

16th March 2016

## **Ngualla Project Study delivers substantial Capex and Opex savings**

### **HIGHLIGHTS**

- Capital costs reduced by 10% to US\$**330** million
- Operating cost reduced by ~ **18%** or US\$**21** million per annum
- Processing flowsheet simplified and de-risked
- Peak is focused on supplying the rare earths that are key components of the growing permanent magnet market, underpinned by increased electrification of automobiles and green energy applications
- 31 year project life

Peak Resources Limited (ASX:PEK) (“**Peak**” or the “**Company**”) has completed a detailed Project Update (the “**Study**”) on the Ngualla Rare Earth Project which has delivered substantial reductions in capital and operating costs compared to the Preliminary Feasibility Study (**PFS**) released 19<sup>th</sup> March 2014. The results have confirmed Peak’s belief that the Ngualla Project has the potential to become one of the lowest cost, highest quality and lowest risk rare earth projects globally.

A key element of the Study involved tailoring the processing flowsheet to focus on the production of Neodymium (Nd) and Praseodymium (Pr) which are key elements in the production of high powered permanent magnets. These high strength magnets are used in high efficiency electric motors, demand for which is growing strongly due to growing demand for electric vehicles and renewable energy infrastructure such as wind turbines. This permanent magnet market represents 79% of the global rare earth market by value (Source: IMCOA) with Neodymium and Praseodymium representing approximately 85% of this market by value.

With a focus on Neodymium and Praseodymium, the Study was based on extensive metallurgical flow sheet development work and pilot plant programs completed since delivery of the PFS, and included sophisticated engineering simulation and mass balance modelling conducted in conjunction with lead engineers, Amec Foster Wheeler. The Study worked on a base-case scenario envisaging production of approximately 2,300 tonnes per annum of Neodymium and Praseodymium rare earth oxide, 250 tonnes per annum of mixed Samarium, Europium and Gadolinium Rare Earth carbonate and 5,900 tonnes per annum of Cerium/Lanthanum carbonate. Production forecasts are based on the weathered Bastnaesite Zone Mineral Resource estimate at a 1% Rare Earth Oxide lower grade cut (Measured and Indicated portions only, see Appendix for category breakdown) summarised in ASX Announcement “Higher grade Ngualla Mineral Resource contains nearly 1 million tonnes rare earth oxide” dated 22 February 2016, together with the mining and processing assumptions contained within the Executive Summary in the Appendix.

**Managing Director, Darren Townsend commented:** *“I would like to congratulate the Peak team and our consultants on the continued excellent progress in the development of the Ngualla Project. These further reductions in capex and opex help to position Ngualla as one of the world’s lowest cost rare earth projects and we look forward to the completion of the Bankable Feasibility Study and subsequent development of the project.”*

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Further detail of the Study outcomes are below and an Executive Summary is included as an Appendix.

Note all costs are in US dollars unless otherwise denoted.

## KEY STUDY OUTCOMES

### Low Capital Cost

Outcomes of the Study have confirmed Ngualla is expected to have substantially lower capital cost than any comparative rare earth project and positions Ngualla at the forefront of potential new rare earth projects.

- Capital cost (including 25% contingency) has reduced by 10% to US\$330 million from the PFS (19<sup>th</sup> March 2014)

A number of capital cost items currently included in the revised Capital Cost estimate (Power Plant Gensets US\$8 million, Accommodation Camp US\$12 million and Mining Fleet US\$10 million) will be reviewed as part of the Bankable Feasibility Study (**BFS**). It is likely some or all of these capital costs could be moved into operating costs through Build, Own, Operate, Transfer (**BOOT**) style contracts.

The Study has already identified a number of opportunities for further reductions in capital costs and these will be examined as part of the current BFS process.

The current capital costs include a base-case assumption of a European Union ('EU') based refinery to produce high purity separated products. Substantive site investigation and preliminary engineering work has been completed for a number of potential EU sites for the refinery.

### Low Operating Costs

The Study has updated operating costs to US\$97 million per annum, an 18% **reduction** (US\$21 million per annum) compared with the PFS. The operating cost reductions have been achieved through optimisation of the flow sheet, which has confirmed that Peak's selective Alkali Roast process allows for the early rejection of the majority of low value cerium and deleterious iron leading to significant reduction in reagent costs.

### Long Project Life

Project mine life has been optimised to 31 years, with this mine life based on the high grade weathered Bastnaesite Zone which comprises only 22% of the total Mineral Resource in terms of contained rare earths.

## Low Development Risk

Peak is confident that the technical development risk of the Ngualla Project remains low. This is primarily due to the following:

- High confidence Mineral Resource (89% of the Bastnaesite Zone +1% REO Mineral Resource is classified in the highest JORC 2012 Measured category)
- Low cost low strip ratio open pit mining
- Conventional multi stage processing plant on site at Ngualla
- Location of refinery in European Union
- Peak team have extensive experience in commissioning and operating rare earth projects
- Low capex/opex requirement
- Very low uranium and thorium mineralisation (15ppm U and 53 ppm Th)
- Proven and demonstrated extraction process
- Advanced development studies

The relatively simple nature of the operation and use of conventional, proven technology demonstrates that Ngualla should avoid the lengthy start-up periods and costs experienced by some new rare earth projects leading Peak to remain confident it can deliver the Project for substantially lower capital cost than any other comparative rare earth project and become one of the lowest operating cost rare earth developers.

The Executive Summary of the Ngualla Study is attached in the Appendix.



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# NGUALLA RARE EARTH PROJECT

PROJECT UPDATE

EXECUTIVE SUMMARY

MARCH 2016



Developing the world-class Ngualla Rare Earth Project into a long term, low cost supplier to the expanding high-tech magnet market.



Above: Ngualla Mine and Multistage Processing Plant layout.

