

## DFS2 enhances scale and economics of the Toliara Project

### Key points

- Increase in post-tax / pre-debt (real) NPV @ 10% discount rate to US\$1.0 billion, measured at FID
- Average revenue to cost of sales ratio of 3.5
- Increase of LOM free cash flow by 60% to US\$5.9 billion, with first 10 years averaging US\$210 million pa
- Stage 2 scaled up to increase mining rates by 33% to ~25Mtpa and increasing MSP production capacity by 47%
- The increased scale of the Toliara Project is underpinned by significant increases to the Ranobe Mineral Resources and Ore Reserves estimates and the long-term supply-demand outlook for mineral sands:
  - Ranobe Mineral Resources estimate has almost doubled to 2,580Mt at an average heavy mineral grade of 4.3%
  - Ranobe Ore Reserves estimate increased to 904Mt at an average heavy mineral grade of 6.1%, a 45% increase in contained heavy mineral, supporting an initial mine life of 38 years
- Stage 1 capex cost, to establish a 13Mtpa mining processing operation, has increased by 18% to US\$520 million, primarily due to cost escalation
- Stage 2 capex cost increase to US\$137 million due to scale up of the operation to 25Mtpa mining rate
- Annual averages (excluding first and last partial operating years):
  - Production of 960kt ilmenite (sulphate, slag and chloride), 66kt zircon and 8kt rutile
  - Revenue of US\$317 million – 65% ilmenite, 32% zircon and 3% rutile
  - Operating costs of US\$77 million or US\$90 million incl. a 4% government royalty
  - Non-operating costs of US\$8 million (community, external affairs, marketing etc.)
  - EBITDA of US\$219 million, NPAT US\$152 million
  - Free cash flow of US\$174 million

African mineral sands producer and developer, **Base Resources Limited** (ASX & AIM: BSE) (**Base Resources**) is pleased to release the outcomes of its enhanced Definitive Feasibility Study (DFS2) for its Toliara Project in Madagascar. The increased scale of DFS2 (from the 2019 DFS<sup>1</sup>) has delivered a substantial improvement in the forecast financial returns for the Toliara Project, including a post-tax/pre-debt (real) NPV<sub>10</sub> of US\$1.0 billion and an average revenue to cost of sales ratio of 3.5, over an initial 38-year mine life.

### Executive Director Operations and Development of Base Resources, Colin Bwye, said:

“The true size and value of the Ranobe mineral sands deposit is only just beginning to reveal itself, as evidenced by the significant increase in the Ranobe Mineral Resources and Ore Reserves estimates, with more expected to come once we can complete the mineralogy work required to incorporate the lower sandy unit which holds great potential. Encouraged by this, and the expected future supply deficit in mineral sands markets, we have taken the opportunity to scale up the Toliara Project in DFS2.”

“The scaled-up project now supports average annual production of 960kt of ilmenite, 66kt of zircon and 8kt of rutile, with the first 10 years of stage 2 operations materially higher at 1.2Mt of ilmenite and 82kt of zircon.”

<sup>1</sup> For further information refer to Base Resources’ market announcement on 12 December 2019 “DFS reinforces Toliara Project’s status as a world class mineral sands development” available at <https://baseresources.com.au/investors/announcements/>.

“In addition, since the release of the 2019 DFS, significant effort has gone into optimising the mine plans and increasing the level of project engineering, as well as engaging with preferred suppliers to improve scope definition, giving greater confidence in the capital cost estimates and allowing a reduction in associated contingencies. While the initial stage 1 capital cost estimate has increased by US\$78 million to US\$520 million, primarily driven by sector-wide cost escalation for capital development, the economics of the project have been substantially enhanced.”

**Managing Director of Base Resources, Tim Carstens, said:**

“We are pleased to share the outcomes of our enhanced DFS2 which reaffirms our view that the Toliara Project is a world class mineral sands development opportunity.”

“While capital costs have increased, the subsequent expansion in production has materially improved the financial performance of the project, with a 55% lift in forecast NPV and free cash flow generated of almost US\$6 billion over the life of the project. Importantly, and despite the increased development costs, the capital payback period is still only 4.5 years”

“We have always firmly believed in the Toliara Project’s potential to be a catalyst for growth in Madagascar, creating transformational opportunities for our communities, economic stimulus for the Toliara region and a flagship foreign investment for the government. The increased scale of DFS2 enhances these opportunities for all stakeholders with the project now forecast to generate almost US\$2.0 billion in direct government revenue and community development expenditure over the 38-year mine life.”

“We will be maintaining a high degree of engagement with the Government of Madagascar in seeking to secure fiscal terms and the lifting of the current suspension of on-ground activities as soon as possible. We remain confident that acceptable terms can be secured that will support the development of the Toliara Project, delivering clear and compelling benefits to our host communities, the nation of Madagascar and our shareholders.”

#### Investment evaluation

Set out below are the key financial and production outcomes from DFS2, compared against those from the 2019 DFS.

	Unit	DFS2	DFS	Change
NPV <sub>10</sub> (discount rate of 10%), post tax, real	US\$ millions	1,008	652	55% higher
NPV <sub>8</sub> post tax, real*	US\$ millions	1,385	910	52% higher
NPV <sub>12</sub> post tax, real*	US\$ millions	733	461	59% higher
NPV <sub>10</sub> – TZMI Q2-2021 price forecast, post tax, real	US\$ millions	996	722 <sup>#</sup>	38% higher
IRR	%	23.8	21.4	11% higher
Initial (Stage 1) Capex	US\$ millions	520	442	up 18%
Construction time (Stage 1)	Months	27	26	+1 month
Stage 2 Capex	US\$ millions	137	69	up 99%
Capital Payback Period (Stage 1 + 2)	Years	4.5	4.3	+2 months
Production (ILM/RUT/ZIR)	kt pa	1,033	839	25% higher
Life of mine (LOM)	years	38	33	+5 years
LOM Operating Costs + Royalty	US\$/t ore mined	3.78	4.31	12% lower
LOM Operating Costs + Royalty (A)	US\$/t produced	88	94	6% lower
LOM Revenue (B)	US\$/t produced	306	295	4% higher
LOM Cash Margin (B-A)	US\$/t produced	218	201	8% higher
LOM Revenue: Cost of Sales Ratio (B/A)	Ratio : 1	3.5	3.2	10% higher

	Unit	DFS2	DFS	Change
LOM Free Cash Flow	US\$ millions	5,922	3,692	60% higher

\* Alternative NPV calculations are provided for illustrative and comparative purposes only. Base Resources considers a 10% discount rate to be the most appropriate for evaluation purposes.

# Based on TZMI Q3 2019 price forecast

### Updated mining and production profile

Production Profile	Life of Mine (LOM)		Stage 1# Years 2 - 4.5	Peak Stage 2# Years 6 - 15	Stage 2+ Years 16+
	Total	annual avg*	annual avg#	annual avg	annual avg†
Ore mined (Mt)	904	23.9	12.6	25.1	25.1
HM%	6.1%	6.1%	9.4%	7.1%	5.4%
HMC produced (Mt)	55.6	1.5	1.2	1.2	1.4
Period (years)	38.4	37.0	3.5	10.0	23.0
<b>Produced (kt):</b>					
Sulphate ilmenite	16,941	450	388	566	407
Slag ilmenite	9,804	261	225	327	236
Chloride ilmenite	9,371	249	215	313	225
<b>Total ilmenite</b>	<b>36,115</b>	<b>960</b>	<b>828</b>	<b>1,206</b>	<b>868</b>
Rutile	283	8	6	9	7
Zircon	2,468	66	56	82	60

# excludes ramp up

\* Does not include the first and last years of operation as these are both partial operating years.

† Does not include the last year of operation as this is a partial operating year.

### Further information about DFS2

Included with this announcement are supporting slides titled "Toliara Project Definitive Feasibility Study 2 – Summary Outcomes" which contain detailed information about DFS2 and its outcomes. This information includes, as applicable, the material assumptions, underlying methodologies and detailed reasoning supporting and used to derive the financial and production outcomes and other forward-looking statements set out in this release (including above), such as the material price and operating cost assumptions. Accordingly, this announcement should be read together with these supporting slides.

Base Resources has concluded that it has a reasonable basis for providing the forward-looking statements set out in this release. This includes a reasonable basis to expect that Base Resources will be able to fund development of the Toliara Project when required. The Disclaimer & Important Notices on page two of the supporting slides also apply to this announcement.

----- ENDS -----

### For further information contact:

**James Fuller, Manager - Communications and Investor Relations**  
Base Resources  
Tel: +61 (8) 9413 7426  
Mobile: +61 (0) 488 093 763  
Email: [jfuller@baseresources.com.au](mailto:jfuller@baseresources.com.au)

**UK Media Relations**  
Tavistock Communications  
Jos Simson and Gareth Tredway  
Tel: +44 (0) 207 920 3150

This release has been authorised by the Board of Base Resources.

#### **About Base Resources**

Base Resources is an Australian based, African focused, mineral sands producer and developer with a track record of project delivery and operational performance. The company operates the established Kwale Operations in Kenya and is developing the Toliara Project in Madagascar. Base Resources is an ASX and AIM listed company. Further details about Base Resources are available at [www.baseresources.com.au](http://www.baseresources.com.au).



# Toliara Project Definitive Feasibility Study 2



## Summary outcomes

27 September 2021

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# Disclaimer & Important Notices



## Definitive Feasibility Study 2

This document has been prepared by Base Resources Limited (**Base Resources**). The information included in this document relates to the outcomes of the Definitive Feasibility Study 2 for the Toliara Project (**DFS2**). DFS2 is based on technical, economic and other conditions and information as at the date of this document, which may be subject to change. Accordingly, the outcomes, conclusions and other information presented in this document should be viewed in this light. Information in this document should also be read in conjunction with other announcements made by Base Resources to ASX.

## Mineral Resources and Ore Reserves estimates, production targets and forecast financial information

This document contains estimated Mineral Resources, estimated Ore Reserves, production targets and forecast financial information for the Toliara Project.

Save in the case of the estimates on a mineralised unit basis, the details included about the estimated Ranobe Mineral Resources and Ore Reserves have been extracted from Base Resources' ASX announcement titled "Updated Ranobe Mineral Resources and Ore Reserves estimates" dated 27 September 2021, available at <https://baseresources.com.au/investors/>. Base Resources confirms that it is not aware of any new information or data that materially affects the information included in this announcements, and that all material assumptions and technical parameters underpinning those estimates continue to apply and have not materially changed.

The details included about the estimated Ranobe Mineral Resources on a mineralised unit basis are based on, and fairly represent, information and supporting documentation prepared by Mr Ian Reudavey. Mr Reudavey is a member of the Australian Institute of Geoscientists. Mr Reudavey is employed by Base Toliara, a wholly-owned subsidiary of Base Resources, does not hold securities in Base Resources and is not presently eligible to participate in Base Resources' long-term incentive plan and receive equity securities under that plan. Mr Reudavey has sufficient experience that is relevant to the style of mineralisation and type of deposits under consideration and to the activity which he is undertaking to qualify as a Competent Person as defined in the JORC Code and is considered a Qualified Person for the purposes of the AIM Rules for Companies. Mr. Reudavey has reviewed this document and consents to the inclusion in this document of the Mineral Resources estimate on a mineralised unit basis and the supporting information in the form and context in which that information appears.

The Ranobe Mineral Resources included in this document are reported inclusive of the Ranobe Ore Reserves.

The estimated Ranobe Ore Reserves underpin the production targets and forecast financial information for the Toliara Project included in this document. This Ore Reserves estimate has been prepared by Competent Persons in accordance with the requirements of the JORC Code. The proportions of Probable and Proved Ore Reserves underpinning the production targets are set out on slide 15. The material assumptions on which the production targets and the forecast financial information derived from those targets included in this document are based are included in this document.

## Forward-looking statements

Certain statements in or in connection with this document contain or comprise forward looking statements. Such statements may include, but are not limited to, statements with regard to capital cost, operating cost, capacity, future production and available grades, forecast global supply, product prices, sales projections and financial performance and may be (but are not necessarily) identified by the use of phrases such as "will", "expect", "anticipate", "believe" and "envisage". By their nature, forward looking statements involve risk and uncertainty because they relate to events and depend on circumstances that will occur in the future and may be outside Base Resources' control. Accordingly, results could differ materially from those set out in the forward-looking statements as a result of, among other factors, changes in economic and market conditions, success of business and operating initiatives, changes in the regulatory environment and other government actions, fluctuations in product prices and exchange rates and business and operational risk management. Some risks that could impact Base Resources' ability to achieve the outcomes or results expressed or implied by such statements include those set out on the slides titled "Pre-FID and Post-FID Risks". Subject to any continuing obligations under applicable law or relevant stock exchange listing rules, Base Resources undertakes no obligation to update publicly or release any revisions to these forward-looking statements to reflect events or circumstances after today's date or to reflect the occurrence of unanticipated events.

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## Glossary

A glossary of key terms used in this document is contained on slides 76 to 78.

**All references to currency (\$ or US\$) are to United States Dollars unless otherwise stated**



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# Changes since DFS

# Rationale and overview of DFS2

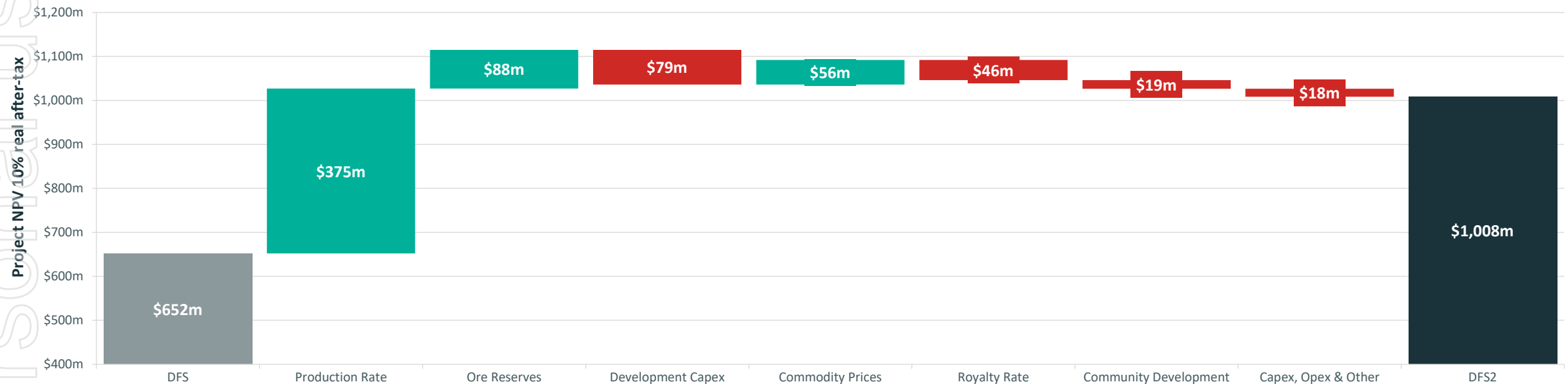


Since the release of the DFS in 2019, the Ranobe Mineral Resources and Ore Reserves estimates have substantially increased, which, when combined with the attractive long-term supply-demand outlook, have provided the opportunity to enhance the project value by increasing its scale.

The project NPV<sub>10</sub> (post-tax real) improves from US\$652m in the DFS to US\$1,008m in DFS2. The main factors contributing to this overall increase in value are:

- Ranobe Ore Reserves estimate increased to 904Mt at an average heavy mineral grade of 6.1%, a 45% increase in contained heavy mineral – extending initial mine life to 38 years.
- Increased scale and scope of Stage 2, lifting mining rates to ~25Mt per annum (33% higher than DFS) and adding a further ~47% to the MSP production capacity (to 220tph) to deliver average LOM annual production of 960kt ilmenite (sulphate, slag and chloride), 66kt zircon and 8kt rutile.
- Stage 1 capex increased to US\$520m (up US\$78m), primarily due to cost escalation, while the larger scale of Stage 2 is reflected in higher capex of US\$137m (up US\$68m).
- Updated Base Resources internal price forecasts and TZMI long term pricing assumptions.

Key drivers of Project NPV change from DFS to DFS2 (USD)





# Side by side comparison - DFS2 to DFS



DFS2 significantly improves the financial outcomes, despite increases in royalties and capital costs.

- 55% increase in post-tax / pre-debt (real) NPV @ 10% discount rate to US\$1,008m.
- Average revenue to cost of sales ratio improves to 3.5.
- LOM free cash flow increased by 60% to US\$5.9 billion, with first 10 years averaging US\$210m per annum.
- Stage 1 capex cost, to establish a 13Mtpa mining and processing operation, increased to US\$520m, primarily due to cost escalation.
- Stage 2 scaled up to increase mining rates by 33% to ~25Mtpa and increasing MSP production capacity by 47% at a higher capex cost of US\$137m.
- Increase in Malagasy government royalty to 4% inline with the proposed revised Mining Code.
- The increased scale of the Toliara Project is underpinned by significant increases to the Ranobe Mineral Resources and Ore Reserves estimates and the attractive long-term supply-demand outlook for mineral sands.
- Annual averages (excluding first and last partial operating years):
  - Production of 1,033kt (ilmenite 960kt) increased from 839kt (ilmenite 780kt).
  - Revenue US\$317m - a 28% increase.
  - Operating costs of US\$90m (inclusive of 4% royalties) higher than DFS US\$77m (inclusive of 2% royalties) due to increased scale of operation and royalties.
  - EBITDA US\$219m – 34% higher.
  - Free cash flow US\$174m – 32% higher.

	Unit	DFS2	DFS
<b>NPV<sub>10</sub> (discount rate of 10%), post tax, real</b>	US\$ millions	<b>1,008</b>	652
<b>IRR</b>	%	<b>23.8</b>	21.4
<b>Initial (Stage 1) capex</b>	US\$ millions	<b>520</b>	442
<b>Construction period (Stage 1)</b>	Months	<b>27</b>	26
<b>Stage 2 capex</b>	US\$ millions	<b>137</b>	69
<b>Construction period (Stage 2)</b>	Months	<b>21</b>	12
<b>Capital payback period (Stage 1 + 2)</b>	Years	<b>4.5</b>	4.3
<b>Life of mine</b>	Years	<b>38</b>	33
<b>LOM operating costs + royalty</b>	US\$/t ore mined	<b>3.78</b>	4.31
<b>LOM operating costs + royalty</b> (A)	US\$/t produced	<b>88</b>	94
<b>LOM revenue</b> (B)	US\$/t produced	<b>306</b>	295
<b>LOM cash margin</b> (B-A)	US\$/t produced	<b>218</b>	201
<b>LOM revenue : cost of sales ratio</b> (B/A)	Ratio : 1	<b>3.5</b>	3.2
<b>LOM free cash flow</b>	US\$ millions	<b>5,922</b>	3,692

# Source of change from DFS - Stage 1 capex



Input cost escalation, scope changes and additional contingency bring the DFS2 capex for Stage 1 to US\$520m.

## Escalation - US\$59m

- US\$44m observed escalation from DFS capex estimate to Q2-2021.
- US\$15m forward looking escalation to the assumed FID in Q4-2022.

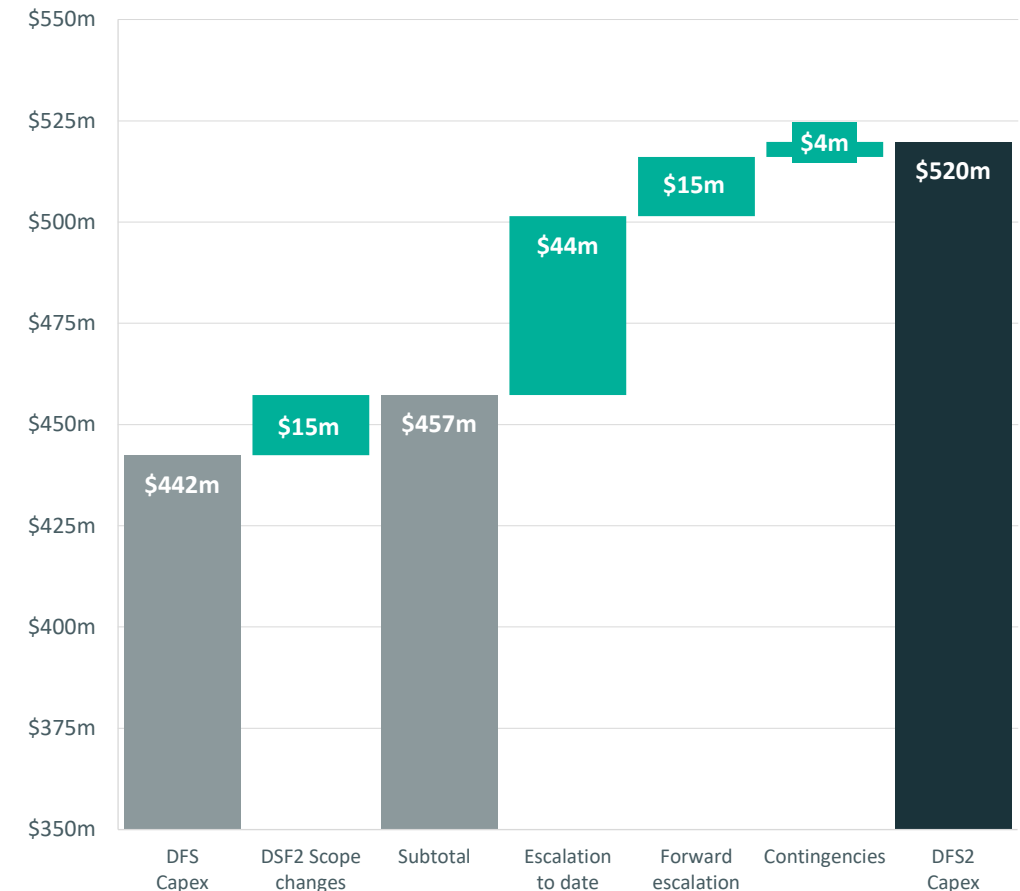
## Key scope changes since DFS completion - US\$15m

- MSP storage shed concrete quantity update and increased marine costs.
- Schedule optimisation changes:
  - Early works (site access road and camp earthworks) moved from Pre-FID to Post-FID.
  - Haul road south design and establishment of quarry contract moved from Post-FID to Pre-FID.
- Provision for a new DMU for Stage 1 in lieu of the previously assumed refurbished Kwale Operations DMU.
- Changes to the MSP to avoid later re-work when throughput increases, including larger up-current classifier and HMC surge bin.
- Site access road upgraded to double lane to improve traffic control.
- Process plant optimisation savings including consolidation of wet circuits.
- Forex exchange movements.

## Contingency – US\$4m

- Contingency increase of US\$4m, inclusive of escalation. However, overall proportion of contingency decreased from 10.5% (DFS) to 9.7% (DFS2) due to increased scope certainty from post-DFS work.

Stage 1 capital cost estimate (US\$m)



# Progress since the DFS



After the delivery of the DFS in November 2019, a significant amount of the front-end engineering design has been completed, preferred suppliers appointed for a number of key contract packages and lender due diligence well progressed.

## Progress made following the DFS

- Power (largest contract package) – finalised tender evaluation, selected the preferred contractor and commenced contract negotiations.
- Processing plants – finalised the Basis of Design documentation, updated all equipment specifications, datasheets and scopes of work for equipment packages ready to issue to vendors. This facilitates early access to vendor data to allow detailed design and long lead fabrication to commence quickly following FID.
- Bridge and export facility piling (critical path contracts) – concluded tender process and selected preferred contractors and awarded design portion of bridge scope (hydrology, geotechnical and detailed design) for early progressing.
- Transport and logistics – confirmed shipping to port logistics, including a detailed review of container quantities and timing, and routes to project site.
- Accommodation - reviewed our manning requirements and strategy, resulting in shifting some pre-FID works associated with this to post FID.
- Ground water – updated the ground water model for DFS2 scale and finalise location of production and monitoring bores.
- Schedule - review, stress tested and optimised the overall delivery schedule.
- Mine planning – detailed review of mine path, DMU block sizes and shape resulted in less mine moves, more uptime, optimised production and HMC stock management.

## Lender due diligence

- Lenders' Independent Engineer (IE) and Independent Environmental and Social Consultant (IESC) engaged to undertake project due diligence.
- IE technical due diligence completed on the DFS, subject to a confirmatory site visit. Due diligence involved an extensive technical audit and review of:
  - Geology, Mining and Tailing;
  - Mineral processing;
  - Infrastructure – water, power, roads;
  - Construction;
  - Operational Management;
  - Operating and capital costs;
  - Technical economic model.
- IESC have reviewed the project's environmental and social management systems against international best practice standards and prepared a preliminary gap analysis which will form the basis for the project's Environmental and Social Action Plan. However, due to COVID-19 constraints, the field work required to complete their report has not yet been started.





# Enhanced Toliara Project – DFS2



# Introduction

The world class Ranobe mineral sands deposit is located in south west Madagascar, 45km north of the regional port town of Toliara, 18km inland, approximately 640km southwest of Antananarivo, the capital of Madagascar.

## The Toliara Project

- The Toliara Project is based on the Ranobe deposit, located 45km north Toliara on a 125.4 km<sup>2</sup> mining lease.
- The deposit comprises a single continuous body of mineralization approximately 20km long, 1.5 to 4.5km wide and 3m to 60m in thickness and situated immediately west of a prominent north-south escarpment. The HM mineralisation (including ilmenite, rutile and zircon) extends from the surface.

## History

- Madagascar Resources NL (MRNL) started exploring for minerals in Madagascar in 1995 and discovered several zones of HM mineralisation.
- In 2003, Ticor Ltd (now Exxaro Resources) negotiated an option over the project. Drilling occurred at Ranobe and Basibasy and a pre-feasibility study commenced on the Ranobe deposit. Between 2005 and July 2009, a bankable feasibility study commenced, but was not completed (strategic focus shifted).
- MRNL, which became World Titanium Resources Limited (WTR) in 2011, engaged TZMI to undertake a comprehensive review of the project, resulting in a definitive engineering study being completed in September 2012.
- A concept to produce only an ilmenite and non-magnetic concentrate as the saleable product (at a time of weak overall market conditions) was developed.
- In early 2016, African Minerals and Exploration Development Fund II purchased a majority stake in WTR and increased the proposed project scale from a mining rate of 8Mtpa to 12.8Mtpa. A definitive feasibility study was completed by external consultants, Hatch.
- Base Resources acquired the project in January 2018 and completed a concept study, the PFS, the DFS and DFS2.

