



ASX RELEASE

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APS

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Allup acquires 100% of McLaren Valuable Heavy Mineral Sands Project, West Eucla Basin, WA and conducts placement

Highlights

- Advanced Valuable Heavy Mineral Sands (VHMS) project in WA has an indicated and inferred JORC Resource (2012) of **280Mt @ 4.8% Heavy Mineral** near surface
- Project comprises 333 sq km of tenements, 150km east of Norseman in the mining-friendly jurisdiction of Western Australia.
- Potential for expanded MRE by including results not in current resource extended, plus extended mine life through additional drilling.
- Ilmenite, a key titanium mineral, is priced well above international silica and kaolin prices at more than US\$300/t¹ due to increasing titanium shortages.
- Strong ilmenite market demand expected to continue due to supply deficits and mine closures in Kenya, South Africa, and Mozambique
- Allup plans to focus on a lower-cost Capex design to fast-track mine development and produce a bulk concentrate.
- Allup will advance PFS and BFS for McLaren with infill drilling, and metallurgical and mineralogical evaluations, to confirm project economics.
- Placement of \$360,000 to raise working capital.

Allup Silica Limited (ASX: **APS**) ("Allup" or "**Company**") is pleased to announce it has acquired 100% of an advanced Valuable Heavy Mineral Sands Project near Eucla, WA.

McLaren Project, WA

McLaren VHMS Project (E69/2388 and E69/2386) comprises 333km², located on the western side of the Eucla Basin, adjacent to the Fraser Range in Western Australia (Figure 1).

McLaren is an advanced-stage exploration project with an indicated and inferred Mineral Resource estimate of **280Mt @ 4.8% Heavy Mineral for 13.5Mt in-situ HM** completed in 2022.

Allup Silica Managing Director Andrew Haythorpe said: *"This Project presents an excellent opportunity for Allup Silica to fulfill its plan of moving*



into production. Albeit a different sand, the mining and washing processes for ilmenite are similar to silica sand, as well as the near-surface mineralisation and low strip ratios. However, the higher product price and lower shipping volumes present a compelling opportunity for development.

Because of the previous work completed and the increasingly high value of titanium minerals, this opportunity presents a faster and higher confidence pathway for Allup Silica and its shareholders. The ground is accessible in all seasons of the year, allowing for more rapid progress. Infill drilling and further metallurgical work is planned to commence as soon as practicable so that we can advance a Pre-Feasibility Study and move onto a Bankable Feasibility Study for the project."

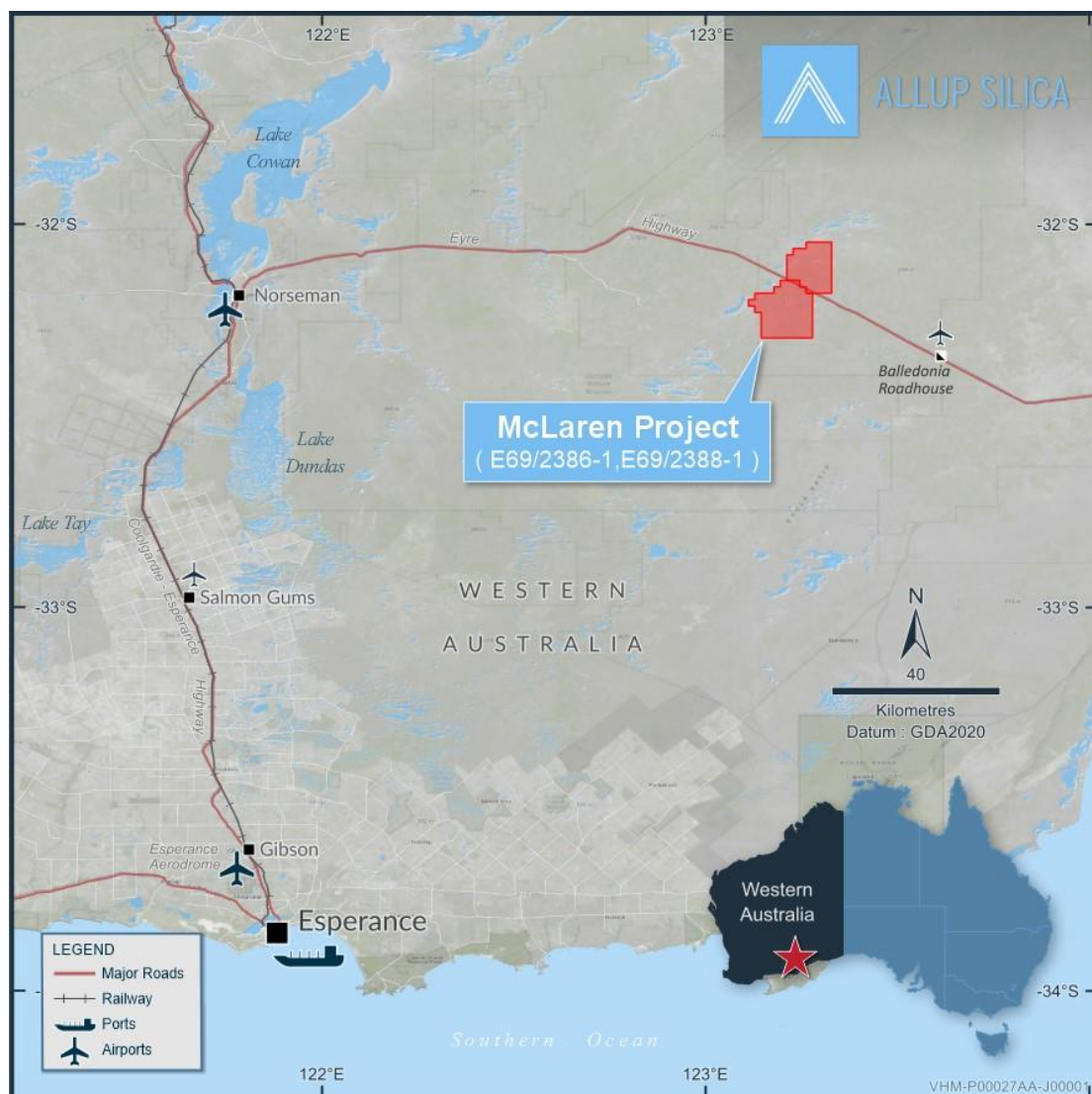


Figure 1: Location of McLaren Valuable Heavy Mineral Sands Project

Acquisition Consideration for 100% of the McLaren VHM Project

The Company has agreed to pay the following consideration:

