



**BlackEarth**  
Minerals NL

Progressing to Full  
Feasibility  
January 2019

ASX:BEM

ACN: 610168191



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Cautionary Statement: The Exploration Targets reported herein are not JORC compliant Mineral Resources. The potential quantity and grade of the Exploration Targets are conceptual in nature, there has been insufficient exploration to determine a Mineral Resource and there is no certainty that further exploration work will result in the determination of a Mineral Resource.

## COMPETENT PERSON'S STATEMENT

- The information contained in this report that relates to Exploration Results and Mineral Resources is based on information compiled by Mr. Peter Langworthy, a member of The Australasian Institute of Mining and Metallurgy. Mr. Langworthy is an employee of OmniGeoX Pty Ltd which is a consultant to BlackEarth. Mr. Langworthy has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity that 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. Langworthy consents to the inclusion in this report of the matters based on the information in the form and context in which it appears.
- The information in this report that relates to the Exploration Target for the Maniry Graphite Project is extracted from the report entitled "Exploration Target Update" dated 14 August 2018 and is available to view on the Company's website [www.blackearthminerals.com.au](http://www.blackearthminerals.com.au). The Company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcement and that all material assumptions and technical parameters underpinning the estimates in the relevant market announcement continue to apply and have not materially changed. The Company confirms that the form and context in which the Competent Person's findings are presented have not been materially modified from the original market announcement.
- The information in this report that relates to the Maiden Resource Estimation for Razafy at the Maniry Graphite Project is extracted from the report entitled "Update – Maiden Resource Estimation for Razafy at the Maniry Graphite Project" dated 14 August 2018 and is available to view on the Company's website ([www.blackearthminerals.com.au](http://www.blackearthminerals.com.au)). The Company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcement and that all material assumptions and technical parameters underpinning the estimates in the relevant market announcement continue to apply and have not materially changed. The Company confirms that the form and context in which the Competent Person's findings are presented have not been materially modified from the original market announcement.
- The information contained in this report that relates to Mineral Resources is based on information compiled by Ms. Annick Manfrino, Principal of Sigma Blue and Manager Geology of Black Earth Minerals. Ms. Manfrino is a member of The Australian Institute of Geoscientists and has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activities undertaken 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." Ms. Manfrino completed a site inspection and is the Competent Person for the resource estimation. Ms. Manfrino consents to the inclusion in this report of the matters based on her information in the form and context in which it appears.
- The information in this report that relates to the Maiden Resource Estimation for Haja at the Maniry Graphite Project is extracted from the report entitled "Update – Maiden Resource Estimation for Haja at the Maniry Graphite Project" dated 27 December 2018 and is available to view on the Company's website ([www.blackearthminerals.com.au](http://www.blackearthminerals.com.au)). The Company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcement and that all material assumptions and technical parameters underpinning the estimates in the relevant market announcement continue to apply and have not materially changed. The Company confirms that the form and context in which the Competent Person's findings are presented have not been materially modified from the original market announcement.
- The information in this document that relates to metallurgical test work results is based on information compiled and reviewed by Mr David Pass, who is a Member of the Australasian Institute of Mining and Metallurgy. Mr Pass is an employee of BatteryLimits. Mr Pass has sufficient experience relevant to the mineralogy and type of deposit under consideration and the typical beneficiation thereof to qualify as a Competent Person as defined by the 2012 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (the JORC Code, 2012 Edition). Mr Pass consents to the inclusion in the report of the matters based on the reviewed information in the form and context in which it appears



# Scoping Study Results\*

Project life (processing)	10 years
NPV @ 10% pre-tax	US\$ 103M
IRR pre-tax	42%
Project CAPEX Stage 1	US\$ 41M (500ktpa ore)
Stage 2	US\$ 29M (1Mtpa ore)
Operating Cost FOB (Port of Ehoala)	US\$ 593/t
Payback for Stages 1 & 2	3.7 years (Stage 1 only: 2.7 years)
Annual graphite production	Av 30ktpa (Stage 1 – Years 1-3) Av 60ktpa (Stage 2 – Years 4+ )
Average Basket Price	US\$ 1215/t

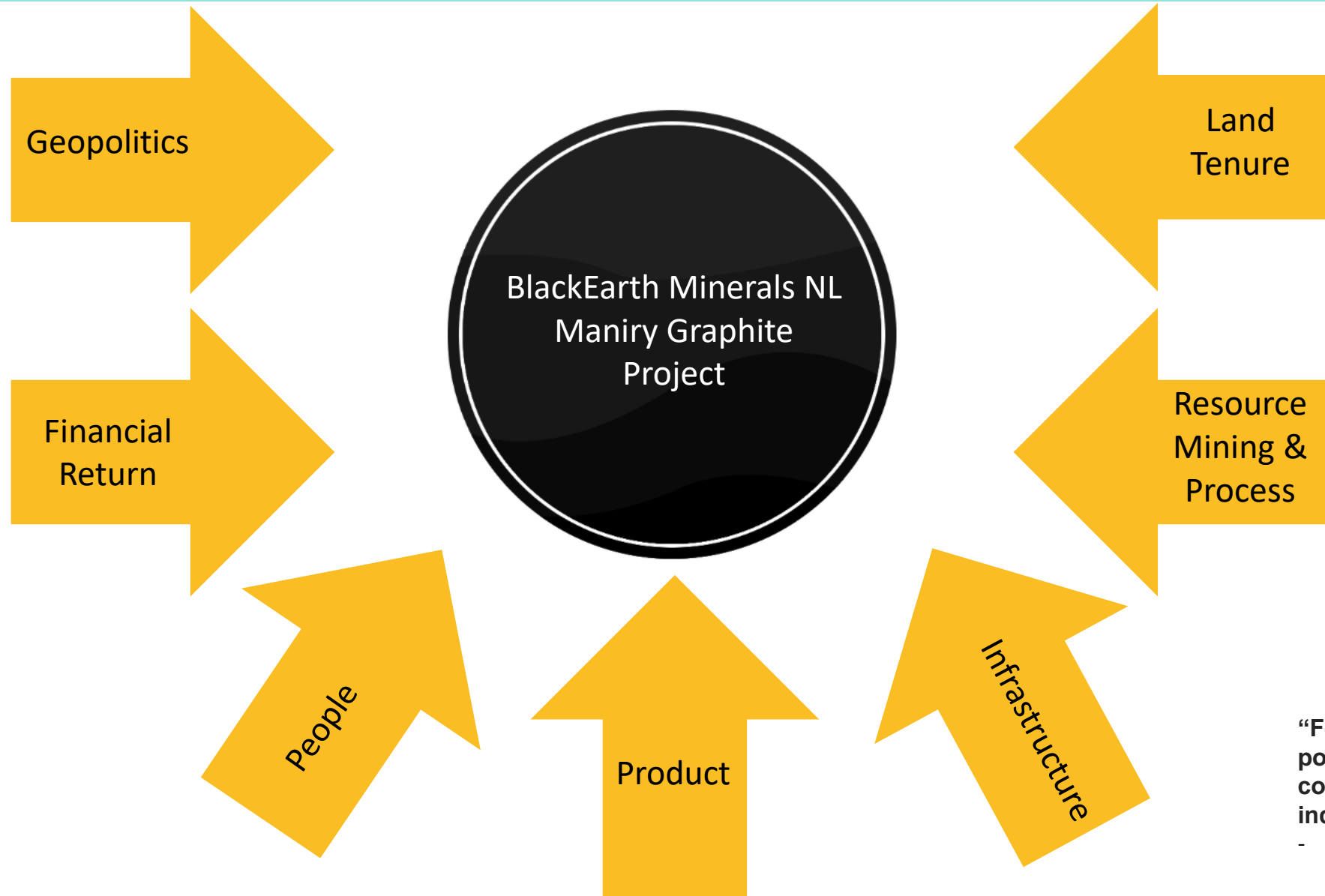


# BEM's Year 1 Report Card

- For personal use only
- ☒ • Listed on the ASX 19 January 2018
  - ☒ • Commenced diamond drilling (March)
  - ☒ • First Maniry – Razafy assays released (May)
  - ☒ • Detailed mineralogy completed (July)
  - ☒ • Indicated & Inferred Resource announced (August)
  - ☒ • Exploration Target released (August)
  - ☒ • Definitive metallurgical test work commenced (September)
  - ☒ • Scoping Study commenced (September)
  - ☒ • Definitive metallurgical results reported (December)
  - ☒ • Haja Resource announced (December)
  - ☒ • Scoping Study completed (January 2019)

