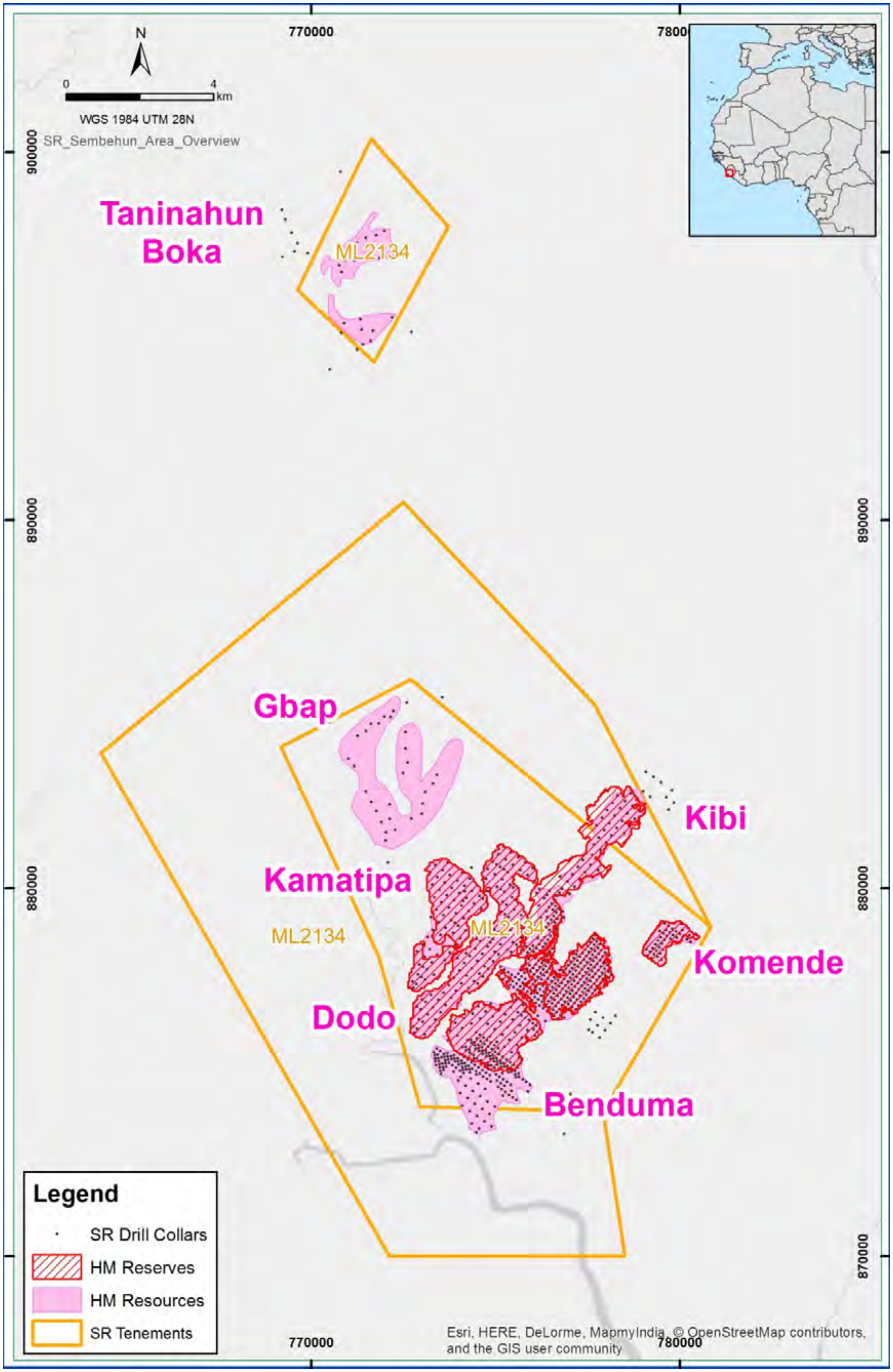


Figure 4.2: Drillhole distribution for the Sierra Leonean rutile deposits – Sembehun Area.

Table 4.2: Coordinate system used on the Sierra Leone rutile deposits.

Survey Descriptor	Projection Information
Coordinate system	UTM Zone 28, Northern Hemisphere
Earth projection	8, 104, "m", -15, 0, 0, 9996, 500000, 0"
Projection	Transverse Mercator (Gauss-Kruger)
Datum	World Geodetic System, 1984
Ellipsoid	WGS 84
Units	Metres
Origin, Longitude	-15"
Origin, Latitude	0"
Scale factor	0.9996
False Easting	500,000
False Northing	0

4.3 Geological Logging

All sample intervals are qualitatively logged in accordance with SRL standard operating procedures. The main geological criteria recorded include:

- Interval length;
- Depth to base of interval;
- Percentage sample recovery;
- Colour;
- Main lithology;
- Lithological qualifiers; and
- Estimates of slime and oversize.

4.4 Sampling and analytical procedures

The SRL deposits have been sampled using several drilling techniques, including Hollow Flight Auger, RCAC, Mechanical Banka, Lightweight Tripod Derrick drilling and Stitz Drilling. Sampling of drillholes was conducted at 0.5 to 1.5 metre intervals and all samples are submitted for assay. The drillhole database typically contains sample location information, density data, lithology, particle size data and HM assay data.

Sampling Methodology: The sampling protocol for all drilling operations is prescribed by various standard operating procedures specific to the type of drilling method adopted. Generally, about 2.0 kg of sample is collected for each interval and is placed in pre-labelled calico sample bags. Unique sample identifiers (e.g. location, line, Hole No, interval) are recorded on metallic tags and placed in the sample bag for submission to the SRL on site laboratory. A duplicate tag is also inserted for validation purposes. The sample intervals for each borehole are placed in sacks designated and labelled for each borehole. A sample submission form that itemises the samples recovered per borehole is completed, photocopied and submitted to both the data-capture clerk and laboratory for further processing.

Sample Composites: The compositing of samples was introduced for some of the post-2002 drill campaigns. The compositing procedure allows sufficient sample volume to be made available for Full Mineral Analysis (FMA) as specified in the current analytical flow sheet. The heavy mineral (HM) grades reported by the laboratory are imported onto geological cross sections of the deposit under consideration. These along with other variables such as lithology, slimes and oversize content, iron staining, are considered when compositing the samples. Care is taken to ensure that only lithological units with similar geological and grade characteristics are composited together.

Sample Preparation
The drill samples are oven dried, weighed and soaked in Tetra-Sodium Pyrophosphate (TSPP) solution. The samples are then dried, attritioned and wet screened to remove the slimes (-63µm) and oversize (+1.0mm) material. All screened fractions are weighed to determine the content in the sample. The +63µm to -1.0mm fraction is riffle split to produce one sample for further analysis and one sample for storage.

Assay, Analysis & Laboratory
The majority of drillhole samples have been analysed at the SRL laboratory using a combination of MRS 400, X-ray Fluorescence (XRF - pressed pellet method) and microscope "point count" analysis. Mineral assemblage data was obtained by compositing the sand fraction of samples from similar geological horizons, screening across a series of size ranges, recovering the HM by dense liquid media and then conducting a magnetic separation (Permroll Magnet). The laboratory procedure has varied between historical and current campaigns. The two laboratory procedures used are described below:

(a) Historical (pre-2002) Methods:
The samples derived from 5ft drill lengths were weighed prior to drying, and reweighed after drying. The latter were then screened using Tyler meshes to produce a slime fraction (discarded) less than 250 Tyler Mesh (~63um). The deslimed sample was re-screened to produce an oversize faction greater than +16 Tyler Mesh (~1.0mm). The +16 mesh fraction was split into +3/8", -3/8" to +3/16", and -3/16" fractions and each weighed, prior to being discarded. The -16, +250 Tyler Mesh fraction from samples were screened in to a -16, +42 Tyler mesh fraction and a -42, +250 fraction and weighed.

The -16 to +250 mesh fractions were recombined and blended, and split to give three subsamples. One subsample was retained for *point count analysis*, whilst the second sample was subjected to magnetic separation, yielding a magnetic and non-magnetic fraction. Both the magnetic and non-magnetic fractions were weighed, prior to the magnetic fraction being discarded. The non-magnetic fraction was pulverized and LOI determined, prior to analysis for sulphur using a Leco sulphur determination. This fraction is then fused for MRS 400 analyses to determine Ti, Fe, Zr, V and Cr. The third sub-sample from the -16 +250 Tyler mesh fraction was subjected to heavy mineral separation using Bromoform, to determine the weight percent of heavy mineral (i.e. specific gravity > 2.85). The resultant heavy mineral fraction was screened to give a +70 and -70 Tyler mesh fraction, and relative weights recorded to provide information on sizing.

The historical assay database typically contains the following parameters:

- Rutile Analysis: Ti XRF analysis on the non-magnetic -16 to +250 Tyler mesh interval fraction normalised to rutile and expressed as a Wt% of the -16 to +250 mesh fraction (sand fraction);
- Rutile Content: Ti XRF analysis on the non-magnetic -16 to +250 Tyler mesh interval fraction normalised to rutile, multiplied by the sand fraction ratio, expressed as Wt% of the whole sample (i.e. recoverable rutile within the whole sample);
- Magnetic heavy minerals: Weight in grams of the magnetic fraction discarded from the magnetic separation stage;
- +3/8, -3/8 +3/16, -3/16 +16, -16 +42, -42 +250: Tyler mesh fractions expressed as Wt% of the whole sample interval. Note that the -250 mesh slimes fraction is not present;
- Heavy Minerals %: Wt% of heavy minerals as determined by the Bromoform heavy mineral separation, expressed as Wt% of heavy minerals (s.g.>2.8) within the -16 to +250 mesh sand fraction;
- HM +70: % of the heavy minerals in the sand fraction greater than 70 Tyler mesh;
- HM -70: % of the heavy minerals in the sand fraction less than 70 Tyler mesh;

- +16, -16 +250, -250: Wt% of the oversize (+16), sand (-16 +250) and slimes fractions (-250) of the whole sample;
- Fe2O3: % iron oxide in sand fraction;
- ZrO2: % zirconium dioxide in sand fraction; and
- Sulphur: % in sand fraction.

(b)Current (post-2002) Methods:
The analytical procedure for the current dataset is included in Attachment 11b. The sample preparation is identical to that of the historical data, with the exception of the initial screening stage. The 3/8” (9.525 mm), 3/16” (4.726 mm) and 16 (0.991 mm) Tyler mesh screens are replaced by metric screen sizes 9.5mm, 4.75mm, and 1mm. The 250 Tyler mesh (61µm) slimes screen has been replaced by a 63µm screen. The secondary screening of the -1mm +63µm fraction is undertaken using a 710µm screen instead of a 42 Tyler mesh (351µm).

More recently, heavy mineral separation by means of Bromoform has been replaced by Lithium Sodium Polytungstate (LST), which is a far less toxic heavy mineral separation media. XRF analyses are undertaken on both magnetic and non-magnetic fractions using pressed pellets for the elements Ti, Ca, Fe, Cr. Mn, Nb, Al P and S.

The 2013 to 2016 grade control analyses were adjusted in this mineral resource to correct for the bias associated with the XRF pressed pellet method. Pressed pellets are prepared rapidly at low cost, but are prone to XRF errors such as particle size, matrix and mineralogical effects. An investigation into the XRF pressed pellet method at SRL revealed that the TiO2 pressed pellet analyses were biased low (Figure 4.1). A positive linear correlation (r^2 = 93%) exists between Wet Chemistry and pressed pellet XRF TiO2, supporting a linear algorithm correction. Two linear algorithms were used to adjust the TiO2 data:

- Algorithm for >1.0% TiO2: **WC TiO2 = (0.9368) PP TiO2 + 0.9482**
- Algorithm for <1.0% TiO2: **WC TiO2 = (0.8149) PP TiO2 + 0.2168**

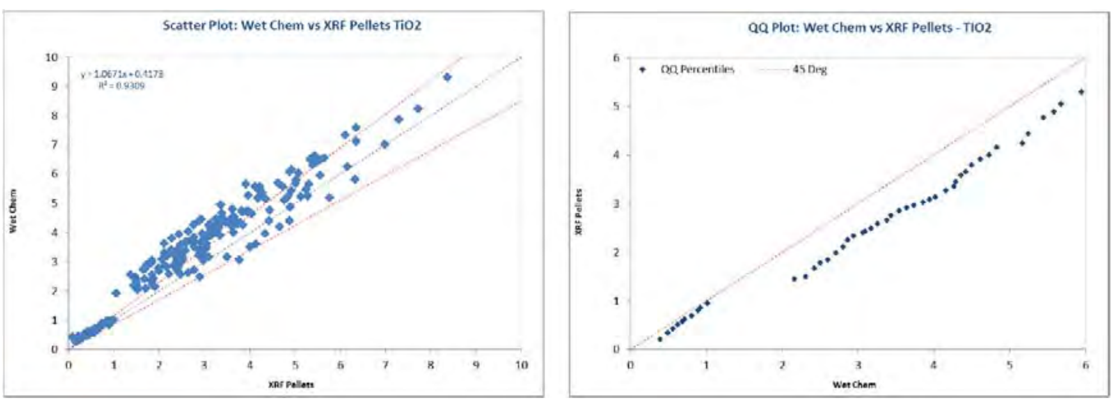


Figure 4.3: Charts of Wet Chem (AAS) vs XRF Pellet analyses for TiO2.