- A\$150,000 in cash for 100% of ELs
- Allup grants a 1.5% Royalty to the vendors (Westover Holdings Pty Ltd and Wild Side (WA) Pty Ltd)
- Allup will issue 2m options exercisable at 20c on or before 5 years from issue, with consideration of \$0.001 per APS share, with a vesting condition being completion of a Bankable Feasibility Study and the Ilmenite concentrate sales exceeding US\$500/t from the Project
- 4,241,571 shares upon completion of the Pre-Feasibility Study (PFS); (PFS Milestone) and
- A further 4,300,583 shares will be issued upon completion of a Feasibility Study (FS Milestone).

The PFS Milestone is satisfied upon completion of a Pre-Feasibility Study on commercially viable terms and other criteria that the Parties agree in writing.

In the event that the PFS Milestone is not achieved within 24 months, the Parties agree to enter into good faith negotiations for a period of 5 business days with a view to agree an alternative basis on which the PFS Milestone Shares (or any part thereof) may be issued to the Vendors.

Subsequent to the PFS Period, the Purchaser agrees to use all reasonable endeavours to conduct a Bankable Feasibility Study in respect of the Tenements.

Placement

The acquisition will be funded from internal cash sources, however, the Company has decided to undertake an additional placement and has received binding commitments for approximately A\$360,000 (before costs) via the issue of 9,000,000 shares to sophisticated, professional and institutional investors at an offer price of A\$0.04 per share. Directors, Mr Haythorpe, Mr Ball and Mr Smyth have agreed to subscribe \$50,000 of the placement subject to shareholder approval at an upcoming meeting.

The placement will be conducted using the Company's LR 7.1 and 7.1A approval.

The Company appointed CPS Capital Group Pty Ltd ("CPS") as Lead Manager to the Placement, and CPS or its nominee, will receive:

- A management fee of 2% (plus GST) for managing the placement ("Management Fee"); and
- A placing fee of 4% (plus GST) for funds raised via the Placement ("Placement Fee").