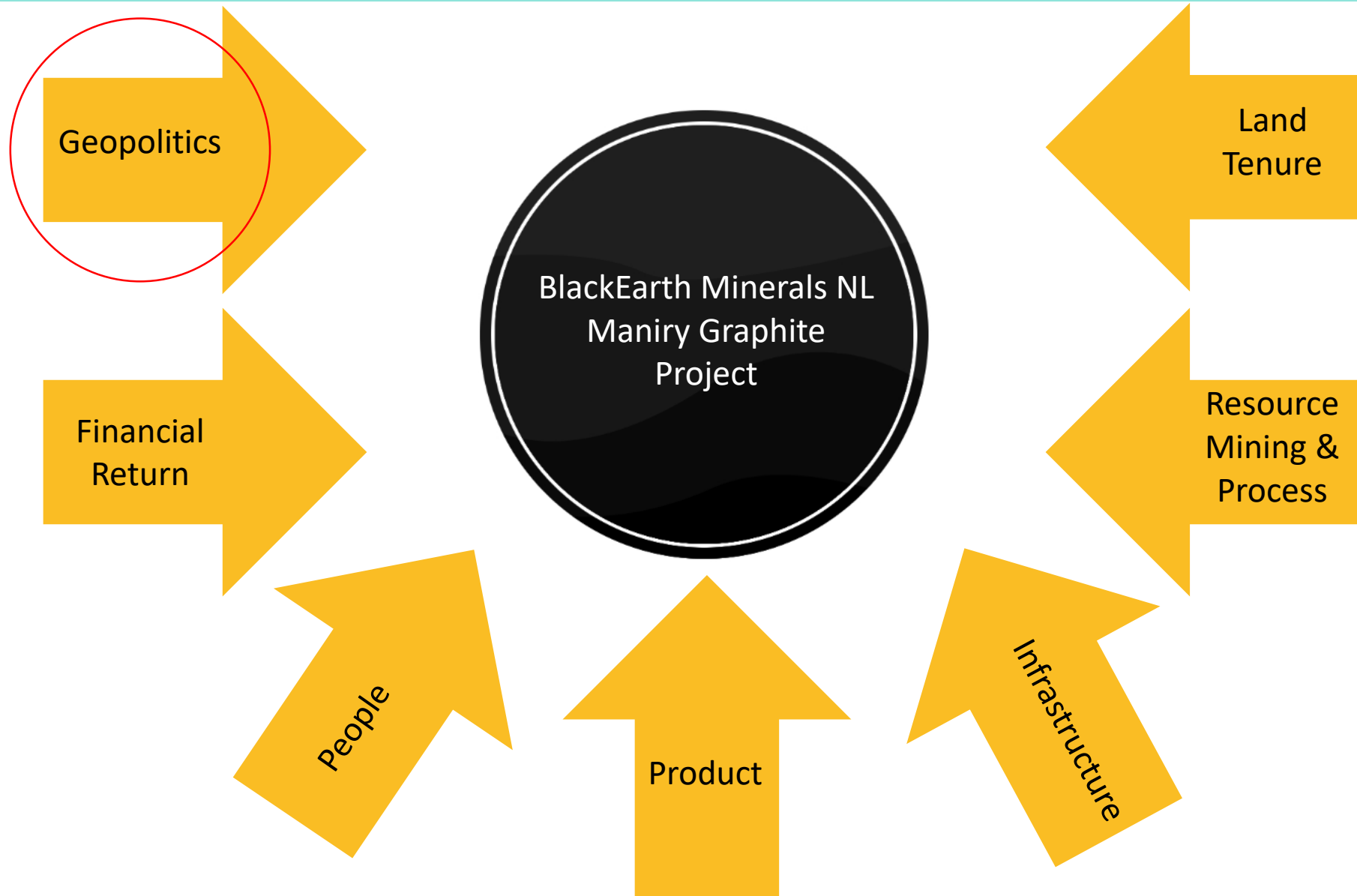


# The Heptathlon of Mining Success



**“Few have the talent; fewer still possess such single-minded commitment. The multi-skilled individual is a special breed”**  
- *What makes a perfect heptathlete?*  
BBC Sport.....Aimee Lewis

# The Heptathlon of Mining Success



# Location – Madagascar

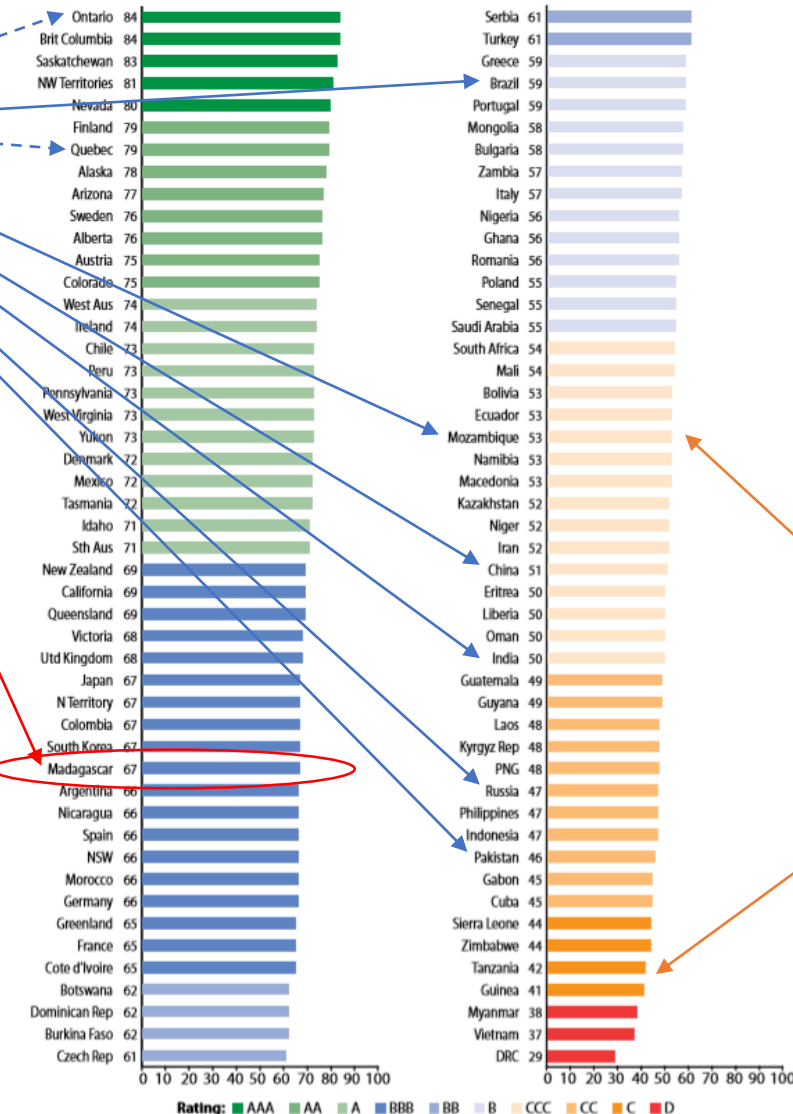
## Top 10 Global Graphite Producers

----- Canada

Norway and Ukraine are unranked

Over 90% of graphite is produced from countries considered “riskier” than Madagascar