4.5 QA/QC and Data Quality

To identify analytical bias and accuracy, the SRL laboratory uses certified standards for calibration of both Atomic Absorption Spectrometry (AAS) and XRF analyses. In addition, 5 to 10% of the analytical submissions are duplicated to verify analytical precision. Discrepancies between duplicate samples are checked by wet chemistry and an external laboratory. Records of historical check assays no longer exist due to their destruction during the insurrection.

The procedure for the QAQC process for geological samples includes:

- submission of coarse duplicate samples across various grades of recoverable rutile, ilmenite and ZrO_2 grades to quantify precision. The pass criteria for the sample programme as a whole, is 90% of duplicates within 20% difference. This is monitored by means of duplicate control charts and any anomalies are validated with the laboratory; and
- submission of random analytical replicates to quantify reproducibility and precision. The pass criteria for the sample programme as a whole, is 90% of duplicates within 5% difference. This is monitored by means of check assay control charts and any anomalies are validated with the laboratory.

At least one replicate is analysed for every twenty normal samples submitted and the results are graphed to identify any samples outside of the accepted tolerance limits. Anomalous samples are flagged and investigated for obvious errors and if no obvious errors are apparent, the entire batch is either reanalysed, confirmed by wet chemistry or the estimate confidence downgraded.

4.6 Verification of Sampling and Assaying

The analytical data undergoes several levels of verification prior to modelling. This includes the interrogation of data for outliers such as:

- non-ore units with lab numbers;
- sample preparation vs. XRF lab submissions;
- collar duplicates; and
- missing analyses;

In addition, the lab integrity of analyses and the spatial ‘correctness’ of analyses in relation to the associated geological units are interrogated by means of:

Mineral Ratios
The ratios of various minerals from the laboratory analyses may be used for identifying anomalies or poor XRF assay results. The mineral ratios are calculated for each analysis and checked for inconsistencies. Any values falling outside of certain limits are highlighted as exceptions for further checking. These are extracted and compared to the original log for data capture errors / anomalies. If an error is confirmed, the incorrect value (and any other associated / compromised values) is deleted from the database, rather than attempting to interpret a more reasonable value. The mineral ratios validated include:

- the mineral proportion of rutile > ilmenite > zircon is seldom violated;
- the valuable heavy minerals (VHM containing rutile + ilmenite+ zircon) is always less than the Total Heavy Minerals (THM);
- ZrO_2 is usually never greater than TiO_2;
- all sizing fractions should always add up to 100%
- MAGS% plus NONMAGS% should always add up to 100%;
- THM is always greater than the sum of individual analyses e.g. RR%, ILM%, ZIR%.

The database is also checked and corrected for other obvious analyses errors e.g. low panned ilmenite – high THM (and vice versa), and point count vs. XRF analyses.

Structure
All borehole data is imported into the Micromine Software program to enable construction of cross sections through the ore-body for geological validation. These sections portray the spatial borehole grades relative to lithological distribution, with anomalous values identified

relative to the surrounding boreholes. All irregularities are checked (visually) and corrected or deleted as appropriate.

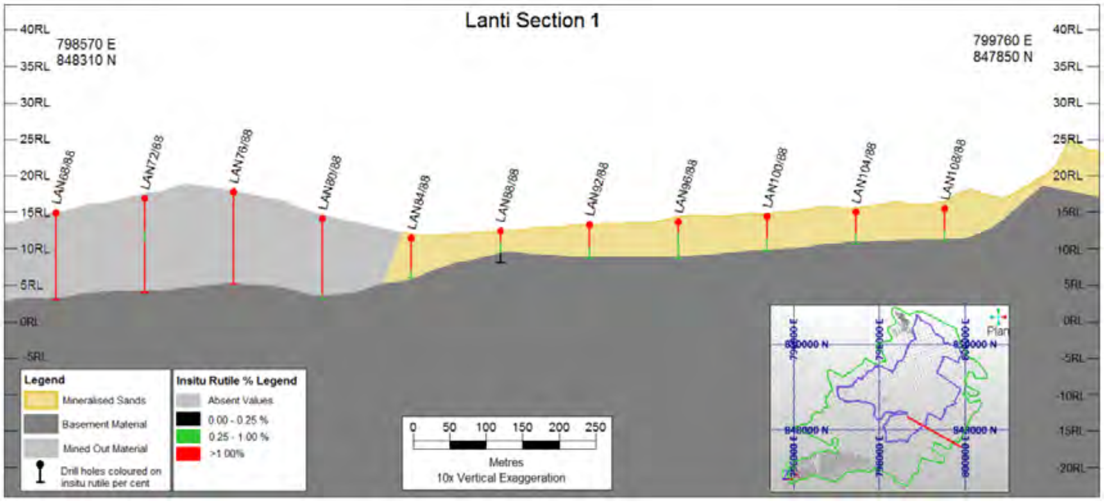


Figure 4.4: Cross-section through the Lanti Deposit.

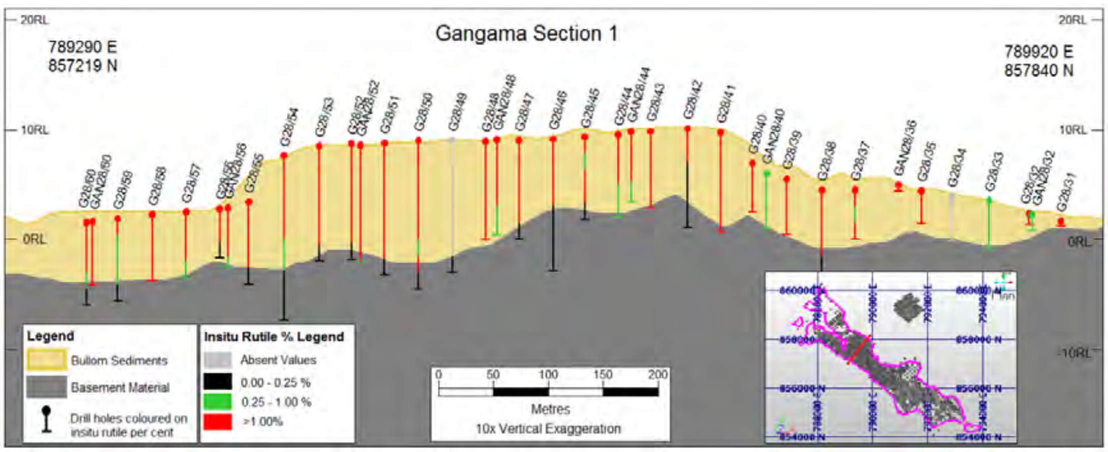


Figure 4.5: Cross-section through the Gangama Deposit.

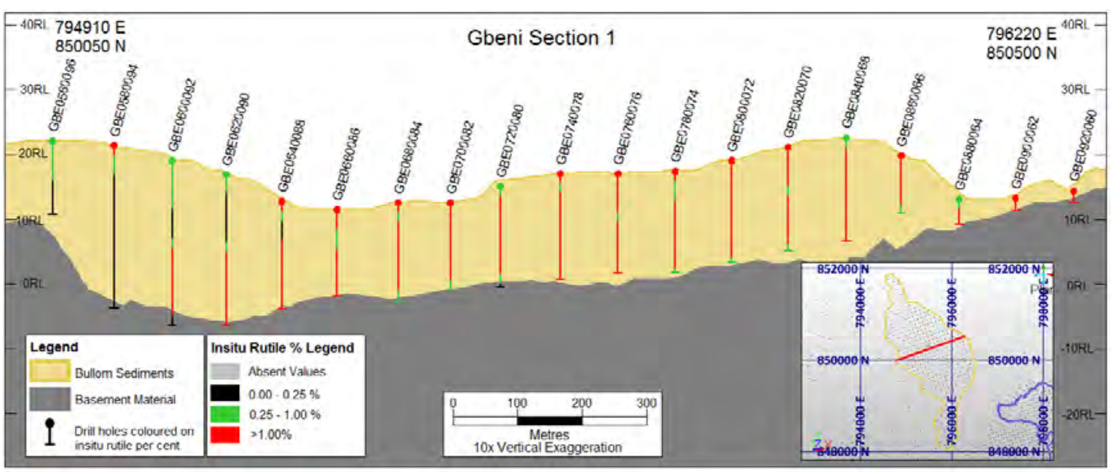


Figure 4.6: Cross-section through the Gbeni Deposit.

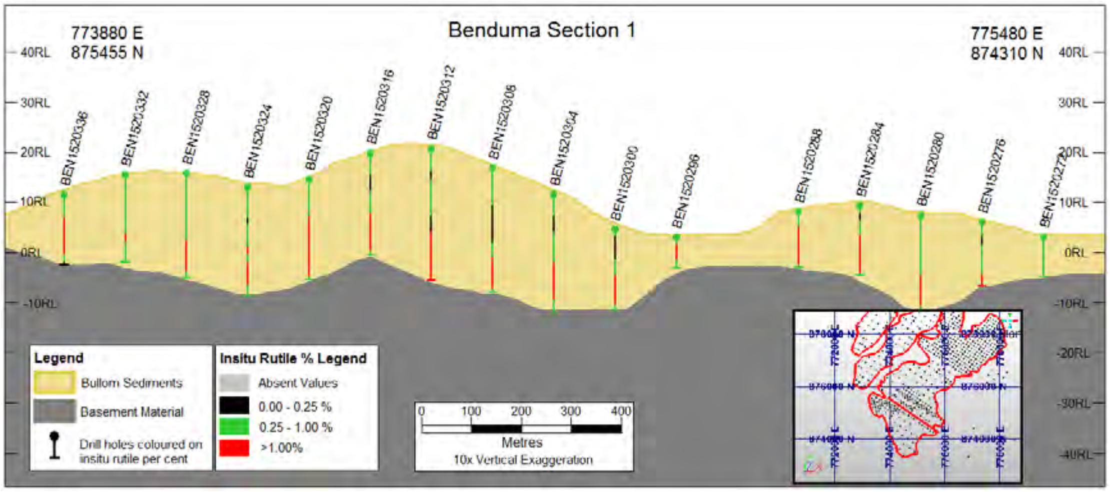


Figure 4.7: Cross-section through the Benduma Deposit.

4.7 Physical parameters

The density for the different lithology types were determined by obtaining samples from a measured volume (using a sand replacement method), weighing the dried sample and calculating the density from mass and volume measurements. Three-foot diameter test shafts were excavated on a set grid in each deposit to determine the density of each lithology type and compare drillhole geology versus samples. The dry density of the different lithology types is included in Table 4.3.

Table 4.3: Summary of Dry Density values applied to various lithology's at SRL.

Lithology	Lith Code	Density t/m^3
Top Soil	TS	1.57
andy/stiff clay	SSC	1.6
Sandy/clayey sand	SCS	1.63
Clay/sandy clay	CSC	1.65
Lateritic Gravel	LG	1.73
Blocky laterite (cemented)	BL	1.67
Bedrock	BED	1.52

5. Resource Estimation

5.1 Assumptions

General assumptions considered in the estimation of the SRL Mineral Resources include:

- A lower cut-off grade of 0.25% has been adopted based on historical experience of what insitu rutile grade could potentially be economic and allowing for some pricing upside. The value also is typically coincident with the transition from mineralised material to waste in historical mining. In the case of the Lanti Deposit the mineral resource is in part defined by a constraining boundary which may include un-mineralised material as a result of the practical constraints associated with the limitations of dredge mining. In keeping with the lower costs associated with dredging a 0.2% rutile cut-off grade has been adopted for the Lanti Deposit.
- The Reported Mineral Resources assume that the dominant mining method going forward will be selective dry open cut mining. The Lanti Dredge will continue to exploit the viable "dredge" resources in the Lanti Mineral Resource.

- Metallurgical recoveries are based on historical mining and it is assumed that the historical recoveries will be the same for deposits to be mined in the future.
- Some areas to be mined in the future contain elevated sulphur levels and there is the potential to generate acidic waste materials. Mine planning strategies to annul this risk will be developed during mine planning and may include re-placement of sulphidic tailing below the water table or the use of neutralising agents.

5.2 Estimation and Modelling Methodology

A variety of geological modelling packages have been used historically by SRL and nominated consultants. Post-2002, Minesight MS3D has been the software used. In 2012 and 2013, the various geological models were consolidated and re-constructed using the Micromine software platform and it remains the software applied at SRL.

Geological interpretation and data analysis

Each deposit was assessed in terms of the various statistical populations present within the data to establish whether these needed to be decomposed into separate domains for estimation. This typically included statistical analysis of the RR% grades using histogram, cumulative frequency plots and probability plots. In addition, variables such as ore thickness, bedrock topography, lithology and geological depositional character were included in the domain evaluation. The Lanti, Gangama, Gbeni, Kamatipa and Ndendemoia deposits all required domaining for estimation purposes, with Lanti the most typical example as shown in Figure 5.1.