Figure 2: McLaren Valuable Heavy Mineral Sands Deposit - Site visit July 2024

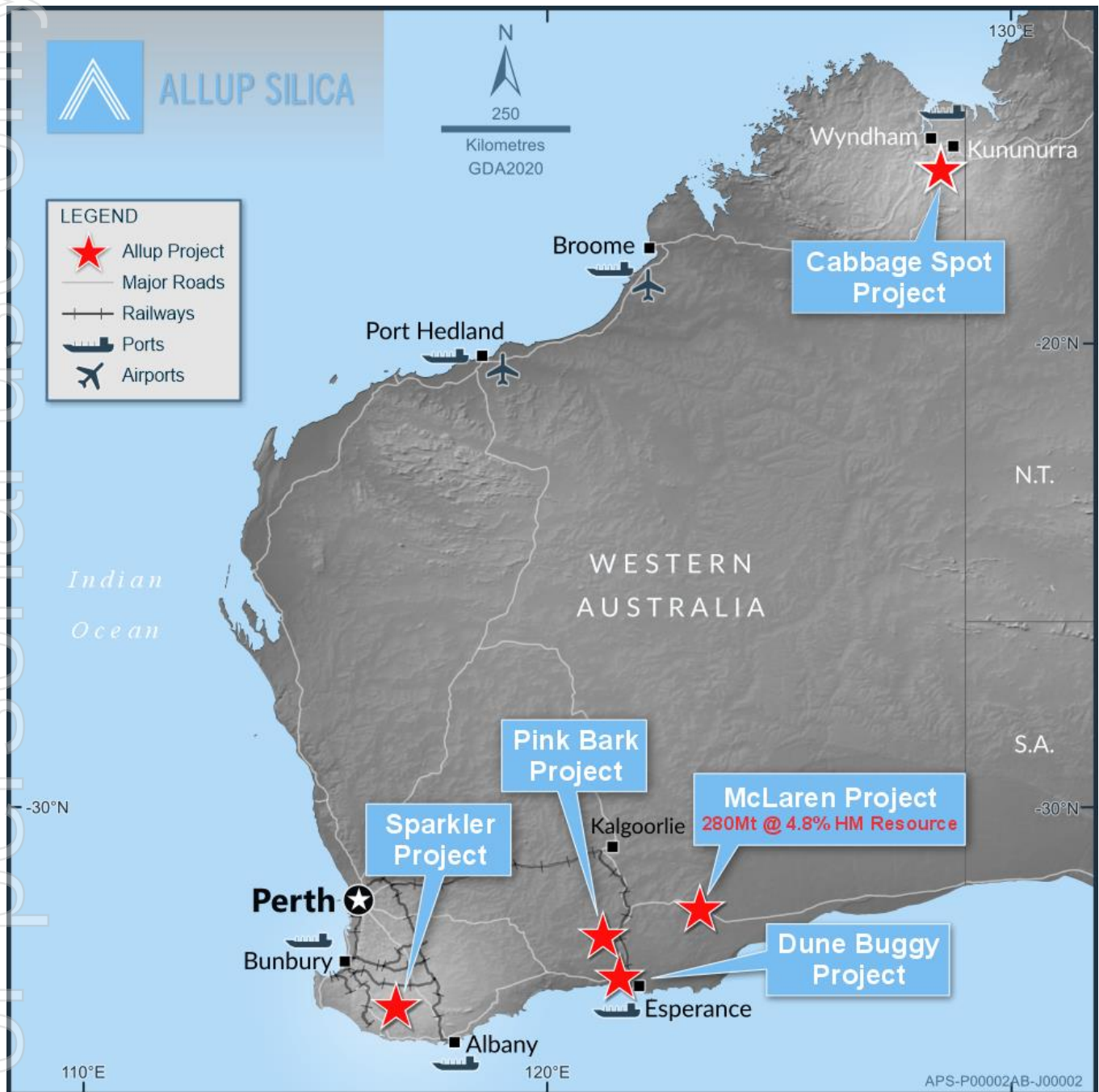


Figure 3: Location of Allup Silica Projects

Project Background

BBI Group Pty Ltd (BBIG), as agent for and on behalf of Forge Resources Crown Pty Ltd, commissioned ERM Australia Consultants Pty Ltd (ERM), formerly CSA Global, to prepare a Mineral Resource estimate update for the McLaren valuable heavy mineral sands (VHMS) deposit, part of the Eucla West VHMS Project, located in

Western Australia. The purpose of the Mineral Resource estimate update was to incorporate assay and mineralogical analysis results received since the previous Mineral Resource estimate was completed in 2015.

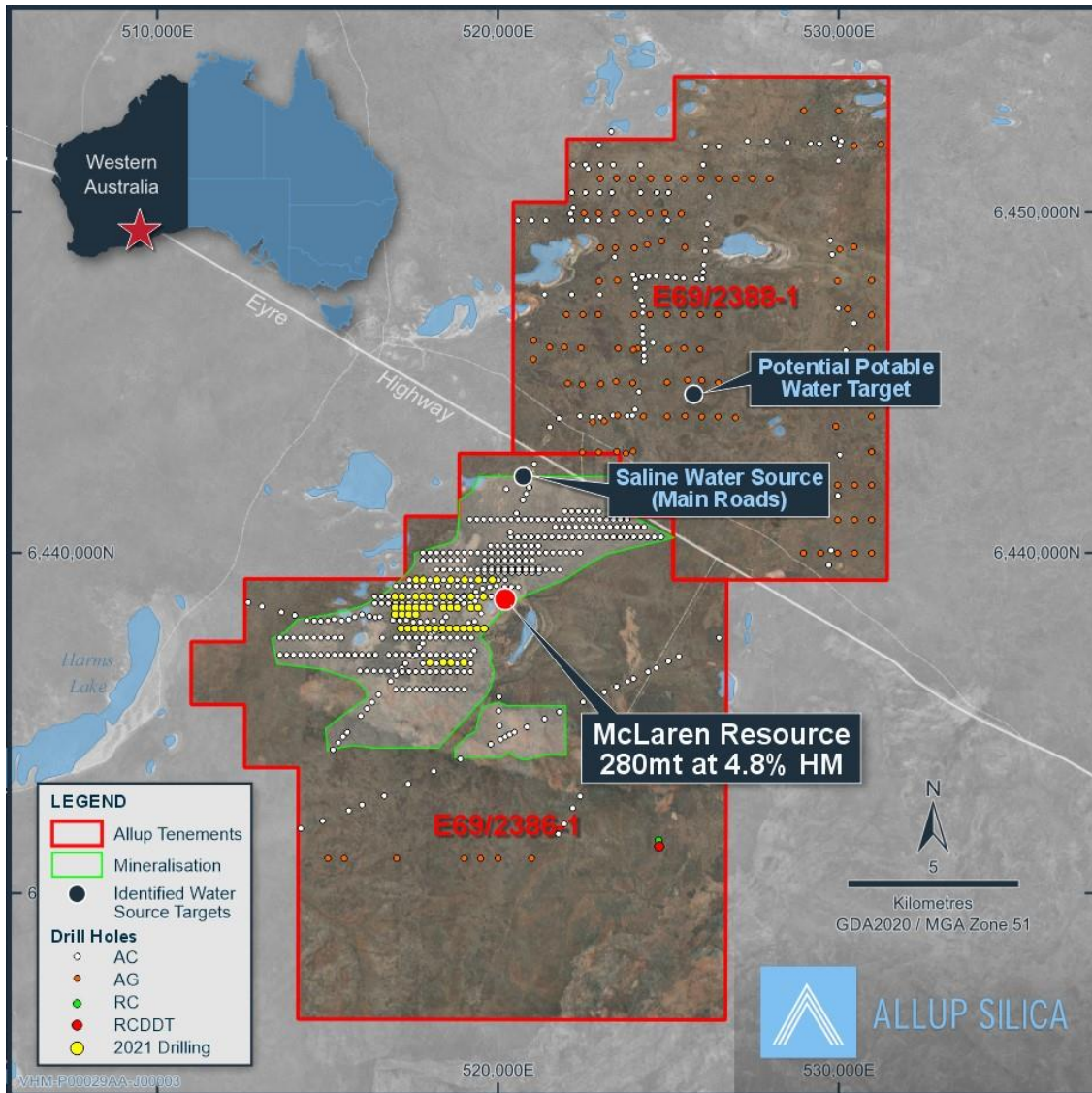


Figure 4 Previous drilling and resource location

The Mineral Resource estimate is presented in Table 1 reported above a cut-off grade of 2% Heavy Mineral (HM) and less than 30% Slimes. The model has been classified as Indicated and Inferred in accordance with the JORC Code¹. The Mineral Resource estimate is an update to the Mineral Resource estimate prepared by CSA Global in 2015.

¹ Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves. The JORC Code, 2012 Edition.