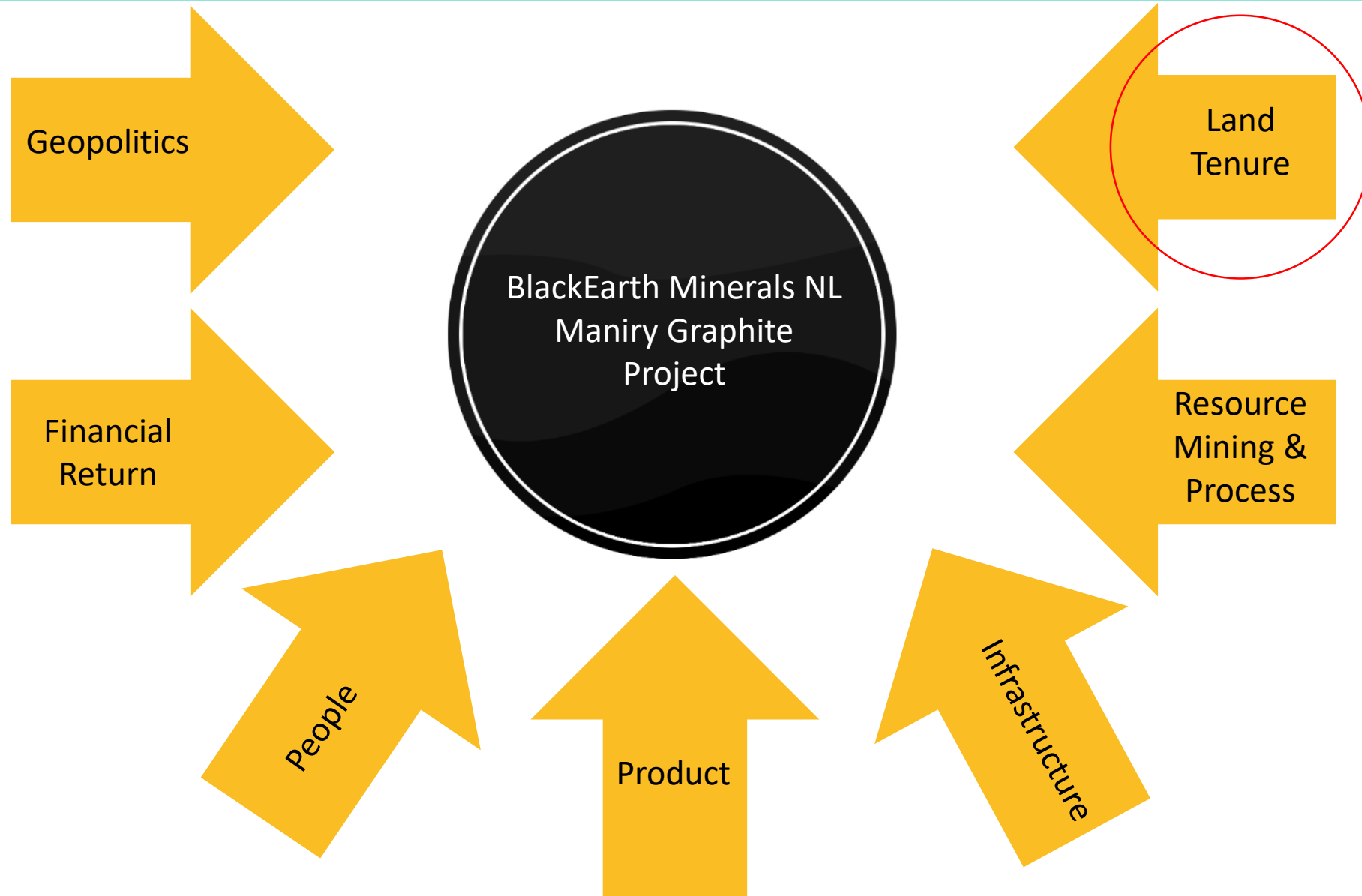
### Investment Risk Index



≥80	Negligible risk	AAA
75-79	Low risk	AA
70-74	Very low risk	A
65-69	Low to moderate risk	BBB
60-64	Moderate risk (lower)	BB
55-59	Moderate risk (upper)	B
50-54	Moderate to high risk	CCC
45-49	High risk	CC
40-44	Very high risk	C
<40	Difficult to justify investment	D

## Exploration Hotspots

# The Heptathlon of Mining Success





# 40 Year Mining Lease Granted

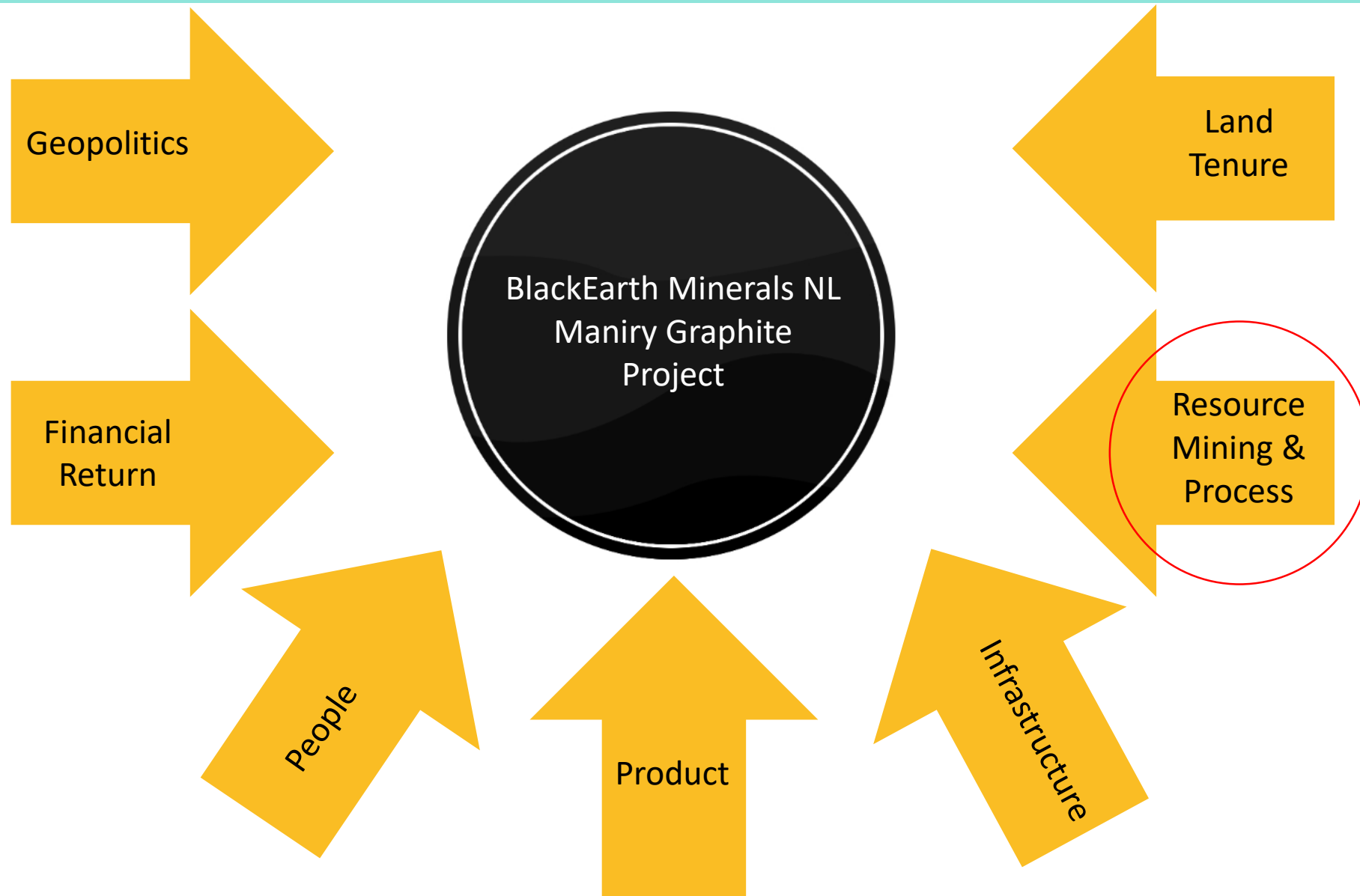
The Maniry Graphite Project contains the Razafy Resource which predominantly sits on the 40 year granted Mining Lease, PE/5394 (expires 19/11/2042 – with an option to extend)

This provides BEM with a LOM of > 8 years (incl Inferred material)

Previous exploration indicates that the Razafy prospect is open within the existing Mining Lease to the north west and potentially via lens repetition to the east



# The Heptathlon of Mining Success



# Resource

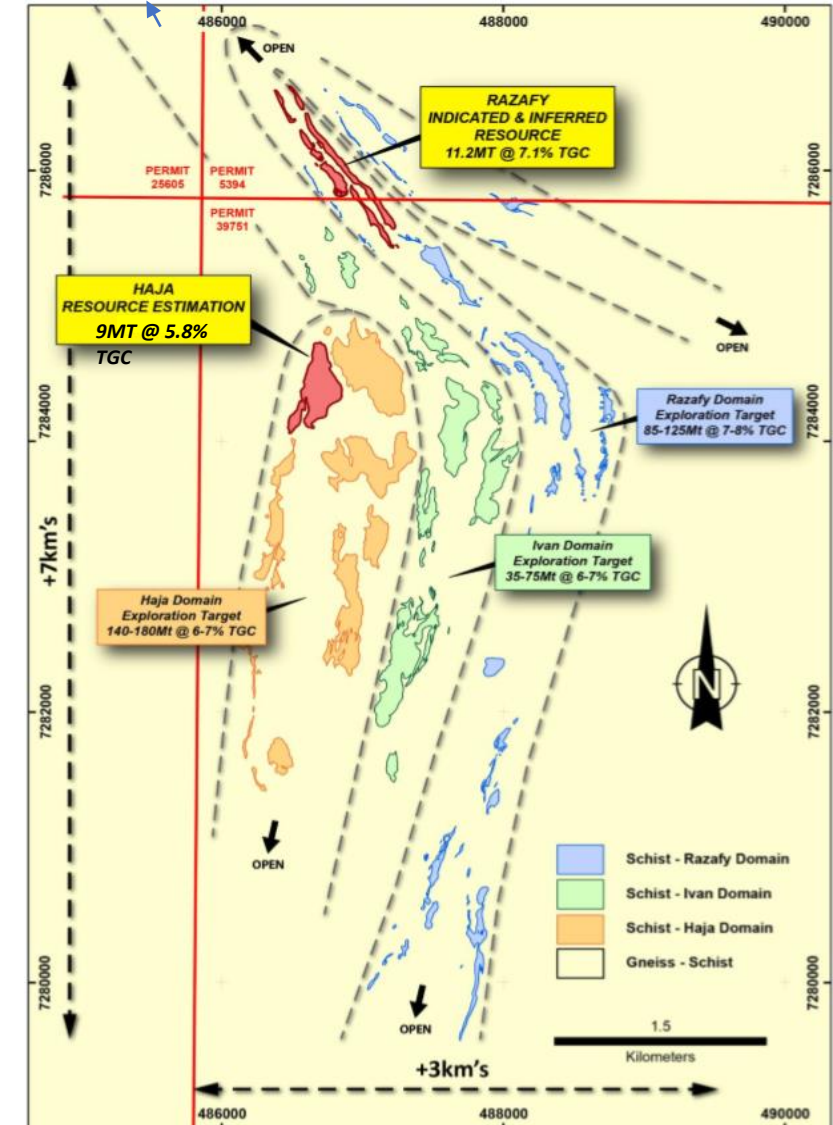
The financial model was built only on the Razafy Indicated Resource