In addition to Peak's in-house technical team, work commissioned by the Company has been carried out by internationally recognised consulting firms covering a wide range of disciplines including:

**Lead Engineering**

Amec Foster Wheeler

**Engineering, Plant Design and infrastructure**

MDM Engineering  
Knight Piésold  
Golder Associates

**Resource Definition and Mineralogy**

SRK Consulting, Australia  
SGS, Perth  
Dr Wally Witt  
Dr Roger Townend and Associates

**Mine Planning**

Orelogy Consulting

**Metallurgy Process Development and Pilot Plant**

ANSTO Minerals  
ALS Metallurgy  
Nagrom  
Independent Metallurgical Operations (IMO)  
Jenike and Johanson

**Environment and Social**

Align Environment and Risk Management  
Paulsam Geo-Engineering

**Corporate and Legal**

Deloitte  
Steinepreis Paganin  
Clyde and Co, Tanzania



Align Environment and Risk



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# NGUALLA RARE EARTH PROJECT

## PROJECT UPDATE

### EXECUTIVE SUMMARY

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# 1 INTRODUCTION

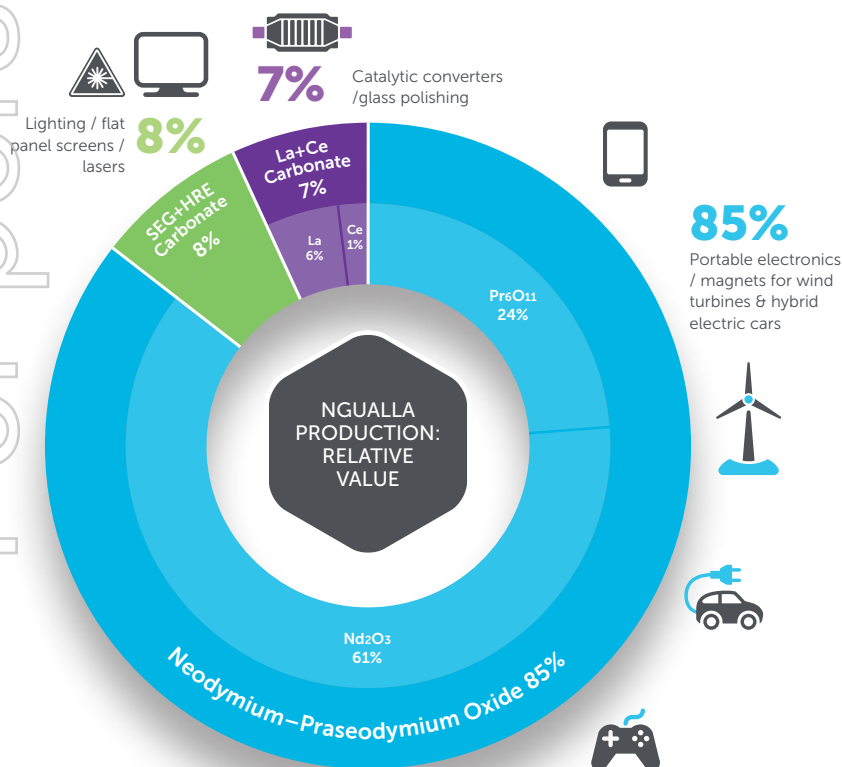
Peak is developing Ngualla to be a low cost Next Generation rare earth project that is strongly aligned to the high value, expanding high-tech magnet metal market. With a distinctly different development approach backed by the advantages of a large high quality deposit and demonstrated process, the Company is well positioned for growth through the expanding demand for magnet metals in the green technology sector.

Peak (the "Company") has completed a Project Update (the "Study") to compile and quantify major advances made in the proposed development of the Ngualla Rare Earth Project since the Preliminary Feasibility Study (PFS) was completed in March 2014. The Project is centred on the Ngualla Carbonatite in Tanzania, host to one of the world's highest grade and largest rare earth deposits that was discovered by Peak in 2010.

The Study incorporates the extensive metallurgical process development testwork completed by the Company since the PFS that has been successful in providing an improved process flowsheet and product suite aligned with the expanding high-tech magnet metal market (Figure 1). The Study builds on the PFS and incorporates the revised Mineral Resource estimate released in February 2016.

The focus of the Study has been to evaluate the capital and operating costs in the development of a mine and associated multistage processing plant on site at Ngualla. A base case of a subsequent rare earth refinery located in a chemical precinct close to markets and source of reagents in the European Union is presented to produce approximately

Figure 1: Relative value\* contributors by product type and constituent REO's.



2,300 tonnes per annum of >99% purity neodymium and praseodymium oxide plus additional co-product rare earth refined products. Alternative marketing strategies may also include the direct sale and / or the toll treating of the processed rare earth product from Ngualla at an existing refinery.

The production rate and mining inventory is based on the 2016 weathered Bastnaesite Zone Mineral Resource estimate at  $\geq 1\%$  rare earth oxide cut-off grade (ASX Announcement "Higher grade Ngualla Mineral Resource contains nearly 1 million tonnes rare earth oxide" of 22 February 2016) and the mining and processing assumptions contained in this report. 91% of the Mineral Resource on which the mining inventory is based is classified in the Measured JORC category and 9% in the Indicated. No Inferred material is included in the mining inventory.

\* Relative value of contained REO equivalent product mix based on February 2016 Metal Pages relative prices for individual rare earth oxides

# 2 KEY OUTCOMES

Drilling on Ngualla Hill.



Peak Resources Limited has completed a detailed Project Update based on extensive metallurgical test work and pilot plant programs completed since the PFS was released in March 2014. With the rapid growth in rare earth permanent magnet demand representing 79% of the rare earth market by value in 2015 (IMCOA, 2016), Peak has tailored its processing flowsheet to focus on the production of Neodymium and Praseodymium, which in 2015 represented 85% of the value of the rare earths used in the permanent magnet market.

Data from a high quality Mineral Resource (see release dated 22nd February 2016 and titled "Higher grade Ngualla Mineral Resource contains nearly 1 million tonnes of rare earth oxide") and a detailed mine planning schedule feed into a processing flow sheet developed through extensive piloting and metallurgical test work completed on Ngualla's mineralisation.

Peak's team in conjunction with Amec Foster Wheeler (AmecFW) have completed sophisticated engineering simulation and mass balance modelling of the demonstrated metallurgical process to support the detailed capital and operating cost estimates for the Study.

The Study establishes a robust capital and operating cost base case based on the production\* of approximately 2,300 tonnes per annum of mixed neodymium and praseodymium rare earth oxide, 250 tonnes per annum of mid and heavy rare earth carbonate and 5,900 tonnes per annum of lanthanum and cerium carbonate. Note all costs in US dollars unless otherwise denoted.