JORC classification	Tonnes (Mt)	HM grade (%)	In-situ HM tonnes (Mt)	Slimes (%)	Ilmenite (% of HM)	Rutile (% of HM)	Leucoxene (% of HM)	Zircon (% of HM)
Indicated	79	6.0	4.7	25.0	30.4	0.7	1.9	0.6
Inferred	201	4.4	8.8	25.4	29.0	0.7	2.1	0.6
Total	280	4.8	13.5	25.3	29.4	0.7	2.0	0.6

Table 1: McLaren HM deposit Mineral Resource, where HM % >2 and Slimes % <30

The Mineral Resource update follows the compilation of all available aircore (AC) drillhole data, with additional AC drilling completed since the 2015 Mineral Resource estimate.

The Mineral Resource estimate is based upon 653 AC drillholes drilled between 2009 and 2021, with drill samples assayed for VHM (%) and Slimes (%), which were interpolated into a Mineral Resource block model. A total of 101 of the drillholes were selected for mineralogical analyses, with downhole intervals composited, and 114 samples dispatched to Bureau Veritas for QEMSCAN analyses. The mineral species rutile, leucoxene, ilmenite, altered ilmenite, total ilmenite, and zircon were also interpolated into the block model (Table 2).

JORC classification	Tonnes (Mt)	HM grade (%)	Ilmenite tonnes (in situ) (kt)	Rutile tonnes (in situ) (kt)	Leucoxene tonnes (in situ) (kt)	Zircon tonnes (in situ) (kt)
Indicated	79	6.0	1,440	32	90	26
Inferred	201	4.4	2,550	60	182	54
Total	280	4.8	3,980	92	272	80

Table 2: McLaren VHM deposit Mineral Resource HM species tonnes, where HM % >2 and Slimes % <30

The Mineral Resource is classified as a combination of Indicated and Inferred and has been reported in accordance with the JORC Code, with geological and sampling evidence sufficient to assume geological and grade continuity within the volumes classified as Indicated. The classification levels are based upon an assessment of geological understanding of the deposit, geological and grade continuity, drillhole spacing, quality control results, search and interpolation parameters, quality and quantity of mineral assemblage data, and an analysis of available density information.

The mineralisation is hosted in relatively free flowing sands, typically red-orange in colour comprising up to 90% well sorted, fine to medium grained quartz generally becoming more clay rich with depth. The deposit generally lies along a distinct Eocene aged paleo-channel feature, but the bulk of the mineralisation is located in elevated ridges within and aligned across these earlier cut, former river channels. The mineralisation is quite variable in both heavy minerals and fines. The content of fines can vary from 15% to over 30% being reflected in the presence of pods of mineralisation with significantly less fines.

Key minerals are Ilmenite, Rutile, Leucoxene and Zircon. These are primarily contained within the sand fraction with grain sizes ranging between 38 μm and 1 mm, and this sand fraction (middlings, or "mids") contains the Mineral Resource. Some heavy mineral content is contained within the slimes fraction (<38 μm) and the oversize (>1 mm) however the HMS content in these fractions is minor to negligible, and their extraction is not regarded as economically viable.

The Competent Person is of the opinion that the deposit is of sufficient grade, quantity, and coherence to have reasonable prospects for eventual economic extraction.



Figure 5: Cross sections from the McLaren resource illustrating continuity from surface to 35m (basement)