The results reflect a thorough approach and understanding derived from extensive sampling & assaying, XRF, XRD and optical petrographics

34 large-scale zones of outcropping graphite schist exist over an area of 7km x 3km

Exploration Target\* of 260-380Mt at 6-8%TGC; significant upside

\*Refer Disclaimer





# Mining

Soft to medium ore hardness

Dilution factored into ore feed grade / financial model

Ore / waste contact well defined

Simple mine plan focused on early high grade and low waste movement to maximise financial return

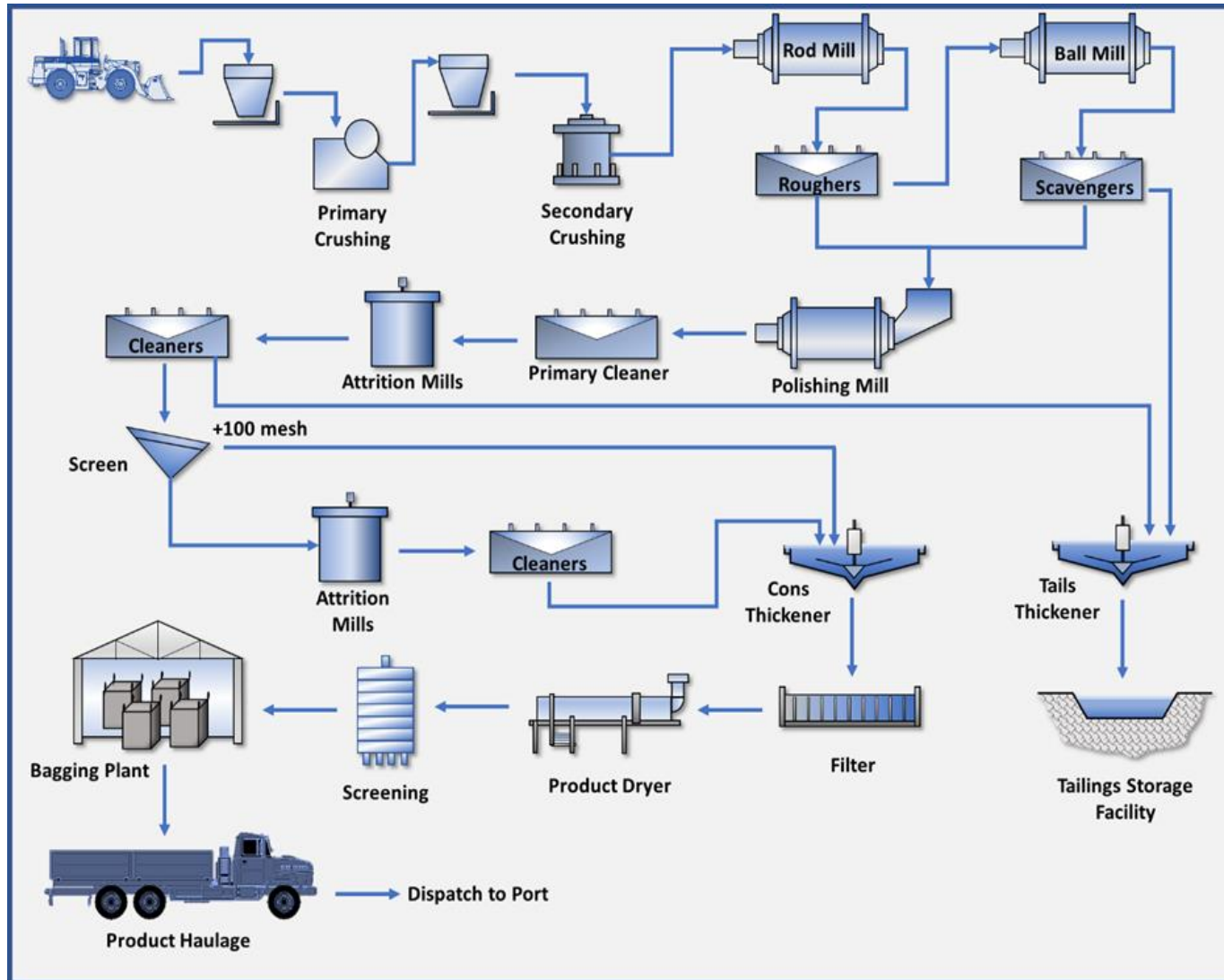
Waste : Ratio = 0.5:1 (Years 1-3)  
0.9:1 (LOM)

