

Level 8, 99 St Georges Terrace Perth WA 6000 **PHONE** +61 (08) 9486 4036 ABN

96 095 684 389

WEBSITE https://fortunametals.limited

15 October 2025

Kampini Hand Auger Commenced Exploration Update

Highlights

- Phase 1 Kampini Project commenced, 58 hand auger drill holes expected to be completed by the end of October
- Phase 2 Mkanda Project, 205 hand auger drill holes will commence early November, covering the entire project area on 800m grid pattern*
- Phase 1 Mkanda Project priority hand auger samples being sent to South Africa for analysis with first assay results anticipated from late Q4 2025
- XRD and QEMSCAN mineralogy analysis underway at ALS Perth to determine rutile content in the heavy mineral concentrate (HMC) of panned samples

Fortuna Metals Limited (ASX: FUN) (**Fortuna** or the **Company**) is pleased to announce the commencement of phase one hand auger drilling at the Company's 100% owned Mkanda and Kampini rutile and graphite Projects (**Projects**) in Malawi (refer ASX release 11 September 2025).

Commenting on the commencement of drilling, Fortuna CEO, Mr Tom Langley, said "We continue to fast track our exploration efforts to test our large 658km² tenement holding for significant rutile mineralisation. The hand auger drilling is proving to be a low cost and quick drilling method that allows us to test large areas that will help demonstrate the widespread resource potential within our Mkanda and Kampini projects.

"Importantly, Fortuna holds the majority of the most prospective geology extending over 70km of strike south from Kasiya, the world's largest rutile and second largest flake graphite resource held by Sovereign Metals.

"Our phase one drilling was completed on time and we are eagerly awaiting rutile assays to confirm the scale and grade of the potential mineralisation across our projects. We believe we are well placed to make a significant rutile discovery."

^{*}Subject to shareholder approval at the AGM on the 30th October 2025.



ADDRESSLevel 8, 99 St Georges Terrace

Perth WA 6000 **PHONE** +61 (08) 9486 4036 ABN

96 095 684 389

WEBSITE

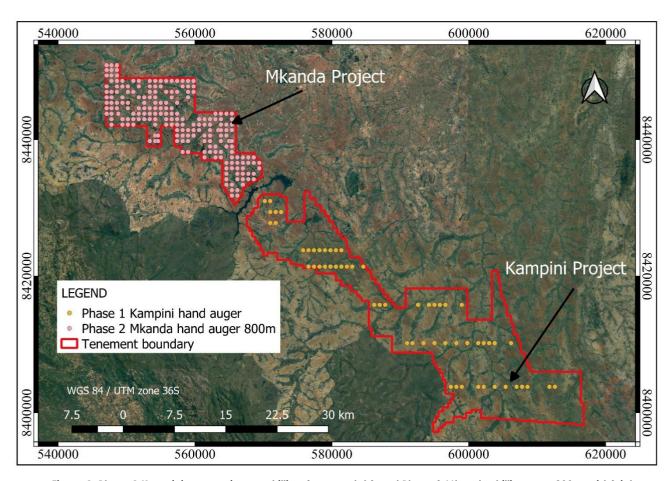


Figure 1. Phase 1 Kampini reconnaisance drilling (orange dots) and Phase 2 Mkanda drilling on a 800m grid (pink dots).



+61 (08) 9486 4036

ABN 96 095 684 389

WEBSITE

https://fortunametals.limited

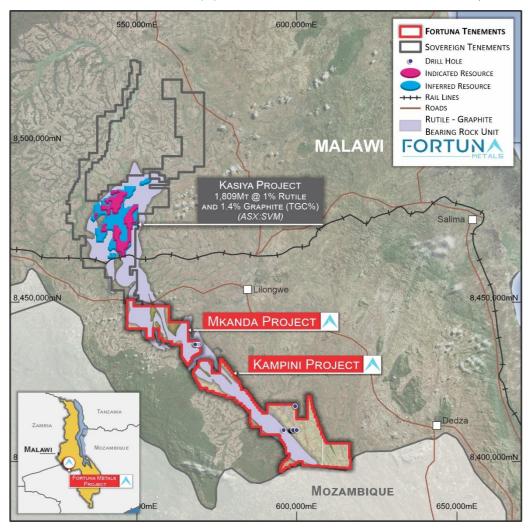


Figure 2. Project location and simplified geology map.