## Key Outcomes:

- Operating cost reduced by \$21 million per annum from PFS (**18% reduction from PFS**)
- Capital cost reduced by \$37 million from PFS (10% reduction from PFS)
- 31 years operational mine life
- Processing flowsheet simplified and derisked through beneficiation and separation pilot plants.
- Focused exposure to high growth rare earth permanent magnet market underpinned by electrification of automobiles and green energy applications

## Low Capital Cost:

- \$330 million Capex including 25% (\$63 million) contingency
- Ngualla has a substantially lower capital cost than any comparative rare earth project. Capital costs include a base case of a European Union based Refinery to produce high purity separated products. The Project's low capital costs and advanced stage of development position Ngualla in the forefront of potential new rare earth producers.

## Low Operating Costs:

- \$97 million per annum for the production of 2,300 tonnes per annum of high purity Neodymium + Praseodymium rare earth oxide, 250 tonnes per annum of Mid + Heavy rare earth carbonate and 5,900 tonnes per annum of Lanthanum + Cerium carbonate. Peak's Alkali Roast process allows for the early rejection of the majority of low value cerium and deleterious iron leading to a significant reduction in reagent costs

## Long life Project:

- 31 years operational mine life in weathered Bastnaesite Zone alone
- There is clear potential for future expansion of the base case level of production once the initial operation and markets are established. The weathered Bastnaesite Zone comprises just 22% of the greater Ngualla Mineral Resource.

The positive outcomes of the Study provide Peak with a clear path forward for the completion of the Bankable Feasibility Study (BFS) and expected subsequent development of the project into the next low cost rare earth producer.

\* Based on approximate LOM average, actual annual tonnages may vary.



# 3 TITLE AND OWNERSHIP

The Ngualla Project is owned 100% by PR NG Minerals Limited incorporated in Tanzania, in which Peak has a 87.5% stake with the remainder held by collaborative partners Appian and IFC. The Project comprises two Prospecting Licences, PL6079/2009 and PL9157/2013. An additional area is subject to application PL10926/2016, which is currently pending (Table 1 and Figure 2).

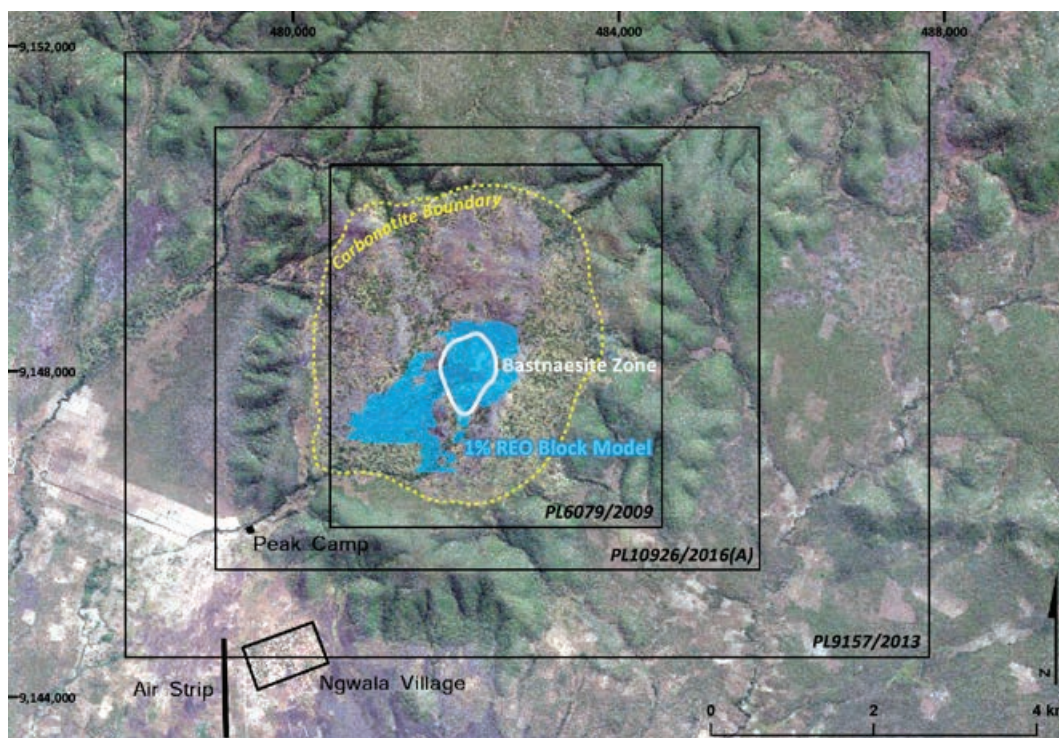
**Table 1:** Licence details, Ngualla Rare Earth Project.

Licence Number	Name	Area	Holder	First Granted	Current term to:
PL6079/2009	Ngualla	18.14 km <sup>2</sup>	PR NG Minerals Ltd (100%)	22 September 2009	21 September 2017
PL9157/2013	Mikuwo	37 km <sup>2</sup>	PR NG Minerals Ltd (100%)	10 June 2013	9 June 2017
PL10926/2016	Unassigned	18.15 km <sup>2</sup>	PR NG Minerals Ltd (100%)	Application	Pending

The two granted licences are in good standing with the Ministry of Energy and Mines and tenure may be secured after the end of the current terms by applications for an extension of term of the Prospecting Licences (PL) or for mining or retention licences under established Regulations.

The village of Ngwala lies 4.5 kilometres south of the deposit. No farms, habitation or reserves occur over the carbonatite structure and proposed development area.