Contract mining assumed – available groups in Madagascar





# Process



Simple and well proven technology

Soft to medium ore hardness

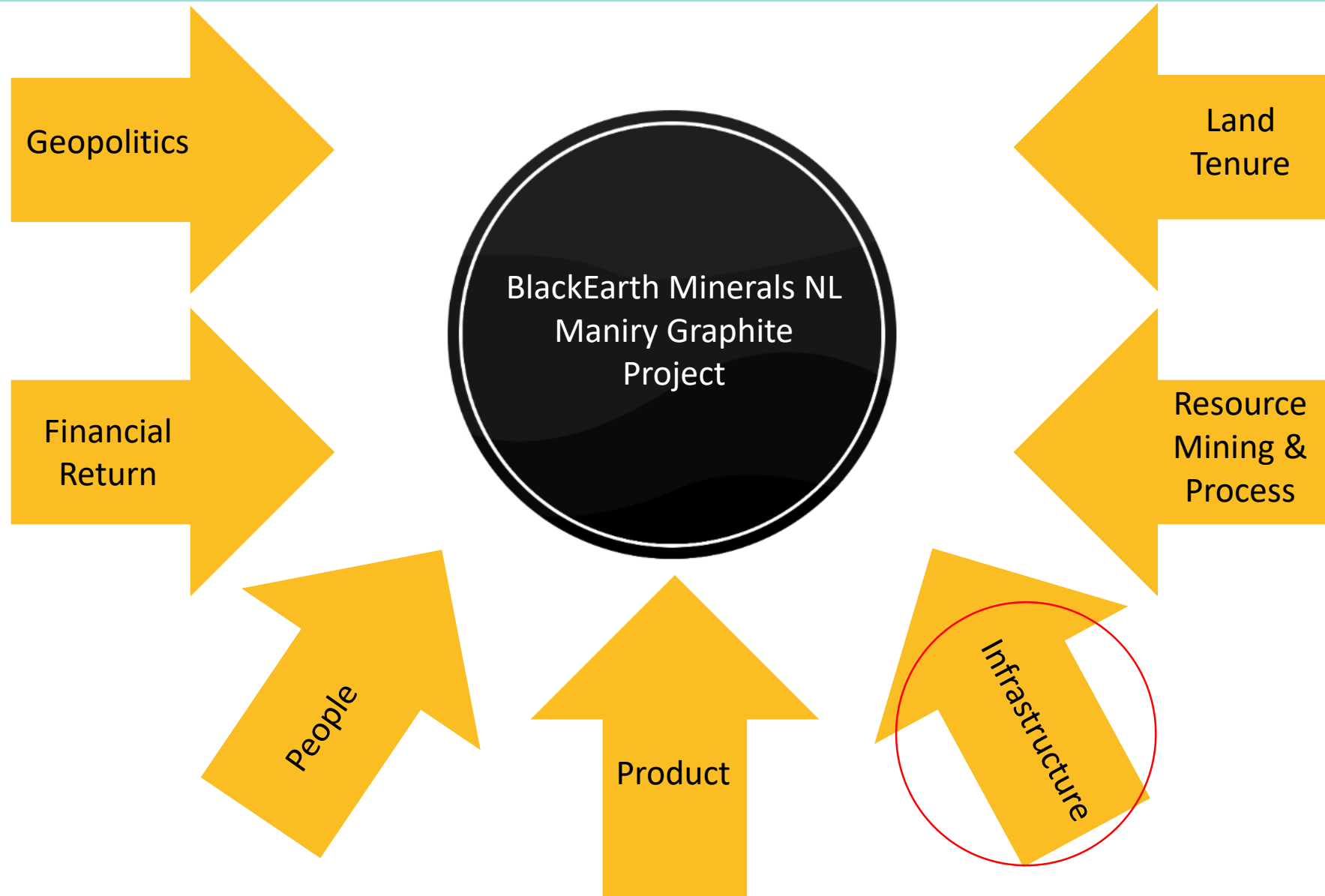
Low abrasion index

Experienced operators available

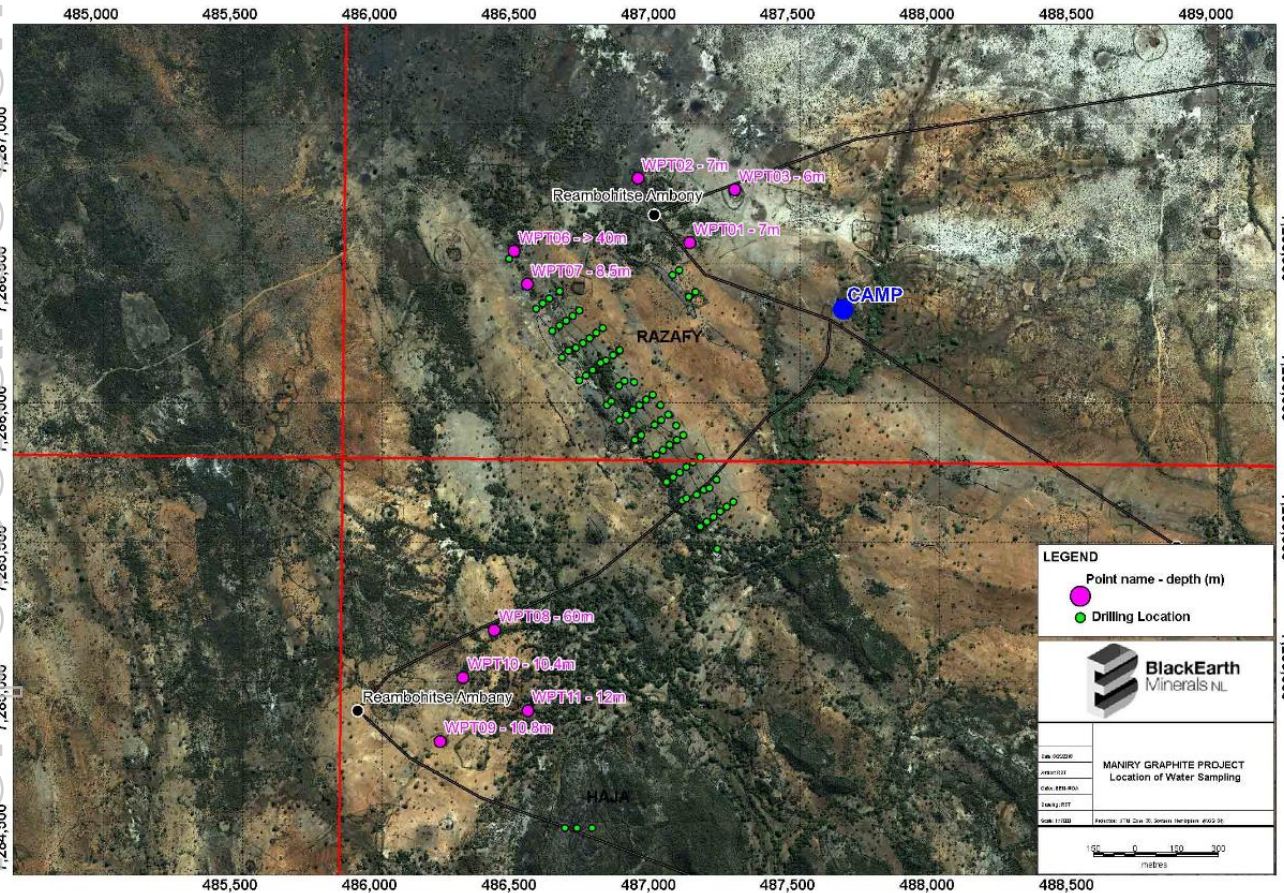
Consistent metallurgy along strike  
and at depth = predictability

Very low sulphide content

# The Heptathlon of Mining Success



# Infrastructure (Water & Power)



Established water wells around the Razafy Resource

## Water

Numerous wells (6-60 metres deep) already exist in the immediate area – all were quality tested and are suitable for processing ore; ALS test work included the use of site water

A nearby closed quarry in the area also contains significant water which was used during the drilling campaign in 2018

Est. annual rainfall 1020mm

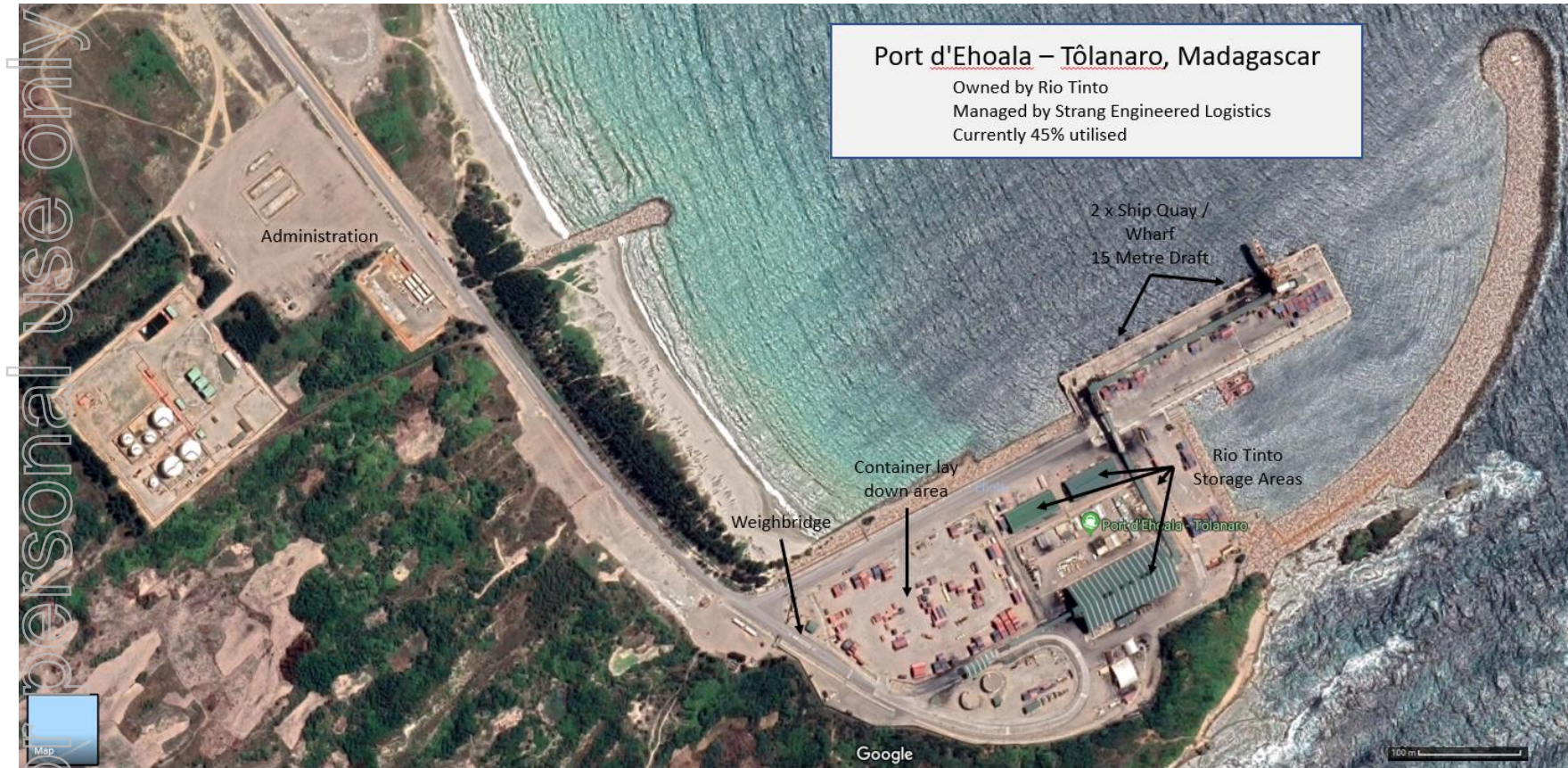
## Power

Total installed power for Stage 1 is 4MW

It is planned to use diesel fired generators, diesel potentially sourced from either Ampanihy (30km) or from the ports of either Toliara or Ehoala



# Infrastructure (Port)



The Port d'Ehoala was built by Rio Tinto under a public-private-partnership with the Government and completed in 2009

It was built to export mineral sands product but remains open to the public being only approximately 45-50% utilised