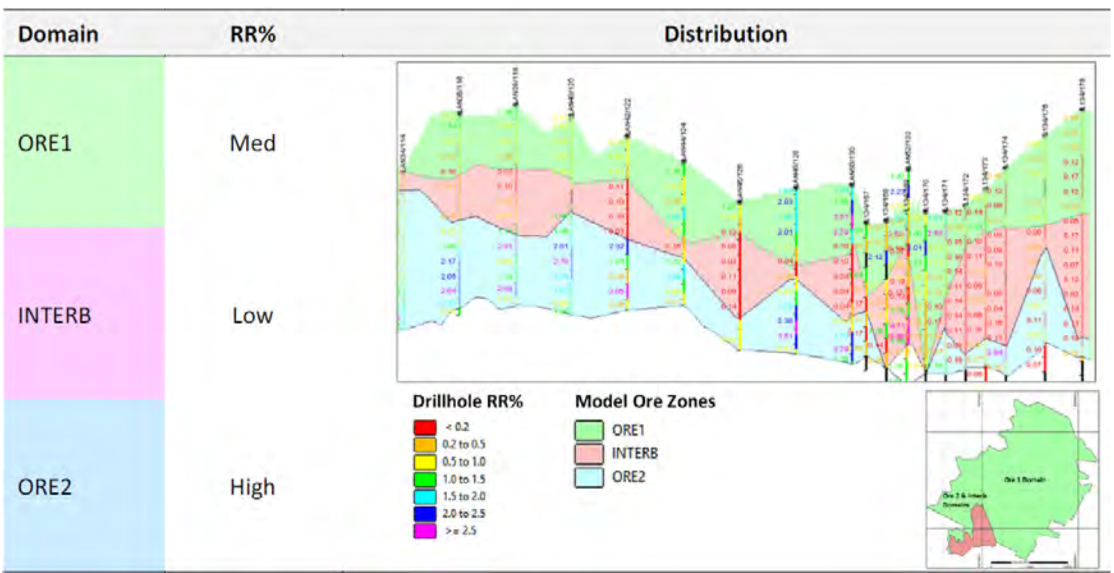


Figure 5.1: Example of zonal control based on lithology and grade domains identified from geological and statistical analysis.

The topographic and bedrock surface DTM's are constructed using the Micromine wireframing function. The wireframes for the topographic and bedrock DTM's were usually extended from the outer borehole co-ordinates plus one-half of borehole spacing to prevent edge effects during block modelling. The topographic DTM for each deposit is derived from the LIDAR survey database, using a 0.5 metre resolution, which has been composited from the original 0.15m resolution. All drillhole collar elevations were projected onto the LIDAR topographic DTM, with the exception of areas disturbed by mining or civil works. The original surveyed drillhole elevations were retained in these areas.

The bedrock wireframes were constructed using the top elevation of the bedrock unit in each respective drillhole as a guide.

Block modelling

The three-dimensional solid formed between the topographic and bedrock DTM surfaces defined the volume of heavy mineral sediments modelled for each deposit. The estimation parameters used for the lithological interpolation are given in Table 5.1, Table 5.2 and Table 5.3.

The variography analysis undertaken by Mine Development Associates (MDA - *Resource Estimate of the Lanti, Gangama, Gbeni, and Sembehun Heavy Mineral Sands Deposits, Sierra Leone*) was used as a guideline for the current block estimation. The variograms derived from this analysis displayed similar anisotropy for most attributes in each deposit. The Gangama deposit anisotropy differs slightly however and may be as a result of the relatively narrow east-west drill hole pattern, which closely follows the linear mineralization trend.

The model block dimensions are typically at 30m x 30m x 1.5m, with subcelling of the parent blocks at the edges of the deposits and in areas of less than 1.5 metre ore thickness. The selected block size fits appropriately with the dominant drillhole spacing and is a suitable configuration for the relatively low (grade) variability observed. This block size also provided an appropriate balance between representative geological and grade continuity and geostatistical volume variance.

Table 5.1: Summary of model structure for the SRL block models.

	Origin			Block Dimensions		
Deposit	East	North	RL	East	North	RL
Lanti	796,052	846,703	-17.80	30	30	1.5
Lanti_L5	795,831	846,703	-26.70	30	30	1.5
Gangama West	787,162	854,084	-9.70	30	30	1.5
Gangama E2	793,396	854,235	12.60	30	30	1.5
Gbeni North	794,478	848,023	-12.00	30	30	1.5
Mogbwemo Tails	Various	Various	Various	15	15	1.5
Mogbwemo Virgin	798,879	859,751	29.35	15	15	1.5
Sembehun - Benduma	773,264	873,293	-15.70	30	30	1.5
Sembehun - Kamatipa	775,559	878,112	2.80	30	30	1.5
Sembehun - Dodo	772,679	875,928	-12.70	60	60	1.5
Sembehun - Kibi	772,648	877,211	-10.40	60	60	1.5
Sembehun - Komende	778,995	877,877	-4.00	30	30	1.5
Mosavi	805,385	846,590	-12.80	30	30	1.5
Ndendemoia East	801,667	858,164	18.90	30	30	1.5
Ndendemoia West	800,761	857,369	11.80	30	30	1.5
Taninahun	801,564	859,629	23.70	30	30	1.5

Table 5.2: Summary of lithology attribute interpolation parameters used.

	Lithological Model									
	Ellipse	Search Ellipsoid - Axis 1			Search Ellipsoid - Axis 2			Search Ellipsoid - Axis 3		
Deposit	Radius	Factor	Azimuth	Plunge	Factor	Azimuth	Plunge	Rotation	Factor	Azimuth
Lanti	170	1	25	0	1	115	0	0	0.0075	180
Lanti_L5	170	1	25	0	1	115	0	0	0.0075	180
Gangama West	60	1	315	0	1	45	0	0	0.0250	0
Gangama E2	200	1	315	0	1	45	0	0	0.0075	0
Gbeni North	45	1	340	0	1	70	0	0	0.0094	0
Mogbwemo Tails	50	1	90	0	1	180	0	0	0.0300	180
Sembehun - Benduma	125	1	35	0	1	125	0	0	0.0120	180
Sembehun - Kamatipa	250	1	35	0	0.6	125	0	0	0.0060	180
Sembehun - Dodo	245	1	35	0	1	125	0	0	0.0063	180
Sembehun - Kibi	245	1	35	0	1	125	0	0	0.0063	180
Sembehun - Komende	150	1	35	0	1	125	0	0	0.0240	180
Mosavi	260	1	35	0	1	125	0	0	0.0580	180
Ndendemoia East	125	1	335	0	1	65	0	0	0.0120	90
Ndendemoia West	125	1	335	0	1	65	0	0	0.0120	90
Taninahun	60	1	310	0	1	40	0	0	0.0246	90

Table 5.3: Summary of the grade attribute interpolation parameters used.

	Grade Model									
	Ellipse	Search Ellipsoid - Axis 1			Search Ellipsoid - Axis 2			Search Ellipsoid - Axis 3		
Deposit	Radius	Factor	Azimuth	Plunge	Factor	Azimuth	Plunge	Rotation	Factor	Azimuth
Lanti	200	1.0	25	0	0.5	115	0	0	0.0075	180
Lanti_L5	200	1.0	25	0	1.0	115	0	0	0.0075	180
Gangama West	60	1.0	315	0	1.0	45	0	0	0.0250	0
Gangama E2	350	1.0	315	0	0.6	45	0	0	0.0043	0
Gbeni North	45	1.0	340	0	1.0	70	0	0	0.0030	0
Mogbwemo Tails	90	1.0	90	0	1.0	180	0	0	0.0167	180
Sembehun - Benduma	225	1.0	35	0	0.6	125	0	0	0.0059	180
Sembehun - Kamatipa	250	1.0	35	0	0.6	125	0	0	0.0060	180
Sembehun - Dodo	490	1.0	35	0	1.0	125	0	0	0.0031	180
Sembehun - Kibi	490	1.0	35	0	1.0	125	0	0	0.0031	180
Sembehun - Komende	405	1.0	35	0	0.6	125	0	0	0.0037	180
Mosavi	410	1.0	35	0	0.6	125	0	0	0.0037	0
Ndendemoia East	200	1.0	335	0	0.6	65	0	0	0.0075	90
Ndendemoia West	200	1.0	335	0	0.6	65	0	0	0.0075	90
Taninahun	100	1.0	310	0	1.0	40	0	0	0.0150	90

SRL use the *Inverse Distance Weight (IDW)* method of interpolating grade into the model. This is supported by the low Coefficient of Variation (CoV) for the rutile assay population.

The IDW search distances for the analytical model attributes ranged from 100 metres in the deposits with a high drill density, to 490 metres in the more widely drilled deposits. To prevent over-smoothing of the grade estimates, the search radii were usually limited to approximately 2 times the modal drill spacing for each deposit. Declustering (4 sectors) was applied to eliminate bias toward isolated high-grade intervals, with the maximum number of points included in each sector restricted to minimise the bias from any single sector.

Note*: The THM, ilmenite and zircon grade data was often sourced from point-counted composites, which were either composited downhole or across similar geological units in adjacent boreholes. This resulted in either too few data points available for estimation or over-smoothed grade estimates. In addition, uncertainty existed in some cases over the analytical state of these grade variables. It is suspected that some of these intervals represent the -1mm to +63µm sand fraction rather than whole rock i.e. biased high. In these cases, the THM, ilmenite and zircon grades were either not estimated at all, or down-graded to the inferred resource category.*

The estimates for the grade model blocks were validated using visual checks, which entailed on-screen review of cross-sections through each of the models where drillhole grades were compared to model estimates. Quantitative strip analysis was also used to validate estimated grades against native data.

6. Mineral Resource Statement

6.1 Resource Classification

The estimate has been classified and reported into the Measured, Indicated and Inferred Mineral Resource categories by Competent Persons in accordance with the guidelines set out in the Australasian Code for the Reporting of Exploration Results, Mineral Resources and Ore Reserves (JORC Code, 2012 Edition) based on a combination of:

- Data provenance and availability;
- Drillhole spacing and sampling density;
- Confidence in analytical data;
- Established geological continuity; and
- The level of confidence in the rutile and mineralogical grade continuity.

In addition the potential for eventual economic extraction is taken into consideration when determining Mineral Resources that are valid for reporting under the JORC Code (2012 Edition).

6.2 Model Depletion

The Lanti, Gbeni and Gangama block models were further optimised by the removal ('depletion') of all mined material. Mined-out perimeters and wireframes for each deposit from the start-up of operations to 31st December 2016 were provided by the Survey Department for the depletion of the models.

The Survey polygons and wireframes were assigned to each respective block model, with all blocks occurring within the depletion shell assigned mining codes in the block models. The mined / unmined blocks were filtered and the respective tonnage and rutile grade of each reconciled against the metallurgical production balance and the original (un-depleted) block model. Negligible discrepancies were evident and were attributed to the imposed sub-celling criteria.

6.3 Grade Estimation

The estimation of the mineral resource tonnages and grade was undertaken in Micromine at various RR% cut-off grades and was based on:

- Statistical evaluation of the sample data;
- Current operational practices for dredge mining and processing;
- Consideration of the lateral and vertical mineralisation distribution;
- The potential mining and extraction methodology; and
- The reasonable prospects for eventual economic extraction.

6.4 Discussion of Relative Accuracy

The relative accuracy and therefore confidence of the resource estimate is reflected in the consideration of the underlying influencing factors considered in Section 6.3 above and are taken into consideration during the classification of the resource estimates by the Competent Person.

6.5 Model Reconciliation

The respective mineral resource block models are reconciled against production on a monthly basis. The local block model tonnages and grades are estimated in Micromine by extracting the resource blocks that occur within the monthly surveyed mined out polygons. The production tonnages and grades are sourced from the month end metallurgical balance, the latter of which is calibrated to the onsite weighbridge. Differences of within 15% monthly and 10% annually of that measured (with a 90% frequency) are considered acceptable. The comparison of resource block model vs. production contained rutile tonnages for dredge mining (D1) and dry mining (DM1&2) are shown in Figure 6.1 and Figure 6.2.

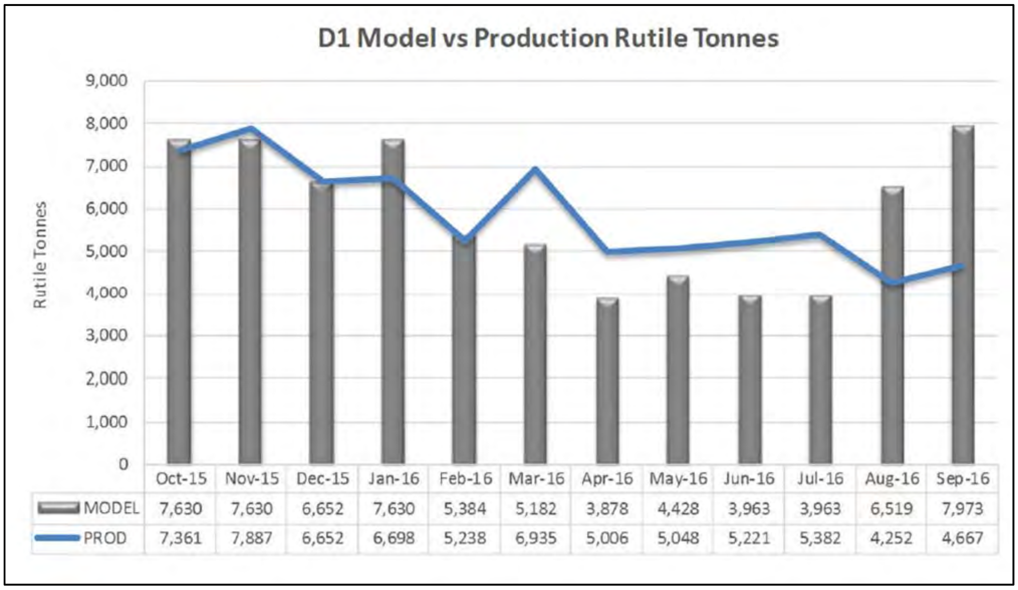


Figure 6.1: Resource Model vs Production Reconciliation for Lanti Dredge.