## Toliara Project Overview

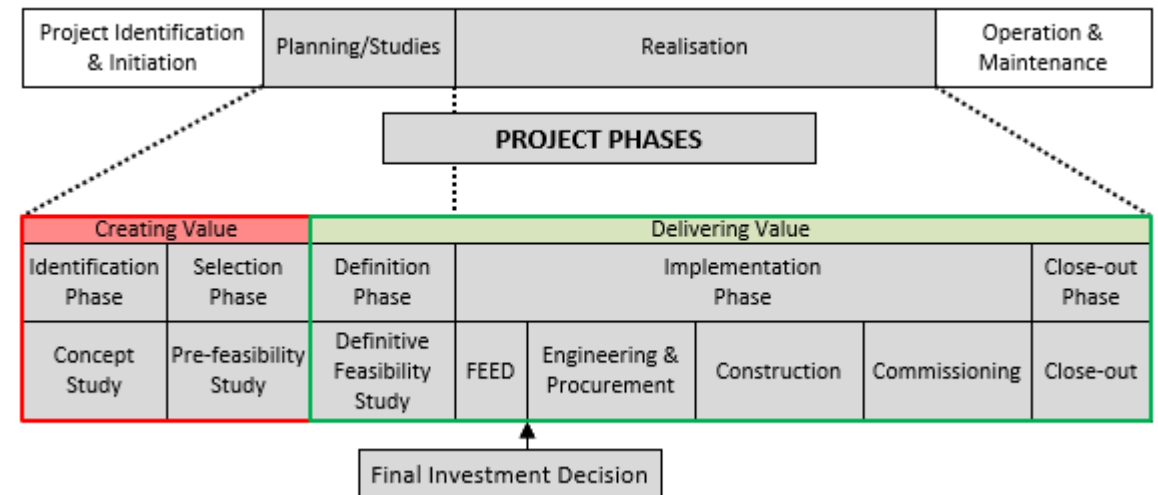


# Introduction



Following acquisition in January 2018, the Toliara Project has been progressing through Base Resources' structured project development system – commencing with identifying conceptual value adding options and then progressively evaluating and selecting the best of those options to progress through to DFS stage. DFS2 redefines the project scope to further enhance value by increasing the scale of Stage 2 and optimising the life of mine plan and associated production rates.

- Base Resources acquired the Kwale Mineral Sands Project in Kenya in mid-2010 and over the ensuing three years successfully funded, engineered, constructed, and commissioned the project.
- In late 2013, mining started at Kwale Operations and the final completion test was satisfied, and normal operations established by mid 2015.
- To fully capitalise on Base Resources' organisational capability, business model and financial platform built at Kwale, Base Resources had been seeking the right growth opportunity from which to drive shareholder value and, after extensive evaluation of many opportunities, acquired the Toliara Project in Madagascar in early 2018.
- The Toliara Project was identified by Base Resources as one of the premier mineral sands development opportunities in the world due to the size of the deposit, the consequent long mine life, its expansion potential, scope for operational scale up, technical simplicity and expected competitive positioning in the sector.
- Project development of the Toliara Project immediately started following a clearly defined Base Project Development System.
- The PFS, completed in March 2019, evaluated development options and selected the preferred development option to progress to the DFS. A clear business case for the Toliara Project was confirmed.
- In December 2019, the DFS was completed. It defined the project scope, how it will be implemented, and confirmed a requisite business case for future investment. The Stage 1 mining rate was 12.6Mtpa, increasing to 18.6Mtpa in Stage 2.
- In September 2021, DFS2 was completed which increased the Stage 2 mining rate to 25Mtpa and the MSP feed rate from 150tph to 220tph as well as updating capital costs, operating costs and product pricing assumptions.





# Project description



**The Toliara Project will be implemented in two stages, with Stage 2 production commencing ~4 years after Stage 1 completion. Once the Government-imposed suspension is lifted and fiscal terms are agreed, an 11-month early works program is required to reach FID.**

On average, the Toliara Project is expected to deliver a combined ~1,033ktpa chloride ilmenite, sulphate ilmenite, slag ilmenite, zircon and rutile over a predicted 38-year mine life based upon exploiting the estimated Ranobe Ore Reserves.

Stage 1 consists of engineering, procurement, construction and commissioning of:

- Heavy mobile equipment (HME).
- A dry mining unit (DMU).
- 1,750tph wet concentrator plant (WCP).
- 150tph mineral separation plant (MSP).
- Field services (pipes, pumps, powerlines, roads).
- Power generation facility.
- Borefield.
- Camp.
- Offices, laboratories and workshops.
- Haul/access road and bridge.
- Export facility storage shed, workshop and offices.
- Jetty, multi buoy mooring (MBM) facility and ship loader (located at Batterie Beach).

Stage 2 production commences ~4 years after Stage 1 mining commences. It will consist of the engineering, procurement, construction and commissioning of:

- A second DMU.
- A second 1,750tph WCP.
- Upgrading the MSP capacity from 150tph to 220tph.
- Additional HME.
- Upgrading the power plant capacity to accommodate increased process plants power demand.
- Additional boreholes to accommodate increased water demand.

The haul road, bridge and export facility are not impacted by Stage 2.

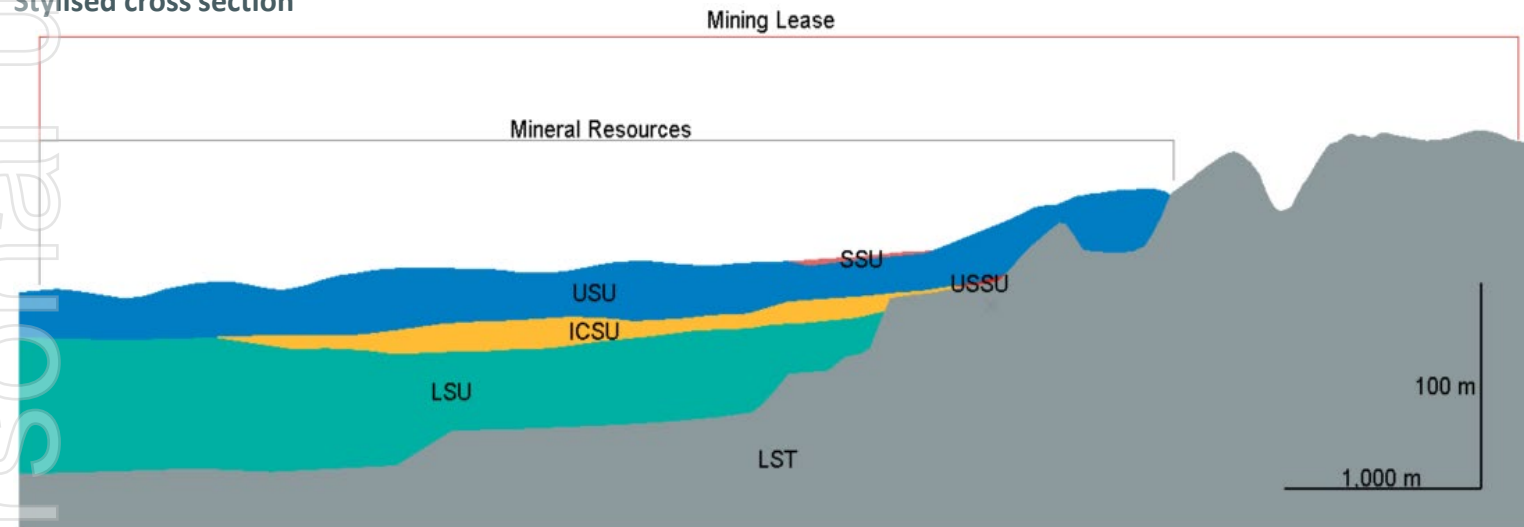
# Geology

Located 45km north of the town of Toliara, the Ranobe deposit comprises five mineralised units.

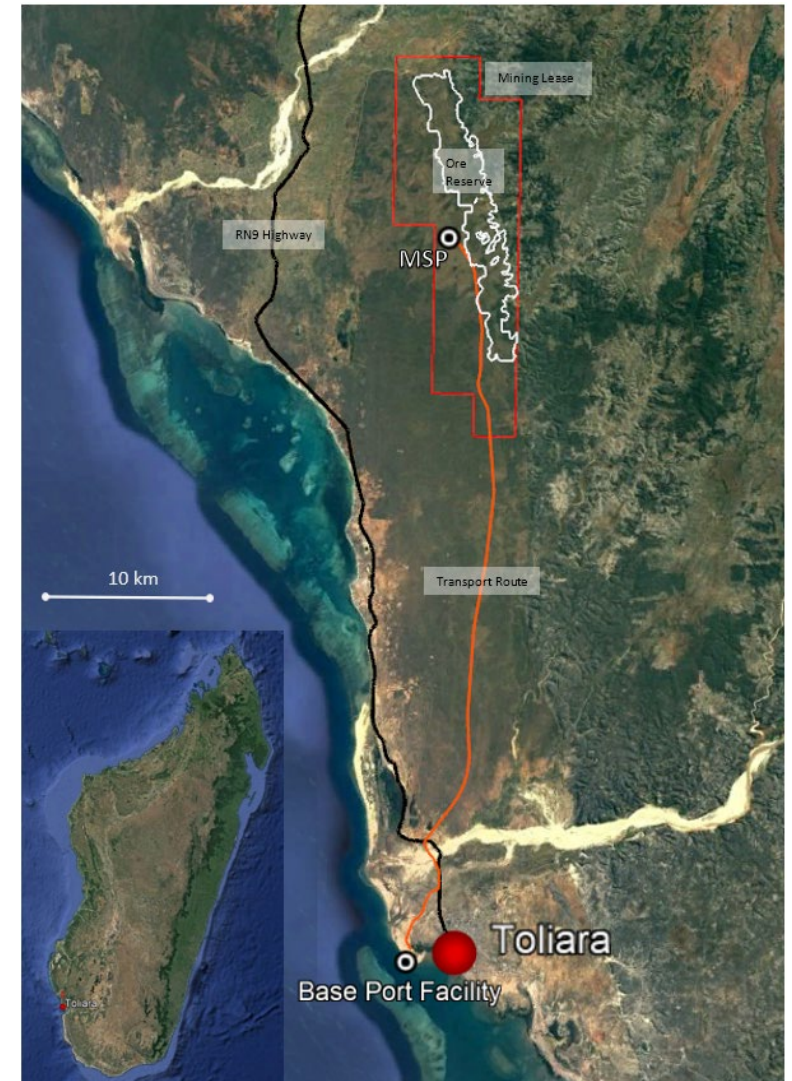
## Deposit geology

- Upper sand unit (USU) - a well sorted, fine-grained, unconsolidated aeolian sand containing approximately 4% slime or clay (SL) and approximately 5% HM. The HM is primarily ilmenite, with secondary zircon and rutile. The USU can also contain a surface silt unit (SSU) within broad topographical drainage features, and another silty sand unit (USSU) at the base of the USU profile.
- Intermediate clay sand unit (ICSU) - a thin unit of high slime content with a dark red to orange brown sandy clay and clayey sand material averaging approximately 3% HM and 25% SL deposited in a low energy lagoonal environment.
- Lower sand unit (LSU) - orange brown to yellow brown medium grained quartz sand with variable mineralisation and moderately low slimes content. The LSU is interpreted as a shallow marine or fluvial sediment that onlaps the limestone (LST) basement with HM primarily ilmenite and garnet, with secondary zircon.
- The deposit thickness generally increases to the west.

## Stylised cross section



## Toliara Project location



# Geology - tenure and drilling

A Mining Lease exists over the entirety of the current Ranobe Mineral Resources estimate.

## Tenure

- The instrument providing tenure is *Permis d'Exploitation* 37242 (PDE 37242), which is a mining lease under Malagasy law, issued to Base Toliara on 23 October 2017.
- PDE 37242 expires on 20 March 2052 (40 years from 21 March 2012, being the date of grant of the original mining lease). The lease may be renewed by increments of 20 years thereafter.
- PDE 37242 provides the right to extract and produce ilmenite, zircon, leucoxene, rutile, guano, basalt, and limestone.

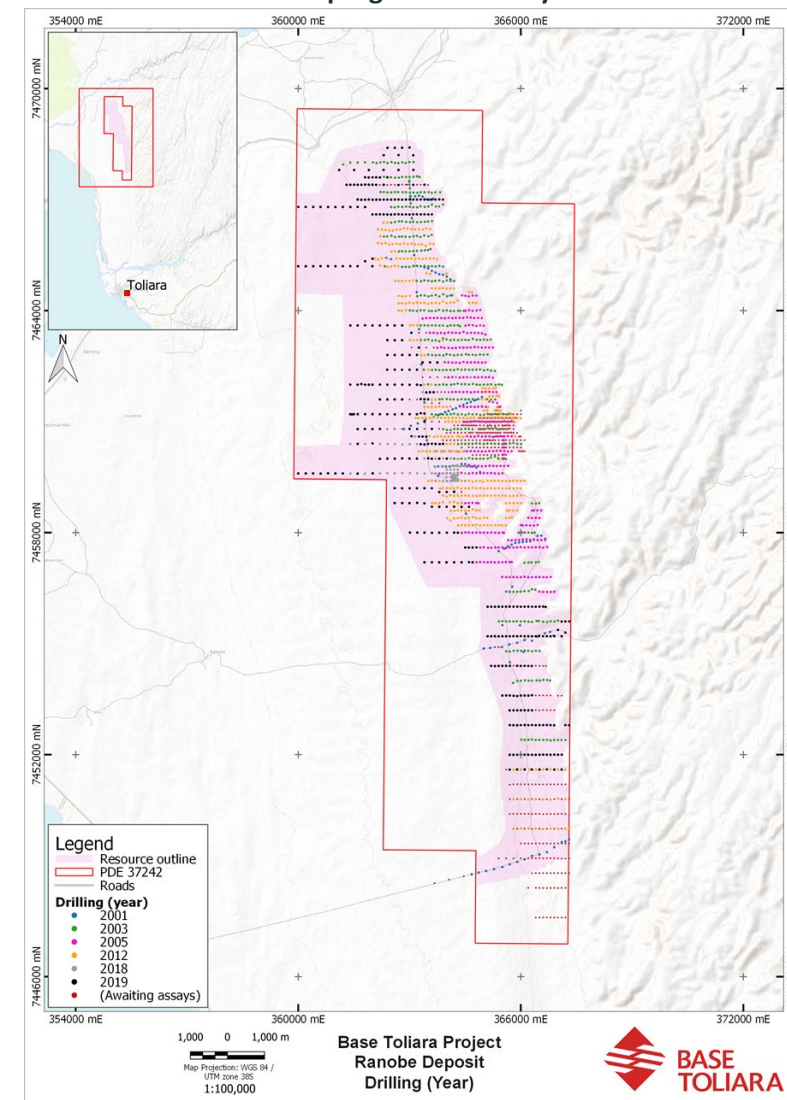
## Drilling

- The Ranobe deposit has had five reverse circulation drilling exploration programs. The first four were carried out by the previous owners of the project and the most recent was completed by Base Resources.
- All programs used Wallis Drilling to perform the drilling.
- Some drilling completed during 2019 (red dots on the map) are yet to be assayed and have the potential to enable the upgrade of Inferred Resources to Indicated Resources and expansion of the Mineral Resources estimate to the south.
- Further drilling is planned which is aimed at providing more definition to the encouraging results from the LSU in the northwest of the tenure area.

## Historical drilling

Program	Company	# Holes	# Metres
2001	Madagascar Resources NL	121	3,074
2003	Ticor/Kumba Resources (Exxaro) joint venture	400	9,424
2005	Ticor/Kumba Resources (Exxaro) joint venture	288	6,135
2012	WTR	363	8,087
2018-19	Base Resources	770	29,753
<b>Total</b>		<b>1,942</b>	<b>56,473</b>

## Drill program summary





# Geology - Mineral Resources



Following a significant drill program completed in 2018 and 2019, the JORC-compliant Ranobe Mineral Resource has been updated to an estimated 2,580Mt at 4.3% HM, including 1,390Mt at 5.1% HM in the Measured and Indicated categories.

## Mineral Resources and Ore Reserves estimates update completed

Assays of 12,759 samples from a 29,753m drilling program completed during 2018 - 2019 were utilized to update the Mineral Resources estimate. A further 5,443 samples from the drill program remain in Toliara awaiting export and analysis following the lifting of suspension.

### Ranobe Deposit Mineral Resources estimate as at 27 September 2021

Category	Tonnes (Mt)	HM (Mt)	HM (%)	SL (%)	OS (%)	HM Assemblage as % of HM					
						ILM (%)	RUT (%)	LEUC (%)	ZIR (%)	MON (%)	GARN (%)
Measured	597	36	6.1	4.3	0.2	74	1.0	1.0	5.9	1.9	2.2
Indicated	793	35	4.4	7.1	0.5	71	1.0	1.0	5.9	1.9	3.6
Inferred	1,190	39	3.3	9.7	0.6	69	1.0	1.0	5.8	2.0	4.3
<b>Total</b>	<b>2,580</b>	<b>111</b>	<b>4.3</b>	<b>7.7</b>	<b>0.4</b>	<b>71</b>	<b>1.0</b>	<b>1.0</b>	<b>5.9</b>	<b>2.0</b>	<b>3.4</b>

Table subject to rounding differences. Mineral Resources estimated at 1.5% HM cut off grade.

Mineral Resources are reported inclusive of Ore Reserves

### Ranobe Deposit Measured and Indicated Mineral Resources estimate as at 27 September 2021<sup>^</sup>

Mineralised Unit	M&I Tonnes (Mt)	HM (Mt)	HM (%)	SL (%)	OS (%)	HM Assemblage as % of HM					
						ILM (%)	RUT (%)	LEUC (%)	ZIR (%)	MON (%)	GARN (%)
Upper sand unit*	1,229	66	5.4	3.6	0.1	73	1.0	1.0	5.9	1.9	2.9
Surface silt unit*	12	0.5	4.2	18	0.6	71	1.0	0.9	5.8	2.0	4.1
Upper silty sand unit	13	0.8	6.3	23	2.3	72	0.9	0.8	6.5	1.5	4.4
Intermediate clay sand unit	136	4	3.0	24	2.0	68	1.2	1.1	6.1	2.2	3.4
<b>Total</b>	<b>1,390</b>	<b>71</b>	<b>5.1</b>	<b>5.9</b>	<b>0.3</b>	<b>72</b>	<b>1.0</b>	<b>1.0</b>	<b>5.9</b>	<b>1.9</b>	<b>2.9</b>

Table subject to rounding differences. Mineral Resources estimated at 1.5% HM cut off grade.

<sup>^</sup>Refer to the Appendix for estimates of the individual categories for the mineralised units.

\*Mineral Resources are reported inclusive of Ore Reserves

# Geology – Ore Reserves



**DFS2 is underpinned by the JORC-compliant Ranobe Ore Reserves estimate of 904Mt at 6.1% HM, comprising the USU and SSU material only.**

- Resource model was optimised to generate pit shells via industry standard Lerch Grossman algorithm using Base Resources internally forecast product pricing, DFS test-work derived mineral recoveries and DFS derived operating costs.
- Building on the DFS work, ten pit shells (71% to 80% of revenue) were scheduled at high level and input into the DFS financial model to select the optimum pit.
- The 74% of revenue shell was selected based on a better match of HMC production with MSP design throughput of 150 tph (Stage 1) and 220 tph (Stage 2), financial metrics (weighted towards NPV and revenue to cost of sales ratio) and mine life expansion from DFS. This shell was subject to preliminary mine planning and scheduled in detail for financial modelling.
- Additional optimisation and mine planning work will occur during FEED and the implementation phase.

**Ranobe Ore Reserves estimate as at 27 September 2021**

Category	Tonnes (Mt)	HM (Mt)	HM (%)	SL (%)	OS (%)	HM Assemblage as a % of HM <sup>^</sup>			
						ILM (%)	RUT (%)	LEUC* (%)	ZIR (%)
<b>Proved</b>	433	30	6.9	3.8	0.1	75	1.0	1.0	6.0
<b>Probable</b>	472	25	5.3	3.9	0.2	72	1.0	1.0	5.8
<b>Total</b>	<b>904</b>	<b>55</b>	<b>6.1</b>	<b>3.8</b>	<b>0.1</b>	<b>73</b>	<b>1.0</b>	<b>1.0</b>	<b>5.9</b>

Table subject to rounding differences

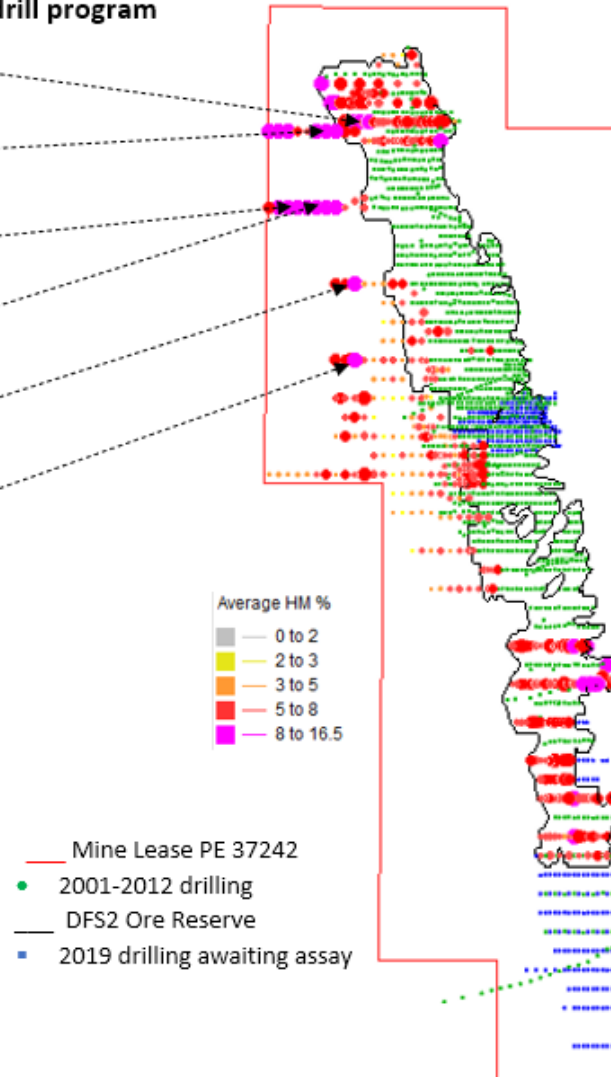
<sup>^</sup> Monazite and Garnet excluded from the Ore Reserves estimate because PE 37242 does not currently provide the right to exploit these products.

\*Recovered Leucoxene will be split between Rutile and Chloride Ilmenite products depending on product specification requirements.

# Geology – exploration opportunity

## Significant results from 2019 drill program

- 71.5m @ 12.2% HM  
- with LSU of 41.5m @ 17.6% HM
- 72m @ 11.6% HM  
- with LSU of 43.5m @ 16.5% HM
- 81m @ 15.7% HM  
- with LSU of 67.5m @ 18.3% HM
- 87m @ 13.9% HM  
- with LSU of 69m @ 16.4% HM
- 78m @ 9.1% HM  
- with LSU of 46.5m @ 13.8% HM
- 87m @ 9.1% HM  
- with LSU of 52.5m @ 13.8% HM



Additional high grade mineralisation discovered in the NW sector of the LSU in 2019 has not been included in the current Ranobe Mineral Resource estimate, due to insufficient mineralogy work having been completed. This mineralisation has the potential to add significant additional value to the Project.

- During the 2019 drill program significant heavy mineral intercepts were identified in the Lower Sandy Unit (LSU) in the NW sector.
- These intercepts are within the Toliara Projects mining lease.
- Further drilling, and subsequent resource definition, targeting high-grade LSU zones in the NW sector will be completed as access to site becomes available.
- Higher garnet levels are evident in the LSU mineral assemblage and initial indications suggest that it is suitable to produce an 80 mesh product for the waterjet and blast markets.

For further information in relation to the drill results on this slide, refer to Base Resources' announcement on 21 January 2020 "Toliara Project drill assays reveal significant high-grade mineralisation" available at <https://baseresources.com.au/investors/announcements>. Base Resources confirms that it is not aware of any new information that materially affects the information included in that announcement.



**The selected mining method is conventional dozer-fed DMU with in-pit tailings deposition, enabling a short 3 to 4-year cycle from initial land clearing to final rehabilitation.**

## Planned mining activity cycle

- Scrub clearing – removal of trees and scrub by bulldozers, excavators and dump trucks. Stockpiled for community use or mulching.
- Topsoil stripping – using bulldozers, excavators, and dump trucks, topsoil is stockpiled for later rehabilitation or directly replaced onto rehabilitation areas. The aim is to preserve seed viability by minimizing time in stockpile.
- Mining – utilizing D11 bulldozers, in 200m x 100m blocks, into the DMU with some excavator assistance. Run of mine feed (ROM) enters the DMU through a grizzly (400mm screen), passes up the DMU conveyor which discharges through a slurry chute onto a 4mm screen. The screen undersize is pumped to the WCP. Oversize is disposed of in the pit void.
- Coarse tailing – Quartz sand separated by the WCP is pumped, initially to an out of pit storage facility and later to the mining pit void where a moveable tails stacker de-waters the slurry. Water is recovered and pumped back to the WCP. Sand is stacked to a height approximating the planned finished surface level and then formed into fine tails evaporation ponds by bulldozer.
- Fine tailing – Flocculated clay tailings from the thickener at the WCP is pumped to the evaporation ponds built on coarse tails. Initially, until enough coarse tails area is available, some ponds will be constructed on ore and the dried tails removed to allow subsequent mining. The tails ponds will be filled to a depth of ~1.5m and, when dry, the clay will be ~0.4m thick. An alternative co-disposal methodology (directly mixing fine and coarse tailings prior to deposition) using technology developed at Kwale will be evaluated during the FEED stage.
- Landform reconstruction and topsoil return – The desiccated fine tails are worked by bulldozer into the coarse tails to make a nominal 2m thick water retention layer at the surface, graded into final landform and topsoil replaced on top using front-end loader (FEL), dump truck and dozer or grader. The area will then be ready for rehabilitation.
- The process from scrub clearing to final rehabilitation is expected to take 3 to 4 years.