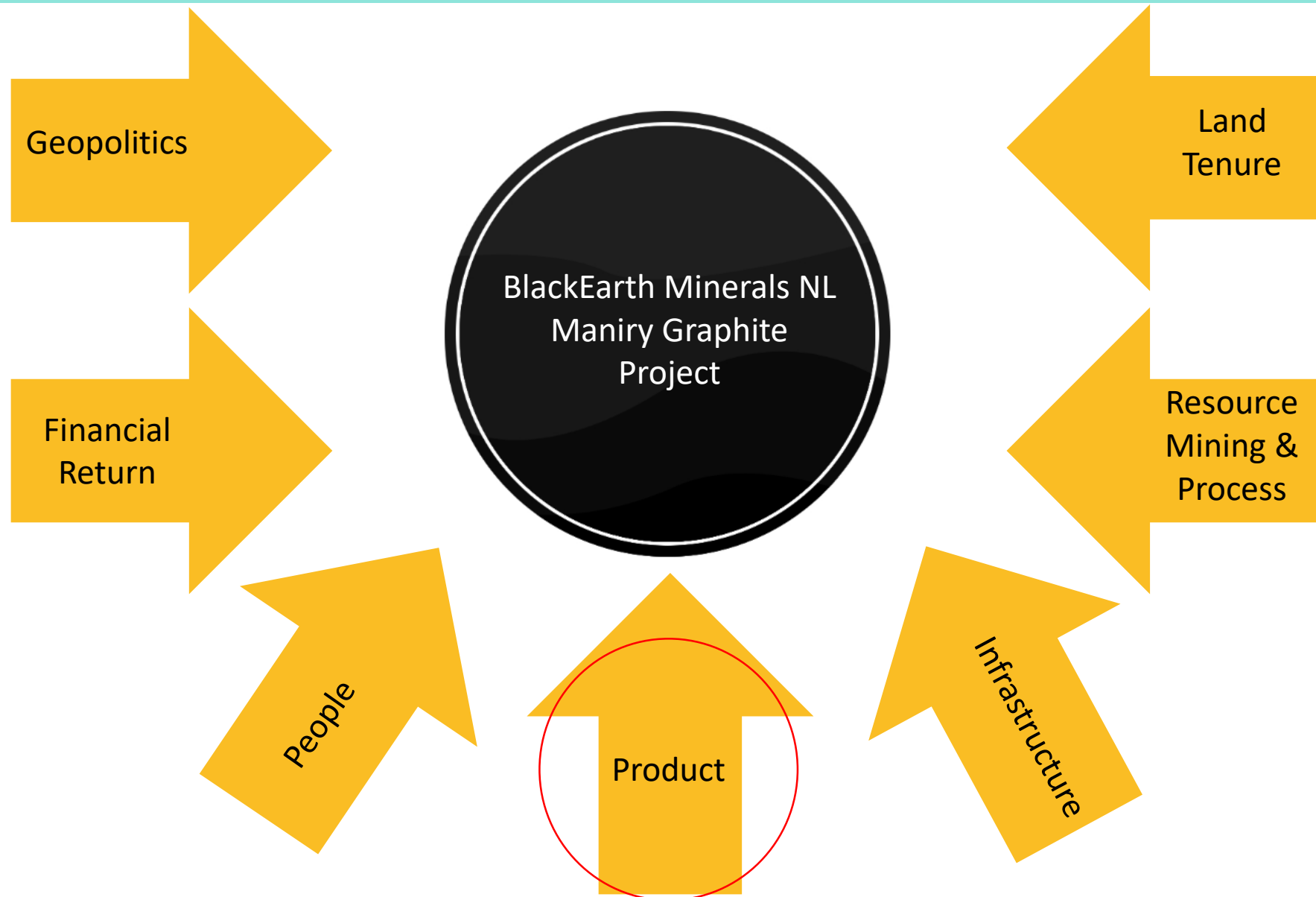
The port is managed independently by Strang Engineered Logistics; a subsidiary of Australian port operator – Patrick Terminals

The port has a secure container storage area needed by BEM and has a 15m draft capable of berthing up to panamax sized cargo vessels





# The Heptathlon of Mining Success



# Product

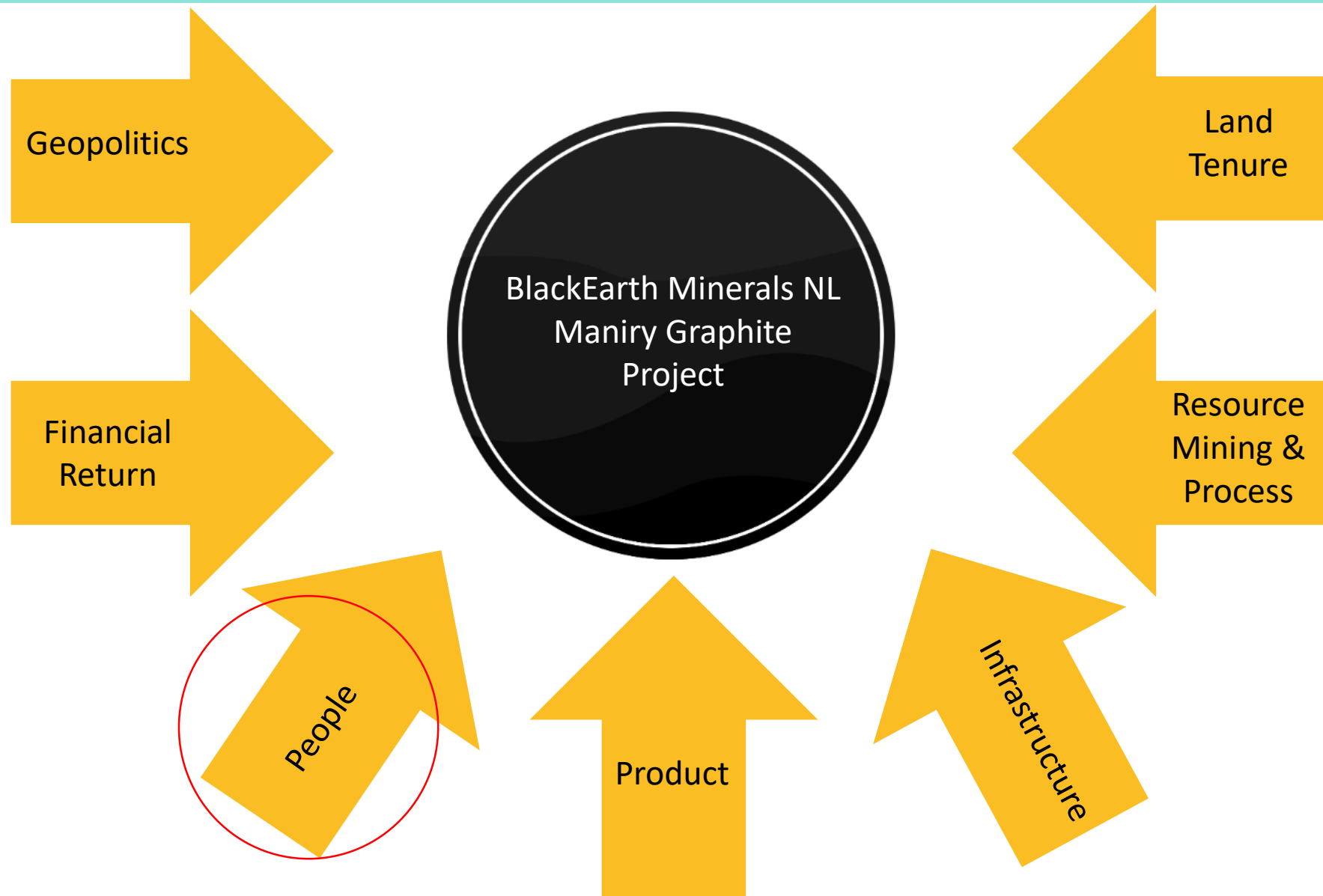
## Final Concentrate Size and Grade Distribution

Flake Size	(microns)	Mesh	Master Composite	
			Mass (%)	TGC (%)
<b>Super Jumbo</b>	> 500	38	2.8	95.8
<b>Jumbo</b>	300 – 500	+50-38	17.3	96.1
<b>Large</b>	180 – 300	+80-50	29.8	95.6
<b>Medium</b>	150 – 180	+100-80	9.1	95.0
<b>Small</b>	-150+75	+200-100	23.6	96.8
<b>Fine</b>	< 75	-100	17.4	96.1

High Value  
Product

50%

# The Heptathlon of Mining Success



# People

## Experience and skills matrix

	Position	Experience (yrs)	Graphite	Madagascar	Africa	Project Development	Corporate / Commercial	Offtake Management
Phil Hearse	Chair	40+	✓	✓	✓	✓	✓	
Tom Revy	Managing Director	35	✓	✓	✓	✓	✓	✓
George Bauk	Non-Exec Director	30			✓	✓	✓	✓
Barry Woodhouse	Company Secretary / CFO	30			✓	✓	✓	
Tracy Harris	Financial Controller	20			✓		✓	
Peter Langworthy	Competent Person - Geol	30	✓	✓	✓	✓	✓	
Annick Manfrino	Manager Geology	35			✓	✓		
Jean-Luc Marquetoux	Country Manager	30		✓	✓	✓	✓	