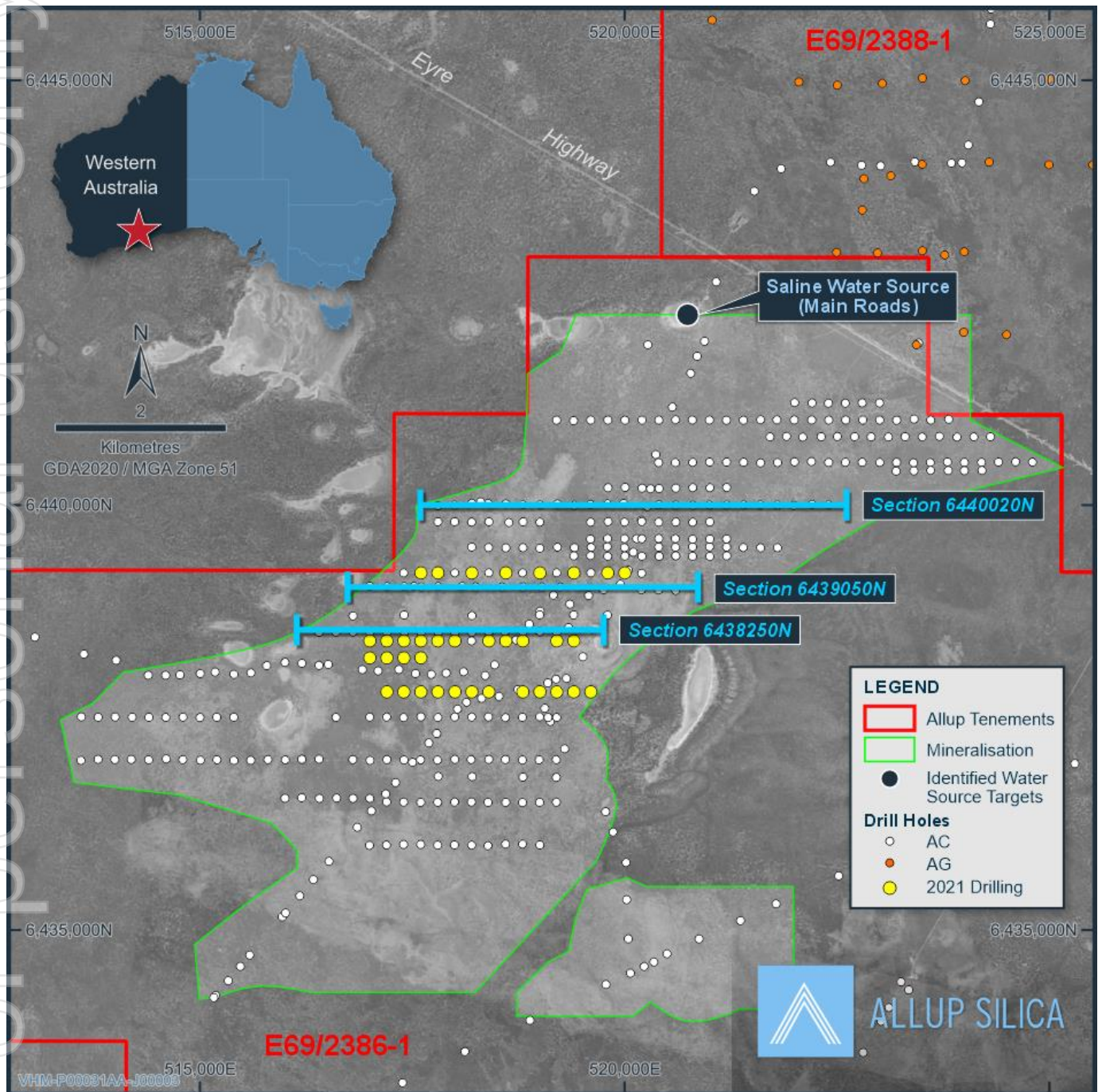


Figure 6. Cross Sections location plan – McLaren Resource.

The project is located within the Eucla region of Western Australia, which is a mature mining jurisdiction with a significant population of experienced mining personnel. The Eyre Highway passes through the tenements at the common boundary of E69/2386 and E69/2388. The Balladonia roadhouse/motel is located 41km east of McLaren on the Eyre Highway. The airstrip at Balladonia will add significant benefits as the project moves through the development phases.

Metallurgical testwork in 2017 carried out on a 14-tonne bulk sample demonstrated that the ilmenite product is of suitable grade to be classified as sulphate grade ilmenite; that produced rutile is of typical quality, and zircon is of typical standard quality, and noting that the zircon contains very low levels of uranium + thorium. (CSA Report).

A significant testwork program was carried out by IHC Robbins on 27 slimes (<38 microns) samples generated from the last Eucla West drill core samples to ascertain settling and compaction rates. All slimes samples responded well to dosing with 3% gypsum and flocculation with the best results achieving settling rates of 20m³/h.

Gypsum is available locally in the area and future test work will also focus on utilising more saline process water.

Market for Titanium feedstocks

- (1) Sulphate ilmenite is very tight supply at the moment. The world's second largest producer of ilmenite is Mozambique with Kwale dominating sales to China. Base have confirmed that Kwale will shut at end of 2024 and already their sales to China have dropped by 50% in past 12 months and will cease in Q1, 2025. This is now being reflected in Ilmenite pricing reaching US\$350-\$400/t. (www.scrapmonster.com/metal-prices/minor-metals/ilmenite/700)

Next Steps

The next steps for the PFS and BFS at the McLaren Project include;

- Infill drilling to increase JORC classification to Measured and Indicated.
- Further metallurgical and mineralogical evaluation to optimise product.
- Evaluation of slimes and evaluation of management methodology
- Investigate both saline and potable water sources for mine supply from the Project area.
- The PFS is intended to confirm the conceptual Project economics by improving the confidence around the deposit, mining and logistics. To summarise this will advance previous conceptual work including;

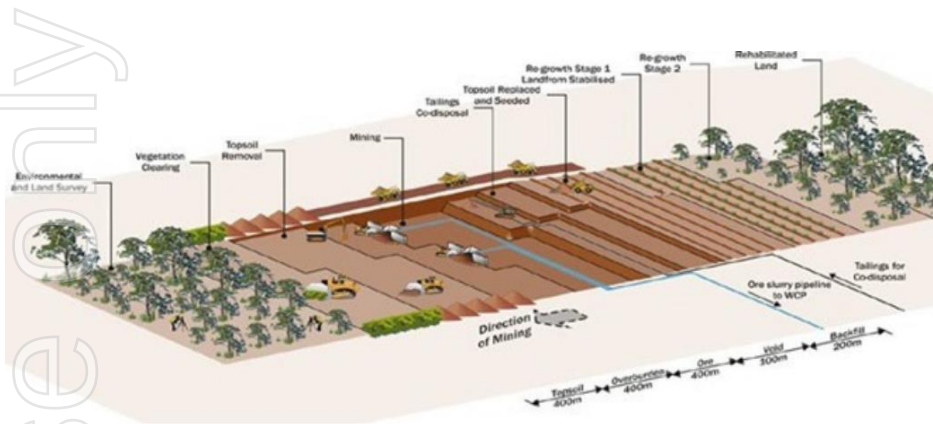


Figure 7: Typical sand mining with Dozer and trap mining method



Figure 9: Typical x4 Road haulage in WA

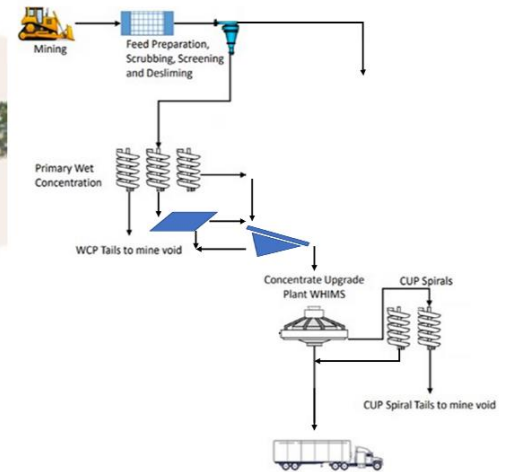


Figure 8: Simple low cost mineral separation plant



Figure 10: Esperance Port Panamax (60,000t) and Handymax (50,000t) bulk shipping and handling

1. Further work aimed at validating the proposed dry mining and dozer trap mining method.
2. Simple sand processing on site to produce VHM concentrate for transport
3. Transport and logistics
4. Export from Esperance using available infrastructure

This Announcement has been approved for release by the Board of Directors.