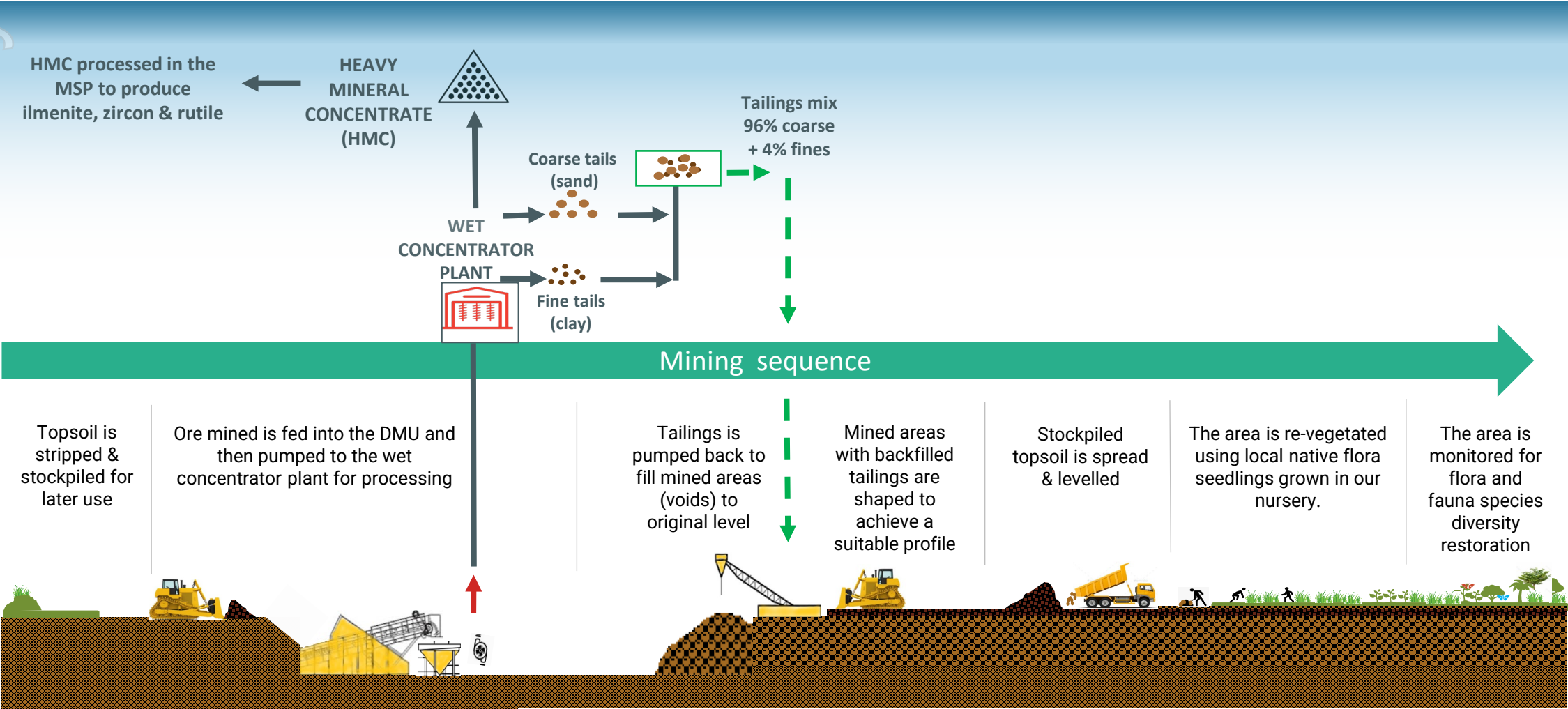
**DMU Mining**



# Mining life cycle

The selected mining method is conventional dozer-fed dry mining with in-pit tailings deposition, enabling a short 3 to 4-year cycle from initial land clearing to final rehabilitation.

ersonal use only



# Optimisation of mine path

**A detailed review of the Stage 1 mine path has been completed to incorporate the latest Ore Reserves and identified mining optimisation opportunities enabling an improved and more stable production profile.**

The review included all mining areas and associated schedules that encompass Stage 1. The schedule is similar to the DFS Stage 1 mine path but has been further optimised to maintain heavy mineral concentrate (HMC) production to meet MSP design capacity whilst remaining within the optimal 2km pumping radius of the WCP.

Operational maximum throughputs for Stage 1 are consistent with the DFS:

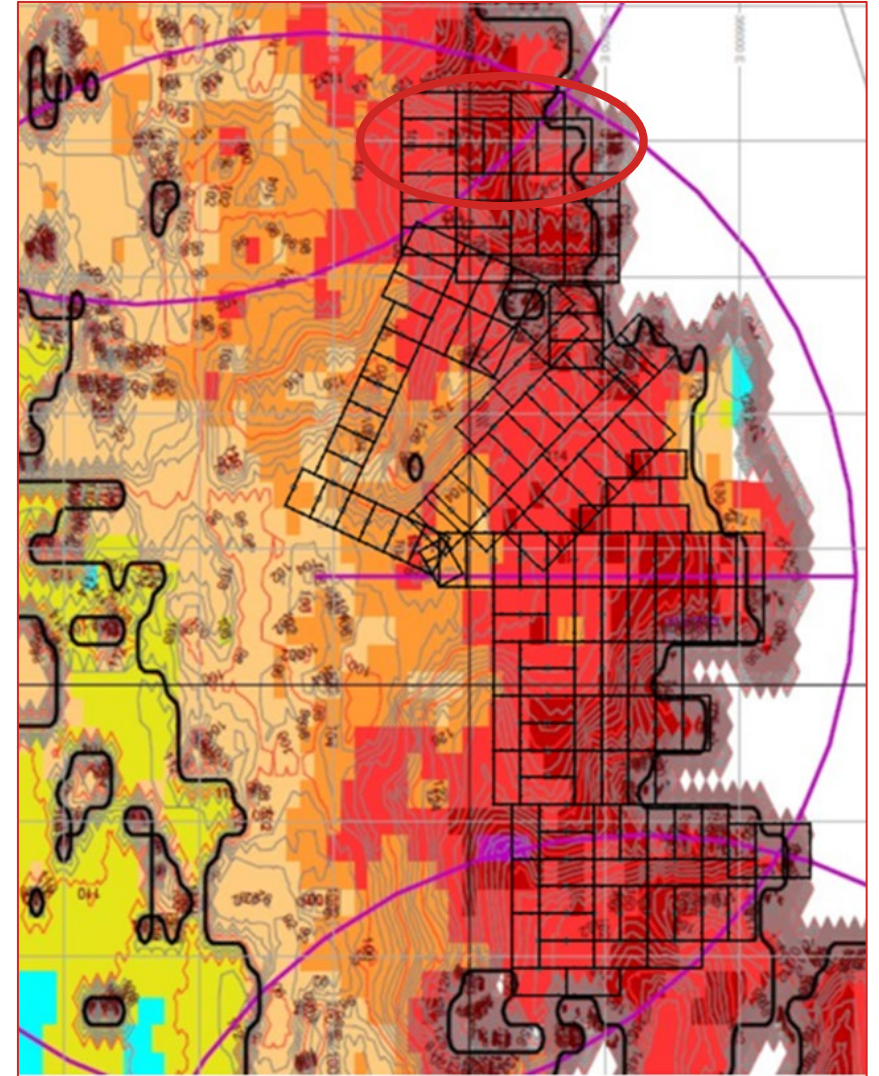
- Dry Mining Unit – 1,750tph.
- WCP - 1,750tph.
- MSP – 150tph.

Three main areas were optimised and modelled to improve Stage 1:

- Pit design & optimisation – a change from the spherical pit shape contemplated in the DFS to a more traditional rectangular pit shape.
- Pre-mining earth works – reduced starter pit requirements, scope and cost as well as optimised associated schedules.
- Revised mine path – optimised to balance ore grade, WCP/MSP commissioning schedule, HMC stocks and final product production.

The optimisation process decreased the planned off-path mining tonnes (truck and shovel) by 60% and reduced the number of DMU moves by 40% over the life of Stage 1. This optimisation has also enabled mining of additional high-grade tonnes at the northern limit of the WCP pumping radius of WCP1.

Further mine planning optimisation opportunities around the time usage model, WCP and starter pit locations have been identified and will be reviewed during FEED.





# Mining schedule

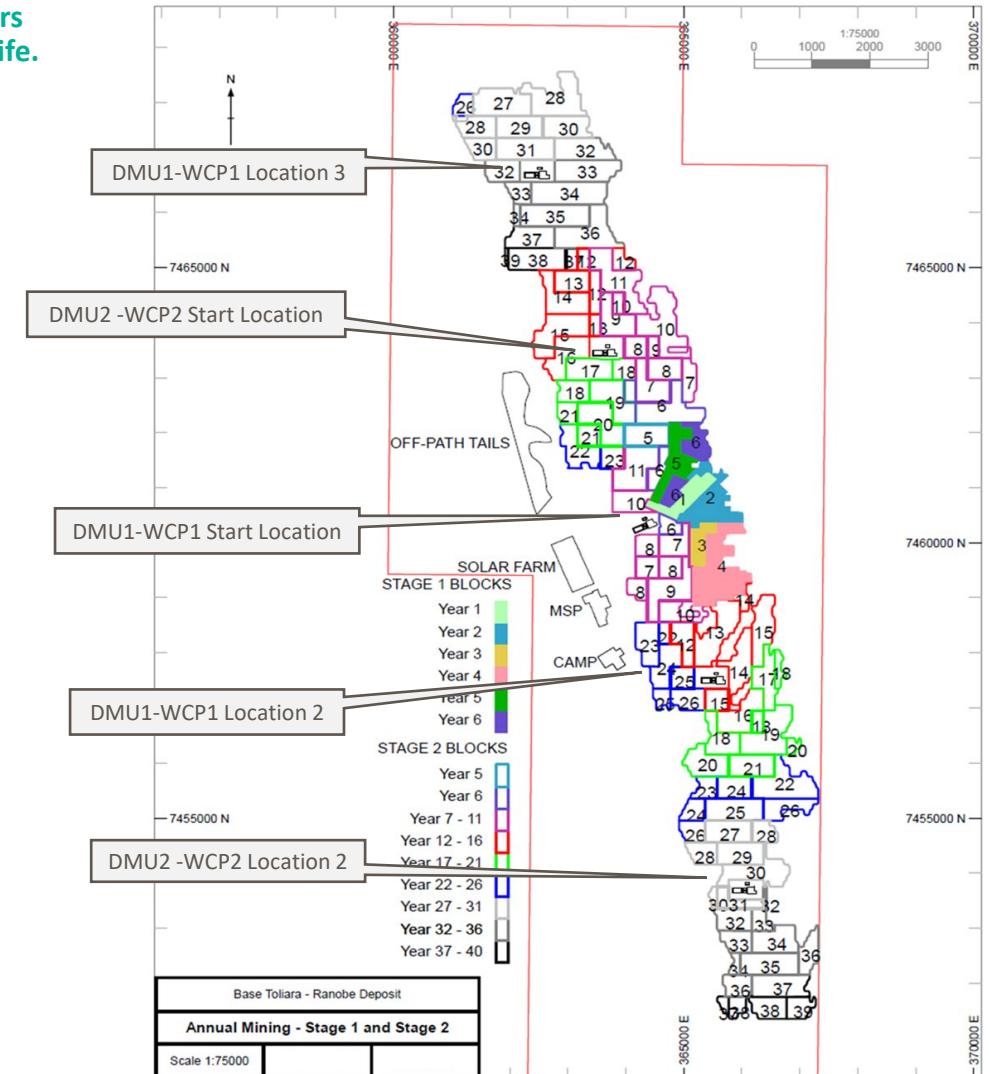
Mining will utilise D11 bulldozers feeding into a DMU to deliver 12.8Mtpa to the WCP in the first 4.25 years before increasing to 25Mtpa with the addition of a second DMU and WCP for the remainder of the mine life.

## Mining schedule

- Stage 1: 0 - 4.25 years – Single DMU and WCP, a fleet of two operating D11 bulldozers mining at a combined rate of 1,750tph. Mining of high-grade ore averaging 9.1% HM.
- Stage 2: 4.25 - 38 years – Additional DMU, D11 bulldozers and WCP operating at 1,750tph. Combined mining rate of 3,500tph, total D11 fleet of four operating units. Average ore grade of 6.1% HM.
- To maintain acceptable overland pumping distances, WCP1 moves in years 12 and 23 and WCP2 in year 23.

## Water abstraction

- Stage 1: 526m<sup>3</sup> per hour.
- Stage 2: 976m<sup>3</sup> per hour.
- Approved bore-field abstraction: 886m<sup>3</sup> per hour. The approval to increase abstraction rates will be applied for prior to the commencement of Stage 2.

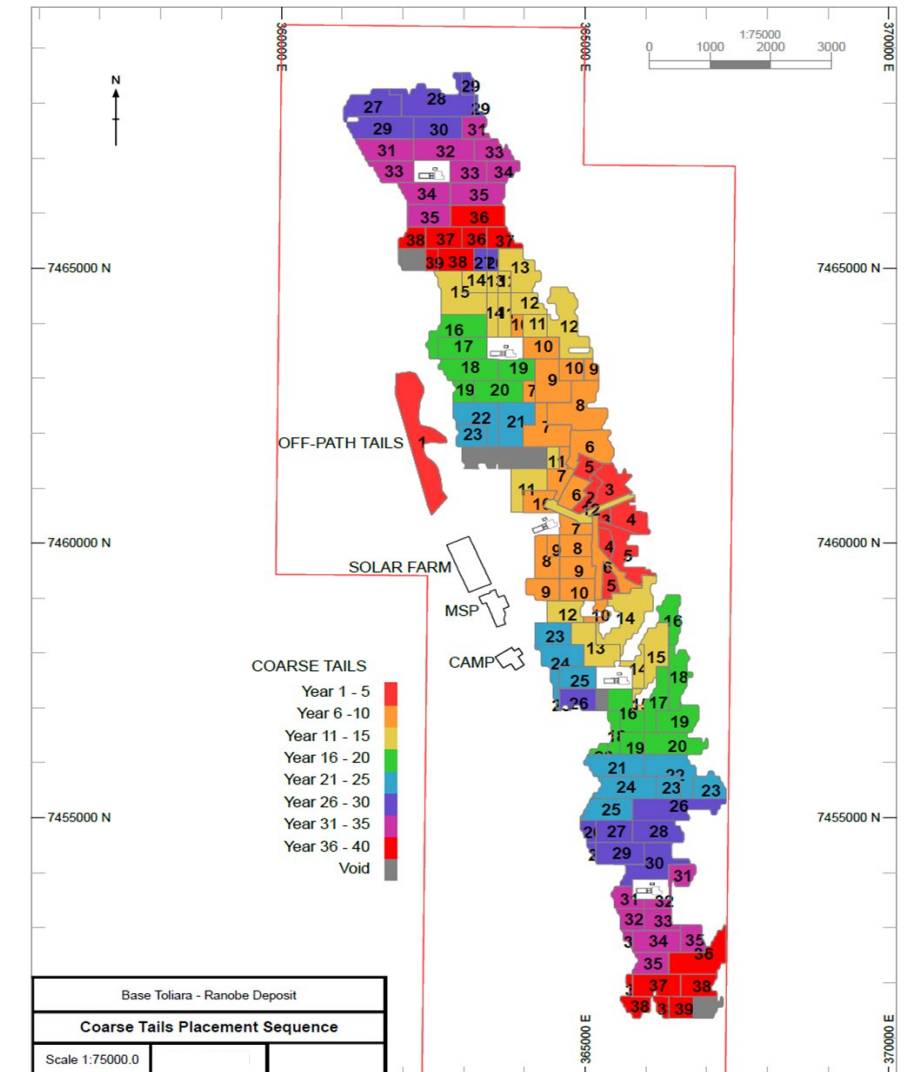


# Tailings schedule

The tailings management plan allows creation of viable final landforms for rehabilitation approximately 18-24 months after mining.

The tailings management plan is:

- Initially tailings will be stored out-of-pit tailing until sufficient pit void is available after 15 months of mining.
- A second out-of-pit tailing storage is required to service the first nine months of operation at the second location of WCP1 (Year 12).
- Subsequent WCP1 and WCP2 locations will use remnant pit voids for their initial tailings.
- Generally, coarse tailings will fill pit voids created 6-12 months earlier.
- Coarse tailings will be used to form evaporation ponds for fine tailings deposition.
- Initial fine tailing areas will be created on ore, and the dry tailings removed prior to mining.
- Fine tailings will normally fill evaporation ponds created on coarse tailings.
- Landform restoration will take place when fine tailings have dried and been reincorporated into upper layer of coarse tailings.
- Topsoil will be placed on reinstated landform, approximately 18-24 months after mining.
- Co-disposal of coarse and fine tails together to create a mix of clay and sand that reflects in-situ levels and promotes regrowth of native vegetation will be further developed and tested at Kwale before being refined during the initial 15 months of the Toliara operation when ex-pit tails storage is undertaken.



# Metallurgical testwork and flowsheet design

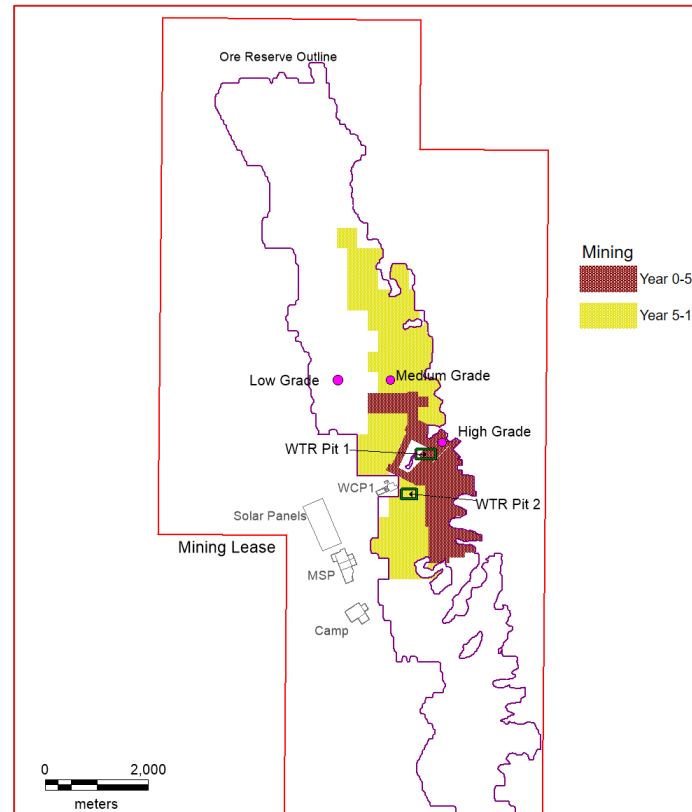


The DFS metallurgical testwork program, using full scale spirals, was the basis of the WCP flowsheet design and resultant design mineral recoveries.

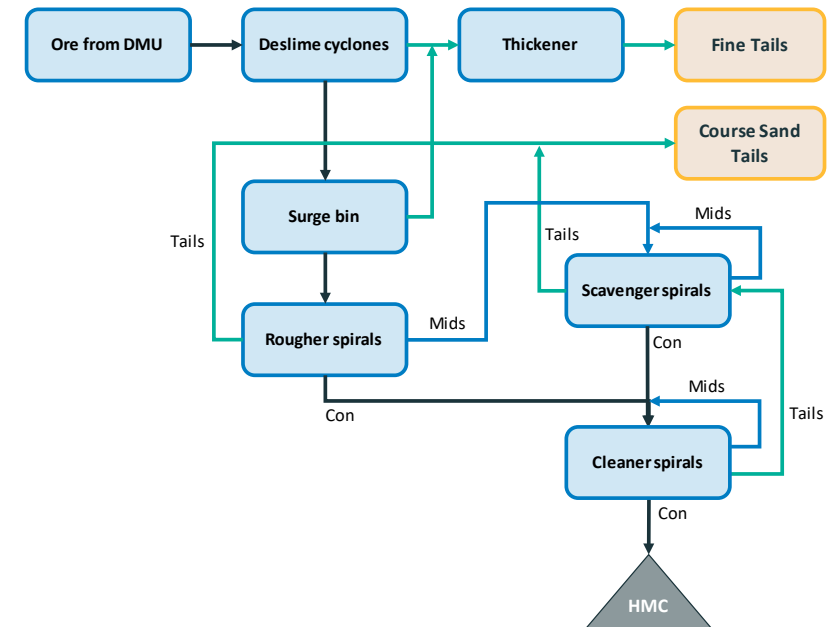
## WCP

- In early 2018, Base Resources generated three bulk samples (low grade - 4.8% HM, medium grade – 8.2% HM, high grade – 10.5% HM) to represent a range of ore grades on which to base the WCP design.
- Base Resources' mineralogy methodology, MinModel, was adapted for the Ranobe deposit and used to calculate WCP performance during the testwork.
- A three-stage spiral wet gravity circuit was tested on the low, medium and high-grade bulk samples using a combination of MG12 and VHG spirals. The testwork was performed by Mineral Technologies in Brisbane.
- The testwork results were modelled using industry proven programs to optimise the flowsheet design, mass balance and resultant performance metrics.
- Bulk HMC samples were generated from each HM grade test as feed for MSP testwork and market sample generation.

## Source of Bulk Testwork Samples



## WCP Flowsheet





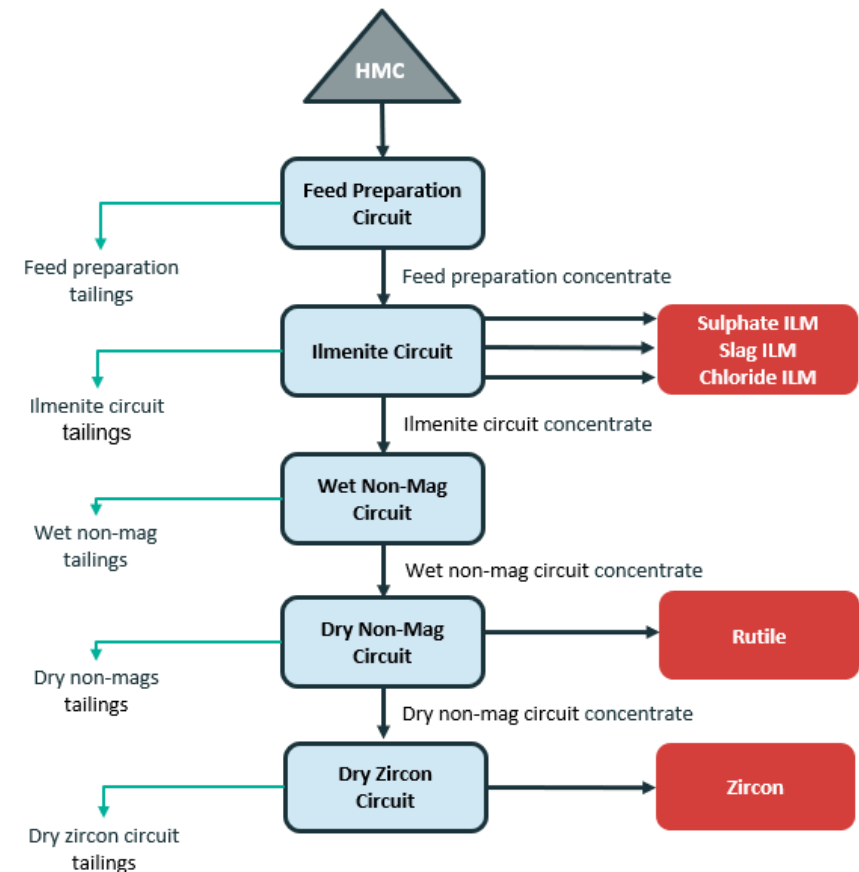
# Metallurgical testwork and flowsheet design

DFS metallurgical testwork program, using full plant scale separation equipment, was the basis of the MSP flowsheet design and confirmed the mineral recoveries and final product qualities.

## MSP

- Three feed samples representing HMC from low, medium and high-grade ore generated from WCP testwork were used as feed for MSP flowsheet development testing. The testwork conducted by IHC Robbins provided final product samples for marketing and established mineral recoveries and final product grades.
- The ability to produce varying ratios of three ilmenite products, sulphate, slag and chloride grades from the full range of HMC feedstock to match market conditions was confirmed and built into the process design.
- A comprehensive and iterative series of tests were completed to establish flowsheets for each processing stage consistent with the design intent:
  - Feed preparation – removal of coarse and fine quartz using wet gravity separation.
  - Ilmenite circuit – produce three ilmenite products under varying ore types and generate a non-magnetic stream, using magnetic and electrostatic separation.
  - Wet non-magnetics circuit – remove residual quartz to enable efficient rutile separation using wet gravity separation.
  - Rutile circuit – produce a rutile product and a non-conductor zircon stream using electrostatic and magnetic separation.
  - Dry zircon circuit – remove Fe and Ti contaminants to produce a standard zircon product using electrostatic and magnetic separation.

## MSP Flowsheet



# Product recoveries



An extensive suite of testwork was undertaken that provides a sound basis for product recovery estimation.

## WCP

- Testwork on each of the low, medium and high-grade bulk samples was used to generate a model (Mineral Technologies) from which the WCP recoveries (ilmenite, rutile and zircon) were estimated.
- High-grade scenario recoveries were assumed and then further reduced (for ilmenite, rutile and zircon) by 1.5% to allow for the reality of plant operations often running at sub-optimal conditions.
- Insufficient data and accuracy was available for leucoxene recovery estimation using the Minmod mineralogy method and the Mineral Technologies WCP simulation. This was calculated based on the non-mag  $\text{TiO}_2$  recovery.

## MSP

- Ilmenite recovery – derived from the MSP testwork and calculated on a circuit-by-circuit basis, an average total recovery (from three bulk samples processed) of 94.4% was established.
- The proportion of each ilmenite product produced (sulphate, slag and chloride) used testwork results adjusted for product quality targets using a mathematical model with interpolation algorithms. The quality targets and splits were optimised for NPV. The design accommodated a range of potential ilmenite splits.
- Zircon recovery - derived from the MSP testwork, a recovery was calculated on a circuit-by-circuit basis to give an overall zircon recovery of 79.4%.
- Rutile recovery – derived from the MSP testwork and calculated on a circuit-by-circuit basis, giving an average total recovery (from three bulk samples processed) of 54.1%.
- Leucoxene is recovered to a HiTi stream which is redirected to both rutile and ilmenite products.
- Leucoxene recovery - derived from the MSP testwork, a leucoxene recovery of 23.2% was calculated that is distributed to ilmenite and rutile, 79% and 21% respectively. This increases the ilmenite and rutile total recoveries to 94.6% and 58.4% respectively.

## WCP Recoveries

	Low Grade Ore	Medium Grade Ore	High Grade Ore	Avg	DFS Design
Rutile	97.1	95.8	93.8	95.6	92.3
Zircon	98.5	98.6	98.7	98.6	97.2
Ilmenite	97.1	96.6	96.4	96.7	94.9
Leucoxene	85.0	80.0	70.0	78.3	75.0
% HM in HMC	91.0	91.0	91.0	91.0	91.0

## MSP Recoveries

	Base	Leucoxene re-distributed
Ilmenite	94.4	94.6
Zircon	79.4	79.4
Rutile	54.1	58.4
Leucoxene	23.2	0

## Ilmenite Splits

Ilmenite	Proportion %	Target % $\text{TiO}_2$
Sulphate Ilmenite	47.0	48.5
Slag Ilmenite	27.2	50.5
Chloride Ilmenite	25.8	57.0

# Process engineering – dry mining unit

The processing plants design for Stage 1 includes a DMU, 1,750tph WCP, 150tph MSP, water circuit, tails disposal and electrical reticulation. Stage 2 includes a second DMU, 1,750tph WCP and upgrade of the MSP to 220tph.