**Figure 2:** Location of Peak's Prospecting Licences the Ngualla Carbonatite, Mineral Resource and Bastnaesite Zone.



KEY FEATURES

Granted licences cover entire area required for development

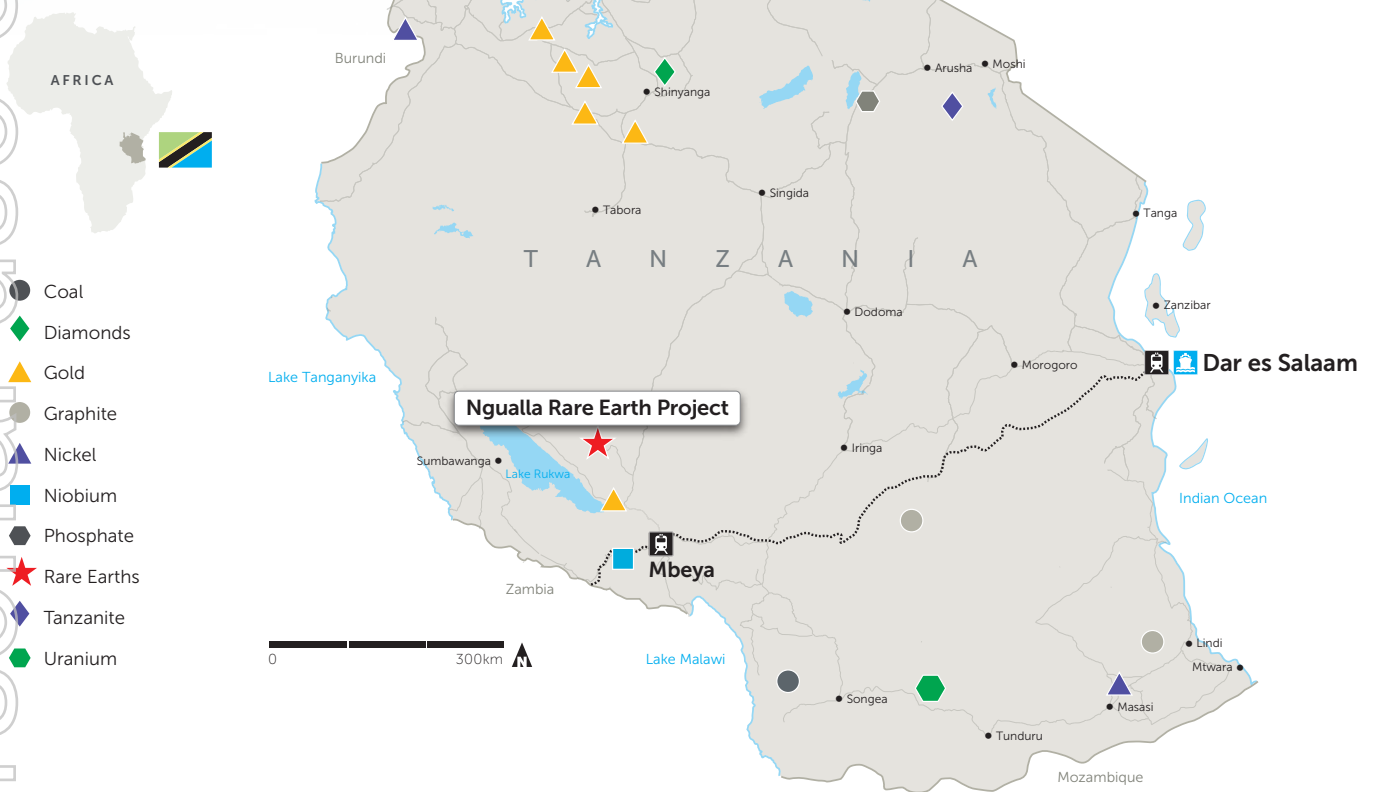
Established mining jurisdiction

Strong strategic partners



Ngualla Hill.

Figure 3: Location of the Ngualla Project, Tanzania.



### 3.1 Tanzania

Tanzania is a politically stable country with a democratic government and one of the best performing economies in the East African region. It is the fourth largest gold producer in Africa and as such has an established mining culture and regulatory system. It's vast natural resources (see Figure 3) have been identified by the government as key to the country's economic development and there are a number of policies and a well-balanced and competitive package of fiscal incentives in place to ensure the mining sector's ongoing and sustained success.

Mining is the fastest growing sector in Tanzania in terms of contribution to GDP and exports. This growth was assisted by the World Bank and the introduction of investor-friendly mining laws that were introduced in 1998. The Mining Act of 2010, guarantees investor's security of tenure and provides transparency in the issuance and administration of mineral rights.

A number of Australian and international corporations are being attracted to the region, including Acacia, AngloGold Ashanti Limited, Resolute Mining Limited and Glencore Plc, all of whom have a significant presence in the country.

Tanzania is a signatory of several multilateral and bilateral agreements on protection and promotion of foreign investment. Among other international agreements and membership, Tanzania is a member of Multilateral Investment Guarantee Agency (MIGA) and International Centre for Settlement of Investment Disputes (ICSID).

### 3.2 Strong Strategic Partners

Peak has entered into a financing transaction with two long term sophisticated investors - Appian Natural Resources Fund (“Appian”) and International Finance Corporation (“IFC”), the details of which are outlined in the ASX Announcements titled “Closing of BFS Financing with Appian and IFC” dated 27 July 2015 and “Appian Stage 2 funding proceeds and convertible note funds received” of 30 December 2015. As well as providing financial investment, Appian and IFC are collaborative partners able to draw on extensive experience and networks in the areas of metals and mining, international finance and resource project development. Appian and IFC are jointly investing on an 80:20 basis.

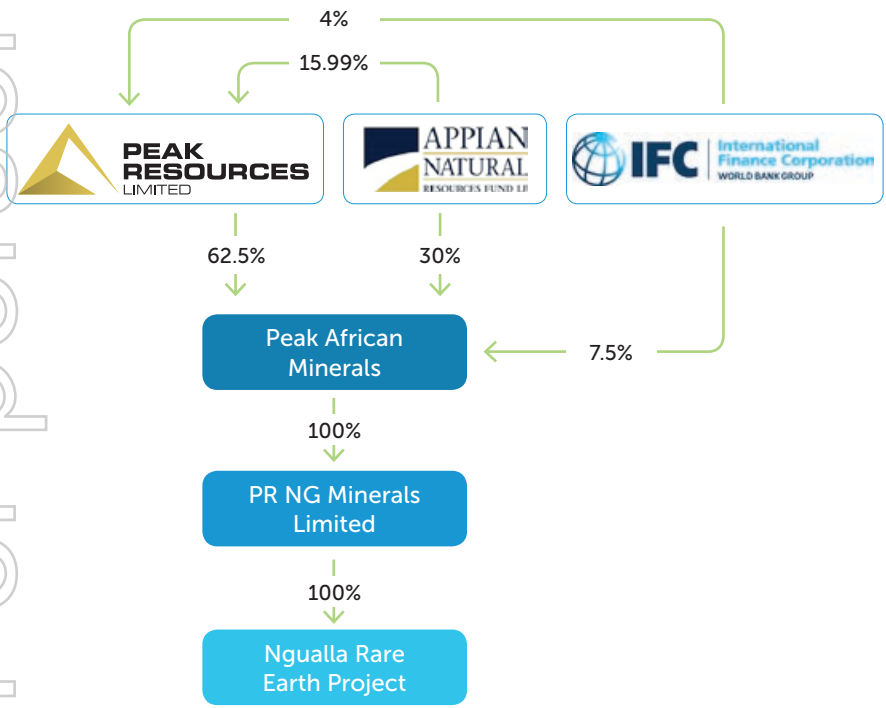
The funding transaction is structured in three stages. Stage 1 is fully complete and comprised an initial investment of ~A\$20 million (before costs) .