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Competent Person Statement

The information in this report that relates to Mineral Resources is based on, and fairly reflects, information compiled by Mr David Williams, a Competent Person, who is an employee of ERM and a Member of the Australian Institute of Geoscientists (RPGeo). Mr Williams has sufficient experience relevant to the style of mineralisation and type of deposit under consideration and to the activity which he is undertaking to qualify as Competent Person as defined in the 2012 Edition of the Australasian Code for the Reporting of Exploration Results, Mineral Resources, and Ore Reserves (JORC Code). Mr Williams consents to the disclosure of information in this report in the form and context in which it appears.

ABOUT ALLUP SILICA LIMITED

Allup Silica is a public silica exploration company focused on the future development of our silica sand tenements located in several Western Australian exploration project locations. West Australian sites are in the South-West; in the North-East near Wyndham, and two others are in the Southern Goldfields near Esperance. The Company's plan is to work towards development of a commercial silica sand product that meets the industry specifications of the sector we are aiming for. Silica is a critical commodity, particularly in the production of photovoltaic (solar) panels and other critical industrial applications.



Appendix 1: JORC Table 1

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.	- The Eucla West deposit was drill sampled by 653 Aircore holes, for 8,877 m. Of these holes, 427 aircore holes (5,995 m) were used to support the Mineral Resource estimate - Holes drilled in 2009 were sampled by scooping 1.5-2.0 kg from the drill sample heaps, whilst in 2011 the samples were split to approximately 1.3 kg using an on-rig rotary splitter into calico bags. - Samples from 2017 to 2021 ('recent') were collected at intervals of either 1.5 m (up to hole EWAC1022) or 1 m (EWAC 1023 to EWAC1195). No information is recorded in the drill hole database regarding the reason for the change in sampling intervals which happened part way through the 2017 drilling program.
Drilling techniques	Drill type (e.g. core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc.) and details (e.g. 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.).	2009 drilling - Aircore drilling was conducted using two rigs. Holes EWAC1 - EWAC57 were drilled using a canter mounted multipurpose rig, with 200 psi and 250 cfm. The remainder of the program, holes EWAC58 – EWAC242 utilised a Mantis 75 Toyota 6-wheel mounted rig (250 psi and 150 cfm). The smaller rig was preferred for its ability to access unformed gridlines. In each instance, the drill crew comprised a driller and only one offsider. Bit size was NQ and used star 2 light RC rods. 2011 drilling – Drilling was completed by Drillwise Pty Ltd using a 4 x 4 Isuzu Mounted Edson 100 air core drill and with a 400cfm, 200-psi compressor. - All holes are vertical with maximum depth of 43 m.
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.	- Sample piles with a visual estimate of HM > 2% were panned to provide an estimate of HM%. - Drill samples were taken every 1.5 m, with samples placed into a pile on the ground (2009 drill program) or split to approximately 1.3 kg sample weights using an on-rig rotary splitter into calico bags. - Sample recovery was excellent. No relationship is observed between sample recovery and HM grade.



Criteria	JORC Code explanation	Commentary
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 drill samples were geologically logged in a qualitative manner, with information for lithologies, colour, sample chip hardness and general comments logged. - Drill holes were sampled at 1.5 m intervals, or 1 m since 2017.
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.	- The sample procedures employed during the 2011 drill program are considered to be of better industry standard than the scoop sampling employed during the 2009 drill program. However, no bias was observed in sample grades when comparing results from the two programs. - No information is available regarding the sampling procedures for the 2017 to 2021 drill programs - Field duplicates were used to test the Quality Control of the sampling program for the historical drilling. No meaningful results were obtained from CRMs. Lab duplicates were analysed from the 2017-2021 sampling. - Mineralogy data were derived from 114 QEMScan analyses of HM samples, derived from composited samples from 101 air core holes previously analysed for HM% and Slimes % content. - The mineralogy data replaces the results obtained in 2015 due to changes in sampling methodology.
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 (e.g. standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (i.e. lack of bias) and precision have been established.	- Drill samples were dispatched to either Western Geolabs (2009) or Diamantina Laboratories (2011 - 2021) for HM and Slimes analyses. - Both assay laboratories used similar techniques to record HM (%) using TBE as a heavy media; Slimes (%) was also recorded. Oversize was irregularly recorded. - Field duplicates and certified reference materials were used to test the Quality Control of the sampling program. Acceptable levels of accuracy were established, sufficient for the current JORC classification level of the Mineral Resource.
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.	- Geological logs and selected drill hole samples and intercepts were reviewed by alternative geological personnel. - Twin drill holes have not been used. - Data is stored in a relational database managed by CSA Global. - No assay adjustments have been made.

Criteria	JORC Code explanation	Commentary
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.	- Drill hole collars were surveyed by hand held GPS for the holes drilled in 2009, whilst the holes drilled in 2011 - 2021 were surveyed by a licensed surveyor using a DGPS. - The geospatial locations of data are in GDA94 (Zone 51 South) grid. - A topographic digital terrain model (DTM) was prepared based upon a PRISM Digital Elevation Model (DEM), with data points every 5 m. The drill hole collar elevations were noted to be different to the adjacent DTM elevation, and whilst greater confidence was placed in the collar elevations, CSA Global decided to register the drill collars to the DTM for the purposes of preparing the Mineral Resource estimate.
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.	- All drilling was completed on grid lines spaced 500 m (Y) with collar spacing 200 m along the grid lines. - Drill hole spacing within the Mineral Resource footprint varies between 500 m (north) and 200 m (east), to 100 m (north) by 100 m (east). - Data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource estimation procedure and classifications applied. - Sample compositing was not applied to the samples analysed for HM and slimes. The samples used for mineralogical analyses by QEMScan were derived from full depth of mineralisation composites from 101 holes, with 13 holes providing 2 composited samples.
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 drill holes were vertical, targeting a flat lying deposit.
Sample security	The measures taken to ensure sample security.	All samples were securely maintained, from time of sample collection to delivery to sample preparation laboratory.
Audits or reviews	The results of any audits or reviews of sampling techniques and data.	CSA Global undertook several reviews of historical sampling and sample analyses, primarily aimed at the techniques used to determine mineralogical assemblages. As a result, the majority of the results for mineralogical assemblages were quarantined, with selected results retained. A mineralogy assemblage study was commissioned in 2015, results of which supported the previous Mineral Resource.