Projects Background

The Phase 1 drill program at Mkanda and Kampini are designed as a first pass reconnaissance drill program to investigate large areas across the project for potential rutile mineralisation. Phase 1 hand auger at the Mkanda Project consisted of 63 auger holes averaging 9.2 metres depth. Samples are being sent in batches to a South African laboratory to assist with quicker turnaround of assays. First results are anticipated to be received in November and regularly through to January 2026.

The next phase of drilling will consist of an 800m spaced grid over the Mkanda Project for a total of 205 holes to 10m depth. Infill drilling on tighter 400m spacing will follow in quick succession based on visual results and geological logging. A 400m drill spacing meets the required drill density for inferred resource estimation, with Sovereign Metals using a 400m drill spacing for their inferred resource at Kasiya.²

The Mkanda and Kampini Projects extend over an area of 658km² and are located in Malawi, immediately to the south of Sovereign Metals Limited's (ASX: SVM) world class Kasiya rutile project.



ADDRESS Level 8, 99 St Georges Terrace Perth WA 6000 PHONE +61 (08) 9486 4036 **ABN** 96 095 684 389

WEBSITE

https://fortunametals.limited

Kasiya is the largest rutile and the second largest flake graphite deposit in the world.3

Fortuna's projects cover the majority of the 70km strike extent of the same Lilongwe Plain weathered gneiss that hosts the rutile and graphite at Kasiya. The high-grade rutile deposit at Kasiya is best described as a residual placer or eluvial heavy mineral deposit. The enrichment of rutile into economic mineralisation is a result of weathering of the primary host rock and concentration, inplace of heavy minerals, as opposed to the high energy transport and concentration of heavy minerals in a traditional placer. The enrichment stage came as tropical weathering during the Tertiary depleted the top ~5 to 10m of physically and chemically mobile minerals. This caused significant volume loss and concurrent concentration of heavy minerals including rutile.⁸

The projects have excellent infrastructure availability, with the central region being approximately 20km from the capital city of Lilongwe, 25km from rail access (11km at the most northern boundary), 15km from high-capacity power lines and with plentiful fresh water.

The Company will set up a low cost in-country laboratory for the initial steps of preparing the sample for heavy mineral separation (HMS), magnetic separation and XRF analysis. The samples that undergo in-country sample preparation will be sent to an external laboratory for analysis.

Rutile - Critical Mineral

Commercial titanium dioxide products; natural rutile (TiO_2 93-97%), leucoxene (TiO_2 70-93%) and ilmenite (TiO_2 48-64%) are the principal feedstocks for pigment production, titanium metal, welding electrodes and advanced manufacturing.

Natural rutile is a highly sought after, high grade titanium feed source currently selling for approximately US\$1,100 - 1,700 per tonne. The outlook for titanium metal is estimated to increase significantly from US\$30B in 2025 to US\$54B by 2034 – CAGR 6.5%.⁵

Natural rutile is the highest quality and best source of titanium feedstock for manufacturing titanium metals and TiO_2 pigment. Traditional deposits are becoming exhausted with legacy producers in decline, with an anticipated tight supply and industrial demand growth expected to drive strong future prices.

Titanium in robotics is revolutionising the field of next-gen machines due to its unique properties of lightweight strength and high durability. As robotic systems become more advanced, the demand for materials like titanium grows significantly. Titanium excels in meeting the dual requirements of lightweight construction and robust performance, making it an essential component for robotic technology advancements. ⁶

Titanium alloys allow for complex, lightweight construction techniques that reduce energy consumption while maintaining operational effectiveness. Robotic technology advancements driven by these materials also contribute significantly to industrial automation, including precision tasks like medical equipment handling and high-tech manufacturing.⁶

In Australia, we are seeing a reduced focus on low grade ilmenite as an economic source of titanium,



ADDRESS Level 8, 99 St Georges Terrace Perth WA 6000 PHONE +61 (08) 9486 4036 **ABN** 96 095 684 389

WEBSITE https://fortunametals.limited

with Iluka (ASX:ILU) putting the Cataby ilmenite dominate mine into care and maintenance. Meanwhile Iluka are currently developing the \$480m CAPEX rutile dominant Balranald deposit in NSW, Australia, with mineralisation starting 60m below surface.⁷

Exploration Update - Lyons and Edmund Project Gascoyne WA

A soil sampling program was completed in September 2025. The survey was planned on a line spacing of 1,000m with samples collected every 200m along lines, for a total of 202 samples. Analysis was done on the $<2\mu m$ fraction using the UltraFine+ method for 53 elements.