Completion of Stage 2 is awaiting final Tanzanian regulatory approval (ASX Announcement “Appian Stage 2 funding proceeds and convertible note funds received” of 30 December 2015) for a further ~A\$3.2million investment.

Appian is Peak’s largest shareholder with a current holding of ~16.1% and IFC 3%. After completion of Stage 2 Appian and IFC will hold a 20% and 5% share respectively of Peak African Minerals (“PAM”), a Mauritian company that owns 100% of the shares in PR NG Minerals Limited, the 100% owner of the Ngualla Project.

Figure 4 summarises the final investment structure on completion of the full three stages, with Stage 3 subject to certain milestones.

Figure 4: Final Investment Structure.



Percentages have been rounded.

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## About Appian

Appian Natural Resources Fund is a private equity fund which has been established to invest specifically in the metals and mining sector. Appian has a uniquely collaborative investment approach that seeks to partner with local owners, managers and investors to leverage its world-class operational and corporate finance expertise.



Appian has Tier 1 standards, being established by Anglo American, Rio Tinto, JPMorgan and Bain Capital individuals collectively holding over 200 years of industry experience and a deep understanding of mine development and investment. This experienced team is complementary to Peak having built and managed 60+ operating mines (30 in Africa) and acted on ~US\$200 billion of mining corporate development transactions

A collaborative cornerstone investor with a value-add approach and long-term investment horizon, Appian is focussed on achieving technical milestones and long term value creation for the investors and other stakeholders of both the Company and Appian.

For more information, visit [www.appiancapitaladvisory.com](http://www.appiancapitaladvisory.com)

## About IFC

IFC, a member of the World Bank Group, is the largest global development institution focused exclusively on the private sector. Working with private enterprises in about 100 countries, IFC use their capital, expertise and influence to help eliminate extreme poverty and boost shared prosperity. In FY14, IFC provided more than US\$22 billion in financing to improve lives in developing countries and tackle the most urgent challenges of development.



IFC has wide experience over 50+ years in international mining finance and demands best practice social and environmental standards. To date IFC have invested over US \$400m in Tanzania.

For more information, visit [www.ifc.org](http://www.ifc.org)

# 4 GEOLOGY, EXPLORATION AND MINERALOGY

## 4.1 Exploration History

The Ngualla Rare Earth deposit was discovered by Peak in August 2010 when the first results of the maiden drilling program were received. Drilling tested high tenor phosphate, niobium–tantalum and rare earth anomalism identified from surface sampling completed by the Company after the grant of the Prospecting Licence in September 2009.

A maiden Mineral Resource for Ngualla was completed in February 2012 and the latest revision was released on 22 February 2016 (ASX Announcement “Higher grade Ngualla Mineral Resource contains nearly 1 million tonnes rare earth oxide”) to incorporate further infill drilling completed in 2015. Peak has completed 893 drill holes and over 45km of drilling within the project since 2010 (Figure 5). Table 2 summarises the drilling completed by Peak upon which the Mineral Resource estimates are based.

Table 2: Drilling programs by year - Mineral Resource area only.

Year	Total number of holes	Total number of metres	Drilling Category					
			Aircore (AC)		Reverse Circulation (RC)		Diamond Drillhole (DD)	
			No. holes	Total metres	No. holes	Total metres	No. holes	Total metres
2010	207	4,898	189	3,559	17	1,237	1	102
2011	227	16,796	107	1,980	114	13,954	6	862
2012	130	13,612	1	2	121	12,583	8	1,027
2015	85	3,479	0	0	68	2,365	17	1,114
<b>Total</b>	<b>649</b>	<b>38,785</b>	<b>297</b>	<b>5,541</b>	<b>320</b>	<b>30,139</b>	<b>32</b>	<b>3,105</b>

## 4.2 Deposit Geology and Mineralisation

The 1 Billion year old Ngualla Carbonatite is a 4km x 3.5km pipe like intrusive complex of oval outline emplaced into Precambrian felsic volcanic, quartzites and gneissic rocks. A more resistant fenite alteration zone forms a ring of hills around the concentrically zoned carbonatite complex.

The Ngualla Carbonatite Complex comprises three distinct carbonatite phases and at least one contemporaneous phase of ultramafic magma. The predominant components of the complex are an annular calcite carbonatite and a later central body of ferroan dolomitic carbonatite. A third carbonatite phase in the form of cross-cutting dykes of dolomitic carbonatite occurs in the transition zone between these two carbonatite phases.

The outer calcite carbonatite is relatively phosphate rich, containing apatite, whereas the central ferroan dolomitic carbonatite is relatively barite–enriched with no phosphate minerals present and is the host to primary rare earth mineralisation.

KEY FEATURES

Thick zone of high grade mineralisation >5% REO at surface

Favourable bastnaesite mineralogy for extraction

Very low uranium and thorium



Exploration drilling, Ngualla 2011.