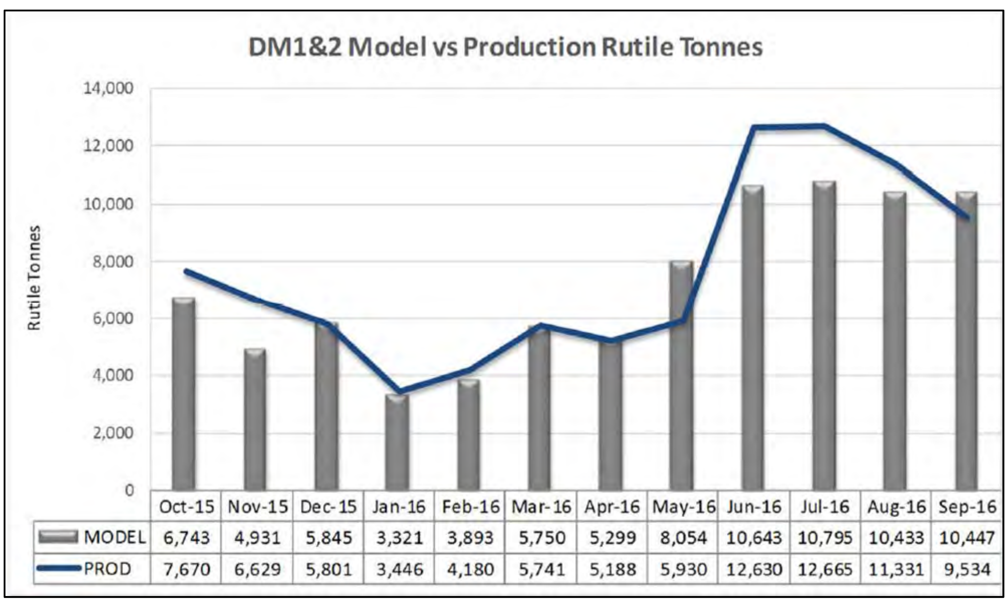


Figure 6.2: Resource Model vs Production Reconciliation for SRL Dry Mining Operations.

The resource block model vs. production reconciliation is within acceptable tolerances on both monthly and annual bases. Annually, the model dredge (D1) contained rutile tonnages are slightly higher than production (+0.7%), whilst the dry mining (DM1&2) rutile tonnages are lower (-5.1%). No dominant bias is evident from the reconciliation and the accuracy of the resource block models are therefore considered appropriate.

6.6 Mineral Resources declared

The in-situ mineral resource estimate for SRL is summarised in Table 6.1. The location of the Sierra Leonean rutile resources is shown on Figure 4.1 and Figure 4.2.

Table 6.1: Summary of the SRL Mineral Resource Inventory as of the 31 December 2016.

SIERRA LEONE MINERAL RESOURCE BREAKDOWN BY DISTRICT, DEPOSIT AND JORC CATEGORY AT DECEMBER 31 2016									
Summary of Mineral Resources for Sierra Leone (3)			**2016**	**2016**	**2016**	**2016**	**2016**	**2016**	**2016**
District	**Deposit**	**Mineral Resource Category (1)**	**In situ Material Kt**	**In situ Rutile (%)**	**In situ Ilmenite (%)**	**In situ Zircon (%)**	**In situ Rutile Kt**	**In situ Ilmenite Kt**	**In situ Zircon Kt**
Sierra Leone	Gambia	Inferred	27,870	1.03			287		
	Gangama	Measured	13,132	1.99		0.31	261		44
	Gangama	Indicated	32,100	1.28		0.22	411		71
	Gangama	Inferred	14,300	0.93		0.09	133		13
	Gbap	Inferred	68,000	1.00			680		
	Gbeni North	Measured	16,717	1.30		0.17	217		30
	Gbeni North	Indicated	26,900	1.19		0.13	320		35
	Jagbahun	Inferred	2,100	0.97			20		
	Lanti	Measured	29,800	0.92	0.24	0.06	274	72	24
	Lanti	Indicated	34,623	1.17	0.24	0.23	406	86	83
	Mogbwemo Tails	Indicated	12,300	0.72			89		
	Mogbwemo Tails	Inferred	610	0.92			6		
	Mogbwemo Virgin	Indicated	700	0.96			7		
	Mosavi	Indicated	47,400	0.72	0.40	0.15	341	190	71
	Ndendemoia East	Indicated	14,800	0.88		0.03	130		4
	Ndendemoia West	Indicated	4,000	0.63		0.07	25		3
	Nyandehun	Inferred	5,630	1.93			109		
	Sembehun - Benduma	Indicated	168,500	0.88	0.17		1,483	286	
	Sembehun - Dodo	Indicated	74,800	1.14	0.22	0.04	853	165	30
	Sembehun - Kamatipa	Indicated	46,300	1.56		0.14	722		65
	Sembehun - Kibi	Indicated	48,800	0.92			449		
	Sembehun - Komende	Indicated	20,800	0.87		0.09	181		18
	Taninahun	Indicated	5,900	0.79		0.07	47		4
	Taninahun Boka	Inferred	3,350	1.65			55		
Sierra Leone	**Measured Total**		**59,649**	**1.26**	**0.12**	**0.16**	**752**	**72**	**98**
Sierra Leone	**Indicated Total**		**537,923**	**1.02**	**0.14**	**0.07**	**5,463**	**727**	**383**
Sierra Leone	**Inferred Total**		**121,860**	**1.06**	**0.00**	**0.01**	**1,290**	**0**	**13**
Sierra Leone	**Grand Total**		**719,432**	**1.04**	**0.11**	**0.07**	**7,505**	**799**	**494**

Notes:

1 Mineral Resources are reported inclusive of Ore Reserves.

2 Mineral assemblage is reported as a percentage of the insitu material.

3 In situ (dry) metric tonnage is reported.

4 Rounding may generate differences in the last decimal place.

5 The ilmenite and zircon grades are included for tabulation purposes under the Measured and Indicated Resource category. The confidence in the estimate of the grade and tonnage of the ilmenite and zircon are however only to be considered as **Inferred** due to material factors influencing the confidence in the estimates for ilmenite and zircon. Ilmenite and zircon are not considered in the estimation of Ore Reserves.

6 The quoted figures are stated as at the 31 December 2016 and have been depleted for all production conducted to this date.

7 A 0.25% insitu rutile cut of grade has been applied with the exception of Lanti (0.2% to compensate for lower mining costs associated with dredging) and Mosavi (0.3%).

7. Independent Review

All geological models used in the 2016 mineral resource estimate were comprehensively reviewed internally by the Competent Person as stipulated by the *SRL policy for reporting of mineral resources and ore reserves, 2012*. In addition, all newly updated models were independently reviewed by Snowden, South Africa during October 2016 (final report of findings pending).

In November 2013, Snowden (Australia) reviewed all the active models i.e. those used for production and ore reserve estimation. This process thus fulfils the SRL policy of a rolling three-year external review schedule. The exception is the Mogbwemo Tails model, which has only been reviewed internally. No further review has been undertaken of the lesser deposits excluded from the current ore reserve estimate and / or have not changed since the 2012 external SRK review. The status of the model reviews are listed in Table 7.1.

Table 7.1: SRL Block Model review summary.

Deposit	Date Updated	Updated By	Audit Auditor	Audit Date
Lanti	Aug-16	M Button	Snowden	2016
Lanti_L5	Aug-16	M Button	Snowden	2016
Gangama West	Sep-16	S Sisay	Snowden	2016
Gangama E2	Sep-16	S Sisay	Snowden	2016
Gbeni North	Sep-16	S Sisay	Snowden	2016
Mogbwemo Tails	Dec-13	M Button	Internal	2016
Sembehun - Benduma	Aug-15	M Button	Snowden	2016
Sembehun - Kamatipa	Jun-16	S Sisay	Snowden	2016
Sembehun - Dodo	Aug-15	M Button	Snowden	2016
Sembehun - Kibi	Mar-15	M Button	Snowden	2016
Sembehun - Komende	Sep-13	M Button	Snowden	2016
Mosavi	Oct-13	M Button	Snowden	2013
Ndendemoia East	Oct-13	M Button	Snowden	2016
Ndendemoia West	Oct-13	M Button	Snowden	2016
Taninahun	Oct-13	M Button	Snowden	2016

8. Further Work

Exploration and Development of the Sierra Leonean rutile deposits will be progressed in a timely manner to support the ongoing mining operations. Updates to the resource models and associated mineral resource estimates will be done as additional exploration data becomes available.

9. Summary of Information to the Ore Reserve

9.1 Reserve Classification

The stated Proved and Probable Ore Reserves directly coincide with the Measured and Indicated Mineral Resources. There are no Inferred Resources included in the stated reserve numbers.

9.2 Mining and recovery factors

Pit optimisations were conducted using Datamine's NPVS mine planning software. This is industry standard software and utilises the Lerch-Grossman algorithm. The optimisation parameters used consisted of current costs, revenues and recoveries and took into consideration the current mining rates as well as the proposed increased mining rates. Localised areas of the deposit were excluded due to dewatering, community or environmental constraints.

The results of the pit optimisations were used for production scheduling and economic evaluation. The mining methods selected were truck and shovel for the existing and proposed dry mining operations and dredging for the existing dredge mine.

New infrastructure will be required at the Sembehun operations to produce a heavy mineral concentrate (HMC) however existing infrastructure will be used for mineral separation. The assumptions used for Sembehun were assessed in detail in a Pre-Feasibility study.

9.3 Modifying Factors

Modifying factors such as mining dilution and ore recovery have been applied from historical performance. Processing recoveries and operating costs based primarily on current operating results have also been applied. The projects are financially viable at the current forecast prices anticipated by Iluka/SRL.

The price assumptions are internally generated and are based on detailed supply and demand modelling. The price assumptions have also been benchmarked against commercially available consensus price forecasts. The detail of that process is commercially sensitive and is not disclosed.

Iluka's internal modelling indicates that the exploitation of the reported reserves would be expected to generate a positive NPV sufficient to meet Iluka's internally generated investment criteria.

9.4 Cut-off grades

A fixed minimum cut-off grade of 0.5 %RR has been used for all deposits that are dry mined. This is based on current and projected costs.

A cut-off grade is generally not applicable to dredge mining as all the material between the pit floor and surface topography is mined by the dredge. The break-even cut-off grade for the dredge is 0.3 %RR and this was applied in the pit optimization. Other factors than cut-off grade are also applied to the dredge, such as minimum draft and maximum dig depth, to limit the extent of dredge mining and were reflected in the Ore Reserve.

9.5 Processing

The first stage processing that produces the HMC is a well-tested and proven methodology and currently exists at SRL, Iluka and other mineral sands operations around the world.

The metallurgical separation process also utilises known technology where the performance and recovery of the mineral products has been well established by SRL and Iluka in current and past operations.

The current mining operations produce a rutile product to specification and the planned Ore Reserves are expected to continue to do the same.

9.6 Ore Reserves declared

The in situ Ore Reserve estimate for SRL is summarised in Table 9.1. The location of the Sierra Leonean Ore Reserves is shown on Figure 4.1 and Figure 4.2.

Table 9.1: Summary of the Sierra Leone Ore Reserve Inventory as of the 31 December 2016.

SRL ORE RESERVE BREAKDOWN BY DISTRICT, DEPOSIT AND JORC CATEGORY AT DECEMBER 31 2016										
Summary of Ore Reserves for Sierra Rutile ²				2016	2016	2016	2016	2016	2016	2016
District	Deposit	Mineral Resource Category ¹	Overburden Volume kbcm	Ore Tonnes kt²	InSitu Rutile (%)³	InSitu Ilmenite (%)³,⁵	InSitu Zircon (%)³,⁵	InSitu Rutile (kt)	InSitu Ilmenite (kt)	InSitu Zircon (kt)
Sierra Leone	Lanti Dredge Mine	Proved	-	8,403	1.07	-	-	90	-	-
	Lanti Dredge Mine	Probable	-	1,117	0.89	-	-	10	-	-
	Gbeni North	Proved	110	15,181	1.30	-	-	197	-	-
	Gbeni North	Probable	2120	16,223	1.27	-	-	206	-	-
	Gangama	Proved		10,668	1.97	-	-	210	-	-
	Gangama	Probable	350	20,958	1.40	-	-	293	-	-
	Lanti Dry Mine	Probable		10,607	1.09	-	-	116	-	-
	Kamatipa	Probable	500	39,363	1.67	-	-	658	-	-
	Benduma	Probable	10300	71,515	1.22	-	-	870	-	-
	Dodo	Probable	890	62,435	1.16	-	-	721	-	-
	Kibi	Probable	710	34,381	1.03	-	-	353	-	-
	Komende	Probable	-	14,796	0.98	-	-	144	-	-
Sierra Leone	**Proved Total**		**110**	**34,251**	**1.45**	**-**	**-**	**497**	**-**	**-**
Sierra Leone	**Probable Total**		**14,870**	**271,395**	**1.24**	**-**	**-**	**3,371**	**-**	**-**
Sierra Leone	**Total**		**14,980**	**305,646**	**1.27**	**-**	**-**	**3,868**	**-**	**-**

Notes:
1 Ore Reserves are a sub-set of Mineral Resources
2 In situ (dry) metric tonnage is reported.
3 Mineral assemblage is reported as a percentage of the insitu material.
4 Rounding may generate differences in the last decimal place.
5 The ilmenite and zircon grades are included for tabulation purposes under the Proved and Probable Reserve category. The confidence in the estimate of the grade and tonnage of the ilmenite and zircon are however only to be considered as **Inferred** due to material factors influencing the confidence in the estimates for ilmenite and zircon.
6 The quoted figures are stated as at the 31 December 2016 and have been depleted for all production conducted to this date.