The most coherent copper-gold anomaly is on the western end of the northern line, recording a peak copper value above 60ppm and gold results in the range of 3 – 5ppb, Figure 5, 6. In the most southern line peak gold values of 10.6ppb and 8.1ppb in close spatial association warrant further investigation.

Further rare earth and niobium exploration programs will focus on the carbonatite and ironstone potential in the remainder of the tenement, specifically Lyons 23 potential carbonatite and Lyons 27 ironstone that was discovered in 2023 and remains open, Figure 4. (Refer ASX Announcement 21 October 2022).

Analysis of the reactive 2-micron clay fraction, with microwave digestion and using the latest low detection level ICPMS technology, has proven to be useful for geologists and geochemists to help see through shallow to moderate cover.

UltraFine+™ is now an established approach to surface exploration analysis using proven geochemical methods to identify sensitive signals at surface. Concentration of metals in the ultrafine fraction gives stronger signals, generally well above instrumental detection limits, and increased signal-to-background ratios.

The soil sampling was investigating an area that had multiple base metal prospects that were identified in the 1980's through to the 1990's when a number of major mining house exploration teams, including BHP Minerals, Newmont Australia and Newcrest Mining, conducted extensive exploration in the area.

The project also has potential for REE mineralisation associated with circular carbonatite bodies interpreted from magnetics imagery, including Lyons_23, which potentially show associated magnetic fenite alteration, similar to the Mangaroon Carbonatites identified by neighbouring Dreadnought Resources.⁹



Level 8, 99 St Georges Terrace Perth WA 6000

PHONE

+61 (08) 9486 4036

ABN

96 095 684 389

WEBSITE

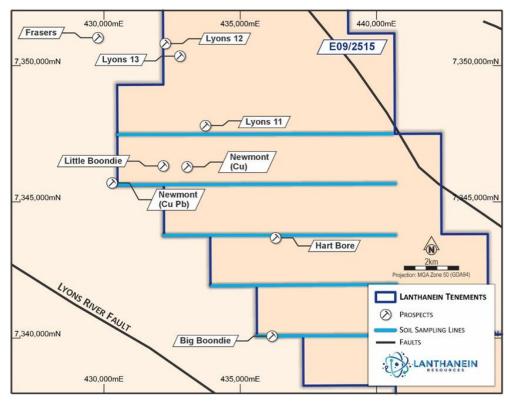


Figure 3. Soil sampling lines at the Lyons Project E09/2515.



Level 8, 99 St Georges Terrace Perth WA 6000 **PHONE** +61 (08) 9486 4036 ABN

96 095 684 389

WEBSITE

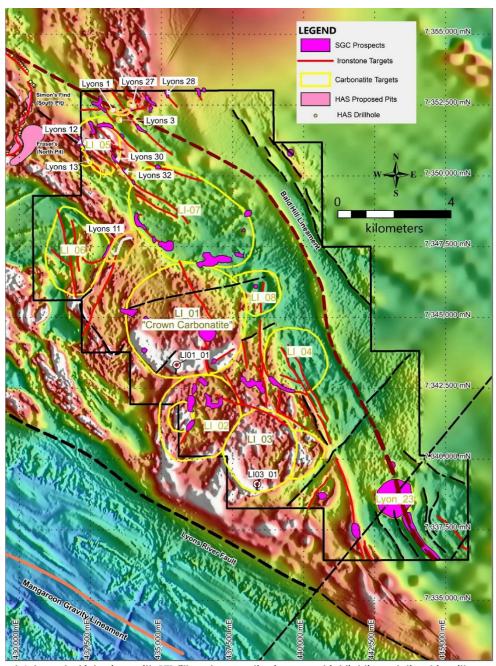


Figure 4. Interpreted intrusives with RTP filtered magnetics imagery, highlighting relationship with rare earth mineralisation at Hastings, and target areas on Fortuna's Lyons Project.