Block Model REO%

- >4%
  - 3 to 4%
  - 2 to 3%
  - 1 to 2%
- Drill hole

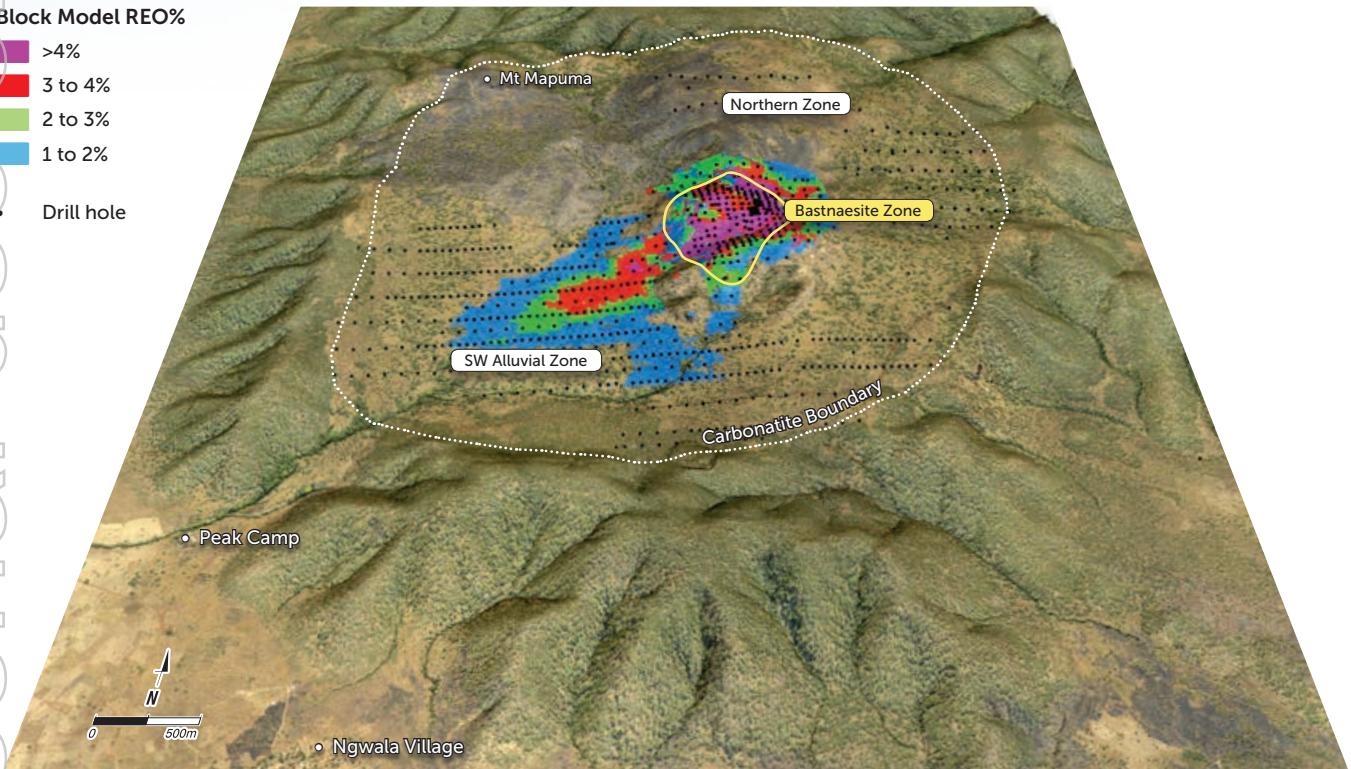
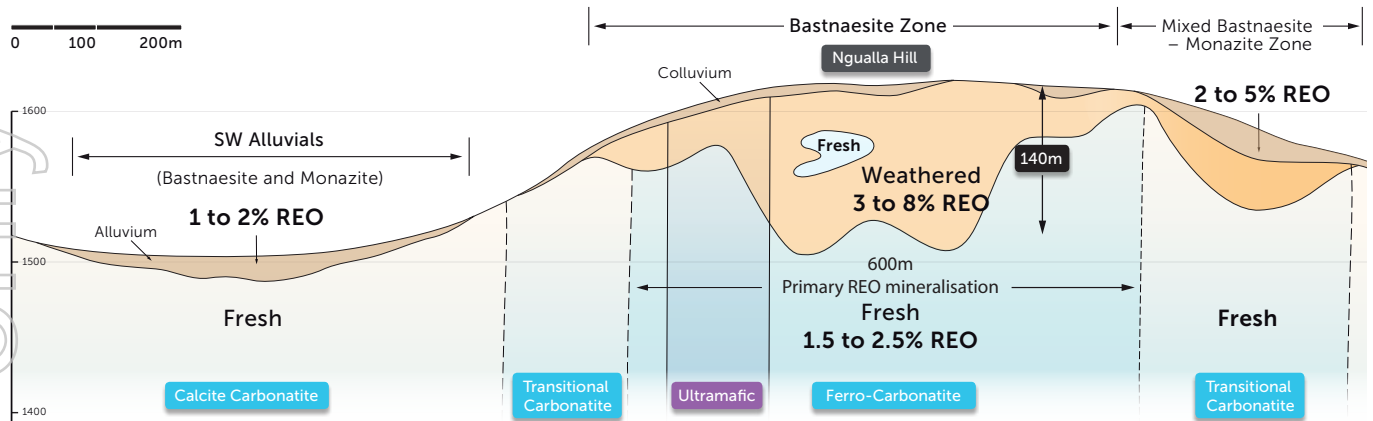


Figure 5: Oblique view looking north of the Ngualla Carbonatite and drill holes, with total Ngualla Mineral Resource block model coloured by REO grade.

An irregular karstic profile (Figure 6) is developed over the central parts of the carbonatite (the Bastnaesite Zone and the hills to the north) and has resulted in the residual enrichment of rare earths in the regolith above the carbonatite through the complete removal of other carbonate minerals during the weathering process. Rare earth mineralisation also occurs from surface in the SW Alluvials area within unconsolidated ferruginous gravels up to 30m thick that have been eroded from the Bastnaesite Zone and surrounding area (Figure 5).

The weathered Bastnaesite Zone comprises in-situ weathered ferroan dolomitic carbonatite, colluvium and ferricrete above the irregular karstic surface. This portion of the greater Ngualla rare earth deposit is identified as having the most favourable mineralogy for low cost metallurgical extraction as well as having the highest rare earth grade and is the focus of this Study. Rare earths, hosted almost exclusively by the fluocarfonate mineral bastnaesite, are enriched to 3 to 8% REO from surface to depths of up to 140m within the weathered Bastnaesite Zone. The primary ferroan dolomitic carbonatite beneath the irregular karstic weathering surface is also mineralised at typical grades of 1.5 to 2.5% REO.

Figure 6: Schematic geological cross section across the central Ngualla Carbonatite showing styles of rare earth mineralisation.



A peripheral mixed monazite–bastnaesite zone surrounds the Bastnaesite Zone and extends to the east and north. As stated above, these zones are distinguished by differing phosphate, barite, magnesium and calcium contents in fresh rock as well as rare earth mineralogy.

The Northern Zone, located 1km to the north of the Bastnaesite Zone (Figure 5), also contains rare earth, niobium–tantalum and phosphate mineralisation within the residual weathered profile above the calcitic carbonatite over a wide area. This area has been only sparsely drill tested to date and is excluded from the current Mineral Resources and development studies. Further drilling in the Northern Zone has the potential to add additional commodities and rare earth mineralisation to the Ngualla Project.