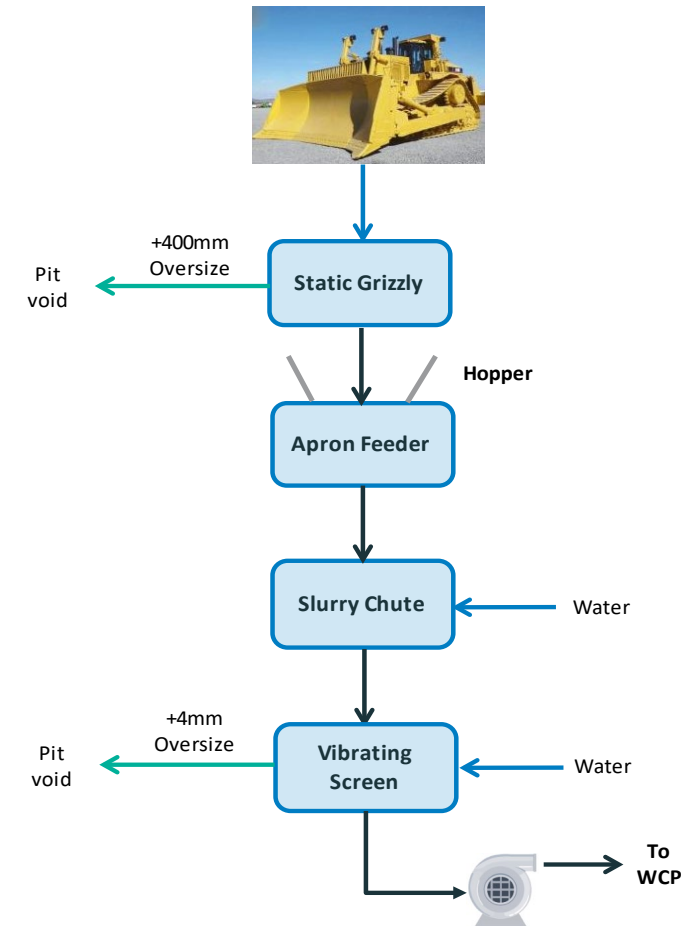
## Dry mining unit

- Piacentini & Son will be commissioned to supply a new DMU for Stage 1, similar to the existing unit at Kwale Operations. The existing Kwale Operations unit will be refurbished and shipped to Madagascar for the Stage 2 upgrade in year 4.
- A 4mm screen will be installed on the DMU hopper to remove all +4mm material in the mining area.
- The DMU pump will be supported by ROM booster pumps to pump ore to the WCP from the DMU when the distance between the two plants is greater than ~800m.
- Each DMU is designed to be relocatable (using Caterpillar D11 bulldozers), which is anticipated to be every 2-4 weeks.

Dry mining unit



Mining process flowsheet



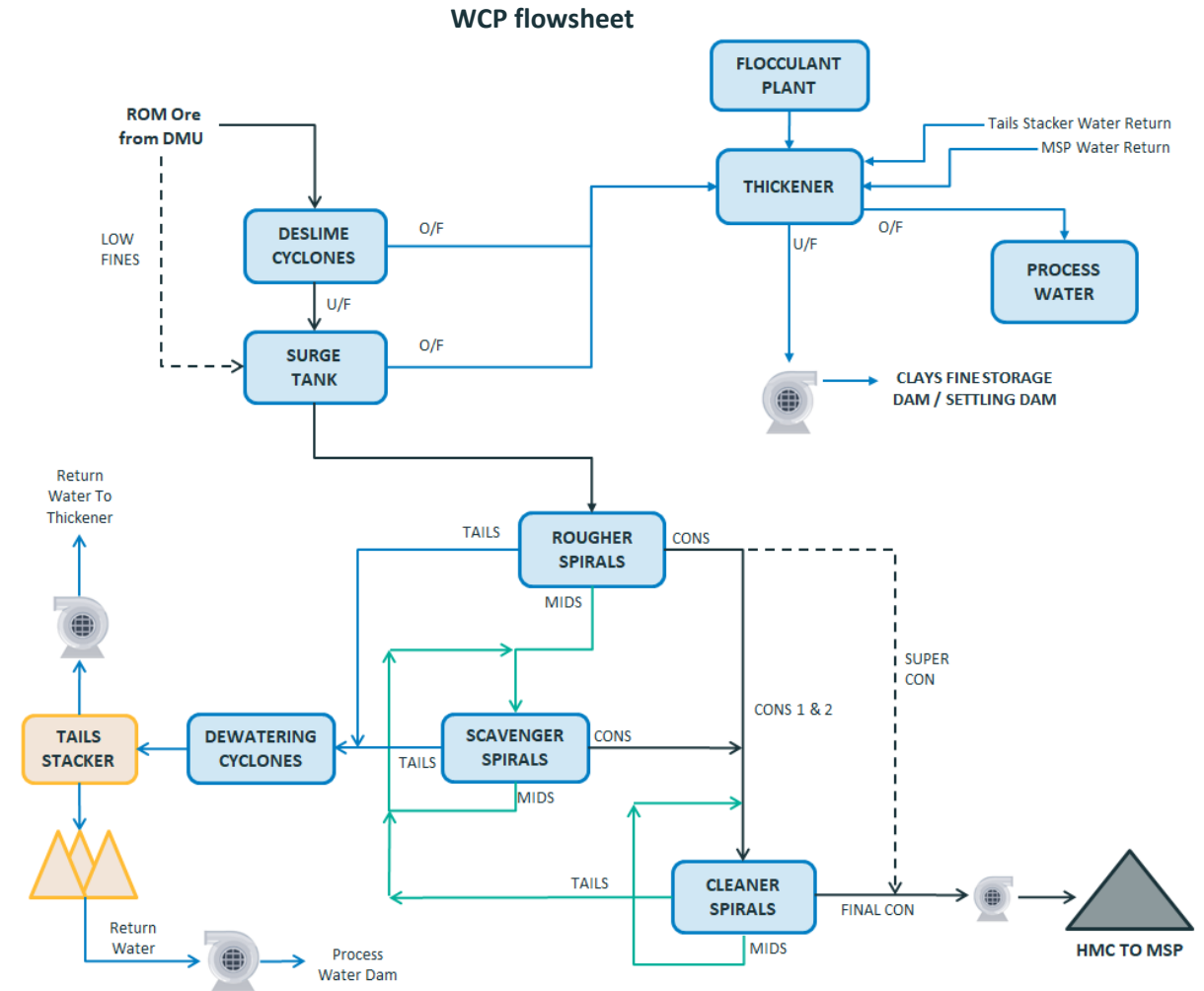
# Process engineering – wet concentrator plant



Both 1750tph WCP's are simple but robust 3-stage spiral plant designs based on bulk sample testwork programs conducted at Mineral Technologies metallurgical facilities and caters for the range of heavy mineral grades within the Ranobe deposit.

## Wet concentrator plant

- The flowsheet developed uses proven spiral technology to produce a HMC grade above 90% HM.
- De-sliming cyclone and thickening circuit designed for wide range of ore clay content.
- A constant density surge tank provides a one-hour buffer between the DMU and WCP.
- MG12 spirals, operating at 2.5tph per start, used in rougher and scavenger stages minimises footprint and simplifies the design, reducing pumping costs and power requirements.
- The cleaner spirals are twin start VHG operating at 1.5tph per start.
- Cross launders have been incorporated in the design to simplify material flow and reduce the number of gravity launders by 75%.
- HMC will be pumped to the MSP from each WCP.
- Tailings are pumped back to the mine void as back fill with water recovered to minimise make up water required from the borefield.





# Process engineering - mineral separation plant



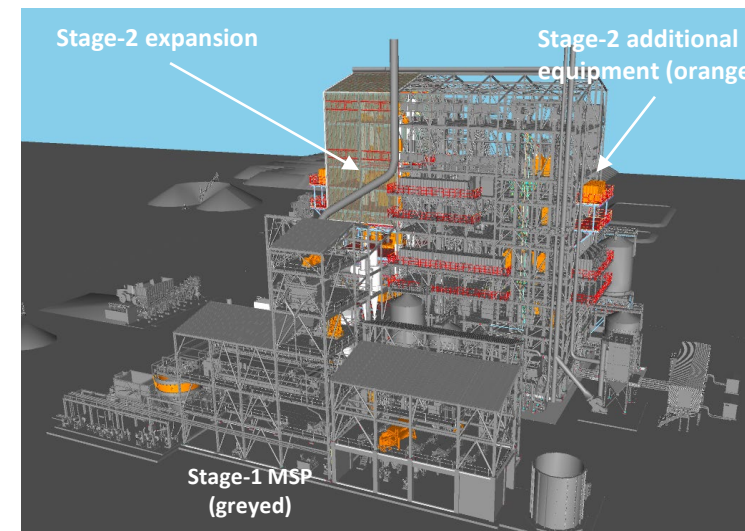
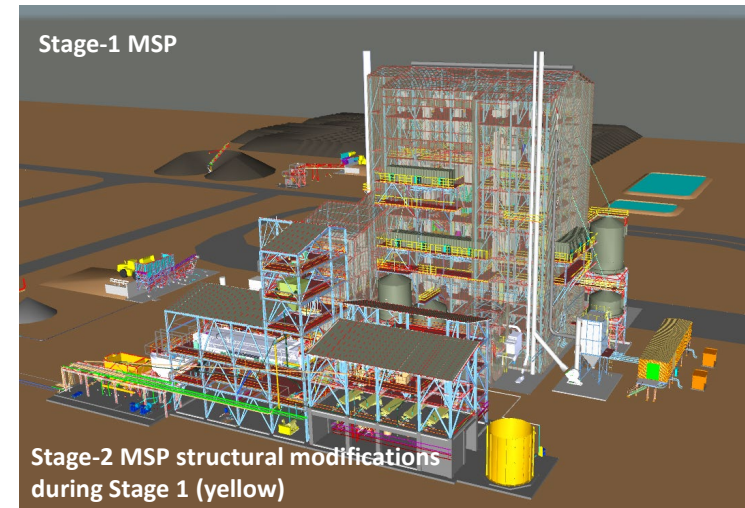
Extensive design optimisation was undertaken to balance plant availability (by reducing number of drives), operating costs and capital costs.

## Mineral separation plant

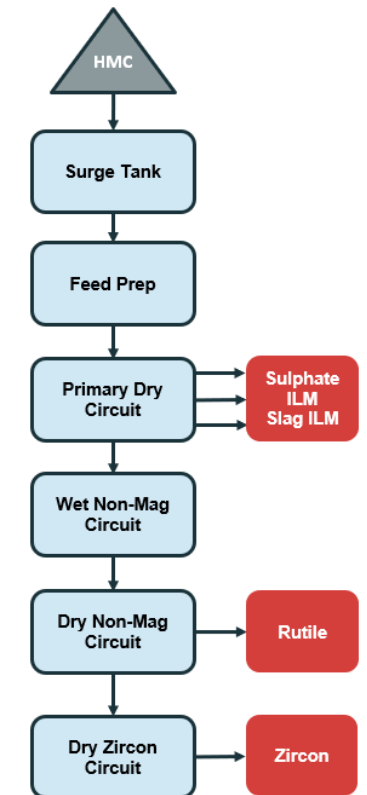
- Stage 1 feed rate of 150tph, decoupled from the mining operation by a HMC stockpile which buffers changing ore grades and differing plant run times.
- The MSP will be upgraded to 220tph in year 4 as part of Stage 2. A larger dryer, belt filter, HMC surge bin, screen and UCC will be included as part of Stage 1 to minimise overall combined Stage 1 & 2 project capex and downtime during the Stage 2 upgrade.
- The MSP location is fixed for the life of mine. It is a ~50m tall building with multiple machine floors to reduce operating cost (by utilising gravity to reduce materials handling equipment and drives).
- Final products will be stored in 1,000t bins (350t for rutile). Additional site storage is provided for the three ilmenite products (two week's production).
- Tails from the MSP are pumped back to the WCP to be disposed with the main tails lines.
- The ilmenite circuit design incorporates the facility to isolate a single machine for cleaning and maintenance.
- Fresh raw water will be used where necessary to ensure product quality.

## Sampling

- All incoming and outgoing streams throughout the plant are automatically sampled, including dry stream analysers on the zircon and rutile circuits.



## MSP flowsheet



# Design progression

The plant design progressed substantially during the DFS. Further engineering development occurred during DFS2 in preparation for detailed design following FID.

## Electrical

- Majority of the power requirements are in overland pumping. Pipe loop testwork has been undertaken to determine the optimum pumping velocities.
- Site high voltage reticulation is at 11kV.
- Switchrooms, electrical equipment rooms and field skid switchrooms are modular pre-fabricated buildings with main equipment pre-installed to minimise construction time.
- Site wide power distribution system is well developed, with a significant effort put into power consumption on a year by year basis, matching the mine plan and pumping requirements.
- High degree of integration across multiple sites (power plant, DMU, WCP and MSP) to enable efficient operation.
- Modelling and sizing of plant cabling requirements well developed (cable schedule).
- Completed lighting study with lux level modelling and selection of optimal luminary locations.

## Control systems

- Fully automated and supported by instruments measuring density, flow, level, temperature, tonnage etc.
- Completed datasheet sets for all instrumentation packages.
- Operating and control philosophy developed for control system design.
- The operator interface system is typical of supervisory control and data acquisition (SCADA) systems. The SCADA monitors and controls instruments in the plant through a programmable logic controller.

## DFS / DFS2 design deliverables produced

- Scope of work documents and firm pricing received from vendors for all mechanical equipment in the processing plant.
- Mechanical equipment list [3].
- Electrical load list.
- Piping & instrumentation diagrams [110].
- Processing plant 3D models, including piping, instrumentation, pipe racks, cable trays and valves.
- Process design criteria, flowsheets and mass balances [18].
- Site layouts, general arrangements and sections [71].
- Standard drawings for electrical, structural, instrumentation, civil, mechanical & piping [68].
- General specifications.
- Tender reviews on mechanical equipment.
- Preliminary platework drawings for vendor pricing [186].
- Single line electrical diagrams [28].
- Valve schedule and piping material take off.
- Instrument list and datasheets [25].
- Detailed structural calculations and material take-offs.
- Detailed pump calculations for all slurry and water lines.
- Fire protection and fire detection system equipment schedules.

# Marketing – product quality



The quality of Toliara Project products ensure they are suitable for a wide range of applications.

The following three ilmenite products to be produced with qualities that specifically target different ilmenite markets.

- **Sulphate Ilmenite**

Of similar quality to Kwale Operations' ilmenite which is widely consumed in the global sulphate pigment industry.

- **Slag Ilmenite**

A higher  $\text{TiO}_2$  (>50%) makes this ilmenite attractive to chloride slag producers where elevated  $\text{Fe}_2\text{O}_3$  has no detriment. An option exists to re-blend it with sulphate ilmenite and have more volume targeting either the sulphate pigment market (albeit with a higher  $\text{Fe}_2\text{O}_3$  specification than the sulphate ilmenite stream) or the slag market (albeit with lower  $\text{TiO}_2$  than the slag ilmenite stream).

- **Chloride Ilmenite**

A typical 57.0%  $\text{TiO}_2$  ilmenite. Optimises revenue while producing a product that suits direct feed chloride pigment production as well as chloride slag and synthetic rutile production.

Processing plant design flexibility and testwork confirms that the split between the ilmenite products and qualities can be adjusted within specification constraints to respond to ore variations and market requirements.

Final Product Typical Specifications

%	Kwale Ilmenite	Sulphate Ilmenite	Slag Ilmenite	Chloride Ilmenite
	Typical	Typical	Typical	Typical
$\text{TiO}_2$	48.3	48.5	50.5	57.0
$\text{Cr}_2\text{O}_3$	0.09	0.08	0.08	0.10
$\text{ZrO}_2$	0.12	0.02	0.04	0.03
$\text{CaO}$	0.02	0.01	0.03	0.02
$\text{MgO}$	0.7	0.6	0.4	0.3
$\text{MnO}$	0.6	0.8	1.0	1.5
$\text{Fe}_2\text{O}_3$	20.4	21.0	27.5	30.5
$\text{FeO}$	27.6	26.8	16.0	6.0
$\text{P}_2\text{O}_5$	0.02	0.02	0.07	0.06
$\text{Nb}_2\text{O}_5$	0.06	0.12	0.15	0.20
$\text{V}_2\text{O}_5$	0.23	0.24	0.23	0.22
$\text{SiO}_2$	0.7	0.6	1.2	1.0
$\text{Al}_2\text{O}_3$	0.6	0.5	1.0	0.9
U+Th (ppm)	55	40	85	148



# Marketing – product quality



A very good standard grade zircon product and a rutile product suitable for all end use sectors.

## Zircon

- A very good standard grade zircon product will be produced.
- The quality is acceptable to all key end use sectors, particularly in China.

%	Kwale Standard Zircon	Toliara Zircon
	Typical	Typical
ZrO <sub>2</sub> +HfO <sub>2</sub>	65.8	65.6
TiO <sub>2</sub>	0.14	0.09
Fe <sub>2</sub> O <sub>3</sub>	0.12	0.12
SiO <sub>2</sub>	32.4	32.9
Al <sub>2</sub> O <sub>3</sub>	1.15	0.89
U+Th (ppm)	400	550

## Rutile

- Rutile very similar to Kwale Operations' rutile, suitable for chloride pigment, titanium metal and welding consumables, will be produced.
- A TiO<sub>2</sub> of 95.0% can be produced (with a potential option drop to a minimum of 93% if significant recovery benefits can be achieved).

%	Kwale Rutile	Toliara Rutile
	Typical	Typical
TiO <sub>2</sub>	95.5	95.0
Cr <sub>2</sub> O <sub>3</sub>	0.22	0.15
ZrO <sub>2</sub>	0.64	0.84
CaO	0.02	< 0.01
MgO	0.05	0.01
MnO	0.03	0.01
Fe <sub>2</sub> O <sub>3</sub>	1.08	0.8
P <sub>2</sub> O <sub>5</sub>	0.02	0.03
Nb <sub>2</sub> O <sub>5</sub>	0.28	0.47
V <sub>2</sub> O <sub>5</sub>	0.61	0.59
SiO <sub>2</sub>	0.8	1.1
Al <sub>2</sub> O <sub>3</sub>	0.4	0.6
U+Th (ppm)	53	240

# Infrastructure

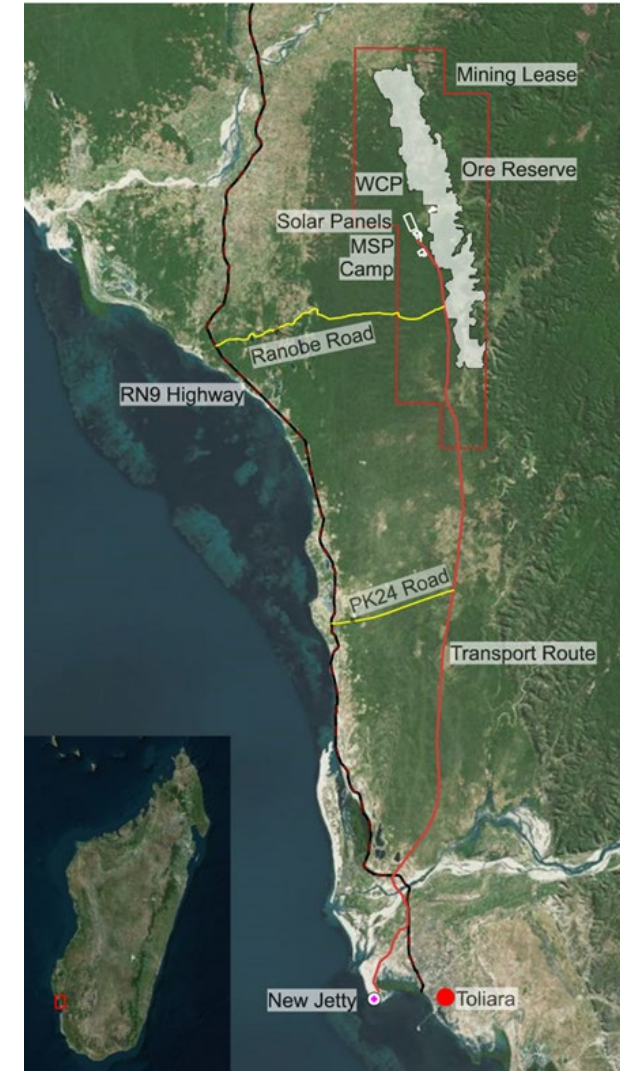
Existing infrastructure required for the development of the Toliara Project is limited. The project scope addresses this through building a dedicated product haulage and access road, bridge, export facility, hybrid power plant, bore field for water supply and a permanent camp.

## Existing infrastructure

- Toliara has an existing container port able to accommodate coastal vessels, an airport with scheduled domestic and international flights and good mobile and data communications.
- The RN9 national route, although upgraded and sealed during the last few years, is not suitable for oversize and heavy construction loads or road train product haulage. The existing bridge over the Fiherenana river also has limited capacity.
- There is no electrical power grid in the vicinity of the mine. Power supply at Toliara is limited and unreliable and currently not adequate for the new export facility site, although plans are in place to upgrade the local generation facility by addition of solar power.
- There is limited existing accommodation in Toliara for the anticipated non-local construction and operations personnel requirements.
- There is no suitable sewage treatment facilities in the area but there is a solid waste recycling plant some 10kms north of Toliara.
- Toliara has a diesel bulk storage facility at the port with limited HFO storage capacity that is shared amongst four distributors.

## Roads

- A new 45km long, sealed, dedicated, haul and permanent access road will be constructed, including a new 630m long concrete bridge over the Fiherenana river. Provision is made for several community crossing points as well as an underpass at the RN9 crossing. The bridge will be designed to withstand 1:100-year floods.
- A staged development approach includes:
  - Upgrading of existing Ranobe road for early process plant contractors' access through the RN9 immediately after FID.
  - Construction of the northern section of the haul road in conjunction with upgrading the PK24 road to facilitate movement of heavier WCP / MSP mechanical equipment. This route avoids populated villages along the RN9 north of PK24.
  - Construction completion of the southern haul road section to the export facility in time for first product export.
  - Contractor access to the export facility will be constructed pre-FID to provide the piling contractor access immediately on FID.



# Infrastructure

**Comprehensive groundwater modelling has confirmed suitable quantities of water can be abstracted from an aquifer without adverse community or environmental impacts. Detailed, binding offers have been received for bulk power supply.**

## Water

- Ground water modelling (Knight Piesold) has confirmed the ability to sustainably source the required make-up water for the Stage 2 (25Mtpa) mining rate from four borefields within the mining permit area, consisting of nine operating (5 for Stage 1 and 4 for Stage 2) and two standby 30l/s boreholes.
- Permits are in place for abstraction of 889 m<sup>3</sup>/hr of raw water but will require renewal after lifting of suspension as they expire in Q4 2022. The estimated raw water requirement for Stage 1 is 526 m<sup>3</sup>/hr and Stage 2 is 972 m<sup>3</sup>/hr. Further regulatory approval is required for the increased Stage 2 abstraction and will be progressed prior to Stage 2 development.
- Drilling of 3 production boreholes to enable step testing and refinement of the groundwater model is planned during the pre-FID phase and monitoring bores for baseline and operational purposes will be installed.

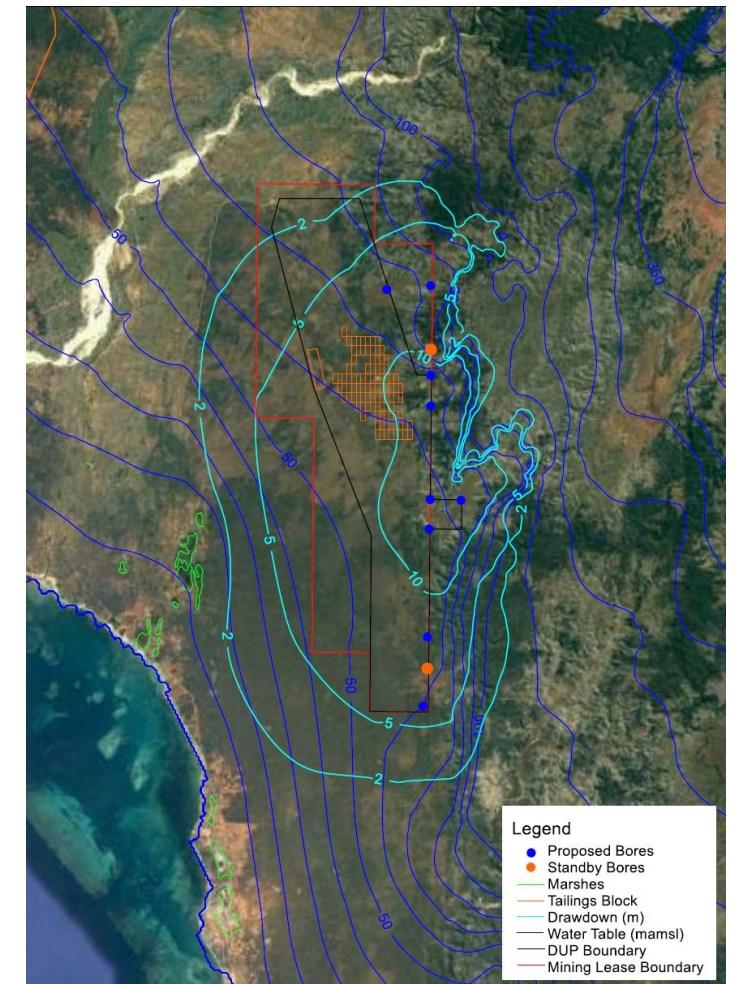
## Power

- Power for the mine site will be “self-supplied” by Base Toliara, with the generation facility to be constructed by an IPP who will in turn operate and maintain that facility on Base Toliara’s behalf.
- Power generation will be based on a hybrid HFO, solar photovoltaics (PV) and battery storage system located near the MSP. The design aims to maximise solar contribution to reduce CO<sub>2</sub> emissions.
- Stage 1 installed power is 23.5MW with a maximum demand of 15.1MW with an average usage of 10.5MW. Stage 2 will increase installed power to 35MW with a maximum demand of 24MW and an average usage of 15.2MW.
- Export facility power will be self-generated using high speed diesel generators with a small contribution from solar PV.

## Accommodation camp

- An accommodation camp of 272 rooms (converted to 511 beds with shared rooms) will be constructed to accommodate the peak construction workforce. 219 rooms are required for operational workforce leaving 53 surplus rooms.
- The 53 surplus rooms are sufficient to accommodate Stage 2 construction and operations workforce.
- National labour and off-site contractors will be housed in the local communities. Local workforce will be bused in daily.

Bore field locations and drawdown





# Infrastructure

Full bridge simulations have confirmed the operability of the multi-buoy mooring berth for vessels in a wide range of operating and environmental conditions up to Panamax class (partially loaded to 68kt). Typically, Ultramax vessels (loaded to 63kt) will be used during operations. Stage 1 ship loading will occur 14-17 times per year while ship loading at Stage 2 peak production will occur up to 26 times per year.

## Mine complex

- Provision has been made for fencing, security, offices, workshops, laboratories, stores, change houses, ablution blocks, control rooms, weighbridge, clinics and first aid facilities, water storage dams and tanks, fuel storage facilities, firefighting systems, storm water management and landscaping. No additional infrastructure will be required for Stage 2.

## Waste treatment

- A sewage treatment plant (STP) will be constructed at the mine complex and serve the process plant, mine complex buildings and accommodation camp. Conservancy tanks will be utilised at remote sites such as the export facility and sewage transported to the STP for treatment. No additional infrastructure required for Stage 2.