10. References

ACA Howe, 2005; "*Sierra Rutile, Sierra Leone; Scoping Study on the Mogbwemo Wet Plant Tailings and other Satellite Deposits*".

Author unknown. 1996; "*Mineral Sands Mining in Sierra Leone.*"

Boli, C., 1982; "*Regional Reconnaissance Exploration*".

Button, MTG, 2016; "*Competent Persons Report, Mineral Resource Statement November 2016*".

Mackenzie, DH Dr. 1961; "*Geology and Mineral Resources of Gbangbama Area. Geological Survey of Sierra Leone, Bulletin No. 3*".

Mining Development Associates (MDA) 2002,"*Resource Estimates of the Lanti, Gangama, Gbeni, and Sembehun Heavy Mineral Sands Deposits*".

Mining Development Associates (MDA) 2003; "*Sierra Rutile Limited, Resources, Reserves, Mine Plans, Site Observations*".

Ransome, I., 2010, "*Resource and Reserve Estimates, Sierra Rutile Limited*".

Randall, MM, 2016, "Competent Persons Report, Ore Reserve Statement December 2016".

Sierra Leone Rutile Deposits – JORC Code 2012 edition. – Table 1 Commentary.

Section 1 Sampling Techniques and Data

(Criteria in this section apply to all succeeding sections.)

Criteria	JORC Code explanation	Commentary
Sampling techniques	*Nature and quality of sampling (eg cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc). These examples should not be taken as limiting the broad meaning of sampling.* *Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.* *Aspects of the determination of mineralisation that are Material to the Public Report.* *In cases where 'industry standard' work has been done this would be relatively simple (eg 'reverse circulation drilling was used to obtain 1 m samples from which 3 kg was pulverised to produce a 30 g charge for fire assay'). In other cases more explanation may be required, such as where there is coarse gold that has inherent sampling problems. Unusual commodities or mineralisation types (eg submarine nodules) may warrant disclosure of detailed information.*	The Sierra Leone rutile deposits have been explored by a number of drilling methods and supporting equipment including Hollow Flight Auger (HFA), Reverse Circulation Aircore (RCAC), Stitz Drill, Bangka Drill and Aluminum Derrick Tripod Rig. A total of 116,720 m of drilling has been completed on the Sierra Leone rutile deposits. The samples are typically geologically logged on site and a nominal 2kg sample obtained by slitting of core from the HFA drilling or through the use of a rotary slitter in the case of the RCAC drilling. Sample lengths are typically 0.5 to 1.5 m intervals and all the drill sample is presented for subsampling. All samples are submitted for assay. The mineralisation is determined by both visual inspection of panned sample and laboratory assays. No geophysical methods have been used in the determination of the Sierra Rutile mineral resources. Samples have been analysed by industry typical methods for heavy minerals at the on-site laboratory attached to the Mogbwemo Mineral Separation Plant. The same basic determination method with minor variations has been used for over 45 years. The earlier mineral analyses were typically more rudimentary and focused on the determination of the rutile resulting in a lower knowledge base for minerals such as ilmenite and zircon. Since the early 1990's the following process has been in effect. The samples are oven dried and weighed. The sample is then soaked for 12 hours and wet screened to remove the slimes (-63µm) and oversize at +1.0mm and +9.5mm. The +63um - 1.0 mm fraction is riffle split to produce one sample of about 100g for further analysis and the remainder is bagged for storage. The sample for further analysis is then sieved at 710 um with the -710 material being subjected to float/sink determination using Bromoform (SG=2.86g/cm^3) prior to 2002 then Lithium-Sodium-Tungsten (SG=2.85) to determine the HM content. The mineral assemblage data is

Criteria	JORC Code explanation	Commentary
		obtained by compositing the HM component of samples from similar geological facies, screening across a series of size ranges, conducting a magnetic separation (Permroll Magnet) and XRF analysis on the magnetic and non-magnetic fractions. This is supported by 500 point grain count analysis to assist in identifying the mineral species present.
Drilling techniques	*Drill type (eg core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc) and details (eg core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc).*	The Sierra Leone rutile deposits have been explored by a number of drilling methods and supporting equipment including Hollow Flight Auger (HFA), Reverse Circulation Aircore (RCAC), Stitz Drill, Mechanical Bangka Drill and Aluminum Derrick Tripod Rig. A total of 116,720m of drilling has been completed on the Sierra Leone rutile deposits. The Stitz drilling which is critical to supporting the Inferred Mineral Resources is sampled via slots in the sample barrel and is recognised as being prone to contamination from previously intersected substrate. Other failings of the Stitz drilling include the inability to penetrate more competent lateritic material and a 6m depth limitation. The resource estimates for mineralisation defined by the Stitz drilling, which was used prior to 1970, have ubiquitously been deemed to have a low confidence resource estimates which is reflected in the Inferred Resource classification awarded. The hole diameter is typically 63 to 76 mm for the HFA drilling and all holes have been drilled vertically.
Drill sample recovery	*Method of recording and assessing core and chip sample recoveries and results assessed.* *Measures taken to maximise sample recovery and ensure representative nature of the samples.* *Whether a relationship exists between sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.*	All drill samples are qualitatively logged in accordance with company (SRL) standard operation procedures which record commentary on the sample recovery and lithological qualifiers. Sample representivity is ensured by collecting the whole of the sample returned from the drilling which is then presented to the laboratory for analysis. Sampling by auger methods generally provides a representative sample. In some instances the auger samples are split to produce a duplicate sample without core loss. The Aircore drilling has been shown to give a low bias of the oversize content. Also the RCAC drilling is prone to slimes loss when samples are dry with fine material “blowing” away. Also the wet clay rich nature of the Sierra Leonean rutile deposits tends result in samples holding

Criteria	JORC Code explanation	Commentary
		up in the sample cyclone and rotary splitting equipment. This results in contamination and poor sample representivity for the RCAC drilling. For these reasons the HFA drilling is favoured over RCAC drilling. The sample results from RCAC drilling are typically not used to support the resource estimates but are used to guide future exploration drilling using the HFA.
Logging	*Whether core and chip samples have been geologically and geotechnically logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and metallurgical studies.* *Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc) photography.* *The total length and percentage of the relevant intersections logged.*	All samples are geologically logged by site geologists at the time of drilling. Information recorded includes the length and diameter of the sample, sample recovery, colour, lithology, lithological characteristics and qualifiers relating to slimes and oversize characteristics. The logging is considered qualitative and is appropriate for supporting the Mineral Resource estimates. The geological logging is also used as a guide to the allocation of samples assigned to metallurgical composites for assemblage determination. No geological logs are available for the Stitz drilling carried out during the 1960/70's due to the destruction of these records. This has been taken into consideration when assigning the JORC Code Resource Classification for the mineral resources supported by this drilling.
Sub-sampling techniques and sample preparation	*If core, whether cut or sawn and whether quarter, half or all core taken.* *If non-core, whether riffled, tube sampled, rotary split, etc and whether sampled wet or dry.* *For all sample types, the nature, quality and appropriateness of the sample preparation technique.* *Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.* *Measures taken to ensure that the sampling is representative of the in situ material collected, including for instance results for field duplicate/second-half sampling.* *Whether sample sizes are appropriate to the grain size of the material being sampled.*	No core sampling has been done on the Sierra Leonean rutile deposits. The entire sample returned from the HFA drilling is submitted for assay, while the sample material from RCAC drilling is presented to a rotary splitter mounted beneath a cyclone at the time of drilling. About a ¼ split weighing 1.5 to 2.0 Kg is taken for analysis. As previously discussed there is potential for the sample to "hang-up" on the sampling equipment due to the wet clayey nature of the mineralised material. As a result the use of the RCAC drilling in resource delineation is limited. Samples presented to the SRL site laboratory are collected in pre-labelled calico bags. Unique sample identifiers are recorded on metallic tags and placed in the sample bag for validation. Duplicate samples are taken at the rate of 1:20 samples from the HFA drilling by halving the material taken from the sample tube. This QA/QC protocol has only been in place since 2013 and prior to this no QA/QC control in relation to the sampling is recorded. Anomalous results are

Criteria	JORC Code explanation	Commentary
		investigated for obvious errors and if none are apparent the associated sample batch is re-analysed. The pass criteria for the sample program as a whole, is 90% of duplicates within 20% difference. The sample size is considered appropriate for the material hosting the mineralisation, which is supported by Gy's sampling theory and the modest variability of duplicate sample results.
Quality of assay data and laboratory tests	*The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.* *For geophysical tools, spectrometers, handheld XRF instruments, etc, the parameters used in determining the analysis including instrument make and model, reading times, calibrations factors applied and their derivation, etc.* *Nature of quality control procedures adopted (eg standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (ie lack of bias) and precision have been established.*	The analysis method used is considered industry standard for mineral sands and appropriate for this style of mineralisation under consideration. The majority of samples analysed at SRL have been analysed using a combination of MRS 400 XRF (analysing a pressed pellet) and grain counting. Wet chemical determination for TiO2 is also confirmed using Atomic Absorption Spectroscopy (AAS). Certified standards are used for the calibration of both the AAS and XRF equipment. In addition 5 to 10% of the analytical submissions are duplicated to verify analytical precision. The pass criteria for analytical samples as a whole, is 90% of duplicates within 5% difference. Anomalous samples are investigated for errors and if no errors are apparent, the entire batch is either re-analysed, confirmed by wet chemistry or the estimate confidence is downgraded. Checks are also run from time to time by analysis at external laboratories.
Verification of sampling and assaying	*The verification of significant intersections by either independent or alternative company personnel.* *The use of twinned holes.* *Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.* *Discuss any adjustment to assay data.*	All results are reviewed by the resource geologist to ensure the values are realistic. Twinned drill holes are completed against historical drill sites during infill drilling campaigns to confirm the historical rutile grades. Three chronologically distinct databases exist at SRL, these being; A historical analogue database, which comprises analogue records for reconnaissance drilling completed in the early 1970's. It comprises various reports and maps which contain the information supporting the resource estimates for the "satellite" deposits of Gbap, Gambia, Jagbahun, Nyandehun and Taninahun Boka.

Criteria	JORC Code explanation	Commentary
		A historical digital database which contains information from drill conducted over ML011/72 and ML105/72 prior to 1995. The information is preserved as text files containing drill hole interval logs and assay data, and historical point count data. The information in this database was originally recorded as imperial units of measurement. Check drilling was carried out during 2002 by MDA which verifies this information. The current database which retains digital records for data collected since 2002 and has adopted a metric data format. The data is hosted in an audited MS Excel database. No adjustment is made to the data within the datasets. Some adjustment to the TiO2 grades from the 2013 – 2016 grade control drilling has been done which have demonstrated a low TiO2 bias when compared to Wet Chemical (WC) TiO2 analyses. The analyses for these programs have used Pressed Pellets (PP) for cost efficiency and time expediency. The pressed pellets have been demonstrated to be prone to a low bias due to matrix and mineralogical effects. A positive correlation (r^2 = 93%) is shown by the comparative datasets. Two linear algorithms were used to adjust the TiO2 data for the purpose of resource estimation where analyses were derived from pressed pellets for these programs. Where TiO2<1.0%: WC TiO2 = (0.9368)*PPTiO2 + 0.9482, otherwise WC TiO2 = (0.8149)*PPTiO2 + 0.2168.
Location of data points	*Accuracy and quality of surveys used to locate drill holes (collar and down-hole surveys), trenches, mine workings and other locations used in Mineral Resource estimation.* *Specification of the grid system used.* *Quality and adequacy of topographic control.*	Each borehole position is located using company owned Leica Viva GS10 GPS equipment, with X, Y, Z accuracy of +/-0.5m. Historically SRL worked within the Clarke 1880 datum, but has subsequently converted all survey information into the World Geodetic System (WGS) 1984. All data points are recorded in the UTM Zone 28 (Northern Hemisphere) using the Sierra Leone National Grid as per the transformation given below.