### 4.3 Weathered Bastnaesite Zone Mineralogy

The large size of the Ngualla rare earth deposit has enabled Peak to select the geologically and mineralogically most favourable portion for initial development. Metallurgical test work has identified this to be the high grade weathered Bastnaesite Zone due to the combination of host rock and rare earth mineralogy (see Section 7: Beneficiation Development and Pilot Plant).

The weathered Bastnaesite Zone occurs as a thick blanket of high grade rare earth mineralisation from surface on Ngualla Hill. The mineralisation contains very low levels of uranium (15ppm) and thorium (53ppm) compared to other large rare earth deposits.

Optical mineralogy, SEM, XRD and QEMSCAN studies completed by Peak confirm that the majority of rare earth minerals occur as the fluorocarbonate mineral bastnaesite, with trace amounts of monazite and cerianite in some local areas. The rare earth minerals are predominantly liberated, with grain sizes in the range of 10–120µm, with the majority under 50µm. The dominant gangue minerals are barite, haematite, goethite and quartz (Table 3). Primary carbonate minerals (dolomite and calcite) have been completely removed through natural weathering processes (Figure 7).

The rare earth minerals occur as discrete fibrous or porous crystals or as inclusions in iron oxides (Plate 1). Some relict, predominately liberated grains of bastnaesite have also been identified. Barite is a dominant gangue species but is less associated with the REO carbonates compared to iron oxides.

The beneficiation and acid leach extraction stages of the mineral process developed for Ngualla take advantage of this favourable association of gangue and rare earth mineralogy to enable an efficient, low cost metallurgical process.

**Figure 7:** Diamond core NDD006.

Weathered iron oxide- barite carbonatite containing high grade mineralisation, 3 to 8 % REO.

Amenable to selective acid leach as majority of carbonate minerals removed through weathering.

Sharp karstic surface contact between weathered and fresh carbonatite.

Fresh carbonatite rock containing primary mineralisation 1.5 to 2.5% REO.

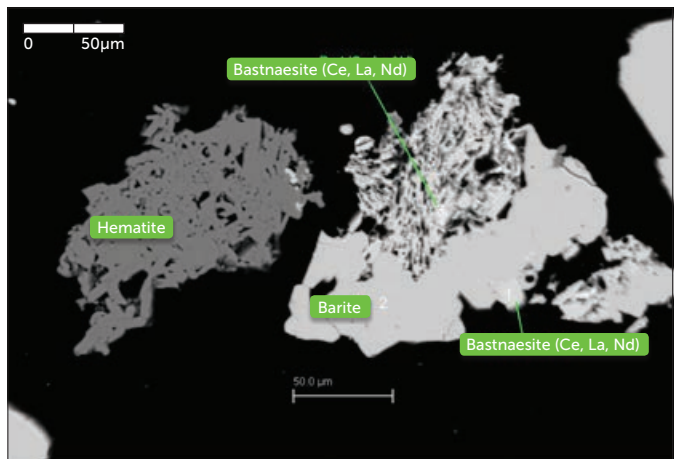
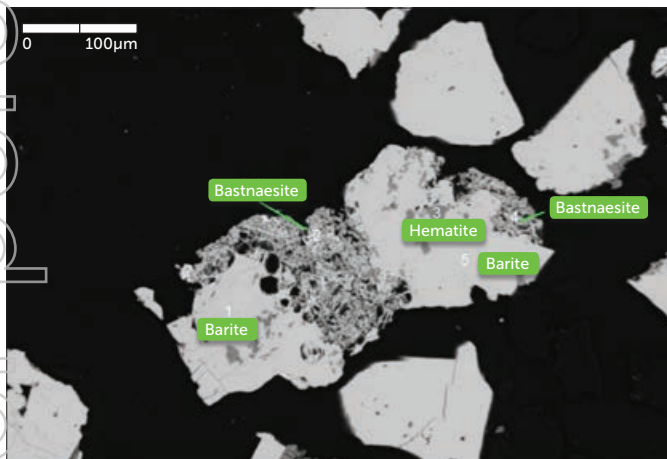


**Table 3:** Mineral summary for weathered Bastnaesite Zone mineralisation.

Main components of typical weathered Bastnaesite Zone mineralisation	
Barite	40%
Iron Oxides (Haematite and Goethite)	35%
Quartz	15%
Bastnaesite	6.5%

Mineral Associations	
Quartz:	liberated
Barite:	liberated
Fe Ox & Bast:	more intimately associated

**Plate 1:** SEM images of weathered Bastnaesite Zone rare earth and gangue minerals.





# 5 MINERAL RESOURCES

The Mineral Resources for Ngualla were reported in accordance with the JORC 2012 Code and Guidelines by independent resource consultants SRK Consulting (Australasia) Pty Ltd (SRK) in February 2016.

The total Mineral Resource estimate for the Ngualla Project above a 1% REO cut-off is:

**214.4 million tonnes at 2.15% REO, for 4,620,000 tonnes of contained REO**

(see Tables 4 and 6 for resource classification and individual rare earth distributions).

Included in the total Mineral Resource is the weathered Bastnaesite Zone which forms the core of the development Study. At a 1% REO lower grade cut-off the Mineral Resource estimate for the weathered Bastnaesite Zone is:

**21.3 million tonnes at 4.75% REO, for 1,010,000 tonnes of contained REO**

(see Tables 5 and 7 for resource classification and individual rare earth distributions).

The +1% REO weathered Bastnaesite Zone comprises 22% of the total Ngualla Mineral Resource at a 1% REO cut-off grade in terms of contained REO, and contains very low levels of uranium and thorium at 15ppm and 54ppm respectively.

The weathered Bastnaesite Zone Mineral Resource is defined as weathered or colluvial mineralisation containing less than 10% calcium and very low phosphorous of less than 0.3%. The 2016 Mineral Resource estimation process and estimate at selected cut-off grades was reported in ASX announcement titled "Higher grade Ngualla Mineral Resource contains nearly 1 million tonnes rare earth oxide" of 22 February 2016. As at the date of this report there has been no change to the Mineral Resource since this announcement.

Metallurgical test work has shown that mineralisation outside the weathered Bastnaesite Zone may be processed using other conventional beneficiation and leach recovery processes. The long mine life supported by the weathered Bastnaesite Zone provides the Company with the opportunity and time to optimise these processes, which could be brought in at a later stage in the life of the operation.