Level 8, 99 St Georges Terrace Perth WA 6000 **PHONE**

ABN

96 095 684 389

WEBSITE

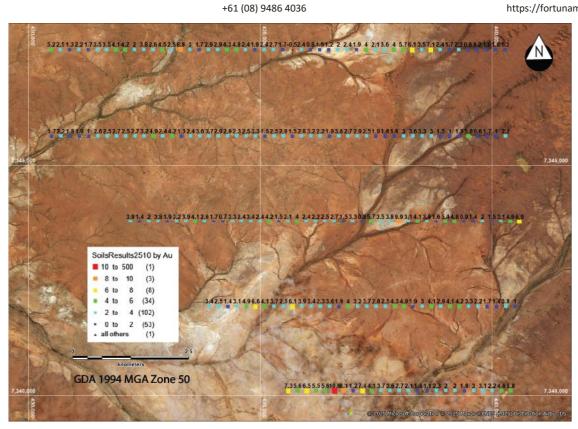


Figure 5. Gold (ppb) results at Lyons Project.

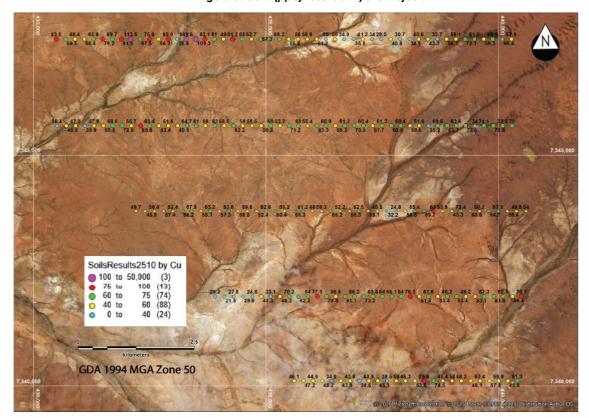


Figure 6. Copper (ppm) results at Lyons Project



+61 (08) 9486 4036

ABN 96 095 684 389

WEBSITE https://fortunametals.limited

References

- ¹ Sovereign Metals Limited (ASX: SVM), High Grade, Broad and Widespread Rutile Potential Demonstrated in Malawi, ASX Release, 24 January 2019
- ² Sovereign Metals Limited (ASX:SVM), Maiden JORC Resource Confirms Kasiya as one of the World's Largest Rutile Deposits, ASX Release, 9 June 2021
- 3 Sovereign Metals Limited (ASX: SVM), Optimised PFS Results dated 22 January 2025. The Kasiya deposit comprises 1,200Mt @ 1.0% TiO₂ and 1.5% TGC and 609Mt @ 0.9% TiO₂ and 1.1% TGC at a 0.7% cut-off as at 5 April 2023.
- ⁴ Sovereign Metals Limited (ASX:SVM), High Grade Rutile Recovered From Malingunde Graphite Tailings, ASX Release, 14 August 2018
- ⁵ Precedence Research Titanium Market Size, Share, and Trends 2024 to 2034. (19 May 2025). Retrieved from https://www.precedenceresearch.com/titanium-market
- ⁶ Retrieved from https://titanium-vstreet.com/blog/titanium-in-robotics-lightweight-strength-for-next-gen-machines
- ⁷ Retrieved from https://www.iluka.com/operations-resource-development/resource development/balranald
- ⁸ Discovery of the giant Kasiya rutile-graphite deposit in Malawi. AIGWA MEGWA Monthly meeting presentation June 2023 Retrieved from <u>MEGWA May 2023: J Stephens: Discovery of the Giant Kasiya Rutile-Graphite Deposit in Malawi. https://www.youtube.com/watch?v=LX0qB4DocuQ</u>
- ⁹ Dreadnought Resources (ASX:DRE), Fresh Rare Earth Surprise 140m @ 0.9% TREO from Stinger, ASX Release, 29 September 2025

This announcement has been authorised for release by the Directors of the Company.