<table>
<tr><th>Criteria</th><th>JORC Code explanation</th><th>Commentary</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Survey Descriptor</th><th>Projection Information</th></tr>
<tr><td>Coordinate system</td><td>UTM Zone 28, Northern Hemisphere</td></tr>
<tr><td>Earth projection</td><td>8, 104, "m", -15, 0, 0, 9996, 500000, 0"</td></tr>
<tr><td>Projection</td><td>Transverse Mercator (Gauss-Kruger)</td></tr>
<tr><td>Datum</td><td>World Geodetic System, 1984</td></tr>
<tr><td>Ellipsoid</td><td>WGS 84</td></tr>
<tr><td>Units</td><td>Metres</td></tr>
<tr><td>Origin, Longitude</td><td>-15"</td></tr>
<tr><td>Origin, Latitude</td><td>0"</td></tr>
<tr><td>Scale factor</td><td>0.9996</td></tr>
<tr><td>False Easting</td><td>500,000</td></tr>
<tr><td>False Northing</td><td>0</td></tr>
</table>
During 2013 LIDAR surveys were conducted over the SRL Mining Leases producing data with a vertical resolution of +/- 0.15 m. Drill collar points are projected to the Lidar surface for the purpose of resource modelling. This provides excellent spatial location for data points and subsequent mine planning.
</td></tr>
<tr><td>Data spacing and distribution</td><td>
Data spacing for reporting of Exploration Results.
Whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied.
Whether sample compositing has been applied.
</td><td>
The drilling prior to 1995 was conducted on regular grid spacing to define the mineralisation and support Mineral Resource and Ore Reserve estimation. Initial drilling is conducted on an ~244 (800ft) to 488m (1600ft) grid array. Subsequent infill drilling is done on an ~122 m grid spacing, often with an additional hole at the centre of each 122m grid block. Post 2002 drilling campaigns were phased, starting with a 240m by 240 m drill spacing with subsequent infill to 120 m by 120 m spacing depending on the mineralisation potential. Select areas are drilled at a 60m by 60 m spacing, particularly over palaeochannels where the geological variability is higher. From 2012, grade control drilling has done in some areas at 20 to 25m grid spacing to support the mining operations.
The drill spacing in conjunction with rutile kriging variance is used to support the application of an appropriate resource classification. Typically a drill grid spacing of 60m or less supports a Measured Resource classification, while drilling from 60 to 240m spacing supports an Indicated Resource classification. Mineral resources defined by drilling spaced at > than ~240m
</td></tr>
</table>

Criteria	JORC Code explanation	Commentary
		are typically awarded an Inferred Resource classification. Note that other factors are also considered when allocating a JORC Code Resource Classification. Compositing of samples has been used to assist in assemblage determination. Heavy mineral fractions from geologically similar units are combined and subjected to magnetic fractionation and XRF analysis of the magnetic and non-magnetic components. Point counting of the magnetic and non-magnetic fractions is also done to support the XRF analyses.
Orientation of data in relation to geological structure	*Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.* *If the relationship between the drilling orientation and the orientation of key mineralised structures is considered to have introduced a sampling bias, this should be assessed and reported if material.*	All drilling has been done vertically which is perpendicular to the mineralisation and geology orientation so no bias is presented.
Sample security	*The measures taken to ensure sample security.*	At the time of logging, duplicate aluminium tags are inserted into the bag. Bags are placed in sacks labelled with the corresponding drill hole ID. The geologist in charge prepares a sample dispatch form each day which is presented to the laboratory with the samples from that days drilling.
Audits or reviews	*The results of any audits or reviews of sampling techniques and data.*	No external review of the sampling techniques is known of. All sampling is conducted as per internal site procedures and audited by the on-site geologists.

Section 2 Reporting of Exploration Results

(Criteria listed in the preceding section also apply to this section.)

Criteria	JORC Code explanation	Commentary
Mineral tenement and land tenure status	*Type, reference name/number, location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environmental settings.* *The security of the tenure held at the time of reporting along with any known impediments to obtaining a licence to operate in the area.*	The Sierra Leonean Rutile deposits are covered by 7 mining leases which are wholly owned by Iluka through its subsidiary company Iluka Investments (BVI). **Licence Name** / **Licence Number** / **Area (km^2)** / **Date Issued** / **Expiry Date** ML011/72 – Area 1 / 2134 / 290.60 / 01-Jul-1984 / 23-Jan-2039 ML012/72 - Gambia / 2134 / 17.50 / 01-Jul-1984 / 23-Jan-2039 ML013/72 - Jagbahun / 2134 / 20.65 / 01-Jul-1984 / 23-Jan-2039 ML014/72 - Nyandehun / 2134 / 5.64 / 01-Jul-1984 / 23-Jan-2039 ML015/72 - Sembehun / 2134 / 73.63 / 01-Jul-1984 / 23-Jan-2039 ML015/72 – Sembehun Ext / 2134 Ext / 125.10 / 17-Sep-1991 / 23-Jan-2039 ML016/72 – Taninahun Boka / 2134 / 12.47 / 01-Jul-1984 / 23-Jan-2039 ML017/72 - Mosavi / 2134 / 13.32 / 01-Jul-1984 / 23-Jan-2039 **Total** / / **558.91** / / The tenements give the right to mine rutile, zircon, ilmenite, monazite, columbite, graphite, garnet and other titanium bearing minerals. Provision to mine is made under the Sierra Rutile Agreement (Ratification) Act of 2002, whereby payment of Surface Rent is made on all land used by the company, with rental payments distributed to the landowner, Paramount Chiefs and Native Administration. Each of the 7 Mining Licenses is valid for a period of 33 years from the commencement of mining in 2006 and may be extended by a further (minimum) term of 15 years.
Exploration done by other parties	*Acknowledgment and appraisal of exploration by other parties.*	In the compilation of the mineral estimates, the subject of this report, information from the following qualified reports has been used and accordingly are acknowledged: Mining Development Associates (MDA) 2002,"Resource Estimates of the Lanti, Gangama, Gbeni, and Sembehun Heavy Mineral Sands Deposits,

Criteria	JORC Code explanation	Commentary
		Sierra Leone. MDA 2002, unpubl. Mining Development Associates (MDA) 2003, "Sierra Rutile Limited, Resources, Reserves, Mine Plans, Site Observations. MDA 2003, unpubl. ACA Howe, 2005, "Sierra Rutile, Sierra Leone; Scoping Study on the Mogbewmo Wet Plant Tailings and other Satellite Deposits". ACA Howe, unpubl. Boli, C., 1982,"Regional Reconnaissance Exploration". Internal SRL Rep. Unpubl. Ransome, I., 2010, "Resource and Reserve Estimates, Sierra Rutile Limited". Internal SRL Rep. Unpubl. Author unknown. 1996. Mineral Sands Mining in Sierra Leone. Internal SRL Rep. Unpubl. Mackenzie, DH Dr. 1961. Geology and Mineral Resources of Gbangbama Area. Geological Survey of Sierra Leone, Bulletin No. 3. Button, MTG., 2016. "Competent Persons Report, Mineral Resource Statement November 2016". Internal SRL Rep. Unpubl.
Geology	*Deposit type, geological setting and style of mineralisation.*	The Sierra Leonean rutile mineralisation is hosted within alluvial and fluvial sedimentary facies of the Bullom Group Sediments. Mineralisation has been derived by the erosion of quartzo-feldspathic gneiss of the Precambrian Kasila group during the Tertiary and redeposited in pre-incised channel systems and alluvial fans flanking topographically elevated areas of the Kasila Group. The host sediments are typically poorly sorted sandy clay and sandy clays. Rubbly surficial laterite development is prevalent through much of the Bullom Group but does not hinder mining.
Drill hole Information	*A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all Material drill holes:* *easting and northing of the drill hole collar* *elevation or RL (Reduced Level – elevation above sea*	The Sierra Rutile database comprises 118,393 m of drilling from 11,630 holes. As such it is impractical to provide a tabulation of all the significant intercepts. This is in part compensated for in the presentation of the Mineral Resource estimates derived from the data and representative cross sections and associated drill hole location plans. All holes are drilled vertically and as such are perpendicular to the

Criteria	JORC Code explanation	Commentary
	level in metres) of the drill hole collar *dip and azimuth of the hole* *down hole length and interception depth* *hole length.* *If the exclusion of this information is justified on the basis that the information is not Material and this exclusion does not detract from the understanding of the report, the Competent Person should clearly explain why this is the case.*	mineralisation. No weighted averaging has been used in the reporting of exploration results. A length weighting is used in instances of irregular sample intervals, otherwise the mineralisation intercepts represent true widths.
Data aggregation methods	*In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (eg cutting of high grades) and cut-off grades are usually Material and should be stated.* *Where aggregate intercepts incorporate short lengths of high grade results and longer lengths of low grade results, the procedure used for such aggregation should be stated and some typical examples of such aggregations should be shown in detail.* *The assumptions used for any reporting of metal equivalent values should be clearly stated.*	No cutting of the mineral grades has been adopted and is not considered appropriate due to the typically low grade variance within the Sierra Leone rutile deposits under consideration. No metal equivalent values have been used in the reporting of mineralisation intercepts.
Relationship between mineralisation widths and intercept lengths	*These relationships are particularly important in the reporting of Exploration Results.* *If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported.* *If it is not known and only the down hole lengths are reported, there should be a clear statement to this effect (eg 'down hole length, true width not known').*	The geology and geometry of the Sierra Leonean rutile deposits is well understood. The drilling is all done vertically which is perpendicular to the mineralisation orientation, and as a result the mineralisation intercepts represent true thickness of the mineralisation.
Diagrams	*Appropriate maps and sections (with scales) and tabulations of intercepts should be included for any significant discovery being reported These should include, but not be limited to a plan view of drill hole collar locations and appropriate sectional views.*	Drill hole location plans and representative cross sections are presented in the associated text of this document to assist in the understanding of the rutile mineralisation.
Balanced	*Where comprehensive reporting of all Exploration Results is not*	The significant intercepts presented in the associated text are typical of

Criteria	JORC Code explanation	Commentary
reporting	*practicable, representative reporting of both low and high grades and/or widths should be practiced to avoid misleading reporting of Exploration Results.*	the mineralisation under consideration. This is superseded to some extent as the estimation of the Mineral Resources considers all material with in the mineralised domains.
Other substantive exploration data	*Other exploration data, if meaningful and material, should be reported including (but not limited to): geological observations; geophysical survey results; geochemical survey results; bulk samples – size and method of treatment; metallurgical test results; bulk density, groundwater, geotechnical and rock characteristics; potential deleterious or contaminating substances.*	Some of the deposits (Gbap, Gambia, Jagbahun, Nyandahun and Taninahun Boka) have limited drill testing. Geological mapping, structural tends and contour analysis has been used to infer the boundary of the mineralisation. This is taken into consideration when applying the resource classification and these deposits are considered to be Inferred. The density for different lithology types was determined using a sand replacement technique. A number of 3 foot deep test pits were excavated. About a 1 cubic foot volume of material was removed and the volume of the hole determined through sand replacement. This in conjunction with the dry weight of the material removed from the test volume was used to calculate the density of the dry insitu material. The dry density of materials encountered in the Sierra Leone rutile deposits was found to range from 1.57 t/m^3 to 1.73 t/m^3. Typically the mineralisation is hosted in unconsolidated sediments which can be excavated with conventional equipment including excavators or bucket ladder dredge. Some minor induration is associated with the development of surficial laterite but this is not developed to the extent that it impedes mining. No deleterious elements are known off. However significant euxinic iron sulphide development is known to be present in the lower lying portions of the deposits adjacent to intertidal/swampy environments. The Sulphide is removed using flotation techniques and re-deposited below water to prevent oxidation and acidification.
Further work	*The nature and scale of planned further work (eg tests for lateral extensions or depth extensions or large-scale step-out drilling).* *Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.*	Owing to the size of the current resource base, the main focus of exploration and testing is limited to staged “proving up” of known mineralisation to support the current mine plans and grade control activities. It is envisaged that exploration for additional mineral resources will be carried out in a timely manner to support the current and future mining operations.

Section 3 Estimation and Reporting of Mineral Resources

(Criteria listed in section 1, and where relevant in section 2, also apply to this section.)