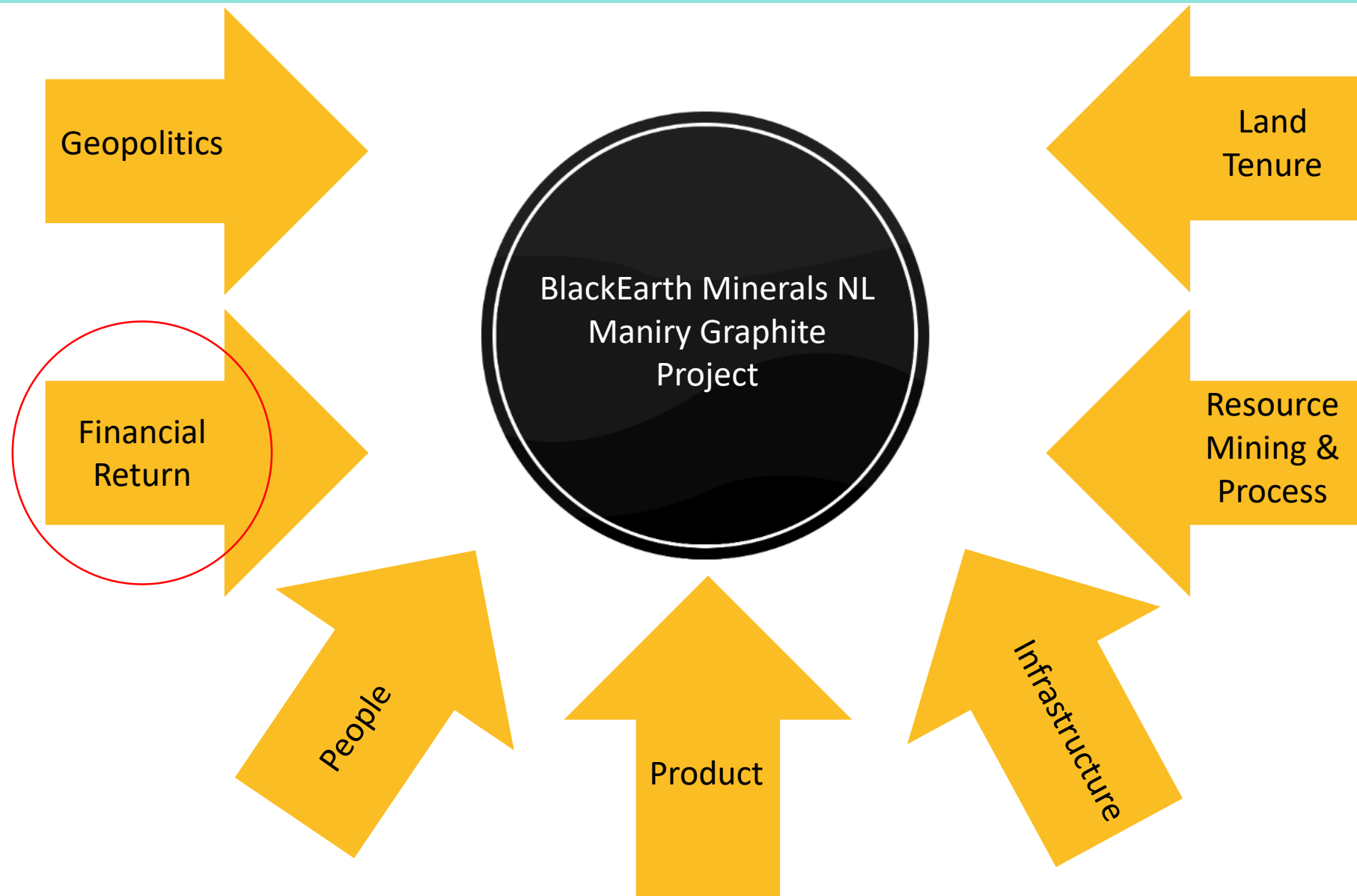
10 staff in Madagascar and based in Antananarivo

All Madagascar residents and include Country Manager, technical staff, administration (incl. HR, accounting) and community liaison

Tom Revy remains the only fulltime staff member in Australia; 80-90% of expenditure goes into Madagascar / Maniry Project



# The Heptathlon of Mining Success

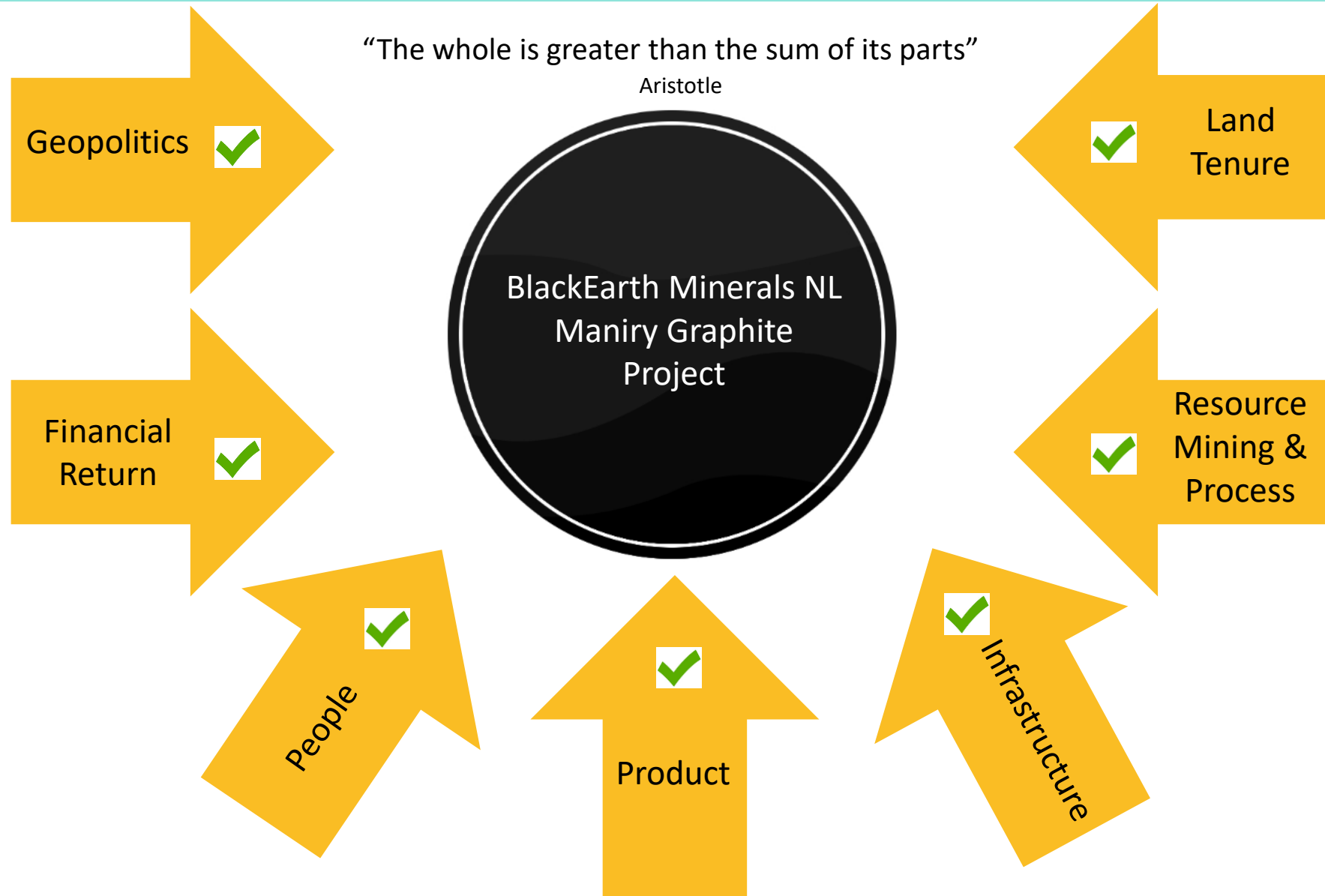


# Financial Return\*

- Project life (processing) 10 years
- NPV @ 10% pre-tax US\$ 103M
- IRR pre-tax 42%
- Project CAPEX Stage 1 US\$ 41M (500ktpa ore)  
Stage 2 US\$ 29M (1Mtpa ore)
- Operating Cost FOB (Port of Ehoala) US\$ 593/t
- Payback for Stages 1 & 2 3.7 years (Stage 1 only: 2.7 years)
- Annual graphite production Av 30ktpa (Stage 1 – Years 1-3)  
Av 60ktpa (Stage 2 – Years 4+ )
- Focus during Feasibility Study: Maximising basket price and feed grade - e.g an increase in feed grade from 6.3% to 7.3%TGC results in a project NPV of US\$152M and an IRR of 55%



# The Heptathlon of Mining Success



# Major Development Targets

- Complete the Bankable Feasibility Study (12 months)
- Offtake arrangements (6-12 months during feasibility)
- Project finance (6 months 2019-20)
- Construction – modular EPC (2020-21)
- Commissioning & first production (H1, 2021)
- Further exploration successes - ongoing