For additional information please visit our website at https://fortunametals.limited/

CAUTIONARY STATEMENT

This announcement has been prepared by Fortuna Metals Limited. The document contains background Information about Fortuna Metals Limited current at the date of this announcement. The announcement is in summary form and does not purport to be all inclusive or complete. Recipients should conduct their own investigations and perform their own analysis in order to satisfy themselves as to the accuracy and completeness of the information, statements and opinions contained in this announcement. The announcement is for information purposes only. Neither this announcement nor the information contained in it constitutes an offer, invitation, solicitation or recommendation in relation to the purchase or sale of shares in any jurisdiction.

The announcement may not be distributed in any jurisdiction except in accordance with the legal requirements applicable in such jurisdiction. Recipients should inform themselves of the restrictions that apply to their own jurisdiction as a failure to do so may result in a violation of securities laws in such jurisdiction. This announcement does not constitute investment advice and has been prepared without taking into account the recipient's investment objectives, financial circumstances or



Level 8, 99 St Georges Terrace Perth WA 6000 **PHONE** +61 (08) 9486 4036 ABN

96 095 684 389

WEBSITE

https://fortunametals.limited

particular needs and the opinions and recommendations in this announcement are not intended to represent recommendations of particular investments to particular persons.

COMPETENT PERSON'S STATEMENT

The information in this document that relates to Exploration Results, Mineral Resources or Ore Reserves is based on information compiled by Mr Thomas Langley who is a member of the Australian Institute of Geoscientists (MAIG) and a member of the Australasian Institute of Mining and Metallurgy (MAusIMM). Mr Thomas Langley is a full-time employee of Fortuna Metals Limited, and is a shareholder, however Mr Thomas Langley believes this shareholding does not create a conflict of interest, and Mr Langley has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which he is undertaking to qualify as a Competent Person as defined in the 2012 Edition of the "Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves". Mr Langley consents to the inclusion in this presentation of the matters based on his information in the form and context in which it appears.

Appendix 2. JORC Code, 2012 Edition – Table 1 report template

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. 	Gascoyne Soil Sampling UFF Soils: Soil samples were collected from 5 - 35cm below surface, sieved to 1mm and bagged in ~250gm samples. Soil samples were collected by Geomin Services and submitted for analysis to Labwest in Perth.



Level 8, 99 St Georges Terrace Perth WA 6000 **PHONE** +61 (08) 9486 4036 ABN

96 095 684 389

WEBSITE

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, facesampling bit or other type, whether core is oriented and if so, by what method, etc).	No drilling undertaken.
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. 	No drilling undertaken.
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. 	UFF Soils: The nature and type of surface material being sampled is logged by Geomin Services personnel.
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. 	UFF Soils: Soil samples were prepared by LabWest. The ultrafine (sub 2 micron) particles were separated utilizing proprietary techniques.



+61 (08) 9486 4036

ABN

96 095 684 389

WEBSITE

	,	
Criteria	JORC Code explanation	Commentary
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. 	UFF Soils: The soil samples have been microwave digested and analysed via low detection ICPMS. Laboratory QAQC involves the use of internal lab standards using certified reference material and blanks as part of in-house procedures. A formal review of this data is completed on a periodic basis.
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. 	UFF Soils: Results included in this report have been verified by Thomas Langley (CEO) Geological logging is completed in the field in hard copy and entered into excel. All data entry is carried out by qualified personnel. Standard data entry is used on site and is backed up on external hard drives and then to a cloud-based database. No adjustments have been made to the assay data
Location of data points	 Accuracy and quality of surveys used to locate drill holes (collar and downhole surveys), trenches, mine workings and other locations used in Mineral Resource estimation. Specification of the grid system used. Quality and adequacy of topographic control. 	UFF Soils: Soil sample locations are collected by hand held GPS (±5m) Grid Datum MGA94 UTM Zone 50S
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. 	UFF Soils: Soil samples were collected at a minimum of 200m on a line spacing of 1,000m, for a total of 202 samples.
Orientation of data in relation to	Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is	UFF Soils: This is early-stage exploration and the orientation of sampling to the mineralisation is not fully understood.