## Product haulage

- Up to a maximum of 1,303kt of product will be hauled annually from the mine to the export facility by a transport contractor utilising 90t triple trailer road trains operating 13 hours per day on a seven days a week basis.

## Export facility

- An export facility at Batterie Beach will include a storage shed for 135kt of ilmenite, 10kt rutile, with a separate shed to store 17kt of zircon. At the MSP, an additional 38kt of product storage will be provided during Stage 1. For Stage 2, the MSP storage capacity will be increased to 75kt.
- Ground improvement (rigid inclusion piles) required for the shed foundations.
- A 550m long jetty with pipe conveyor and fixed ship loader will load Panamax vessels (loaded up to 68kt) or Ultramax vessels (loaded up to 63kt) moored on a multi-buoy mooring berth. No additional infrastructure is required for Stage 2.
- A charter contract will be placed for a fully crewed tug with minimum bollard pull of 40 ton and a mooring line handling vessel for the operations phase.

Multi Buoy Mooring Navigation Simulation



# Marketing – pricing



**Product pricing forecasts through to 2030 are derived from Base Resources’ internal supply/demand analysis before transitioning to TZMI’s long term inducement prices from 2035.**

Over the short term, Base Resources’ supply forecast is generally aligned with TZMI’s five year outlook for existing producers, but Base Resources forms its own view on the anticipated timing of new brownfield and greenfield projects coming into production.

Base Resources’ medium to long term supply forecast is based on its internal view of future production from existing operations as well as new brownfield and greenfield projects. For each new project forecast to commence production in the future, Base Resources considers the stage of development, estimated economics, mine life, applicable risks and the forecast market supply gap to determine a likely start-up date.

## **DFS2 forecast product prices**

- Base Resources’ internal price forecast for each product is used until 2030.
- From 2035 prices are assumed to be the long-term inducement prices, as forecast by TZMI, re-based to 2021 real. The exception to this is chloride ilmenite, which is derived from Base Resources’ internal long-term outlook specific to the chloride ilmenite sector and a pricing structure that is more consistent with traditional practice within that sector.
- Prices transition between 2030 and 2035 in a straight line.
- All forecast prices are FOB, real 2021, after adjusting for expected product quality.

## **Base Resources’ internal supply/demand analysis and price forecast methodology**

Base Resources’ internal price forecast is derived from continuous supply and demand analysis. In broad terms, when a supply deficit is forecast, prices are predicted to trend upwards and when a supply surplus is forecast, prices are predicated to trend downwards. However, the direction and extent of forecast price movements also take into consideration:

- Industry inventory levels relative to levels considered to be normal.
- Estimated “floor” and “ceiling” prices derived from historical precedents, for example, where low price levels would threaten the economic viability of many producers or excessively high prices encourage product substitution to take significant effect.
- The anticipated behaviour of key suppliers actively managing production to support prices.

Base Resources’ internal supply and demand analysis utilises historical production and consumption data. Base Resources’ forecast product demand utilises TZMI’s five year demand outlook before transitioning to a steady annual growth rate, generally consistent with global GDP growth forecasts, adjusted for product specific considerations where applicable.

Product Prices USD/t (FOB)	Average 2025 – 2030	Average 2031-2034	From 2035	LOM Average
Sulphate ilmenite	\$187	\$197	\$189	\$189
Slag ilmenite	\$196	\$207	\$199	\$199
Chloride ilmenite	\$254	\$281	\$285	\$278
Rutile	\$1,369	\$1,259	\$1,117	\$1,185
Zircon	\$1,628	\$1,573	\$1,496	\$1,532

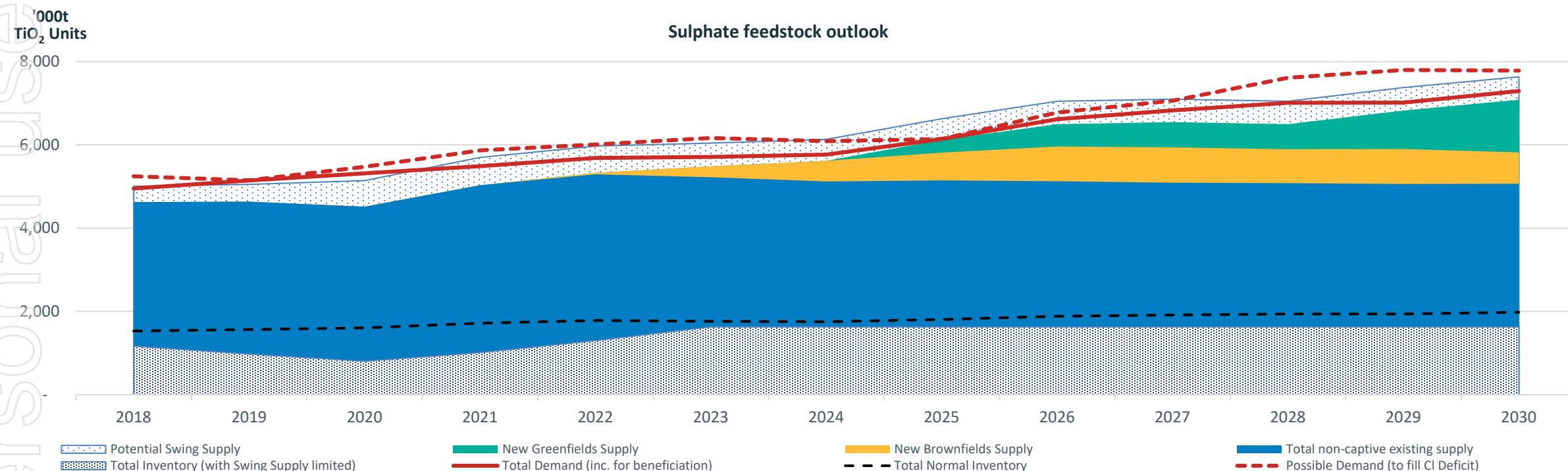
# Marketing outlook – sulphate $\text{TiO}_2$ feedstock



A future sulphate feedstock supply deficit is forecast, providing robust support for the development of the Toliara Project.

## Sulphate and slag ilmenite

- Longer term there is an anticipated emerging supply gap assumed to be partially filled by the Toliara Project and other new greenfield projects.
- Medium term outlook subject to high cost “swing” supply (concentrates and Vietnam). Prices in the range of US\$190 to US\$230 are generally required to stimulate and/or sustain swing supply.
- Upside demand for sulphate ilmenite is likely given the extent of the deficit in the chloride feedstock market which will lead to increased sulphate pigment production (to fill the shortage from feedstock-constrained chloride pigment) and/or new chloride slag capacity to fill the chloride feedstock deficit (which will use sulphate ilmenite as feed).



Source: Base Resources internal analysis. Refer to slide 34 for the applicable methodology for this analysis.



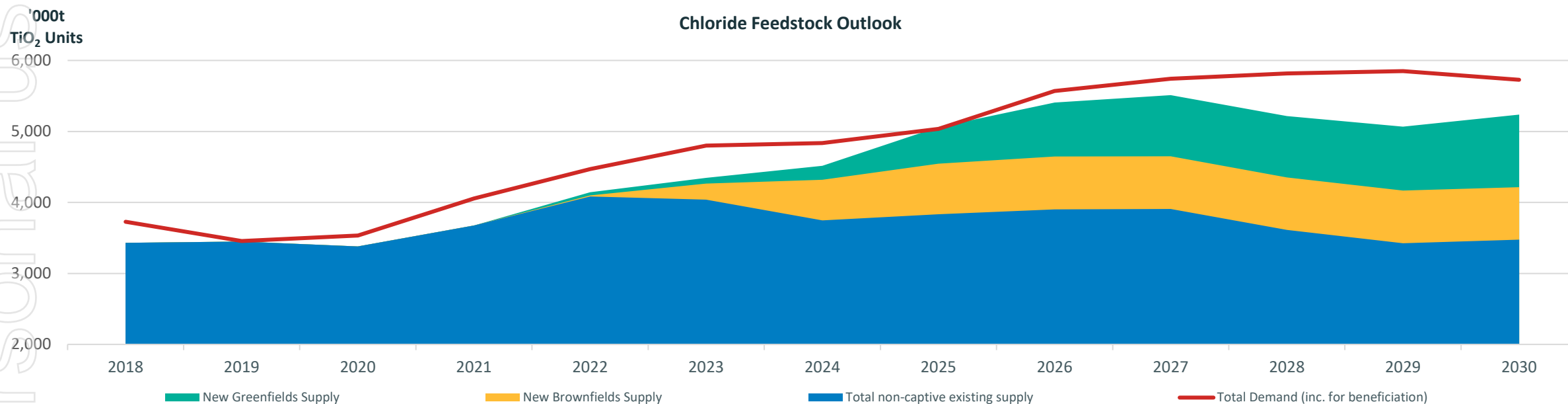
# Marketing outlook – chloride $\text{TiO}_2$ feedstock



A future chloride feedstock supply deficit is forecast, providing robust support for the development of the Toliara Project.

## Chloride ilmenite and rutile

- Substantial anticipated deficits for chloride pigment feedstocks support a positive outlook for rutile and chloride ilmenite from the Toliara Project.
- Chloride ilmenite is a unique feedstock within the overall chloride feedstock sector which has its own dynamics – see next slide.
- Rutile is a preferred high-grade feedstock for chloride pigment production and the relatively small quantities produced from the Toliara Project will be easily absorbed.
- The longer-term supply deficit should either:
  - stimulate further chloride slag production which will result in higher demand for sulphate ilmenite suitable as a feedstock for chloride slag; or
  - constrain chloride pigment production (lack of feedstock availability) which would result in more sulphate pigment being produced and more demand for sulphate ilmenite.



Source: Base Resources internal analysis. Refer to slide 34 for the applicable methodology for this analysis.

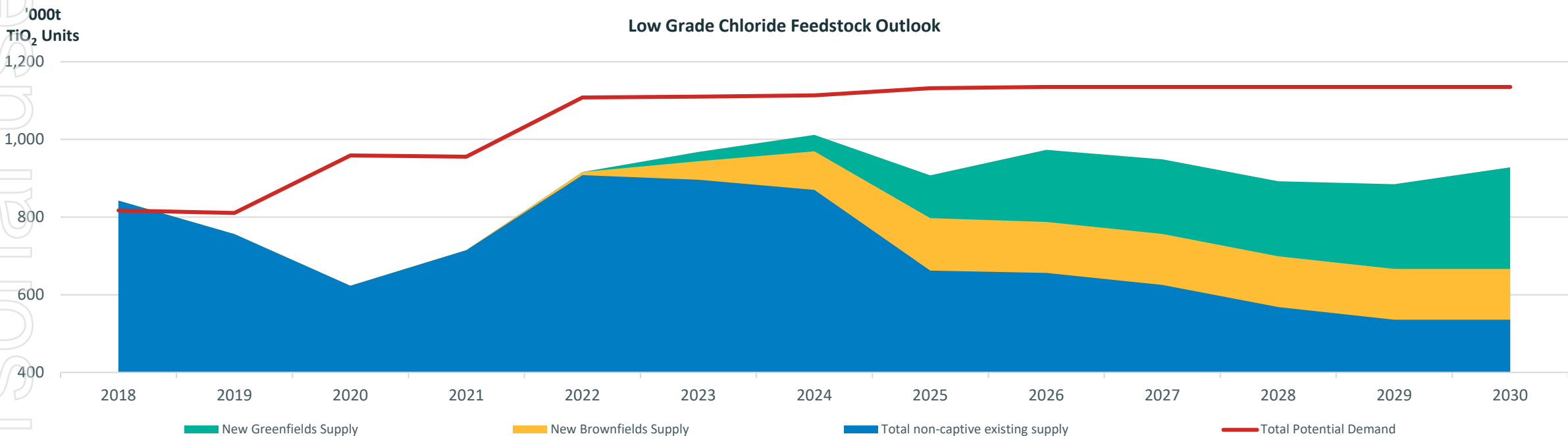
# Marketing outlook – chloride ilmenite



The forecast chloride ilmenite supply deficit is more significant than overall chloride feedstocks, providing a source of high value for the development of the Toliara Project.

## Chloride ilmenite

- Stage 1 production of chloride ilmenite will add ~ 20% to global supply in a market that is forecast to be in substantial deficit, ensuring production is easily absorbed.
- Demand for chloride ilmenite is driven by pigment, synthetic rutile and chloride slag production. Pigment expansions in recent years and an increased focus on external sourcing of chloride ilmenite for chloride slag and synthetic rutile production suggests that actual demand for chloride ilmenite now exceeds historic peak consumption levels and will continue to increase into the future.
- Availability of chloride ilmenite supply has historically constrained consumption, with end users able to consume significantly higher volumes. Chloride ilmenite consumers from each end use sector have expressed concern over the significant deficit of this specific titanium mineral in coming years.



Source: Base Resources internal analysis. Refer to slide 34 for the applicable methodology for this analysis.

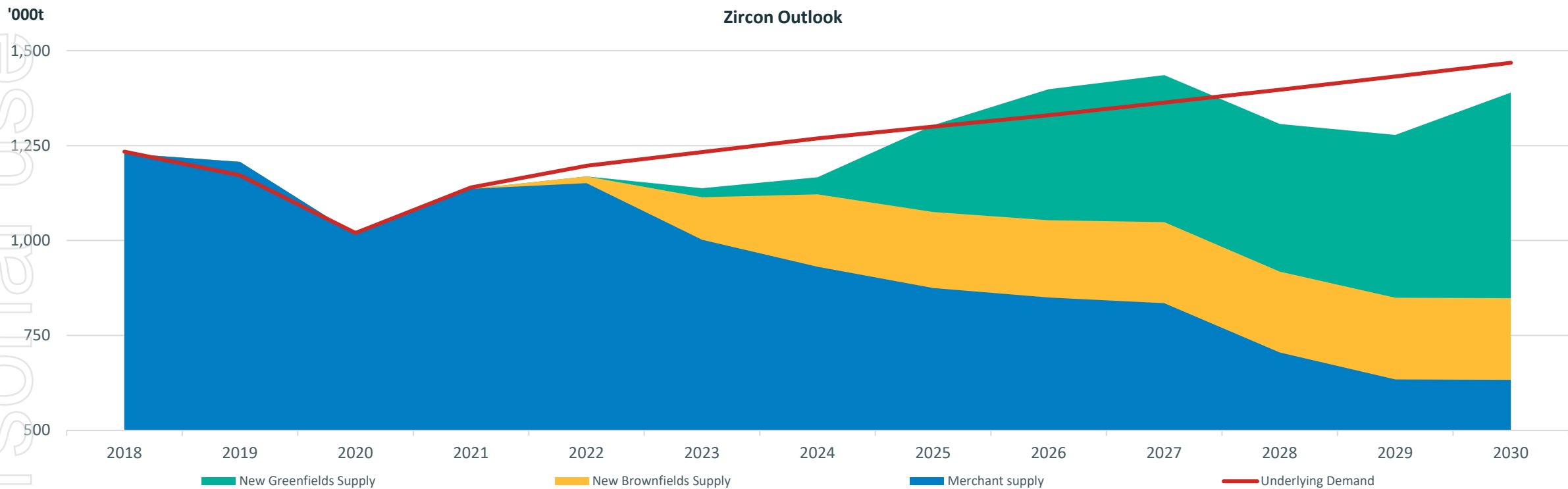
# Marketing outlook – zircon



A future zircon supply deficit is forecast, providing robust support for the development of the Toliara Project.

## Market outlook – zircon

- Significant new supply is needed from new supply to meet projected zircon demand.
- There is limited opportunity of “swing” supply from concentrates to manage this in the medium term.
- Over the long term there are forecast to be growing shortages.



Source: Base Resources internal analysis. Refer to slide 34 for the applicable methodology for this analysis.



# Implementation strategy



The Toliara Project is a “greenfields” mineral sands project that will be constructed on a remote site in a developing country with limited construction resources. The delivery approach addresses this, incorporating Base Resources’ experience in delivering and operating Kwale Operations.

## Toliara Project implementation objectives

That the wider industry will see the delivery of the Toliara Project as the best reference project to emulate:

- It has been delivered safely, on time, on budget and environmentally responsibly.
- It is making a real and sustainable positive difference to the surrounding people and communities.
- A new standard has been reached in terms of incorporating an optimum balance between innovation, low capital cost and risk.
- Design and delivery have ensured the facilities are effectively operated, maintained and quickly ramped up to the requisite production efficiencies and outputs.
- People and companies who are part of the delivery feel they have been part of an outstanding success and experience.

## A number of factors drive the implementation strategy

- Complex scope (mineral sands) and long life requires continual owners input to ensure an enduring, fit for purpose and world class design is delivered.
- Remoteness of the project and the country risk limits the appeal of “lump sum” contracts (to a limited contractor market for complex processing plants) making this approach high cost with minimal increase in delivery certainty.
- Government and community engagement and approval processes are more effectively conducted by Base Resources due to the complexity, risk, and

existing/future relationships.

- Utilising Base Resources’ knowledge gained through the Kwale project delivery and operation.
- Outsourcing or fixed price contracts where Base Resources doesn’t have the requisite knowledge (power) or competitive value is tied to a contractor's unique methods or capability (marine and power).

## The broad delivery approach is as follows

- Mining – Owner Implementation.
- Processing plants and field services – EPCM.
- Infrastructure – EPCM.
- Fiherenana bridge – EPC.
- Jetty, shiploader and marine infrastructure – EPC.
- Power – “self-supplied” by Base Toliara, with the generation facility to be constructed by an Independent Power Provider (IPP) that will operate and maintain that facility on Base Toliara’s behalf.

# Implementation strategy



The delivery of the Toliara Project will follow Base Resources' proven project development system and standards.

## Project development phases

Base Resources has followed its proven project development system and standards for the concept, pre-feasibility and definitive feasibility study phases. This was achieved by retaining engineering companies and key staff from PFS through DFS, and now DFS2. Subject to performance and cost, this is intended to carry through into implementation.

## Pre-FID works program

- Following lifting of the on-the-ground suspension (LOS), 11 months will be required to complete the necessary work before FID can be achieved. This work includes community engagement, permitting and environmental approvals, land acquisition, funding and geotechnical investigations, engineering and contractor procurement for key packages.
- The pre-FID work aims to de-risk the overall implementation schedule by progressing engineering designs and selecting preferred contractors to start construction of the camp, export facility shed piling, haul road, bridge, jetty and power plant as soon as practical after FID. The project implementation plan will be updated during this period.

## Final investment decision

- The Board will consider the DFS2, forecast market conditions and funding availability in order to make the FID.

## Implementation phase

- Planned in two stages:
  - Stage 1 includes DMU1, WCP1, MSP, haul road, bridge, export facility and all associated infrastructure and is scheduled over 27 months from FID.
  - Stage 2 comprises the construction DMU2, WCP2 and MSP upgrade over a 21 month period, delivered 4.25 years after Stage 1 implementation ends.

## Transport and logistics

- An experienced logistics contractor will be engaged to manage freight forwarding, customs clearance and organise road transport to site.

Stage	Commence	Finish	Duration (months)	Cost (US\$m)
Assumed LOS	Jan-22	-	-	-
Pre-FID	Dec-17	Dec-22	60	194*
Stage 1 FID	Dec-22	-	-	-
Stage 1 Implementation	Jan-23	Mar-25	27	520
Stage 2 Studies / FEED	Nov-25	Mar-27	17	2
Stage 2 FID	Mar-27	-	-	-
Stage 2 Implementation	Apr-27	Dec-28	21	137

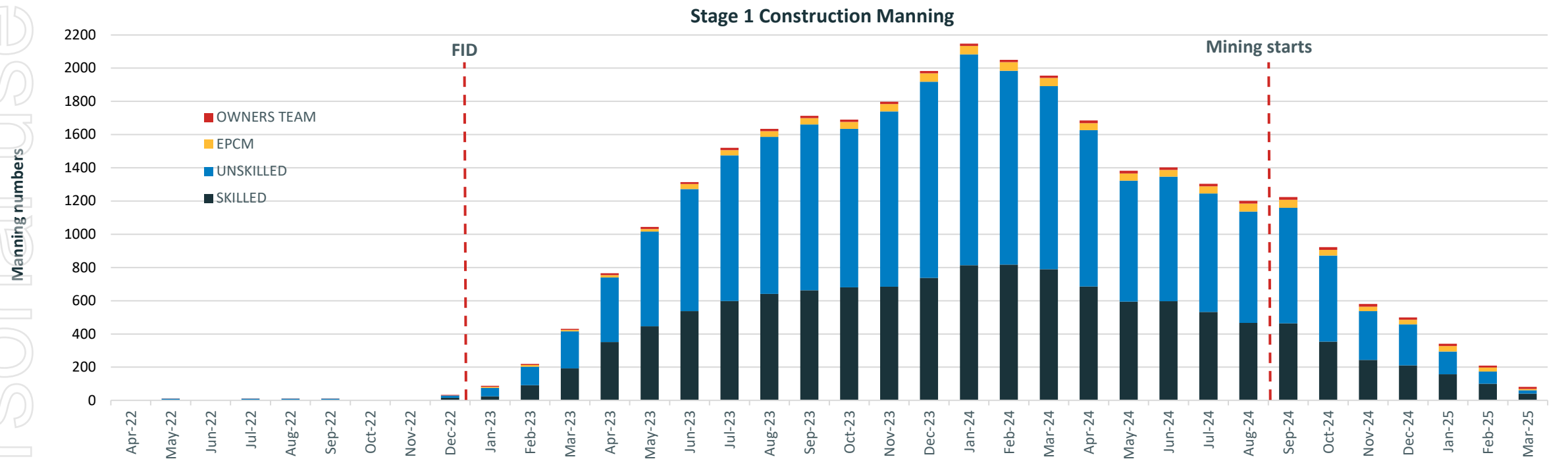
\*\$149m spend up to LOS and US\$45m required from LOS to FID

# Construction workforce



The construction effort will be spread over a wide geographic area covering the MSP, WCP, mine infrastructure, road, bridge and export facility. These works will be performed by multiple civil, structural mechanical & piping (SMP), electrical & instrumentation (EI) and marine contractors, with a workforce peaking at ~2,150.

- Peak workforce of ~2,150 personnel excluding Base Resources operational, community, environmental and administration personnel.
- Up to 800 skilled contractor personnel and 1,350 unskilled local workers will be on site during the 27-month construction period.
- The accommodation camp facilities will be completed early and are sized to cater for the non-local workforce and supervisory staff working on the process plant site facilities.
- Local Toliara people and contractors working on facilities other than the process plant site construction activities, will be accommodated in Toliara and local towns.



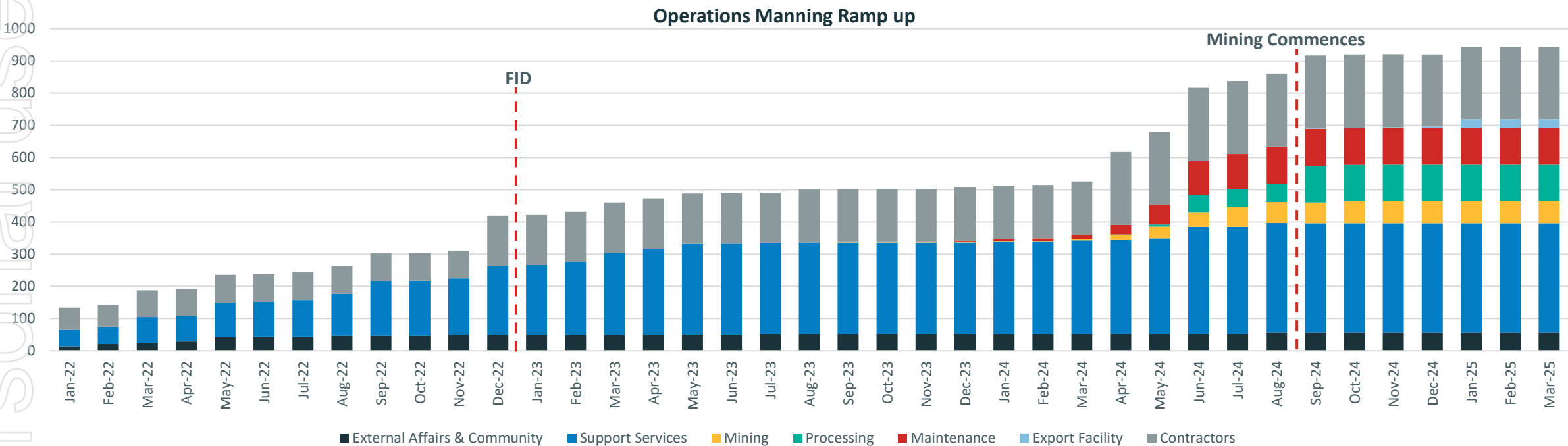


# Operational workforce



A detailed manning ramp-up plan has been developed to estimate the requirements for the operational phase. For Stage 1, a total of 690 employees is forecast for mining and WCP start-up at September 2024, increasing to 731 by February 2026, prior to commencement of Stage 2 construction.

- It is anticipated that the total operations workforce at the commencement of mining in September 2024 will be 690 employees, rising to 731 employees by February 2026 and will remain stable until the commencement of Stage 2 operations. Of these, it is expected that 60 employees will be expatriate at start up, reducing to 49 employees by the start of Stage 2 operations. The remainder of the employees and contractors will be Malagasy, primarily from the Toliara region.
- Accommodation objectives balance several factors including community impact, benefits to the community, availability of accommodation, fit-for-work standards and the attraction and retention of capability. On-site camp accommodation is planned for expatriate fly-in fly-out, shift workers on night shift, emergency response teams, apprentices, clinicians, on-call tradespeople and consultants.
- Malagasy employees from outside the Toliara region are expected to relocate to the surrounding communities and transported to work daily.



# Operational management and readiness

Early capability and capacity building programs were initiated to develop Toliara regional skills in semi-skilled, skilled and professional categories prior to the operational phase.

## Operating and construction readiness

The complete range of skills required to commission, start up and operate the Toliara Project are not readily available in the Toliara region. While there are many skills available and people with diverse academic qualifications, these need to be augmented with:

- Specific mining and processing training and work experience in order to reach acceptable capacity and capability for the needs of the project.
- Use of expatriate employees in key technical and managerial positions during early operational phases.