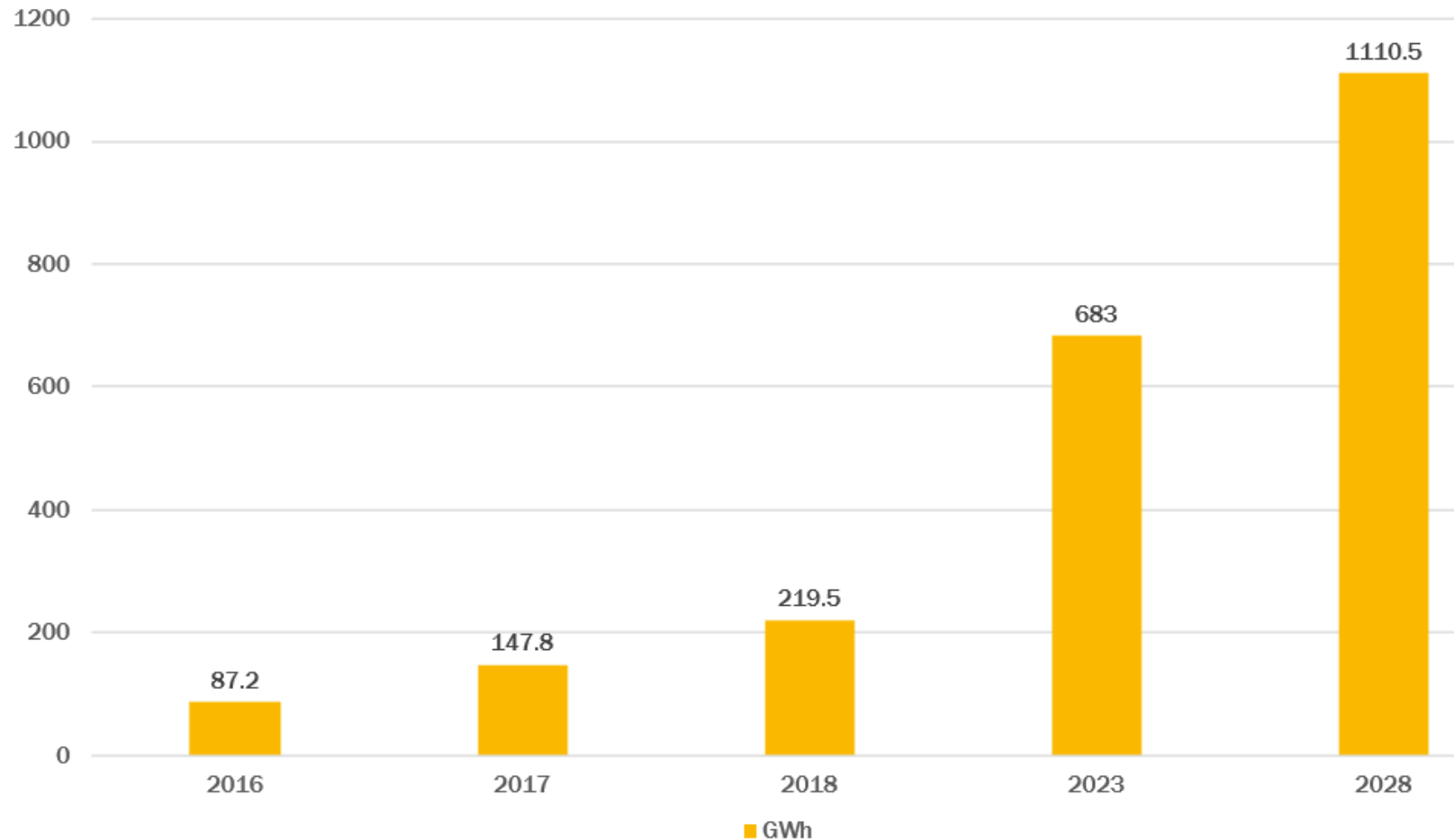


# The Right Commodity at the Right Time

GRAPHITE +  
ANODES 2018



## Pipeline lithium ion battery capacity out to 2028



Est. 10 year battery capacity growth of 891GWh

Equates to > 900kt “battery-suitable” natural graphite or up to 2.7Mt new production

Feedstock typically 75-180µm

Benchmark Mineral Intelligence has identified “base case” graphite supply shortages to commence around 2023



Source: Benchmark Mineral Intelligence, Lithium ion Battery Megafactory Assessment

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# Global Trends in the Graphite Market

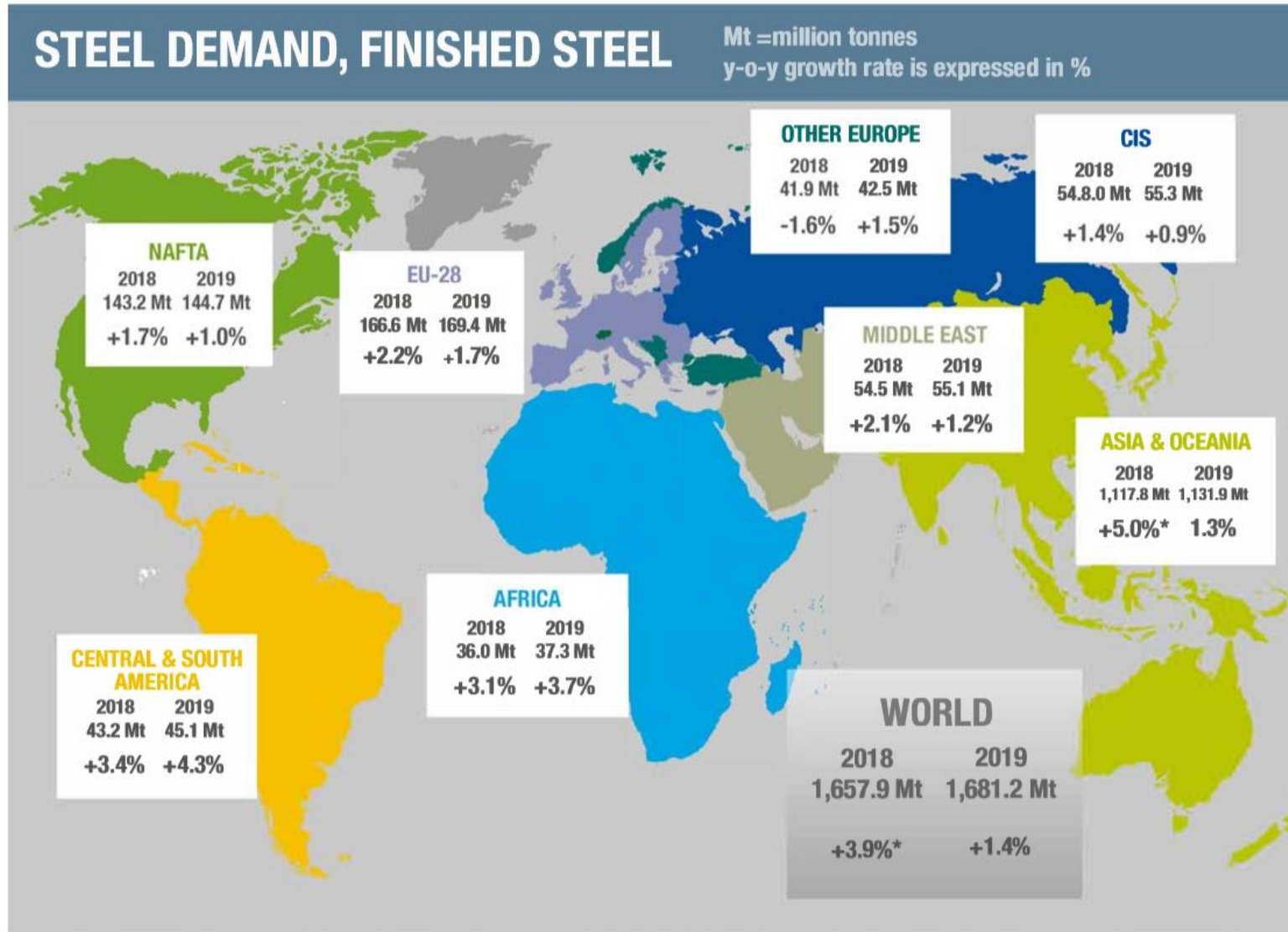
- Expandables – flame retardants and thermal shields
- Feedstock typically  $>180\mu\text{m}$
- “China needs 40 million tonnes of fire retardant building materials per annum, which will contain 5% expandable graphite.” President of the China Building Materials Application Technology Research Institute



West London's Grenfell Tower

# Global Trends in the Graphite Market

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- Steel Industry - Strong industrial foundation



Iron ore prices refer to Iron Ore Fine China Import 63.5 percent grade Spot Cost and Freight for the delivery at the Chinese port of Tianjin



# Thank You



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