Criteria	JORC Code explanation	Commentary
		No audits for sampling or mineralogy studies have been conducted since 2015.
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.	BBI hold granted Exploration Licenses E90/2386 and E90/2388 at the time of preparation of this Mineral Resource.
Exploration done by other parties	Acknowledgment and appraisal of exploration by other parties.	No other exploration has been conducted by other parties.
Geology	Deposit type, geological setting and style of mineralisation.	The Eucla West Project is underlain by units of the Precambrian Albany Fraser Orogen, with the units structurally aligned along a northeast to southwest trend. Superimposed upon this structural framework are prominent palaeo-channels, ancient drainage lines that have been in existence since the Eocene Epoch (56 Ma to 39 Ma). The HM mineralogical assemblages accumulated by fluvial deposition in the paleo-channels, with subsequent reworking due to marine transgression during the Miocene Epoch. However, the McLaren HM deposit is not considered as 'mature' as many other HM deposits surrounding the Eucla Basin (e.g. Cyclone, Jacinth) which have undergone extensive reworking and winnowing within beach sand dune settings, thereby increasing the concentration of the HM, and conversely decreasing the volume of slimes.
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	All drill hole data were used in support of the Mineral Resource estimate. Hole spacing, inclination and maximum depths discussed earlier in this document.



Criteria	JORC Code explanation	Commentary
Data aggregation methods	<i>the report, the Competent Person should clearly explain why this is the case.</i> - In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (e.g. 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 grades employed at the exploration stage.
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 deposit is interpreted to be flat lying, and the intercept widths reflect the vertical profile of the heavy minerals mineralisation. - Example cross sections are presented in the body of this report.
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.	Maps and cross sections are presented in the body of this report.
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 tenor of mineralisation (HM, slimes) are represented by the results reported from the MRE.
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.	114 of the drill holes were selected for mineralogical analyses, with down hole intervals composited and the samples dispatched to Bureau Veritas for QEMScan analyses. The mineral species Rutile, Leucoxene, altered Ilmenite, Ilmenite, total Ilmenite and Zircon were interpolated into the block model.
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.	- Infill drilling and twinning of selected aircore holes with diamond holes are recommended to possibly allow the MRE to be classified at higher levels. - Diamond core samples should be used to conduct density testwork. - Adoption of robust QA/QC protocols is considered by the Competent Person to be of priority with any further exploration activities.
Criteria	JORC Code explanation	Commentary

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 is stored in a relational SQL database, managed by CSA Global, with tables provided as appendices in the company Annual Reports to the WA government. No checks were made between this data and the laboratory certificates. - Drill hole data loaded into Datamine was checked for overlapping sample intervals and missing collars. No errors were detected. - Drill hole collars were registered to the topographic DTM, including those collars surveyed by DGPS. This was to ensure relative consistency in the collar elevations.
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.	No site visits were undertaken by the CP. However, a CSA Global representative visited site to assess the geology in 2014. CSA Global also managed later drilling programs.
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 confidence in the geological interpretation is sufficient for an Indicated and Inferred classification. - Aircore derived drill samples of 1.5 m or 1 m lengths were used. HM assays were the primary driver of the geological interpretation. - An MRE (inferred) was prepared in 2012, and in 2015, with fewer drill hole results, with a similar geological interpretation to that currently presented. - The interpretation is based upon HM (%) assays which in turn reflect the host geology. - The geological host is preserved fluvial units (clays, poorly sorted sands) which follow a paleochannel. The geological continuity along and across strike is reflected by the HM grade.
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.	Mineralisation is modelled over a strike length of approximately 10,000 m, with a plan width of between 3,400 m and 6,500 m. Mineralisation varies in depth from the natural surface from 1.5 m to 28 m.
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 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	- All modeling was completed in Datamine Studio. GeoAccess Professional and Snowden Supervisor were used for geostatistical analyses of data. The HM (%) envelopes were based upon a lower cut-off grade of 2% HM, based upon inflections in the log probability plot for all the HM data. This lower grade was also used in the 2012 and 2015 Mineral Resources. - The Mineral Resources consists of two HM domains. Mineralisation domains were encapsulated by means of 3D wireframed envelopes. Domains were extrapolated along strike or down plunge to half a section spacing or if a barren hole cut the plunge extension before this limit. - Top cuts were used to constrain extreme grade values if it was determined