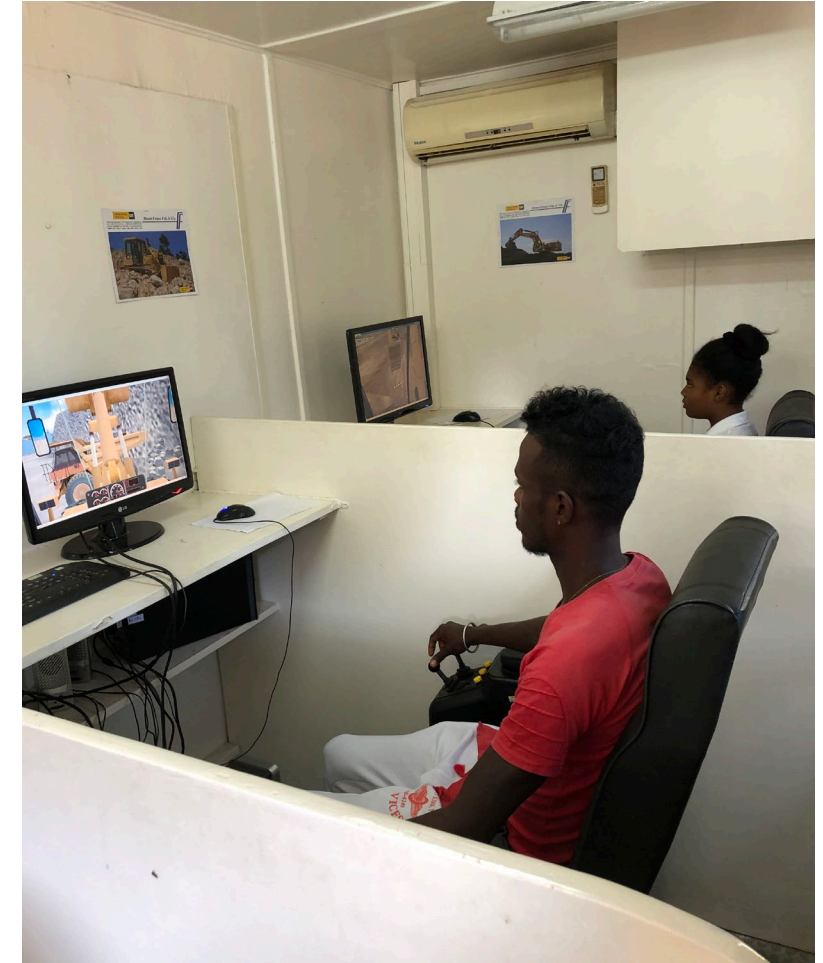
In accordance with the Labour, Recruitment and Influx Management Plan (LRIMP), a comprehensive early capacity building program commenced in early 2019:

- Registration of over 7,000 local people for traineeships.
- Over 2,000 people progressed through a selection process to finalise the selection of over 500 people to train in a variety of skill sets.
- Construction and operational traineeships in trades, equipment operation, maritime operations and computing, combined with English literacy, numeracy and leadership training have been completed. The first group of 24 apprentices have successfully completed internationally recognised trade qualifications whilst on secondment at the Kwale Operations. Further to this, the early selection of 17 Malagasy nationals for the graduate program is complete. Training programs will resume prior to and throughout the construction period.
- Monitoring of employee performance during construction will provide a basis for operational phase training and employment.

## Management systems

- Health and safety systems address the relative inexperience of locals working in the mining industry.
- Administrative systems are computer based and integrate with existing Base Resources applications.
- Maintenance systems reflect the need for the operations to be self-sufficient due to remoteness.

Mobile equipment operator training



# Workforce skills and training

**The required construction and operational skills are not readily available in the Toliara region. Base Toliara has implemented strategies to maximise the availability of skills for the implementation and operational phases of the Toliara Project.**

To ensure the required skills are available, Base Toliara has planned and is implementing:

- A system of preferential recruitment, agreed with community stakeholders, where skills are sourced locally where available, and then from progressively further afield in Madagascar and internationally, where they are not available in Toliara. This arrangement is embodied in the LRIMP.
- Training for trades apprentices and professional graduates from Madagascar, at Base Resources' Kwale Operations in Kenya, through the national and in-house training programmes.
- Community capacity-building and training to develop local construction and other work skills.

Following a registration and screening process, over 7,000 applicants from the project area have registered for employment and training opportunities. Over 500 of these have completed Base Resources' construction readiness training courses in mobile equipment operation, construction "wet trades", and other work skills.

Contractors from outside the local area will utilise their existing management, supervisory and specialist personnel to the extent allowable. Procedures are in place to support contractor access to the Base Resources registration database for skilled, semi-skilled, and unskilled local labour, and to assist contractor recruitment of additional skilled personnel from outside Toliara if required.

Inductions and training will be used to prepare construction workers for shift work during construction which will serve as an introduction to the long-term shift work required for operations.

For maximum effectiveness, leadership positions relating to local functions such as community and government relations will be held by a Malagasy national. To date, three senior positions in this area (General Manager External Affairs, Manager Community Relations and Manager Government Relations) have been successfully sourced.

**Mobile equipment operator trainees**





# Operational management and readiness

## Operating philosophy

The majority of the operation functions will be owned and operated by Base Resources.

Functions outside Base Resources' experience or where financial benefits accrue will be outsourced allowing focus on core activities:

- Mining – owner operator.
- Processing – owner operator.
- Administration – owner operator.
- Product transportation – contractor.
- Export facility operation (land) – owner operator.
- Export facility operation (marine) – contractor.
- Power – “self-supplied” by Base Toliara, with the generation facility to be constructed by an IPP that will operate and maintain that facility on Base Toliara’s behalf.
- Laboratory services – owner operator.
- Camp services – contractor.

## Management

Internal candidates have been identified for key operational positions:

- General Manager Operations.
- Manager Human Resources.
- Manager Finance & Administration.
- Manager Environment.

Proposed power generation



# Stakeholder engagement



## Stakeholder mapping

Analysis of the various stakeholders' ability to influence Toliara Project development provides an understanding of the potential for persons, organisations and institutions to play a supportive or disruptive role in development of the Toliara Project.

Base Resources has been able to form an understanding of the "on ground" situation in the Toliara area through its own stakeholder mapping in conjunction with initial stakeholder mapping performed during the Environmental and Social Impact Assessment (ESIA) study by the previous owners (WTR).

## Consultation process

Community consultation programs have commenced but are currently on hold due to the Government-imposed suspension of activities. These programs are intended to improve information sharing and bring communities and other stakeholders closer to the Toliara Project. An overview of the Community Stakeholder Engagement Plan process and participants is as follows:

- The Regional Coordination Committee (SCRC in French) was established by the Government to manage stakeholder engagement during WTR project ownership. It comprises 45 members and is intended to sit monthly to discuss progress, grievances and give feedback. The Governor (the senior most administrative position in the region) is the Chairman. Its current function remains focused on high-level communication and information sharing amongst regional players.
- The Resettlement Working Groups (RWG), one for the mine site and another representing communities along the haul road and at the export facility site, are committees that bring together communities that will be subject to the resettlement requirements of the Toliara Project, enabling them to participate in the decision-making process and provide input into how to achieve positive outcomes for the process. These committees comprise community representatives that will be directly affected by resettlement and relevant government agencies and local administrators that have a participatory role in delivering positive resettlement outcomes aligned to IFC Performance Standard 5 – Involuntary Resettlement.
- Community Liaison Committees (PLL in French) are the main stakeholder and communication link between communities outside the Toliara Project's footprint. The PLL will be formed once the RWG process is well established. The PLL committees are intended to be very mobile, reaching out to remote areas to establish trust with local communities and avoid issues of information distribution shortcomings which can be a result of closed-door static committees. Each village will have a representative in a PLL to enhance the community's ability to share information amongst themselves.

# Land acquisition



**Foreign controlled companies are not permitted to own land in Madagascar but can obtain surface rights through a lease arrangement with the Government.**

A high-level overview of the process of obtaining surface rights being employed by Base Resources is as follows:

- Establish title/ownership of land – only a small number of land parcels required have an existing formal title (106 of 1,041), the rest are held through customary interests. This stage has been completed.
- Agree/determine the land value. There are two options to do this:
  - Compulsory acquisition of land through the DUP process. Currently on hold pending the lifting of suspension following which the Evaluation and Compensation Committee (CAE) will finalise field work required and negotiate compensation.
  - Private treaty negotiations direct with landowners is permitted under the Mining Code. Currently on hold pending the lifting of suspension and completion of CAE's negotiations.
- As Base Toliara cannot own land, it will fund the Government (on the basis of values determined above once the process is completed) to:
  - acquire land titles where available; or
  - acquire the customary interests where no land title exists.
- Where the Government acquires customary or privately owned interests through compulsory acquisition, a title must be created for that land in the name of the State.
- Base Toliara will then negotiate a lease with the Government for the surface rights to the land held by the Government as required for the project.

A total of 20 households associated with Base Toliara employees working at the exploration camp, and residing nearby on the mine site, were forcibly removed by a group of people opposed to the Toliara Project. Base Toliara supported them to return to Benetse, their village of origin, and constructed temporary accommodation and provided materials to replace lost belongings. They remain listed as subject to physical relocation and will receive full compensation and relocation benefits in compliance with IFC Standards after preparation of the Resettlement Action Plan (RAP) once the consultation process can begin again in collaboration with the RWGs.

The DUP process does not extend to dealing with livelihood replacement, the relocation of tombs and other requirements under IFC Standards which Base Resources seeks to comply with through the RAP. These additional steps will involve the RWGs and run in parallel to ensure legal and IFC compliance. The Livelihood Replacement Plan has been completed and will be further refined through consultation with affected stakeholders once engagement activities can resume. The tombs relocation program was about one third complete prior to the suspension of activities.



# Land acquisition - DUP process



Compulsory acquisition of land can be achieved through the DUP process.

## An overview of the DUP process:

- The process commences with public notification of the intention to undertake compulsory acquisition. This has been completed.
- Those affected are given 30 days to register their interest. This has been completed.
- Following registration, the DUP Decree is issued and land parcel identification and socio-economic studies are undertaken. The DUP Decree for the haul road and export facility was issued on 15 April 2018 and the mine site issued on 19 July 2018.
- A list of land interests is prepared and posted in the community for a 30-day public review period. This has been completed.
- Following a review process, the issuance of the Act of Transferability confirms land parcels impacted by the Toliara Project. The applications for the Acts must be submitted within 12 months of issuance of the DUP Decree or it expires. This has been completed.
- Concurrently, the CAE is established to manage the final steps. The CAE is responsible for confirming the eligibility of landowners of each of the parcels listed and the evaluation of any associated private assets such as structures and crops. Following this, negotiation of compensation rates is undertaken, culminating in agreed amounts for the various assets involved. The CAE has been established for the Toliara Project land acquisition and eligibility and values have been determined subject to field confirmations which are now awaiting lifting of the suspension.
- Once compensation amounts are finalised, the CAE will advise Base Resources of the total cost of compensation.
- Following payment of the compensation amount to the Government, the compulsory acquisition is finalised by transfer of land title to the Government.

# Community development, employment and local content



## Community development

Base Resources recognises the significance community development plays in building positive relationships and ensuring locals benefit from development of the mineral resource.

The approach is focused in specific areas of development:

- The health sector.
- Education programs.
- Community infrastructure.
- Livelihood enhancement projects.

A Community Development Management Plan will be developed in consultation with affected communities, Non-Government Organisations (NGOs) and regional authorities to align outputs with stakeholder priorities and local development plans.

Funding for community development activities is by way of:

- Distribution of 70% of mineral royalties by legislative requirement to communities in the region affected by the Toliara Project.
- Planned annual community development expenditure of US\$3m by Base Resources from commencement of operations is now assumed in the modelling.
- An upfront community development fund of US\$10m is now assumed to be established prior to the commencement of operations.

## Employment

Affected communities will be prioritised for employment during both the construction and operations stages. To facilitate this, community training programs have commenced. Though not all who participate in this training will be employed, it will give people, particularly youth and women, valuable skills to secure employment elsewhere.

Base Resources has developed the LRIMP which has been approved for use by the Committee for Transparency in Recruitment, a regional committee set up to oversee the Toliara Project recruitment process. The LRIMP identifies job seekers and prioritises them based on impact (i.e. if they were resettled) and their proximity to the Toliara Project. A lower priority is assigned to those living further away.

This system is also a commitment under the ESIA approval process outlining the need for both skills development and local employment prioritisation as mitigation for social impacts.

## Local content

The procurement of goods and services from local organisations creates benefits through direct and indirect job creation and helping to build the local economy. Local businesses will be given training on Base Resources minimum standards to prepare them for tendering and possible selection as a supplier or contractor.

# Environment



## Environmental setting

Madagascar is the world's fourth largest island and is recognised as one of the world's top ten hotspots for biodiversity, owing to its unique biota and the high degree of threat to its natural habitats.

It is estimated that there are about 10,000 plant species on the island. Of these, 80% or more occur nowhere else. Human settlement commenced in Madagascar 2,000 years ago and has resulted in the clearing of much of the island's forest habitats.

Madagascar is globally important in terms of its biodiversity and is within the Madagascar and Indian Ocean Islands Biodiversity Hotspot as designated by Conservation International. Despite considerable biological interest, knowledge of the flora and faunal biodiversity in the region is still hampered by unresolved taxonomic problems and poor sampling.

The Toliara Project area falls into the Madagascar Spiny Thicket Ecoregion, which is divided into succulent woodlands and Madagascar spiny thickets. The total size of the ecoregion is 124,000km<sup>2</sup>, falling into the deserts and succulent shrublands habitat type of Madagascar and is classified as a Critically Endangered region.

The spiny thicket is exceptional in this regard, with 95% of all plant species, and 48% of the genera occurring in the ecoregion endemic to Madagascar. The thicket is dominated by members of the endemic Didiereaceae family.

Fauna is also important for this region, with Madagascar and the Spiny Thicket Ecoregion exhibiting high levels of endemism. The conservation of forested habitats is a priority as they are subject to the greatest threats (slash-burn agriculture and charcoal production). There are few protected areas covering the ecoregion with very little known about the biodiversity and ecology of the region.

Reserves protect approximately 3% of the region, leaving the rest susceptible to

degradation. The main threats include charcoal production, logging for construction, grazing of domestic animals (primarily zebu cattle, but also goats) and agriculture. Invasive plant species also cause a loss of habitat, as does illegal collecting of endemic and endangered species for commercial trade.

## A rare opportunity to make a significant contribution to conservation

The environmental setting of the Toliara Project within a Biodiversity Hotspot and one of the ecoregions of the Madagascar and Indian Ocean Islands supporting a rich fauna and flora with high levels of endemism presents a significant opportunity for Base Resources to make a meaningful contribution to the region's biodiversity and conservation efforts through:

- Targeted environmental programs.
- Collaboration with conservation partners – government environmental departments, research institutions, NGOs and communities.
- Collaborations with regional, national and international researchers such as Missouri Botanical Garden, Flora & Fauna International, Reef Doctor and the African Butterfly Research Institute.

## Regulatory framework

- Environment Permit No 55-15/MEEMF/ONE/DG/PE is granted and valid.
- Approved *Plan de Gestion Environnementale* (PGE) (an environmental management plan) in place.
- Office National Pour l'Environnement (ONE), the Malagasy environmental management authority, have advised that subsequent amendments to the Toliara Project should be made through an updated PGE and the Construction and Operations *Plan de Gestion Environnementale Spécifique* (PGES') – see below.
- The Construction PGES', prepared during FEED and submitted to ONE three months prior to commencement of construction, will present project changes to date.
- Operational PGES' will be prepared and submitted to ONE three months prior to commencement of operations.

## Environmental and Social Impact Assessment documentation

A number of ESIA's have been prepared and approved over the years for the Toliara Project, with the principal documents being:

- 2005-2006: Scoping Report prepared and submitted to ONE.
- 2006-2007: Specialist studies conducted, not submitted to ONE.
- 2012: Revised Scoping Report submitted to ONE for public review.
- 2012-2014: Specialist assessments redone, detailed ESIA completed and submitted to ONE.
- 2015: PGE issued by ONE together with the Environmental Permit.
- 2017: Addendum ESIA submitted to ONE. PGE Addendum 1 issued by ONE.

## Base Resources is committed to international best practice

The Toliara Project will develop and operate a comprehensive Environmental and Social Management System (ESMS) to meet the requirements of Base Resources' policies, Malagasy legislation and international best practice, including the Equator Principles, IFC Performance Standards and the World Bank Group's Environmental, Health and Safety Guidelines.

## Environmental and Social Management System

- ESMS will give effect to Base Resources' commitments.
- ESMS based on a 'Plan-Do-Check-Act' business performance improvement cycle utilising risk and impact assessments as a key tool.
- ESMS components will include:
  - Update of the PGE to reflect name change and Project changes.
  - Summary ESIA to consolidate ESIA's and reflect Project changes.
  - PGES' for construction, operational and decommissioning phases for submission to ONE three months before the start of associated activities.
  - Construction phase, operational phase and decommissioning phase ESMPs.
  - Baseline studies – update of previous studies, new studies and modelling.
  - Comprehensive environmental monitoring program, including ecological monitoring.
  - Environmental programs to support Base Resources' commitment to improving biodiversity, promoting conservation and sustainability, including an indigenous tree nursery to research propagation methods of the region's unique flora, establishment of biodiversity corridors and offset and reforestation programs.



# Government and political



## Overview

Madagascar is a country with a heightened degree of political risk, with a history of regular events of instability, most recently with the political crisis in 2009. Madagascar does not have a history of civil war and most of its troubles are characterised by political paralysis rather than widespread violence.

The Presidential elections concluded in December 2018 were relatively free from social unrest, regarded as materially free and fair and the result met with general acceptance, including by the key opposition candidates. Consequently, the President can be considered to have a clear mandate and there is an expectation of a period of relative political stability. The presidential term is five years.

## Government engagement

The President has expressed support for development of the Toliara Project both during the late-2018 election campaign and subsequently. This, combined with statements from key advisers, is considered to represent a genuine support for the Project's development.

A structured and intensive stakeholder engagement strategy has been focused on establishing and building relationships with the relevant national and local government authorities as well as key influencers who can contribute to a lobbying coalition in shaping the Government's policy in relation to mining and, more specifically, its disposition towards the Toliara Project.

## Proposed changes to the mining regime

The national government has documented its desire to implement a "new vision for mining" and is undertaking a consultation process with key stakeholders as it develops its mining policy. While the scope and timing for any changes to the mining regime remain uncertain, key aspects being considered for reform are:

- Taxes applicable to mining projects, including concessions applicable large-scale mining.
- Securing Government free carried interest in mining projects.
- An increase in royalty rates.
- Increased mining company contribution to regional development, specifically aligned to the Government's development priorities (e.g. roads, power access, food security).

An intensive, coordinated and broad-based lobbying campaign is ongoing to ensure that the Government makes informed decisions on policy and implements them in a way that does not render the Toliara Project, as well as the wider mining sector in Madagascar, unviable. Separately, Base Resources is engaged in direct discussions with the Government seeking to agree the fiscal regime that will apply to the Toliara Project, which will allow the project to proceed independent of any reform to the mining regime. While an acceptable outcome should be achievable, the risk remains significant.

# Applicable legal regime



## General

The legal system in Madagascar is based upon the French civil law system. This is a codified legal system based on the Napoleonic model. As in all civil law systems, statute law (which is contained in a series of codes) has the greatest importance. In contrast with common law systems, the doctrine of precedent (jurisprudence) has little weight.

## Mining law

The *Code Minier* or Mining Code and the Large Mining Investment Law (LGIM) (and their implementing decrees) are the main pieces of legislation that govern the mining sector in Madagascar.

Under the Mining Code, Madagascar is divided into squares of 625m. Only one permit exists per square.

Mining permits are administered by the *Bureau de Cadastre Minier de Madagascar*, the Madagascar Mining Registry. It operates on a first-come, first-served basis. The system operates in a generally reliable, stable fashion and the risk of outright expropriation is considered low.

A royalty is payable to the Government based on the value of the product extracted. The Mining Code currently prescribes the rate as 2% of the value of the first sale.

## Environmental laws

Any entity wishing to perform exploration activities is required to obtain an environmental authorisation, and any entity wishing to perform exploitation activities is required to obtain an environmental permit.

## Land laws

There is a system of land registration in Madagascar. Land that is registered is recorded in the books at the land registry. The Topographic Service holds an official plan drawn up by a surveyor, showing the boundaries of the land. In practice, regional land registries (including the one in Toliara) are largely paper-based and often incomplete.

Foreign controlled entities are not entitled to own land in Madagascar. Instead, occupation of land by foreign entities is typically through a long term lease (with a maximum term of 99-years).

# LGIM explained



## Overview

The Large Mining Investment Law, or LGIM, which was drafted with the assistance of the World Bank and is intended to create a beneficial legal and financial platform to attract investment in the mining sector.

To date, only the Ambatovy project has been certified as eligible under the LGIM.

Eligibility certification requires submission of environmental authorisations, obtaining of exploration or exploitation permits, and certification of the investment plan, including evidence that the proposed investment will exceed MGA50 billion (approximately US\$15m).

## Key benefits of the LGIM

- Guaranteed stability of taxes and custom duties, and no restrictions on the sale of mining products.
- Entitlement to use foreign currencies and hold foreign bank accounts.
- Beneficial tax regime, including VAT exemptions.
- Beneficial customs regime.
- Protections from expropriation.
- Access to international arbitration for the resolution of disputes with Government.

The process after submission is generally expected to take five months from the date of application (potentially more) depending on the number of documents or clarifications required by the Government. Generally, the LGIM eligibility period runs from the date of LGIM certification until expiry of the mining permit granted to the permit holder. For the Toliara Project, the eligibility period would be expected to end on 20 March 2052, to coincide with the end of the initial term of PE 37242.

LGIM eligibility certification (or equivalent legal and financial stability regime) is considered a pre-requisite for successful funding of the Project.

Base Resources filed its application for eligibility certification under the LGIM in August 2020, based on the outcomes of the DFS, however this application has not progressed as a result of the Government's suspension of the Project's activities and pending agreement on the fiscal terms that will apply to the Project. Base Resources is confident that the Toliara Project satisfies the criteria for eligibility certification under the LGIM and expects timely consideration of its application once fiscal terms are agreed and the Government's suspension of the Project's activities is lifted.

# Progress with fiscal terms negotiations



**In November 2019, the Government of Madagascar required Base Toliara to suspend on-the-ground activity on the Toliara Project. Activity remains suspended as Base Resources continues to engage with the Government in relation to the fiscal terms applicable to the Toliara Project and lifting of the on-the-ground suspension.**

## **Negotiations of fiscal terms with the Government of Madagascar**

- Base Resources is engaged in direct discussions with the Government seeking to agree the fiscal regime that will apply to the Toliara Project. Progress is being made and Base Resources remains confident that an acceptable outcome is achievable, however the timing for reaching an agreement, and the precise terms of that agreement, remain uncertain.
- Upon agreeing the fiscal regime, the intent is for those terms to be secured through eligibility certification under the LGIM, a convention, or another mechanism that achieves an acceptable level of legal and fiscal stability.
- Base Resources lodged its LGIM eligibility certification application with the Government in August 2020, supported by the outcomes of the DFS. However, this application has not progressed pending agreement on fiscal terms and LOS.

## **Suspension and COVID-19**

- With the Government suspension of activity, continuing international travel restrictions and broader COVID-19 measures and impacts both in Madagascar and globally, the FID to proceed with development of the Toliara Project has been delayed.
- Once fiscal terms are agreed, it is expected that there will be a LOS. There will be approximately 11 months' work to complete prior to FID following the LOS. This work includes finalising financing, obtaining LGIM eligibility certification (or similar legal and fiscal stability), completing the land acquisition process and concluding major construction contracts.
- Consequently, in order to achieve the assumed FID in December 2022, the LOS would need to be secured by the end of January 2022.

## **Activities planned upon LOS**

- Community engagement to allow access for geotechnical investigations.
- Land acquisition processes.
- Obtaining the LGIM eligibility certification or comparable legal and fiscal stability arrangements.
- Securing of required statutory construction approvals and permits at the local, regional and national government levels.
- Conducting environmental baseline studies and monitoring and securing required environmental construction approvals.
- Negotiation and verification of indicative offtake terms with customers and finalising term sheets with offtake partners.
- Completion of project funding, including JV partner negotiations.
- Early works - water drilling, quarry investigations and building of contractor access roads.
- Concluding major construction contracts.



# Key approvals – Project Development



Key Approval	Notes
<b>Export facility</b>	
MoU	Provides the mechanism for land to be incorporated into the export facility site
Permission	Agreement to allow construction and operation of the export facility site
Design and construction approvals, and issue of construction permit	
<b>Land acquisition (export facility, road and mine site)</b>	
Private contracts and agreement	Used to acquire private rights, where possible
Land decree classifying lands as State public domain	Act of Transferability (acte de classement) to be issued by way of decree
Government lease	Long term lease over government land (Domaine privé de l'Etat) in favour of Base Toliara. Applies to haulage road and mine site
<b>Haulage road</b>	
MoU	Establishes the basis for the construction and use of the haulage route
Design and construction approvals	

Key Approval	Notes
<b>Camp</b>	
Design and construction approvals, and issue of construction permit	
Borehole construction and water extraction	
<b>Mine construction</b>	
Design and construction approvals, and issue of construction permit	
Borehole construction and water extraction	
Authorisation to operate the power facility (Autoproduction authorisation)	Applies to larger facilities (over 500kW for thermal, hydraulic and solar installations, and over 1MW for biomass installations, geothermal, wind or waste processing).
<b>Environment</b>	
Environmental impact assessment approval	Environmental impact assessment issued and approved through issuance of PGE.
Environmental permit	Environmental permit issued
<b>Large mining law</b>	
Large Mining Investment Law (LGIM) certification	Provides financial and legal stability regime for large scale mining investments, favourable customs regime, guaranteed foreign exchange rights and certain tax benefits

# Capital cost

**Stage 1 capital cost is estimated at US\$520m (accuracy +10%/-5%) based on definitive engineering designs, tendered pricing, budget quotes and escalation allowance. Stage 2 capital cost is US\$137m.**

- The Capital Cost Estimate (CCE) reflects the maturity of the design and is based on engineering layout and design drawings, equipment lists or general arrangement layouts and prices have been derived from a combination of the following sources:
  - 42% from project specific tenders (marine, export facility shed piling, bridge, IPP, drilling and equipment), 50% from project specific budget quotations, 7% estimated or built-up rates and 1% factored from similar works.
- Approx. 25-30% of engineering has been completed, underpinning a CCE accuracy of +10 to -5%.
- An extensive Tender and BQR process was conducted for major contract packages to establish unit rates that reflect the market conditions in Madagascar. Firm quotes were received (Q4-2019) for all major mechanical / electrical equipment vendor packages and over 90% of the CCE is supported by pricing sourced from reputable suppliers and contractors.
- The onshore piling, offshore marine facility and bridge costs were obtained via a tender process supported by post-tender technical and commercial clarification meetings.
- The DFS CCE completed in December 2019 was updated in Q2-2021 for:
  - Escalation, including additional owners labour costs, reflecting the DFS2 revised FID timing. The cost escalation estimate has been derived from data collected from various African projects and forward-looking views from 5 different sources.
  - Applicable foreign exchange rates - 71% of CCE is USD based, 14% ZAR, 12% AUD and 3% EUR.
  - Contingency provision reduced to 9.7% (down from 10.6%) due to the increased scope certainty following de-risking and optimisation work completed since DFS release.
- Owner's costs were developed from Kwale Operations experience and the planned production ramp up.