Criteria	JORC Code explanation	Commentary
Database integrity	*Measures taken to ensure that data has not been corrupted by, for example, transcription or keying errors, between its initial collection and its use for Mineral Resource estimation purposes.* *Data validation procedures used.*	The data undergoes several levels of verification prior to modelling. This includes the interrogation of data for outliers such as: • Non-resource units with lab numbers; • Sample prep vs XRF submissions; • Collar duplication; • Missing assays. Other forms of interrogation include mineral ratios such as: • The portion of rutile>ilmenite>zircon is seldom violated; • The VHM % (rutile + ilmenite + zircon) is < than the THM % • Sizing fractions add to 100%; • The mags + non-mags add up to 100%. Also a visual spatial review of the data is carried out by viewing cross sections to ensure the drill holes are in valid locations and the assay values corroborate with the lithological distribution. Due to the age of the dataset it is apparent that a number of the older analytes were not analysed for. In most instances these values are presented as absent but in some instance a “0” value has been errantly substituted for HM%, HM(+70), HM(-70), Fe2O3, ZrO2 and possibly Sulphide. This does not have any impact on the magnitude or robustness of the Mineral Resource estimate for rutile.
Site visits	*Comment on any site visits undertaken by the Competent Person and the outcome of those visits.* *If no site visits have been undertaken indicate why this is the case.*	A site visit was undertaken by Brett Gibson and Mark Button for 2 days during early May 2016. The site visits witnessed the geological structure of the deposits, the exploration activities and ongoing mining operations. Prior to this the Competent Person (Mark Button) visited the site 2 or 3 times per year and compiled resource risk reviews and site visit reports. Numerous other site visits have been undertaken by other Competent Persons since the commencement of mining operations in the 1967.
Geological	*Confidence in (or conversely, the uncertainty of) the geological*	The geology of the style of mineralisation under consideration is well understood from supporting exploration data and exposure to mining over

Criteria	JORC Code explanation	Commentary
interpretation	*interpretation of the mineral deposit.* *Nature of the data used and of any assumptions made.* *The effect, if any, of alternative interpretations on Mineral Resource estimation.* *The use of geology in guiding and controlling Mineral Resource estimation.* *The factors affecting continuity both of grade and geology.*	the past 50 years. All relevant information has been sourced from the drill samples and the interpretations have developed over successive drill campaigns which have included both in-fill drilling within known resources and extensions on the margins of the known deposits. Given the current detail afforded by the geological dataset and mining over the past 50 years no other geological interpretation has been considered for the Sierra Leonean rutile deposits. The geological data from borehole logs has been used to create a basement wireframe surface, which in conjunction with the topographic surface, is used to constrain the mineralisation to the intersected host alluvial and fluvial sediments. Statistical analysis of each deposit was also undertaken to determine if sub-domaining was required. As a result sub-domaining was carried out for the Lanti, Gangama, Gbeni, Kamatipa and Ndendemoia deposits. The sediments hosting the mineralisation appear to become more “mature” with distance from the source topographic highs. As a rule the rutile content also decreases with distance from the source in the sediments. Near the source the host sediments tend to be present as structurally controlled incised valley fill. As distance from the source increases and the basement gradient decreases and the deposits tend to present as alluvial fans.
Dimensions	*The extent and variability of the Mineral Resource expressed as length (along strike or otherwise), plan width, and depth below surface to the upper and lower limits of the Mineral Resource.*	The mineral resources under consideration have a wide variation in physical dimensions. The deposits vary from a few metres to over 20m in thickness. The deposits vary in width from 100m to over 2000m in places. If the leading edge of the Sembehun group of deposits is considered as a single mineralised entity then the width of the mineralisation is over 5000m. The deposits length varies from about 1000m to over 6000m. The deposits vary significantly in size from a few mt to over 150mt. In general the mineralisation is present from surface. Some poorly mineralised interburden layers are present at the Lanti and Benduma Deposits.
Estimation	*The nature and appropriateness of the estimation technique(s)*	The resource modelling and estimation for the Sierra Leone rutile deposits

Criteria	JORC Code explanation	Commentary
and modelling techniques	*applied and key assumptions, including treatment of extreme grade values, domaining, interpolation parameters and maximum distance of extrapolation from data points. If a computer assisted estimation method was chosen include a description of computer software and parameters used.* *The availability of check estimates, previous estimates and/or mine production records and whether the Mineral Resource estimate takes appropriate account of such data.* *The assumptions made regarding recovery of by-products.* *Estimation of deleterious elements or other non-grade variables of economic significance (eg sulphur for acid mine drainage characterisation).* *In the case of block model interpolation, the block size in relation to the average sample spacing and the search employed.* *Any assumptions behind modelling of selective mining units.* *Any assumptions about correlation between variables.* *Description of how the geological interpretation was used to control the resource estimates.* *Discussion of basis for using or not using grade cutting or capping.* *The process of validation, the checking process used, the comparison of model data to drill hole data, and use of reconciliation data if available.*	has been done using Micromine Software. The three dimensional solid formed between the topographic and basement surfaces defines the volume to be interpolated for each deposit. The wireframes were typically extended from the outer boreholes by a half of the typical borehole spacing for that deposit. In some instances sub-domaining was carried where justified by supporting statistical analysis of the data. The typical model block dimension adopted is 30*30*1.5m (X*Y*Z) with an allowance for sub-celling down to 3*3*0.5m dimensions. For deposits supported by more widely spaced drilling the parent cell dimension was increased to 60*60*1.5m. The grade interpolation was done with using Inverse Distance squared (ID2). Search distances for grade variables varied from 100m in the case of Gbeni with very close spaced drilling to 490m for the Dodo and Kibi deposits. Anisotropic search distances were used with the longer search direction oriented to coincide with the deposit anisotropy. No dip was applied to the search ellipse volume. Declustering was applied to reduce bias towards isolated high grade intervals, with the maximum number of points included in each sector restricted to minimise grade bias from any sector. No assumptions have been made in relation to the recovery of by-products in the resource modelling of the Sierra Leonean rutile deposits. No assumptions have been made in relation to modelling of selective mining units. No assumptions were made during the resource modelling in relation to correlation of grade variables. No cutting of grades has been done as it is not considered applicable in deposits of this nature with relatively low grade variability. The resource models were validated by visually comparing the interpolated grades to the drill grades. Also quantitative strip analysis was used to validate estimated grades against the raw data.
Moisture	*Whether the tonnages are estimated on a dry basis or with natural*	All tonnages are estimated using dry in-situ density factors.

Criteria	JORC Code explanation	Commentary
	moisture, and the method of determination of the moisture content.	
Cut-off parameters	*The basis of the adopted cut-off grade(s) or quality parameters applied.*	The mineral resources designated to be dry mined have been reported using a 0.25% rutile cut-off grade. The grade is somewhat lower than would be considered economic under the current mineral pricing conditions but allows for potential price increases as predicted in future mineral pricing forecasts for the mineral sand industry. The comparative non-selectivity of dredge mining limits the concept of applying a cut-off grade as all material in the scheduled path will be mined. Because of this mineral resource boundaries are adopted which allow for adequate dilution and support minimum mining dimensions. The mine planning model accounts for this by limiting the mining shell to volumes that will generate positive revenue. The estimation of the mineral resource tonnages and grade was undertaken using Micromine Software at various cut-off grades based on : • Statistical evaluation of the sample data; • Current operation practices for dredge and dry mining options; • Consideration of the lateral and vertical mineralisation distribution; • The potential mining and extraction methodology; and • The reasonable prospects for eventual economic extraction.
Mining factors or assumptions	*Assumptions made regarding possible mining methods, minimum mining dimensions and internal (or, if applicable, external) mining dilution. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential mining methods, but the assumptions made regarding mining methods and parameters when estimating Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the mining assumptions made.*	Historically the Sierra Leone rutile deposits have been primarily dredge mined. During 2016 only 37% of the rutile production was from dredge mining with 63% attributable to dry mining which commenced during 2014. Dry mining is considered to be a higher cost method but affords greater selectivity. The current dredge Ore Reserve is due to be exhausted in 2018 after which all mining is planned to be by dry mining.
Metallurgical factors or assumptions	*The basis for assumptions or predictions regarding metallurgical amenability. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential metallurgical methods, but the assumptions regarding metallurgical treatment processes and parameters made*	Mining has been carried out intermittently on the Sierra Leonean rutile deposits for a period of nearly 50 years. The metallurgical amenity of the deposits is reasonably well understood from this historical mining. As a result the metallurgical recoveries are factored on the basis of historical

Criteria	JORC Code explanation	Commentary
	when reporting Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the metallurgical assumptions made.	recoveries
Environmental factors or assumptions	*Assumptions made regarding possible waste and process residue disposal options. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider the potential environmental impacts of the mining and processing operation. While at this stage the determination of potential environmental impacts, particularly for a greenfields project, may not always be well advanced, the status of early consideration of these potential environmental impacts should be reported. Where these aspects have not been considered this should be reported with an explanation of the environmental assumptions made.*	Current mining practice is to return all waste materials to the mine void as soon as reasonably possible after mining.
Bulk density	*Whether assumed or determined. If assumed, the basis for the assumptions. If determined, the method used, whether wet or dry, the frequency of the measurements, the nature, size and representativeness of the samples.* *The bulk density for bulk material must have been measured by methods that adequately account for void spaces (vugs, porosity, etc), moisture and differences between rock and alteration zones within the deposit.* *Discuss assumptions for bulk density estimates used in the evaluation process of the different materials.*	The dry in-situ bulk density is based on a sand replacement method. The number of samples used to determine the density of various lithology's is unknown as much of the original data was destroyed. The density testwork was The sand replacement method adequately takes into consideration the potential for void space between sediment grains and has also been carried out on a number of different materials encountered in the mineral deposits.
Classification	*The basis for the classification of the Mineral Resources into varying confidence categories.* *Whether appropriate account has been taken of all relevant factors (ie relative confidence in tonnage/grade estimations, reliability of input data, confidence in continuity of geology and metal values, quality, quantity and distribution of the data).* *Whether the result appropriately reflects the Competent Person's view of the deposit.*	The mineral resource estimates have been classified and reported in accordance with the guidelines of the JORC Code (2012 ed.). The resource category applied (Measured, Indicated or Inferred) is based on a combination of: • Data provenance and availability; • Drillhole spacing and sample density; • Confidence in the analytical data; • Established geological continuity which is corroborated by a long history of mining; and • The confidence in the rutile and mineralogical grade continuity.

Criteria	JORC Code explanation	Commentary
Audits or reviews	*The results of any audits or reviews of Mineral Resource estimates.*	All of the geological models created are reviewed internally by the Competent Person as per the internal company policy and procedures of SRL (prior to the merger). In Addition, all updated models were independently reviewed by Snowden (South Africa) during October 2016. The final report of this review is pending. All models were previously reviewed by Snowden (Australia) in 2013 in line with the SRL protocol of having comprehensive external reviews every three years. The review by Snowden in 2013 did not reveal any fatal flaws although some potential improvements were recommended. The controlling company at the time (SRL) has considered these and updated the data and modelling processes as deemed necessary.
Discussion of relative accuracy/ confidence	*Where appropriate a statement of the relative accuracy and confidence level in the Mineral Resource estimate using an approach or procedure deemed appropriate by the Competent Person. For example, the application of statistical or geostatistical procedures to quantify the relative accuracy of the resource within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors that could affect the relative accuracy and confidence of the estimate.* *The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnages, which should be relevant to technical and economic evaluation. Documentation should include assumptions made and the procedures used.* *These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.*	It is the view of the Competent Person(s) that the frequency and accuracy of the data and the process in which the Mineral Resources have estimated and reported are appropriate for the style of mineralisation under consideration. The relative accuracy of the estimates is reflected in the reporting of the Mineral Resources and the Resource Category assigned as per the guidelines set out in the JORC Code (2012 Edition). The statement refers to global estimates of tonnage and grade. The respective resource block models are reconciled against production on a monthly basis. The local block model tonnages and grades are estimated in Micromine by cutting the model with the respective monthly surveyed volumes. The production tonnage and grade are sourced from monthly metallurgical balance which is calibrated to the onsite weighbridge. Typically the production figures agree to within a few percent of the model estimated rutile tonnages over the longer term although there is increased variability over shorter (monthly) reporting periods. Charts showing monthly reconciliation are presented in the supplementary summary text.

Section 4 Estimation and Reporting of Ore Reserves

(Criteria listed in section 1, and where relevant in sections 2 and 3, also apply to this section.)

Criteria	JORC Code explanation	Commentary
Mineral Resource estimate for conversion to Ore Reserves	*Description of the Mineral Resource estimate used as a basis for the conversion to an Ore Reserve.* *Clear statement as to whether the Mineral Resources are reported additional to, or inclusive of, the Ore Reserves.*	The Mineral Resource estimate is based on the Sierra Rutile Ltd (SRL) report completed in November 2015, compiled by SRL's independent Resource Geologist (Mark Button). The SRL Ore Reserves are based on a combination of the 2013, 2015 and 2016 Resource models for Lanti, Gbeni, Gangama and the Sembehun group of deposits comprising of Benduma, Dodo, Kamatipa, Kibi and Komende. The Ore Reserves were compiled by an independent mining consultant (Matthew Randall) who is also a Competent Person (CP) and a Member of the Institute of Materials, Minerals & Mining. Mr Randall has been reporting the Ore Reserves for SRL for a number of years. The Ore Reserves have been reviewed and approved by an Iluka Resources Limited (Iluka) CP. Mineral Resources are reported inclusive of the Ore Reserves.
Site visits	*Comment on any site visits undertaken by the Competent Person and the outcome of those visits.* *If no site visits have been undertaken indicate why this is the case.*	The CP has visited the site on numerous occasions, the last in May 2016. Site visits to SRL by Iluka CP's occurred during due diligence and since in post-merger visits to review mining operations. No additional site issues were found that could impact the Ore Reserves.
Study status	*The type and level of study undertaken to enable Mineral Resources to be converted to Ore Reserves.* *The Code requires that a study to at least Pre-Feasibility Study level has been undertaken to convert Mineral Resources to Ore Reserves. Such studies will have been carried out and will have determined a mine plan that is technically achievable and economically viable, and that material Modifying Factors have been considered.*	Mining is currently underway at the Gangama, Gbeni and Lanti deposits. A Prefeasibility Study (PFS) has been completed for the Sembehun group. LOM plans are in place for all deposits currently being mined. The Sembehun PFS contains technically achievable mine plans that are considered economically viable. Subsequent internal documents have been produced that assess the overall strategic direction for the mine in the form of the Strategic Business Plan (SBP) and Life of Mine (LOM) plans. Modifying factors such as mining dilution, ore recovery and processing recoveries have been applied. The projects are financially viable at the current forecast prices anticipated by Iluka/SRL.
Cut-off	*The basis of the cut-off grade(s) or quality parameters applied.*	A fixed minimum cut-off grade of 0.5 %RR has been used for all deposits that are dry mined. This is based on the projected costs from the 2016