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	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. • 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.	that the extreme high grades would potentially over-estimate local block estimates, either due to limited sample numbers, or if the individual assay result was considered too high compared to the rest of the domain's population. No top cutting of HM assays was warranted, however the slimes assay data were top cut to 75%, with 8 samples recorded as being above this assay limit. The decrease in the global mean sample grade for slimes (%) was negligible with the application of the top cut. • The drill hole samples were composited to 1.5 m in length. All aircore drill hole data were made available for the geological interpretation, statistical analyses and grade interpolation. • A block model with parent cell sizes 100 m x 250 m x 3 m (Easting, Northing, RI) was constructed, compared to typical drill spacing of 200 m x 500 m. The 3 m vertical block size was based upon 2 drill samples depth, and allowed for vertical resolution of grade during interpolation. • Statistical analyses of the HM and slimes by mineralisation domain were conducted. No distinct correlation was observed between HM and slimes, although as a general rule, as the HM percentage increases, slimes decrease. • Variograms for HM, mids and slimes for the largest domain were modelled, with the primary direction coincident with the strike of the deposit. Each of the grade variables demonstrates low relative nuggets and long ranges. • A kriging neighbourhood analysis (KNA) was carried out to determine optimum block size and key grade interpolation parameters, including search ellipse radii, number of samples used per block estimate and cell discretisation. • Grade estimation was carried out using Ordinary Kriging with Inverse Distance Squared (IDS) estimation concurrently run as a check estimate. A minimum of 3 and maximum of 16 samples were used in any one block estimate for HM, mids and slimes. A maximum of 4 samples per drill hole were used in any one block estimate. Grade interpolation was run within the individual mineralisation domains, acting as hard boundaries. • The mineral species Rutile, Leucoxene, altered Ilmenite, Ilmenite, total Ilmenite and Zircon were interpolated into the Mineral Resource model using IDS interpolation. • A density value of 1.7 t/m³ was assigned to all blocks in the model. • No mining depletion has occurred at the deposit. • No by-products were modelled.



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		- No selective mining units were assumed in this model. - The grade model was validated by 1) creating slices of the model and comparing to drill holes on the same slice; 2) swath plots comparing average block grades with average sample grades on nominated easting, northing and RL slices; and 3) mean grades per domain for estimated blocks and flagged drill hole samples. No reconciliation data exists to test the model. - The Mineral Resource estimate is an update to the Mineral Resource estimate reported in 2015, and represents a minimal change in reported tonnages and grade. This Mineral Resource reports Indicated resources for the first time, due to the infill drilling and mineral assemblage test work carried out.
Moisture	Whether the tonnages are estimated on a dry basis or with natural moisture, and the method of determination of the moisture content.	Tonnages are estimated on a dry basis.
Cut-off parameters	The basis of the adopted cut-off grade(s) or quality parameters applied.	The reporting cut-off grade of 2% HM, with an upper limit of 30% slimes, is as used to report the 2012 and 2015 Mineral Resources. A series of grade – tonnage reports are presented in the form of grade tonnage tables. Slimes and mineralogy percentages from the reported blocks were captured and reported.
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.	It is expected the deposit will be mined by conventional open cut dry mining methods. The CP is of the opinion there are reasonable prospects for eventual economic extraction, based upon the shallow depths of the deposit, favorable mineralogy, access to site (adjacent to a major highway) and favorable mining laws in the state of Western Australia.
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 deposit contains a high slimes content which must be factored into process plant designs. - During 2017, a 14 tonne bulk sample was taken from the McLaren deposit and sent to a metallurgical laboratory to make an assessment of product material types and product recoveries. - The metallurgical testwork completed confirms that the McLaren material is amenable to standard mineral sands processing methodologies, utilising typical mineral sands equipment. Characterisation of a representative sub-sample derived from the bulk sample indicated the slimes, mids and oversize



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		fractions are similar to the fractions as estimated in this Mineral Resource. • The testwork demonstrated that the ilmenite produce is of suitable grade to be classified as sulphate grade ilmenite; the rutile product is of typical quality; and the zircon product is of typical zircon quality, noting that the zircon contains very low levels of U+Th. • Mineral recoveries of 74.5% for Ilmenite, 45.6% for rutile and 52.2% for zircon.
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.	• No assumptions have been made regarding waste disposal. Any waste dump material is not expected to be contaminated by deleterious minerals. There is a reasonable expectation that waste material will be placed back into the open pit following mining of the ore, with top soil placed back on top and re-seeded.
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.	• A density value of 1.7 t/m³ was assigned to all blocks in the model. No density measurement data was located, or is known to exist to support this value. The Fingerboards mineral sands deposit (Kalbar Resources Ltd., Victoria) presents an analogy, with a similar geological setting, with a calculated density of 1.68 t/m³
Classification	• The basis for the classification of the Mineral Resources into varying confidence categories. • Whether appropriate account has been taken of all relevant factors (i.e. 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 is classified as a combination of Indicated and Inferred and has been reported in accordance with the JORC Code, with geological and sampling evidence sufficient to assume geological and grade continuity within the volumes classified as Indicated. The classification levels are based upon an assessment of geological understanding of the deposit, geological and grade continuity, drillhole spacing, quality control results, search and interpolation parameters, quality and quantity of Mineral Assemblage data, and an analysis of available density information. • All available data was assessed and the competent persons relative confidence in the data was used to assist in the classification of the Mineral Resource. • The current classification assignment appropriately reflects the Competent



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Audits or reviews	The results of any audits or reviews of Mineral Resource estimates.	Person's view of the deposit. The Mineral Resource model and reported results were reviewed by CSA Global, as part of their internal quality control procedures. No issues of any consequence were noted, with a few recommendations acted upon prior to final reporting or the Mineral Resource.
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.	- An inverse distance estimation algorithm was used in parallel with the ordinary Kriged interpolation, with results very similar to the Kriged results. - No other estimation method or geostatistical analysis has been performed. - The Mineral Resource is a local estimate, whereby the Mineral Resource is constrained within grade domains, with the tonnages and grade above the reporting cut-off grade appropriately reported. - Relevant tonnages and grade above a nominated cut-off grade for HM, and below a nominated slimes grade, are provided in the introduction and body of this report. Tonnages were calculated by filtering all blocks above the cut-off grade and sub-setting the resultant data into bins by mineralisation domain. The volumes of all the collated blocks were multiplied by the dry density value to derive the tonnages. The contained metal for each block were calculated by multiplying the HM grade (%) by the block tonnage. - No production data is available to reconcile results with.