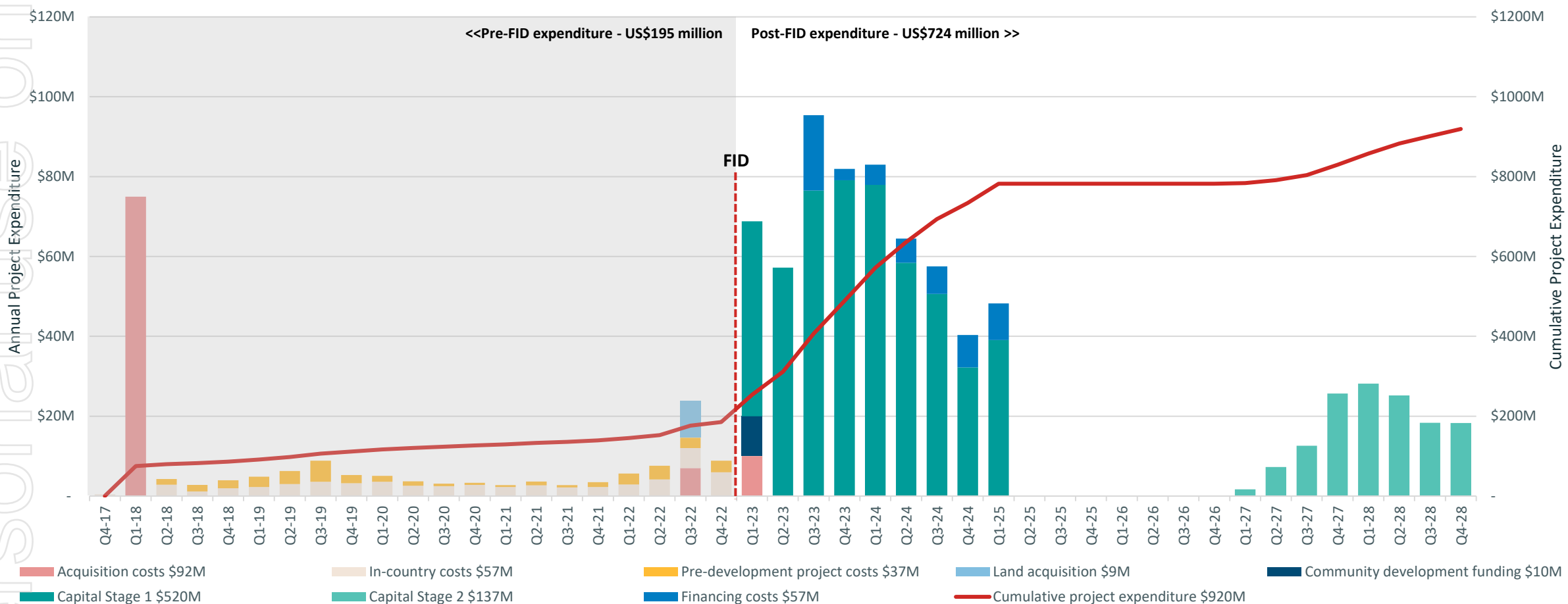
Capital Cost Estimate (US\$m)	Stage 1	Stage 2
Mining (including HME and DMU)	39	20
Process Plants	110	67
Infrastructure (Camp, roads, bridge, power, water, buildings)	86	8
Product Storage & Export Facility	82	-
Professional Services (EPCM's, Vendor Reps, Specialists Consultants)	32	6
Owner's costs (see further breakdown in table below)	66	6
<b>Sub total</b>	<b>415</b>	<b>107</b>
Escalation (14.2% and 16.0%)	59	17
Contingency (9.7% and 10.5%)	46	13
<b>Total Project Capital Costs</b>	<b>520</b>	<b>137</b>

Owner's Costs Estimate (US\$m)	Stage 1
Integrated Management Team – Labour & Expenses	12.7
Initial Clearing for mining, TSF & Starter Pit	1.4
Camp operating (based on Kwale + US\$2m fuel)	5.8
Spares, tools and 1st fills	8.0
In-country operations (community, environment, external affairs, operations team, finance, admin)	32.9
Light Vehicles	2.0
1% customs stamp duty on value of imports	1.1
Plant Mobile Equipment	2.6
<b>Total Owners Cost</b>	<b>66.4</b>

# Project Development expenditure timeline



Pre-FID expenditure of US\$195m includes acquisition costs, feasibility studies, land compensation, construction early works and in-country operating costs. Early works expenditure on a number of work packages will result in a fast ramp up of construction following an FID and allow construction to meet phased operational implementation and ramp-ups in line with critical path items. FID is assumed to be Q4 2022.



# Operating costs



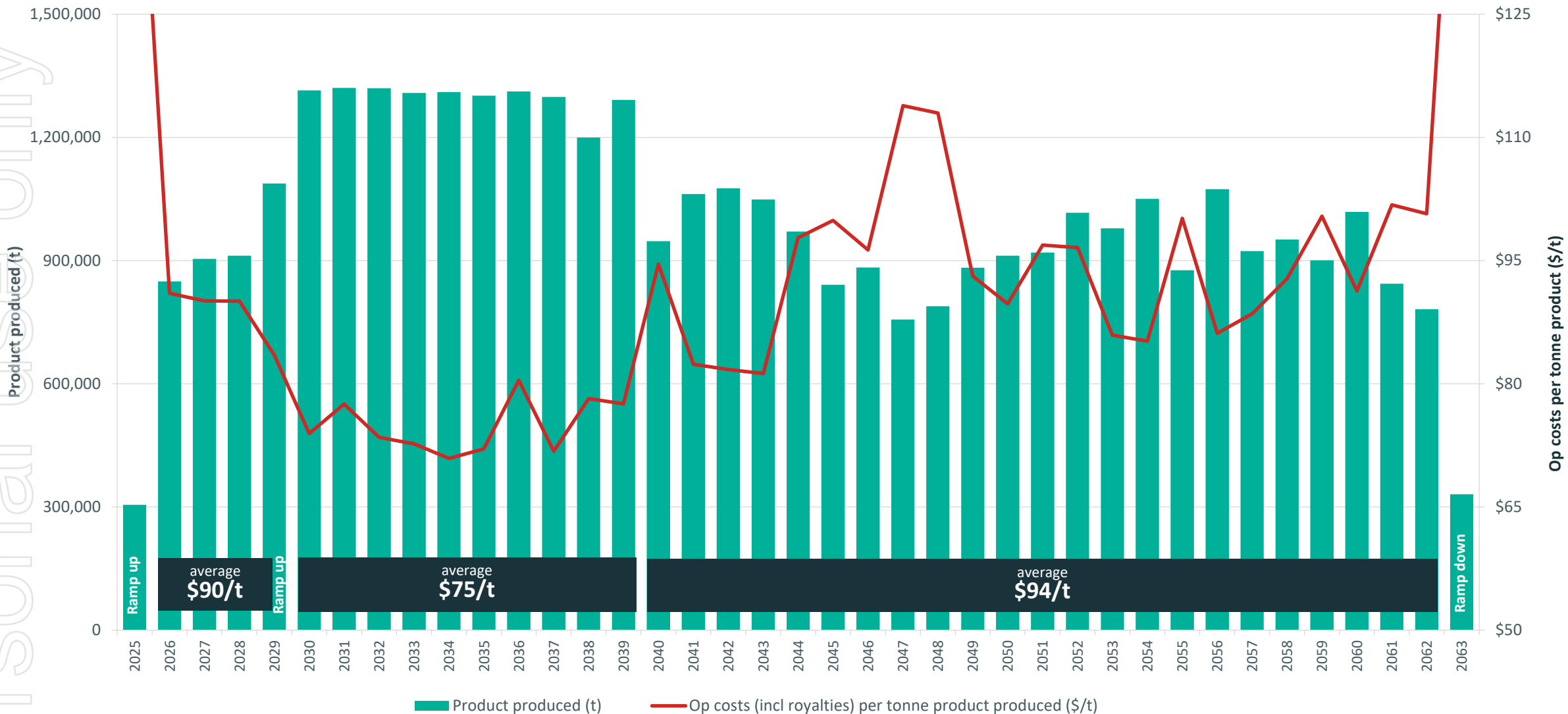
Operating costs have been derived from first principles and experience gained at Kwale Operations, incorporating local Malagasy cost inputs where appropriate.

Operating cost category	LOM Total US\$m	US\$m per annum <sup>1</sup>	US\$/t mined <sup>1</sup>	US\$/t produced <sup>1</sup>	Comments
Power	720	19	0.79	18.2	Power is based on a solar hybrid solution using HFO as a primary fuel source and a small amount of supplementary diesel. Assumes a HFO price of US\$0.63/L, which results in an average power price of US\$0.16/kWhr.
Maintenance	602	16	0.67	15.5	Maintenance is based on Kwale experience and scaled where appropriate.
Labour – expatriates	159	4	0.16	3.8	Operations reach 60 expats in early years, before dropping to 17 after 6 years and reaching a steady state of 8 expatriate senior managers from 2033 onwards.
Labour – nationals	276	7	0.30	6.9	Excluding contractors and corporate staff, operations commence with 631 national employees, before peaking at 820 in 2033 following completion of the Stage 2 and transition of managerial roles.
Fuel – drying	259	7	0.29	6.6	Diesel usage for the MSP drying process is based on Kwale experience and a delivered diesel fuel price of US\$0.85/L.
Fuel – mobile equipment	161	4	0.18	4.1	Equipment fuel burn rates are from Kwale experience, and a delivered diesel fuel price is US\$0.85/L.
Product transport & export facility rates	342	9	0.38	8.7	Bulk transport to the export facility estimated at US\$3.45/t plus US\$0.60/t for free issue diesel. Marine operations will be contracted to a chartering service at US\$2.4M per annum. Port of Toliara export rates are estimated at US\$2/t shipped, plus annual lease costs of US\$0.7M.
Flocculant	14	1	0.02	0.4	Flocculant usage between 0.08 and 0.12kg/t slime at cost of US\$2.85/kg.
Other operating costs	410	11	0.44	10.3	Other fixed operating costs, including insurance, camp management, security contractors and training.
<b>Total operating costs</b>	<b>2,943</b>	<b>77</b>	<b>3.22</b>	<b>74.5</b>	
Royalties	475	13	0.53	12.3	Government royalty rate of 4%.
<b>Total operating costs (incl. royalties)</b>	<b>3,419</b>	<b>90</b>	<b>3.75</b>	<b>86.7</b>	

<sup>1</sup> Annual averages exclude first and last part-operating years



# Unit operating cost per tonne produced



# Contracts

A comprehensive strategy has been developed for the key contracts that will be required to obtain FID, construct the project or operate the assets.

## Strategy

- Maintain project knowledge through continuing successful relationships with customers and key engineering and construction contractors.
- Selecting contract delivery models (e.g. EPC, EPCM, build own operate and transfer, supply, services) with a combination of bespoke and standard FIDIC terms and conditions to provide optimum benefit/risk balance.
- Consolidate contract packaging to optimise contractor overhead costs.
- In addition to commercial terms, all implementation and operating contracts will include clauses related to Toliara Project specific objectives such as labour recruitment, remuneration, health, safety and environmental management.

## Key FEED/early works agreements

- Mineral Technologies and Lycopodium Alliance (joint venture) appointed as an EPCM contractor for the FEED and Early Works program.
- Marine consultant, PRDW, appointed to provide technical support on the export facility FEED work.
- Zutari and Johnson, Winter & Slattery appointed to support during power tender evaluation and Power Agreement negotiations.
- Zutari appointed to support roads design and contractor procurement.
- Colas Madagascar appointed to conduct river hydrology, geotechnical investigations and preliminary design for the Fiherenana bridge.
- Fugro and Subtech appointed to conduct marine geotechnical investigations and

Seismic Survey.

- Wave International appointed to provide support for project controls.
- Early Works construction packages will be awarded to a mixture of first tier and local contractors on re-measurable rates contracts.

## Key implementation contracts to be finalised during FEED subject to FID

- EPCM Contract for EPCM services.
- Marine EPC Contract including the marine works, ship loader and jetty conveyor contract. Contract based on FIDIC Yellow Book conditions.
- Fiherenana River Bridge EPC Contract based on FIDIC Yellow Book conditions.
- Export Facility Piling Contract based on FIDIC Red Book conditions.
- Haul Road North Construction Contract based on FIDIC Red Book conditions.
- Haul Road South and Export Facility Bulk Earthworks Construction Contract based on FIDIC Red Book conditions.
- Ranobe Road and Processing Plants Bulk Earthworks Construction Contracts based on FIDIC Red Book conditions.
- Accommodation Design and Construction Contract based on FIDIC Red Book conditions for the design and construction of the balance of the camp.
- Bespoke contract for power.

# Contracts



A comprehensive strategy has been developed for the key contracts that will be required to obtain FID, construct the project or operate the assets.

## Key implementation contracts to be finalised after FID

- Civil construction contracts based on FIDIC Red Book conditions. One contract at the mine site and one at the export facility. EPCM manage supply and logistics of the “free issued” reinforcing steel.
- SMP installation contracts based on FIDIC Red Book conditions. Two contracts at the mine site and one at the export facility. EPCM manage supply and logistics of the “free issued” materials and equipment.
- Electrical and instrumentation installation contracts based on FIDIC Red Book conditions. Two contracts at the mine site and one at the export facility. EPCM manage supply and logistics of the “free issued” materials and equipment.
- Bespoke contract for supply chain and logistics management.

## Key operations contracts to be negotiated during FEED subject to FID

- Fuel supply contract.
- Camp operations contract.
- Communications contract.

## Key operations contracts to be negotiated post FID

- Marine operations contract (tug and line boat) will be fully chartered. Tendering to commence at FID.
- Product haulage contract. Tendering for a five-year contract will commence with prequalified contractors after FID. Base Toliara will supply fuel on a flow-through basis.

## Offtake agreements

Base Resources has provided potential customers with product samples and aims to leverage its market reputation and existing customer base to secure offtake agreements or final term sheets, prior to FID, that will support project funding activities.

## Owner operate

During the DFS, an owner operate approach was selected for mining and laboratory services.

# Mining and production profile



Production Profile	Life of Mine (LOM)		Stage 1 <sup>#</sup> Years 2 - 4.5	Peak Stage 2 <sup>#</sup> Years 6 - 15	Stage 2 <sup>†</sup> Year 16+
	Total	annual avg*	annual avg	annual avg	annual avg
Ore mined (Mt)	904	23.9	12.6	25.1	25.1
HM%	6.1%	6.1%	9.4%	7.1%	5.4%
HMC produced (Mt)	55.6	1.5	1.2	1.8	1.4
Period	38.4	37.0	3.5	10.0	23.0
<b>Produced (kt):</b>					
Sulphate ilmenite	16,941	450	388	566	407
Slag ilmenite	9,804	261	225	327	236
Chloride ilmenite	9,371	249	215	313	225
<b>Total ilmenite</b>	<b>36,115</b>	<b>960</b>	<b>828</b>	<b>1,206</b>	<b>868</b>
Rutile	283	8	6	9	7
Zircon	2,468	66	56	82	60

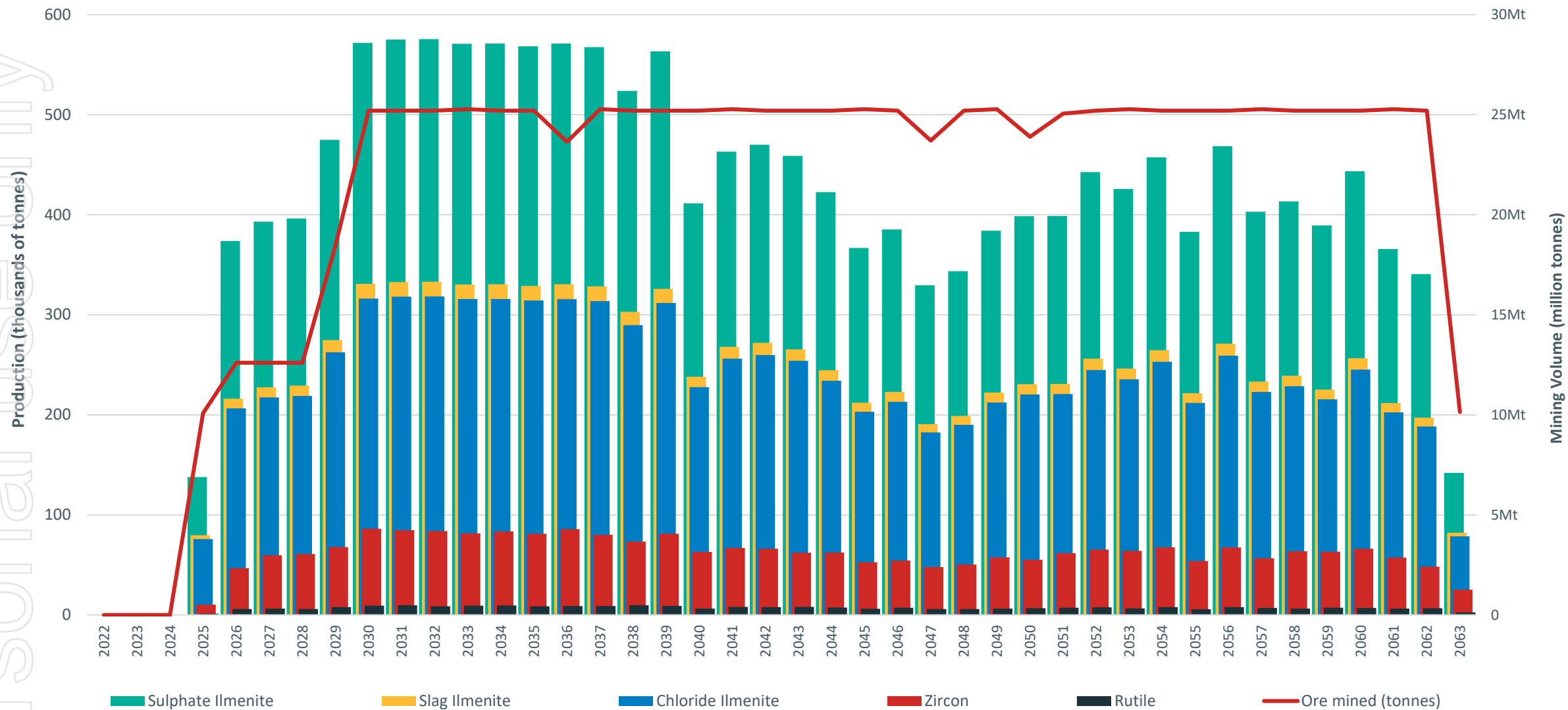
# excludes ramp up

\* Does not include the first and last partial operating years.

† Does not include the last partial operating year.



# Mining and production profile



# Financial performance profile



Financial Profile	Life of Mine (LOM)		Stage 1 <sup>#</sup> Years 2 - 4.5	Peak Stage 2 <sup>#</sup> Years 6 - 15	Stage 2 <sup>†</sup> Year 16+
	Total	annual avg*	annual avg	annual avg	annual avg
Ore mined (Mt)	904	23.9	12.6	25.1	25.1
Total production (kt)	38,866	1,033	889	1,298	935
Revenue - Total	\$11,899m	\$317m	\$265m	\$402m	\$286m
Operating Costs - Total	\$3,419m	\$90m	\$80m	\$97m	\$87m
EBITDA	\$8,163m	\$219m	\$176m	\$297m	\$190m
Free Cash Flow	\$5,922m	\$174m	\$117m	\$241m	\$151m
Revenue - per tonne produced	\$306	\$306	\$298	\$310	\$306
Operating Costs <sup>^</sup> – per tonne mined	\$3.78	\$3.75	\$6.38	\$3.87	\$3.49
Operating Costs <sup>^</sup> – per tonne produced	\$88	\$87	\$90	\$75	\$94
Cash Margin	\$218	\$220	\$207	\$235	\$212
Revenue : Cost of sales ratio	3.5	3.5	3.3	4.1	3.3

# excludes ramp up

\* Does not include the first and last partial operating years.

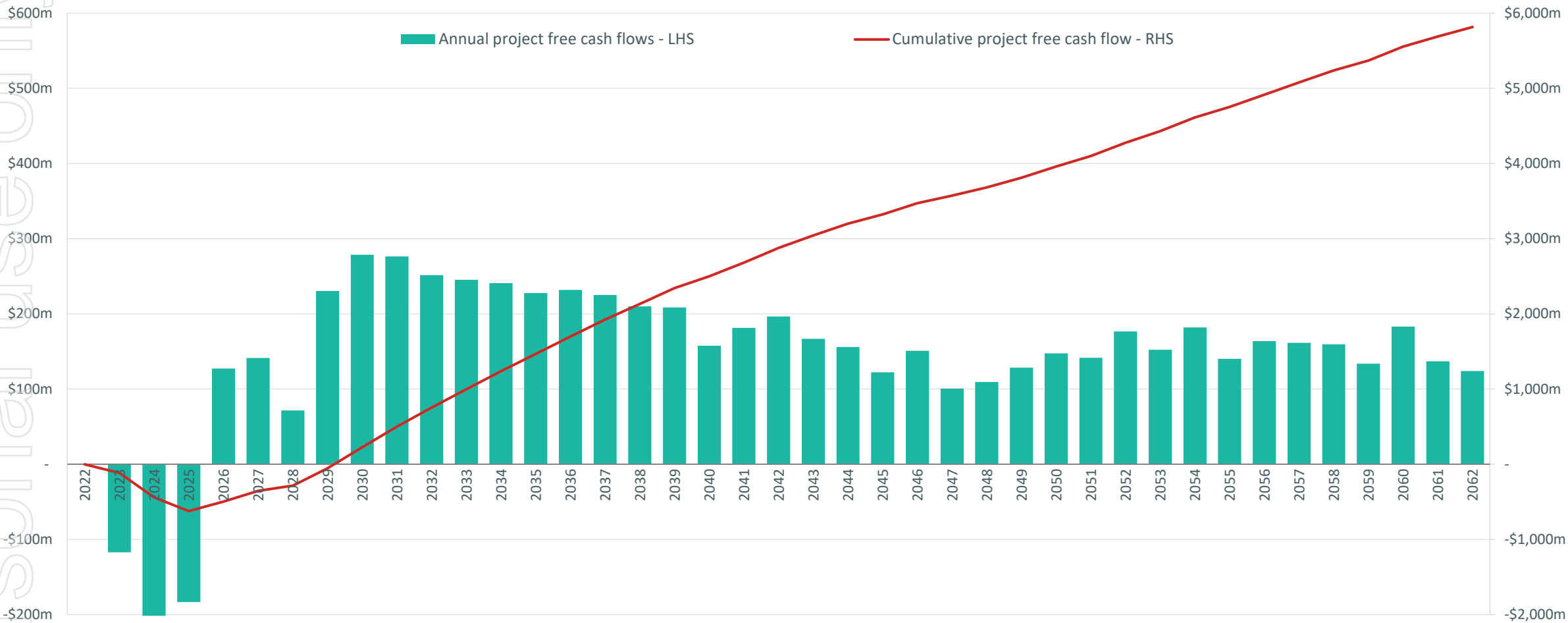
† Does not include the last partial operating year.

^ Operating costs include royalties.

# Project cash flows (excludes funding)



Strong operating cash flows result in capital payback (for both stage 1 and 2 capex) occurring after four and half years of operation.

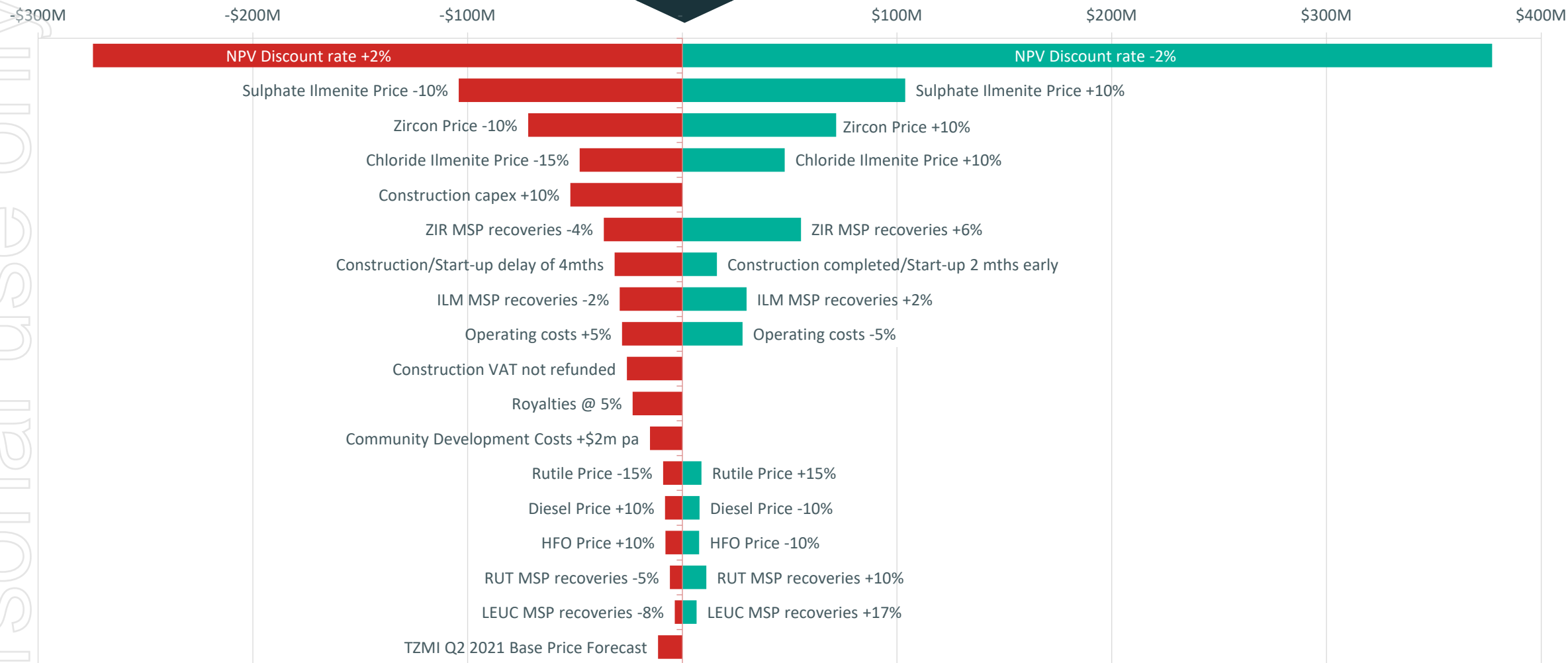


# NPV sensitivities



NPV Sensitivities - Post tax / Pre debt, 10% discount rate, US\$m

Base Case US\$1,008m





# Pre-FID expenditure

Pre-FID expenditure of US\$42.3m is required from October 2021 to FID in December 2022.

In-country operating activities will ramp up when the suspension is lifted and US\$20.9m is forecast to maintain and support external affairs, community initiatives, baseline studies, training and administrative activities.