Criteria	JORC Code explanation	Commentary
parameters		Annual Operating Plan (AOP). A cut-off grade is generally not applicable to dredge mining as all the material between the pit floor and surface topography is mined by the dredge. The break-even cut-off grade for the dredge is 0.3 %RR and this was applied in the pit optimization. Other factors such as minimum draft and maximum dig depth, were applied to dredge mining and reflected in the Ore Reserve.
Mining factors or assumptions	*The method and assumptions used as reported in the Pre-Feasibility or Feasibility Study to convert the Mineral Resource to an Ore Reserve (i.e. either by application of appropriate factors by optimisation or by preliminary or detailed design).*	Pit optimisations were conducted by Matthew Randall using Datamine's NPVS mine planning software. This assumed that the whole of the deposits were accessible. Areas of the deposit were then excluded where there were dewatering restrictions or other community or environmental constraints. The optimisation parameters used consisted of current costs, revenues and recoveries and took into consideration the current mining rates as well as the proposed increased mining rates in the case of Gangama and Gbeni. Pre-strip is minimal as the SRL deposits generally have very low waste to ore strip ratio's.
	The choice, nature and appropriateness of the selected mining method(s) and other mining parameters including associated design issues such as pre-strip, access, etc.	At Lanti, dredging is used for the majority of the deposit, whilst a truck and shovel open pit method (dry mining) is used for the remaining area. The mining method used to determine the Ore Reserve for all of the other deposits was assumed to be truck and shovel operations. The mining methods selected are conventional methods and used currently onsite successfully. The current dredge Ore Reserve is due to be exhausted in 2018 after which all mining is planned to be by dry mining. In the case of dry mining with trucks and shovels the ore is excavated, placed in trucks and then transported to a run-of-mine (ROM) stockpile or placed directly into the mining unit plant (MUP) hopper. In the case of dredge the ore is mined and heavy mineral concentrate (HMC) then pumped from the wet concentrating plant to the shore. The HMC is then loaded into trucks and transported to the land plant for processing.
	The assumptions made regarding geotechnical parameters (eg pit slopes, stope sizes, etc), grade control and pre-production drilling.	The geotechnical assumptions used in the optimisation are based on historical observations. A conservative approach has been implemented,

Criteria	JORC Code explanation	Commentary
	The major assumptions made and Mineral Resource model used for pit and stope optimisation (if appropriate). *The mining dilution factors used.* *The mining recovery factors used.* *Any minimum mining widths used.* *The manner in which Inferred Mineral Resources are utilised in mining studies and the sensitivity of the outcome to their inclusion.* *The infrastructure requirements of the selected mining methods.*	where an assumed Overall Slope Angle (OSA) for the open pit of 20 degrees. Mining dilution factors are assumed from historical data and have been estimated as 1-3%. Mining Recovery factors are assumed from historical data and have been estimated as 95-99%. Pits that are dry mined by truck and shovel have a maximum design width of 100m. Restrictions for dredging include a minimum draft of 4.6m, maximum reach above pond level of 5m and a maximum dredging depth of 20m. Inferred Mineral Resources are used in scheduling for planning and infrastructure design but are not included in financial assessments of the study. There is existing infrastructure for the mining and processing of the deposits currently being mined. This includes: • administration buildings , • workforce accommodation, • power supply; • workshops and stores • Site access roads • MUP's, wet concentrator plants (WCP) and mineral separation plants (MSP). The Sembehun development will require replicating all of the above infrastructure except the mineral separation plant as it will continue to be used to treat the concentrate produced at Sembehun.
Metallurgical factors or assumptions	*The metallurgical process proposed and the appropriateness of that process to the style of mineralisation.*	The metallurgical process proposed has been utilised historically and is currently applied at SRL. The ore is dry mined or dredged with the first stage of processing removing the oversize and slime by combination of scrubbing and screening. The remaining sand then passes through a series of spirals to remove the lighter fraction of the ore and the heavy mineral recovered is

Criteria	JORC Code explanation	Commentary
	Whether the metallurgical process is well-tested technology or novel in nature. *The nature, amount and representativeness of metallurgical test work undertaken, the nature of the metallurgical domaining applied and the corresponding metallurgical recovery factors applied.* *Any assumptions or allowances made for deleterious elements.* *The existence of any bulk sample or pilot scale test work and the degree to which such samples are considered representative of the orebody as a whole.* *For minerals that are defined by a specification, has the ore reserve estimation been based on the appropriate mineralogy to meet the specifications?*	then stockpiled as HMC. The metallurgical separation process utilises known technology where the performance and recovery of the mineral products has been established by SRL and Iluka in current and past operations The current mining operations produces a rutile product to specification with industry standard processing techniques and recoveries. Metallurgical test work has confirmed with a high level of confidence that a similar rutile product will be produced using similar processing techniques on declared Ore Reserves. Processing requirements for any deleterious elements present are in place at the current operations. No additional deleterious elements are expected. Continuation of existing controls are deemed sufficient for all unmined Ore Reserves. The number of bulk samples taken across the deposits is considered appropriate for the corresponding Mineral Resource classifications. Rutile produced at SRL is high quality and has been sold into the market for a long period of time. There is no evidence to suggest the rutile quality will change as the mine progresses.
Environmental	*The status of studies of potential environmental impacts of the mining and processing operation. Details of waste rock characterisation and the consideration of potential sites, status of design options considered and, where applicable, the status of approvals for process residue storage and waste dumps should be reported.*	All environmental studies and approvals required under the Sierra Leone government have been granted and numerous agreements with the local landowners and communities are in place for existing operations. Studies and approvals for the Sembehun project are currently in progress and there is a reasonable expectation that these will be in place before the project is executed. No waste rock will be produced during mining or processing activities. Limited overburden and interburden exists within the deposits and this

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		waste that will be mined does not create any environmental risks when stockpiled. Mining by-products produced from the MSP tails stream will at times contain naturally occurring radioactive material (NORM) and will be managed as per SRL/Iluka practices of blending back into mine tails during the life of mine.
Infrastructure	*The existence of appropriate infrastructure: availability of land for plant development, power, water, transportation (particularly for bulk commodities), labour, accommodation; or the ease with which the infrastructure can be provided, or accessed.*	SRL holds secure tenure over the Ore Reserves and appropriate existing infrastructure is in place. A large percentage of SRL employees are local and if required for expansions, further recruitment is possible from the nearby communities.
Costs	*The derivation of, or assumptions made, regarding projected capital costs in the study.*	Capital assumptions for the Sembehun development were determined during the PFS. Existing infrastructure will be utilized for mineral separation. Other costs were based on previous recent experience of SRL mine developments and industry estimates.
	The methodology used to estimate operating costs.	Operating costs are based on historical performance and updated for current economic conditions.
	Allowances made for the content of deleterious elements.	Cost and recovery penalties have been applied to deleterious elements in the optimisation and subsequent cost estimate.
	The source of exchange rates used in the study.	All costing's are calculated in $US.
	Derivation of transportation charges.	Transportation charges are based on recent rates procured from SRL.
	The basis for forecasting or source of treatment and refining charges, penalties for failure to meet specification, etc.	Treatment costs are based on actual operational costs including deleterious elements. Actual operating costs are used to benchmark the operating cost estimates.
	The allowances made for royalties payable, both Government and private.	Appropriate allowance has been made for Sierra Leone Government and other private stakeholder royalties.
Revenue factors	*The derivation of, or assumptions made regarding revenue factors including head grade, metal or commodity price(s) exchange rates, transportation and treatment charges, penalties, net smelter returns, etc.* *The derivation of assumptions made of metal or commodity price(s),*	Commodity price assumptions are based on internal analysis that monitors supply and demand on an ongoing basis. Price assumptions are benchmarked against commercially available price forecasts by industry observers. Revenue factors are flexed to establish pit sensitivities and to test for robustness of the Ore Reserve. Detailed price assumptions are

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	for the principal metals, minerals and co-products.	commercially sensitive and are not disclosed.
Market assessment	*The demand, supply and stock situation for the particular commodity, consumption trends and factors likely to affect supply and demand into the future.* *A customer and competitor analysis along with the identification of likely market windows for the product.* *Price and volume forecasts and the basis for these forecasts.* *For industrial minerals the customer specification, testing and acceptance requirements prior to a supply contract.*	SRL sales volumes of rutile were expected to be higher in 2016 than 2015. Improved market conditions have generated additional sales and prices are expected to improve in 2017. Pigment inventories are returning to more normal levels and expected to result in increases in demand and prices in the medium term. The likely market window for product from the SRL mine is to maintain supply to existing and future customers in the paint, plastics, paper and titanium metal industries. Iluka/SRL establishes short, medium and long term contractual agreements with customers and these reflect the pricing and volume forecasts adopted. Contracts and agreements pertaining to Iluka/SRL project and the wider company are confidential. Iluka/SRL provides internal testing for clients. Clients are provided with reports in accordance with their required specifications. Customers are provided reasonable access to verify conformance with requirements.
Economic	*The inputs to the economic analysis to produce the net present value (NPV) in the study, the source and confidence of these economic inputs including estimated inflation, discount rate, etc.* *NPV ranges and sensitivity to variations in the significant assumptions and inputs.*	Macro-economic assumptions used in the economic analysis of the mineral sands reserves such as foreign exchange, inflation and discount rates have been internally generated and determined through detailed analysis by Iluka/SRL and benchmarked against external sources where applicable. The price assumptions are internally generated and are based on detailed supply and demand modelling. The price assumptions have also been benchmarked against commercially available consensus price forecasts. The detail of that process is commercially sensitive and is not disclosed. Sensitivity analysis is undertaken on key economic assumptions such as costs and price to ensure the reserves remain economic. Changes in product prices and costs have the potential to increase or decrease the total Ore Reserve.
Social	*The status of agreements with key stakeholders and matters leading to social licence to operate.*	SRL has operated in country for fifty years and is perceived to be part of the national social fabric. The community and operations are closely integrated with little exclusion of the public from the mining lease area

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		over the five Chiefdoms the mining operation covers. SRL/Iluka support a number of development programs through donations. Most donations relate to infrastructure projects, including schools, churches and mosques.
Other	*To the extent relevant, the impact of the following on the project and/or on the estimation and classification of the Ore Reserves:* *Any identified material naturally occurring risks.* *The status of material legal agreements and marketing arrangements.* *The status of governmental agreements and approvals critical to the viability of the project, such as mineral tenement status, and government and statutory approvals. There must be reasonable grounds to expect that all necessary Government approvals will be received within the timeframes anticipated in the Pre-Feasibility or Feasibility study. Highlight and discuss the materiality of any unresolved matter that is dependent on a third party on which extraction of the reserve is contingent.*	No identifiable naturally occurring risks have been identified to impact the Ore Reserves. The mineable extents of the pits are constrained in some cases by excavation depth due to presence and ability to dewater groundwater. There are no known risks to the Ore Reserves due to any material legal or marketing arrangements. All relevant agreements and approvals are in place for the existing Ore Reserves currently being mined. Government agreements and approvals for the Sembehun project are currently in progress and there is a reasonable expectation that these will be in place before the project is executed.
Classification	*The basis for the classification of the Ore Reserves into varying confidence categories.* *Whether the result appropriately reflects the Competent Person's view of the deposit.* *The proportion of Probable Ore Reserves that have been derived from Measured Mineral Resources (if any).*	Measured Mineral Resources are converted to Proved Ore Reserves and Indicated Mineral Resources are converted to Probable Ore Reserves. Inferred Mineral Resources are not included in the reported Ore Reserve. The results reflect the Competent Persons view of the deposit. None of the Probable Ore Reserves have been derived from Measured Mineral Resources.
Audits or reviews	*The results of any audits or reviews of Ore Reserve estimates.*	The Ore Reserves were compiled by an independent mining consultant Mr Matthew Randall. Iluka CP's reviewed the Ore Reserves during Due Diligence activities in 2016 and again in January 2017 after Mr Randall completed the 2016 Ore Reserve Statement. No material issues were found by Iluka CP's in either review.
Discussion of	*Where appropriate a statement of the relative accuracy and*	SRL has considerable experience in reconciliation of its Mineral

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relative accuracy/ confidence	*confidence level in the Ore Reserve estimate using an approach or procedure deemed appropriate by the Competent Person. For example, the application of statistical or geostatistical procedures to quantify the relative accuracy of the reserve within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors which could affect the relative accuracy and confidence of the estimate.* *The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnages, which should be relevant to technical and economic evaluation. Documentation should include assumptions made and the procedures used.* *Accuracy and confidence discussions should extend to specific discussions of any applied Modifying Factors that may have a material impact on Ore Reserve viability, or for which there are remaining areas of uncertainty at the current study stage.* *It is recognised that this may not be possible or appropriate in all circumstances. These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.*	Resources and Ore Reserves. Actual results generally indicate very good agreement with the geological model and close reconciliation with rutile tonnes, ore tonnes and rutile percentage head grade. The risk of not achieving good physical Ore Reserve reconciliation is considered to be low. This is indicative of a robust estimation process. Operational metallurgical experience, relevant testwork and SRL's experience supports the view that metallurgical risk is low. Revenue generation is impacted by pricing forecasts. The company's forward predictions are considered well balanced and supported by external forecasters. Mining and processing methods selected are typical for mineral sands and have been demonstrated in various other mineral sand operations, they are considered a low risk of impacting the Ore Reserves. All costs used in the optimisation and Ore Reserve process are supported by extended operational experience at SRL and actual results. Risk of significant underestimation and the effect of that underestimation is considered to be low.