+61 (08) 9486 4036

ABN 96 095 684 389

WEBSITE

https://fortunametals.limited

Criteria	JORC Code explanation	Commentary
geological structure	 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 	
Sample security	 material. The measures taken to ensure sample security. 	UFF Soils: The chain of custody of the samples is managed by Geomin Services. The Lyons project samples were delivered to Labwest by Geomin personnel.
Audits or reviews	The results of any audits or reviews of sampling techniques and data.	UFF Soils: Sampling techniques and procedures are regularly reviewed internally, as is data. To date, no external audits have been completed on these data.

Section 2 Reporting of Exploration Results

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

Criteria	JORC Code explanation	Commentary
 Type, reference name/number, location 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. 	Fortuna Metals Limited entered into a conditional agreement to acquire all of the shares in Dalkeith Capital Pty Ltd (Dalkeith) which holds two granted exploration licences in the Gascoyne Region of Western Australia. The acquisition was completed on 4 January 2022. The Gascoyne Project consists of 2 granted Exploration Licenses (E09/2515 and E09/2516). All tenements are 100% owned by Dalkeith Capital. The Gascoyne Project covers 2 Native Title Determinations including the Thudgari (WAD6212/1998)	
		and the Combined Thiin-Mah, Warriyangka, Tharrkari and Jiwarli (WAD464/2016).
		The Gascoyne Project is located over the following pastoral leases; Edmund, Gifford Creek, and Wanna.
Exploration done by other parties	Acknowledgment and appraisal of exploration by other parties.	Historical exploration of a sufficiently high standard was carried out in the region by a few parties including:
		Hurlston Pty Ltd 1986-1987: WAMEX Report A23584
		Newmont 1990: WAMEX Report A32886
		Newcrest 1990: WAMEX Report A36887



+61 (08) 9486 4036

ABN

96 095 684 389

WEBSITE

Criteria	JORC Code explanation	Commontany
Ciliena	JOKC Code explanation	Commentary
		Desert Energy 2006-2007: WAMEX Reports A78056, A80879
Geology	Deposit type, geological setting and style of mineralisation.	The Gascoyne Project is located within the Gascoyne Province of the greater Capricorn Orogen – the region that records the collision of the Pilbara-Glenburgh Terrane at 2215–2145 Ma (Ophthalmian Orogeny) and eventual collision of Pilbara/Glenburgh and Yilgarn at 2005–1950 Ma (Glenburgh Orogeny), the Gifford Creek Carbonatite Complex (GCCC) intrudes the Durlacher Supersuite (including Yangibana and Pimbyana Granites) and the Pooranoo Metamorphics.
		The c.1360 Ma GCCC is composed of; • ~NW striking Lyons River Sills (calcio-, magnesio- and ferrocarbonatites) • ~NE striking fenite (alteration) veins • Yangibana Ironstones (REE ore bodies) • Magnetite-biotite dykes
		Carbonatites in the region are thought to have been generated from melting of the Glenburgh Orogen-fertilized mantle during reactivation of structures (e.g. Lyons River Fault) at c. 1370 Ma followed by magma ascent along the same structures.
		The Gascoyne Project is prospective for Ferrocarbonatite hosted REEs.
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 	No drilling undertaken.



+61 (08) 9486 4036

ABN

96 095 684 389

WEBSITE

#01 (00) 9400 4030 Https://Tortunametals.i		
Criteria	JORC Code explanation	Commentary
	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. 	UFF Soils: Individual sample points at Lyons are plotted as per the intervals shown on Figure 3.
Relationship between mineralisatio n 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'). 	No drilling undertaken.
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.	Refer to figures within 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. 	UFF Soils: Individual sample points at Lyons are plotted as per the intervals shown on Figure 3.
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 meaningful and material information has been included in the body of the text. No metallurgical or mineralogical assessments have been completed.
Further work	The nature and scale of planned further	Further exploration programs at the Lyons and



Level 8, 99 St Georges Terrace Perth WA 6000 **PHONE** +61 (08) 9486 4036 ABN

96 095 684 389

WEBSITE

Criteria	JORC Code explanation	Commentary
	 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. 	Edmund projects will consist of investigating carbonatite and rare earth mineralisation using soil sampling, drilling and geophysical surveys.