The Project Development Pre-FID forecast of US\$12.2m includes cost for:

- Integrated Management Team – Base Resources team for design management, project controls and contracts development.
- Front End Engineering and Design:
  - Engineering design to “Issue for Tender” status for bulk earthworks, accommodation camp, haul road and the Ranobe access road. Detailed design for processing plants and Fiherenana bridge.
  - Consultancy services for marine, power, geotechnical, ground water investigations and piling.
  - Procurement to allow contract award for the bridge, marine, piling, roads and bulk earthworks.
- Geotech/borehole investigation and drilling:
  - Geotechnical drilling for the haul road, marine works and bridge.
  - Production water borehole drilling.
- Early works construction:
  - Toliara Port bridge upgrade.
  - Quarry mining and stockpiling contract.

Toliara Pre-FID Cost	Forecast (LOS to FID) US\$m
Labour costs	6.4
Security contractors	2.4
External consultants	2.7
Environmental studies & programmes	1.3
Community programmes	2.4
Travel & accommodation	1.2
OHS & training	0.3
Public & investor relations	1.1
Employee overheads	0.4
Other	2.7
<b>Toliara in-country operating activities</b>	<b>20.9</b>
Land acquisition costs	9.2
<b>Project Development (FEED / EW) cost</b>	<b>12.2</b>
<b>Total Toliara pre-FID cost</b>	<b>42.3</b>

Toliara Project FEED / EW cost (US\$m)	Forecast (LOS to FID) US\$m
Integrated Management Team	3.2
Front End Engineering and Design	3.7
Geotech/borehole investigation and drilling	2.6
Early works construction	2.7
<b>Total PD cost</b>	<b>12.2</b>

# Funding update



**Base Resources does not have the financial capacity to internally fund the project development on its own. External funding in the form of some combination of debt, JV interest and/or equity will be required to supplement Base Resources' internally generated cashflow.**

Funding for the Toliara Project can be broken down into three elements:

1. Deferred acquisition consideration of US\$17m payable to the Project's prior owners on receiving LGIM certification (\$7m) and on FID (\$10m).
2. Pre-FID funding (October 2021 to December 2022) of US\$42.3m to advance the Project, comprising in-country operating activities (\$20.9m), land acquisition (\$9.2m) and project development cost (\$12.2m).
3. Construction and operational start-up funding of US\$700m (increased from US\$595m in the DFS), consisting of:
  - Capex of US\$520m.
  - Working capital of US\$124m, including an estimated US\$55m for VAT (legally refundable but assumed for this funding analysis to not be recovered until operating year 5).
  - Debt establishment and servicing during construction of US\$51m (based on the funding mix assumed below).

It is anticipated that the deferred acquisition consideration and pre-FID costs will be funded internally from cash generated by Kwale Operations.

The ultimate funding mix for construction and start-up will be determined prior to FID and will be dependent on Base Resources' internally generated cashflow position and forecasts for the construction and ramp-up period, market outlook, debt availability and cost, and scope of any strategic joint venture at the time. For the purposes of the funding analysis, the following assumptions have been made for the US\$700m of construction and start-up funding:

- 40% equity contribution - US\$280m sourced from some combination of cash generated from Kwale Operations, equity contributions from a joint venture participant (in conjunction with substantial offtake arrangements) and/or a capital raising. Additionally, successful negotiation of a targeted VAT exemption, or timely refunds, could reduce the overall funding requirement by up to US\$55m and contribute to reducing the required equity funding.
- 60% debt facility - US\$420m sourced from commercial banks, DFIs and export credit agencies.

Financial modelling confirms the Project's ability to comfortably support this debt load.

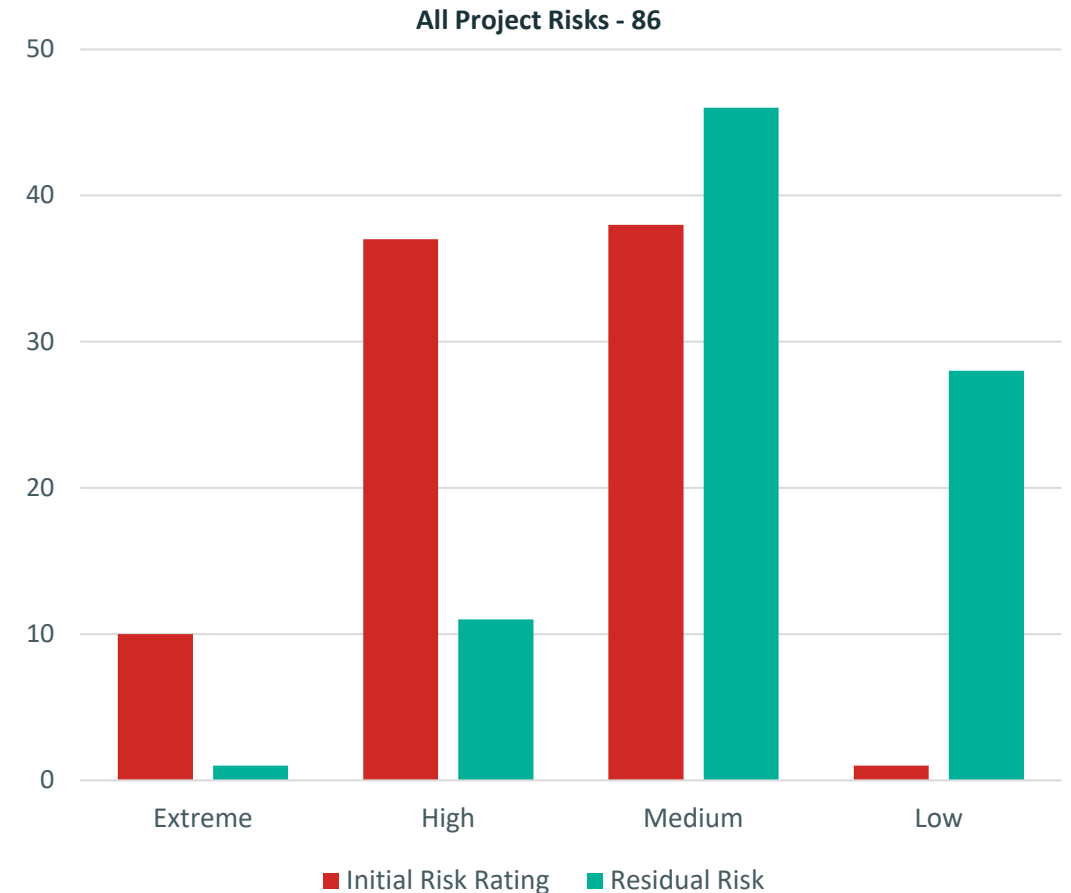
On the basis of the project economics established by the DFS2 (in particular free cash flow generation), the robust market outlook for mineral sands products (refer Marketing analysis), Base Resources' sound financial position (net cash and cash generation from Kwale Operations), track record of successfully developing, operationalising and repaying financing on a similar project (Kwale Operations), prior success in capital raisings as and when required (including for the acquisition of the Toliara Project in early 2018) and preliminary work already undertaken in relation to debt and JV participation, Base Resources' considers that there is a reasonable basis that development of the Toliara Project can be successfully funded.

# Risks

During the DFS, a comprehensive risk review was completed. The risk outcomes have been continuously reviewed and updated to capture new risks and track risk mitigation activities to ensure all information remains current and relevant. The risks presented in DFS2, reflect the Toliara Project risk profile as at Q3-2021. 86 project risks are captured of which 47 had an initial risk rating of “high” or “extreme”, reduced to 12 risks after factoring in mitigations.

## Risk classification

- A qualitative rating is applied to each risk or opportunity based on a likelihood and impact matrix.
- Each risk is given an initial risk rating and, where risk mitigations are identified, a residual risk rating.
- All risks with ratings of high or extreme undergo a high-level review by management to ensure the rating is appropriate, followed by a moderation exercise.
- Risks are generally classified as high or extreme if there is both a reasonable (or higher) likelihood of occurrence and the consequence of such an occurrence is serious (or worse).
- A number of factors are considered when assessing likely consequence, including impact on finances, environment, personal safety, company reputation, legal or regulatory implications, operating continuity and strategic implications.
- Risks have been classified as pre-FID, post-FID (or applicable to both) and operational to identify those that need to be addressed prior to FID or during implementation. Of the 86 risks identified, there were 22 pre-FID risks, 38 post-FID and 26 risks relevant to both pre-FID and post-FID periods.
- Operational risks are captured in the knowledge management system for use in commissioning and operations.
- No material changes to the captured risks are expected during the period up to FID.



# Pre-FID and Post-FID risks

There are 22 pre-FID risks identified, 14 of which have an initial risk rating of high or extreme - following mitigations these reduced to one extreme and five high residual risks. There are 26 risks identified that apply to both pre-FID and post-FID periods, 13 of which have an initial risk rating of high or extreme - following mitigations this reduces to three high residual risks. 38 post-FID risks have been identified, 20 of which have an initial risk rating of high or extreme – following mitigations this reduces to three high residual risks.

## Pre-FID risks

### Government and legal risks.

- DFS2 project valuation assumes higher royalty rates than the current regulatory obligation. However, any change to the mining regime through action on the government's "new vision for mining" and associated Mining Code review could increase this further. Any changes to royalties, contribution to regional development or possible free carried government interest will impact economics and potential fundability of the Toliara Project. Depending on the magnitude of the change, this may cause project delay, possibly for an extended period or indefinitely. (Initial rating: extreme -> Residual rating: extreme).
- Project delay associated with obtaining remaining required approvals from the various regulatory bodies. (Initial rating: extreme -> Residual rating: high).
- Engagement with the Government to obtain support continues. Lifting of the suspension is linked to reaching agreement with Government on fiscal terms, which is ongoing. (Initial rating: extreme -> Residual rating: high).
- The Project may not be certified as eligible under LGIM, or there may be a significant delay in obtaining certification. A LGIM application, based on the DFS, has been submitted and engagement with Government continues. (Initial rating: extreme -> Residual rating: high).
- Land acquisition at the Ranobe mine site is not finalised in time for construction activities to commence. (Initial rating: high -> Residual rating: high).

### Funding risks

- Inability to secure sufficient long-term take-or-pay product offtake agreements with customers of good standing to satisfy traditional debt funding requirements. (Initial rating: extreme -> Residual rating: high).

## Pre-FID and Post FID risks

### Health and safety risks

- A fatality or serious injury during construction. (Initial rating: extreme -> Residual rating: high).

### Community risks

- Project delay caused by local political interference and/or civil unrest. (Initial rating: extreme -> Residual rating: high).

### Delays caused by COVID-19 pandemic.

- COVID-19 has caused upheaval globally with significant impact on businesses with markets slowing down which could result in delayed funding, loss of preferred contractors due to economic strains, closed borders and potential unforeseen new laws. (Initial rating: extreme -> Residual rating: high).

## Post FID risks

### Marketing risks

- Inability to form a strategic offtake relationship with target integrated slag/pigment producers on acceptable terms. (Initial rating: high -> Residual rating: high).

### Government and legal risks

- VAT incurred during the project construction phase (~\$55m) is not refunded or significantly delayed by GoM. (Initial rating: extreme -> Residual rating: high).

# Opportunities



**17 significant opportunities were identified in the DFS that could add value to the project. High potential opportunities are centered around Mineral Resource and Ore Reserves, mine optimisation, environmental enhancement, community development, implementation scheduling and exploitation of the deposit's significant rare earth content.**

## **Mineral Resources & Ore Reserves Opportunities**

- Increasing the Mineral Resources and Ore Reserves estimates through additional drilling. The present Mineral Resources estimate remains open to the west and does not include the deep mineralised Lower Sand Unit (LSU).

## **Mine Planning and Optimisation**

- Mine planning design review has been completed that demonstrated improved productivity and allowed for increased equipment utilisation. Further optimisation opportunities with regard to productivity, mined grade and product mix will be continually reviewed over the life-of-mine. Adopting Co-Disposal Tailings methodology will eliminate the need to construct a solar pond for slimes disposal as all slimes will be mixed with sand tails prior to disposal.

## **Environmental Opportunities**

- Through the implementation of effective conservation programs, knowledge and practices may improve species propagation, and may eventually lead to species being removed from the critically endangered list. While not impacting on project net present value, this would enhance the Project's contribution to regional and national betterment and Base Resources' reputation and strength of licence to operate.

## **Community Opportunities**

- Engagement and positive interaction with the local community facilitated by the early skills training program, placement of block manufacture and early works contracts may provide a good foundation to build relationships prior to commencement of the mine, export facility and process plants.

## **Implementation Schedule Opportunities**

- Reducing the implementation duration provides earlier project cashflow and improve project net present value by US\$6m for every month the construction duration is shorter. All options to improve the schedule will be considered during further FEED work.

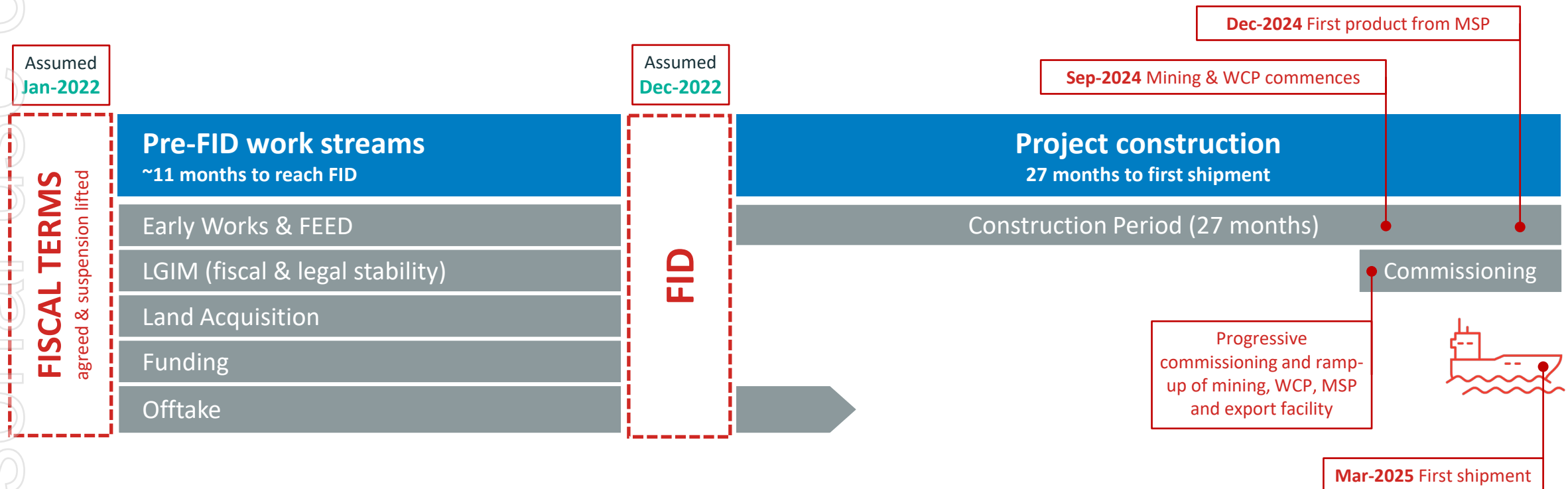
## **Rare Earths**

- The 2021 Ranobe Mineral Resources estimate heavy mineral contains 2.0% monazite, which, given the grade and size of the deposit, represents a significant potential source of Rare Earth Oxides that will be investigated in future studies.



# Toliara Project indicative timeline

Planned FID has been delayed due to COVID travel restrictions and the suspension of on-ground activities. Once fiscal terms are agreed and this suspension is lifted, there will be approximately 11 months' work to complete prior to FID, including finalising financing, completing the land acquisition process and concluding major construction contracts. Some resumption of international travel will also be required to complete a significant portion of this work. We maintain readiness to accelerate progress when conditions support. For the purposes of the DFS2, FID is assumed to be end December 2022.





BASE  
RESOURCES

ersonal use only



A. Level 3, 46 Colin Street, West Perth WA 6005  
PO Box 928, West Perth BC 6872, Australia

Ph. +618 9413 7400

F. +618 9322 8912

E. [info@baseresources.com.au](mailto:info@baseresources.com.au)

[baseresources.com.au](http://baseresources.com.au)

**For further information contact:**

James Fuller, Manager – Communications and Investor Relations

Ph. +618 9413 7426

M. +61 488 093 763

E. [jfuller@baseresources.com.au](mailto:jfuller@baseresources.com.au)



# Glossary and appendices

# Glossary



Term	Meaning
\$ or US\$ or USD	United States Dollars
Al <sub>2</sub> O <sub>3</sub>	Aluminum oxide
Base Toliara	Base Toliara SARL, Base Resources' wholly owned Malagasy operating subsidiary
Base Resources or the Company	Base Resources Limited (ABN 88 125 546 910)
BQR	Budget quotation request
CAE	Evaluation and Compensation Committee
CaO	Calcium oxide
Capex	Capital expenditure
Ce	Cerium
Competent Person	The JORC Code requires that a Competent Person be a Member or Fellow of The Australasian Institute of Mining and Metallurgy, of the Australian Institute of Geoscientists, or of a 'Recognised Professional Organisation'. A Competent Person must have a minimum of five years' experience working with the style of mineralisation or type of deposit under consideration and relevant to the activity which that person is undertaking.
Cr <sub>2</sub> O <sub>3</sub>	Chromium (III) oxide
DFI	Development finance institution
DFS	2019 definitive feasibility study for the Toliara Project, the results of which were announced on 12 December 2019
DFS2	2021 definitive feasibility study, the results of which are set out in this document
DMU	Dry mining unit
DUP	Compulsory acquisition of land through the process called Declaration of Public Utility
Dy	Dysprosium

Term	Meaning
EPC	Engineer-procure-construct
EPCM	Engineer-procure-construct-manage
ESIA	Environmental and social impact assessment
ESMS	Environmental and social management system
FEED	Front end engineering development
FEL	Front end loader
Fe	Iron
FeO	Iron oxide
Fe <sub>2</sub> O <sub>3</sub>	Iron (III) oxide
FID	Financial investment decision by the Board of Base Resources to commence construction of the Toliara Project
FIDIC	International Federation of Consulting Engineers
FOB	Free on board
FY	Financial year. 1 July to 30 June.
GARN	Garnet
GoM or Government	Government of Madagascar
HFO	Heavy fuel oil
HiTi	High grade leucoxene
HM	Heavy mineral
HMC	Heavy mineral concentrate
ICSU	Intermediate clay sand unit
IFC	International finance corporation
ILM	Ilmenite



# Glossary



Term	Meaning
<b>Indicated Mineral Resource</b>	An Indicated Mineral Resource is that part of a Mineral Resource for which quantity, grade (or quality), densities, shape and physical characteristics are estimated with sufficient confidence to allow the application of Modifying Factors in sufficient detail to support mine planning and evaluation of the economic viability of the deposit
<b>Inferred Mineral Resource</b>	An Inferred Mineral Resource is that part of a Mineral Resource for which quantity and grade (or quality) are estimated on the basis of limited geological evidence and sampling. Geological evidence is sufficient to imply but not verify geological and grade (or quality) continuity. It is based on exploration, sampling and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes
<b>IPP</b>	Independent power producer
<b>IRR</b>	Internal rate of return
<b>JORC</b>	The Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves 2012 Edition, as published by the Joint Ore Reserves Committee of The Australasian Institute of Mining and Metallurgy, Australian Institute of Geoscientists and Minerals Council of Australia.
<b>JV</b>	Joint venture
<b>kt</b>	Thousand tonnes
<b>kV</b>	Kilovolts
<b>Kwale Operations</b>	Base Resources' mineral sands operations in Kwale county, Kenya
<b>kWhr</b>	Kilo watt hour
<b>La</b>	Lanthanum
<b>LEUC</b>	Leucoxene
<b>LGIM</b>	Large Mining Investment Law
<b>LOM</b>	Life of mine
<b>LOS</b>	Lifting of the on-the-ground suspension

Term	Meaning
<b>LRIMP</b>	Labour, recruitment and influx management plan
<b>LSU</b>	Lower sand unit
<b>LST</b>	Limestone
<b>M&amp;I</b>	Measured and Indicated Mineral Resource
<b>Measured Mineral Resource</b>	A Measured Mineral Resource is that part of a Mineral Resource for which quantity, grade (or quality), densities, shape, and physical characteristics are estimated with confidence sufficient to allow the application of Modifying Factors to support detailed mine planning and final evaluation of the economic viability of the deposit
<b>MG12 spirals</b>	A new high-performance spiral separator from Mineral Technologies
<b>MgO</b>	Magnesium oxide
<b>Mineral Resource</b>	Mineral Resources are a concentration or occurrence of solid material of economic interest in or on the Earth's crust in such form, grade (or quality), and quantity that there are reasonable prospects for eventual economic extraction. The location, quantity, grade (or quality), continuity and other geological characteristics of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge, including sampling. Mineral Resources are sub-divided, in order of increasing geological confidence, into Inferred, Indicated and Measured categories
<b>Minmod</b>	A company developed mineralogy modelling technique, it comprises an XRF analysis of the magnetic and non-magnetic fractions of each composite or sample, the results from which are then back-calculated to determine in-ground mineralogy.
<b>MnO</b>	Manganese oxide
<b>MON</b>	Monazite
<b>MRNL</b>	Madagascar Resources NL
<b>MSP</b>	Mineral separation plant
<b>Mt</b>	Million tonnes



# Glossary

Term	Meaning
<b>Mtpa</b>	Million tonnes per annum
<b>MW</b>	Megawatt
<b>Nb<sub>2</sub>O<sub>5</sub></b>	Niobium pentoxide
<b>Nd</b>	Neodymium
<b>NGO</b>	Non-governmental organisation
<b>NPV</b>	Net present value
<b>ONE</b>	Office National Pour l'Environnement
<b>Ore Reserves</b>	Ore Reserves are the economically mineable part of Measured and/or Indicated Mineral Resources. Ore Reserves are sub-divided in order of increasing confidence into Probable and Proved categories.
<b>OS</b>	Oversize
<b>P<sub>2</sub>O<sub>5</sub></b>	Phosphorus pentoxide
<b>PE 37242</b>	Base Toliara's Permis D'Exploitation 37242, which is a mining lease under Malagasy law
<b>PFS</b>	Pre-feasibility study for the Toliara Project, the results of which were announced on 21 March 2019
<b>Pr</b>	Praseodymium
<b>Probable Ore Reserves</b>	The economically mineable part of an Indicated, and in some circumstances, a Measured Mineral Resource. The confidence in the Modifying Factors applying to a Probable Ore Reserve is lower than that applying to a Proved Ore Reserve.
<b>Proved Ore Reserves</b>	The economically mineable part of a Measured Mineral Resource. A Proved Ore Reserve implies a high degree of confidence in the Modifying Factors.
<b>ROM</b>	Run of mine
<b>RUT</b>	Rutile
<b>RWG</b>	Resettlement working groups
<b>SiO<sub>2</sub></b>	Silicon dioxide

Term	Meaning
<b>SL</b>	Slime or clay
<b>SMP</b>	Structural mechanical and pipework
<b>Solar PV</b>	Solar photovoltaic system
<b>SSU</b>	Surficial silt unit
<b>t</b>	Metric tonne
<b>Tb</b>	Terbium
<b>TiO<sub>2</sub></b>	Titanium dioxide
<b>Ti</b>	Titanium
<b>Toliara Project or Project</b>	The mineral sands development project, based on the Ranobe deposit, located in south west Madagascar, 45km north of the regional port town of Toliara
<b>TSF</b>	Tailings storage facility
<b>tph</b>	Tonnes per hour
<b>TZMI</b>	TZ Minerals International. An independent consulting group.
<b>WCP</b>	Wet concentration plant
<b>WTR</b>	World Titanium Resources Limited
<b>UCC</b>	Up current classifier
<b>USU</b>	Upper sand unit
<b>USSU</b>	Upper silty sand unit
<b>U + Th</b>	Uranium and thorium
<b>V<sub>2</sub>O<sub>5</sub></b>	Vanadium pentoxide
<b>VAT</b>	Value added tax
<b>ZIR</b>	Zircon
<b>ZrO<sub>2</sub>+HfO<sub>2</sub></b>	Zirconium and hafnium

# Appendix - Mineral Resources by Zone



Ranobe Deposit Mineral Resources estimate as at 27 September 2021

Zone	Category	Tonnes (Mt)	HM (Mt)	HM (%)	SL (%)	OS (%)	HM Assemblage as % of HM					
							ILM (%)	RUT (%)	LEUC (%)	ZIR (%)	MON (%)	GARN (%)
USU Upper Sand Unit	Measured	575	36	6.2	3.7	0.1	74	1.0	1.0	5.9	1.9	2.2
	Indicated	654	30	4.6	3.6	0.2	71	1.0	1.0	5.9	1.9	3.6
	Inferred	820	27	3.3	2.8	0.1	69	1.0	1.0	5.8	2.0	4.5
	<b>Total USU</b>	<b>2,040</b>	<b>93</b>	<b>4.5</b>	<b>3.3</b>	<b>0.1</b>	<b>72</b>	<b>1.0</b>	<b>1.0</b>	<b>5.9</b>	<b>1.9</b>	<b>3.3</b>
SSU Surface Silt Unit	Measured	4	0.2	5.2	21	0.4	73	1.1	0.8	5.9	2.0	4.0
	Indicated	8	0.3	3.7	16	0.7	69	0.8	1.0	5.7	2.0	4.2
	Inferred	6	0.2	3.0	18	0.4	70	0.7	1.0	7.7	1.7	4.7
	<b>Total SSU</b>	<b>18</b>	<b>0.7</b>	<b>3.8</b>	<b>18</b>	<b>0.5</b>	<b>71</b>	<b>0.9</b>	<b>0.9</b>	<b>6.3</b>	<b>1.9</b>	<b>4.3</b>
USSU Upper Silty Sand Unit	Indicated	13	0.8	6.3	23	2.3	72	0.9	0.8	6.5	1.5	4.4
	Inferred	10	0.7	6.6	26	0.7	73	0.8	0.8	6.4	1.6	4.8
	<b>Total USSU</b>	<b>23</b>	<b>1.5</b>	<b>6.4</b>	<b>25</b>	<b>1.6</b>	<b>72</b>	<b>0.8</b>	<b>0.8</b>	<b>6.5</b>	<b>1.6</b>	<b>4.6</b>
ICSU Intermediate Clay Sand Unit	Measured	18	0.5	3.0	23	3.0	68	1.3	1.2	6.4	2.2	2.3
	Indicated	118	3.6	3.0	24	1.8	68	1.1	1.1	6.1	2.2	3.5
	Inferred	354	11	3.2	25	1.8	69	1.0	1.0	5.8	2.1	3.8
	<b>Total ICSU</b>	<b>490</b>	<b>15</b>	<b>3.2</b>	<b>25</b>	<b>1.8</b>	<b>69</b>	<b>1.1</b>	<b>1.1</b>	<b>5.9</b>	<b>2.1</b>	<b>3.7</b>
<b>Grand Total</b>		<b>2,580</b>	<b>111</b>	<b>4.3</b>	<b>7.7</b>	<b>0.4</b>	<b>71</b>	<b>1.0</b>	<b>1.0</b>	<b>5.9</b>	<b>2.0</b>	<b>3.4</b>

Table subject to rounding differences. Mineral Resources estimated at 1.5% HM cut off grade.

\*Mineral Resources are reported inclusive of Ore Reserves