The +1% weathered Bastnaesite Zone is a high confidence Mineral Resource, with 98% classified as Measured or Indicated, and the majority (89%) being Measured (see Table 5). The mining inventory and production schedule for the Study is based on the Measured and Indicated portions of the +1% REO weathered Bastnaesite Zone Mineral Resource.

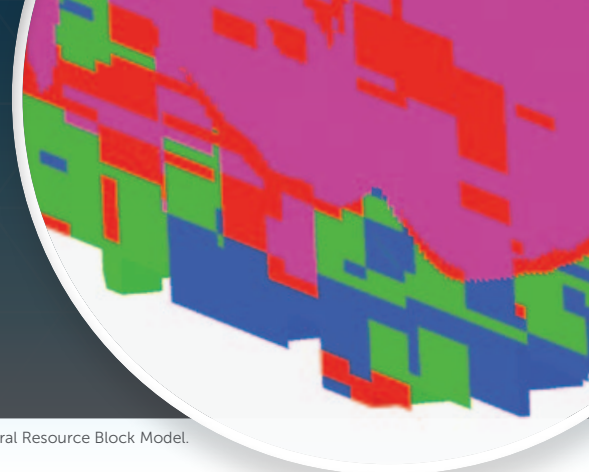
The Mineral Resources are delineated by angled (generally -60° west) RC, aircore and diamond drilling from surface at 40m x 50m spacing in the core of the deposit and Bastnaesite Zone, widening to 80m x 100m on the peripheries of the deposit (see Table 2 for summary of drilling on which the Mineral Resource is based). The majority of grade information is based on geochemical assaying of 2 metre composite RC samples and 1 metre PQ3 diamond quarter core. Assays were completed by NATA certified and ISO 9001 and 17025 accredited SGS Laboratories, Perth for 38 elements using XRF fusion, XRF pressed powder or multi-acid digest and ICP-MS instruments.

KEY FEATURES

Very large and high grade, globally significant deposit

Bastnaesite Zone alone supports a 31 year operational mine life

High confidence 89% is Measured JORC Mineral Resource



Ngualla Mineral Resource Block Model.

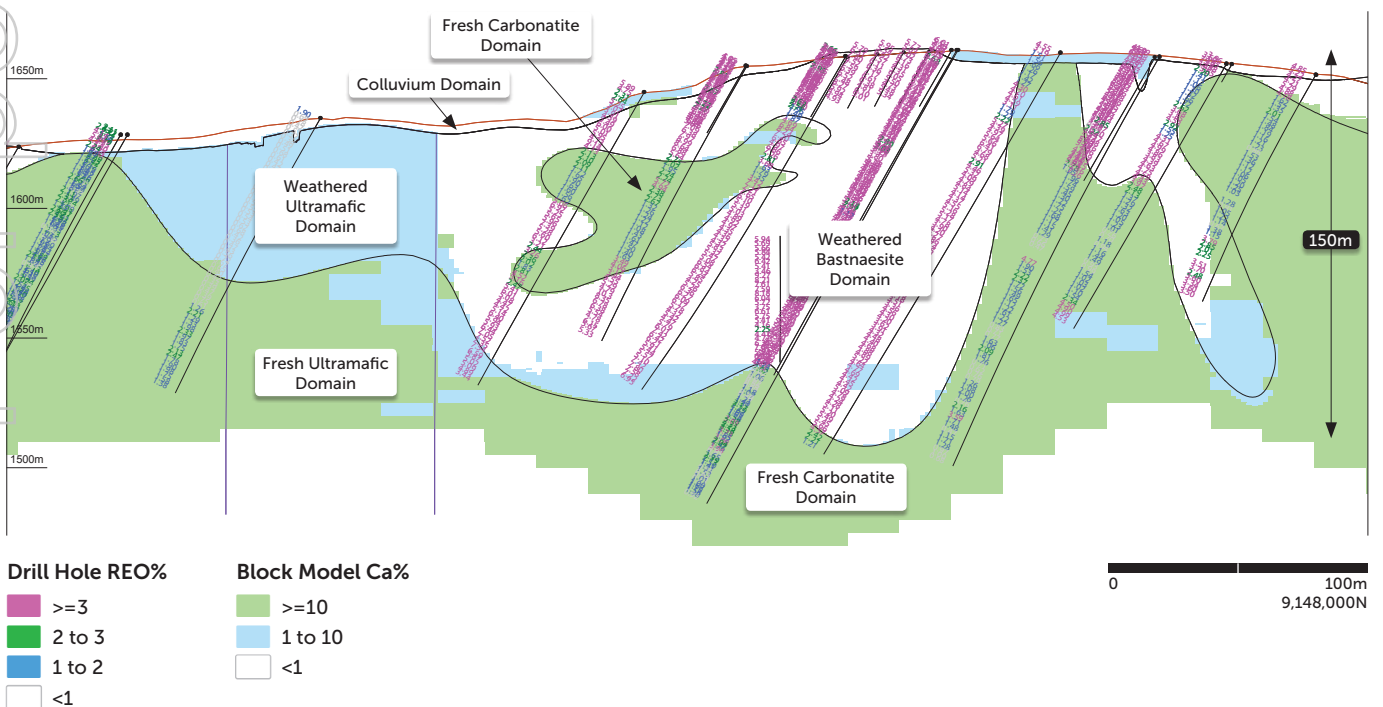
Mineral Resources were estimated using industry best practice geological modelling techniques to constrain the geological domains based on geological logging and multi-element geochemistry (Figure 8) together with geostatistical modelling to constrain the distribution of rare earth grades within these domains.

The Mineral Resource estimates were prepared using conventional block modelling and geostatistical estimation techniques. The modelling study was performed using Datamine Studio®, Supervisor® and X10®.

Kriging Neighbourhood Analysis (KNA) studies were used to assess a range of parent cell dimensions, and a size of 20m x 20m x 5m was selected as appropriate given the drill spacing, grade continuity characteristics and expected mining method. Sub celling was applied to enable wireframe volumes to be accurately modelled. Lithology wireframes were used as hard boundary estimation constraints. The parent cells were estimated using ordinary kriging. Search orientations and weighting factors were derived from variographic studies. Dynamic anisotropic searching was used for selected domains. A multi-pass estimation strategy was invoked, with KNA used to assist with the selection of search distances and sample number constraints. Extrapolation distances beyond the outermost holes were limited to approximately half the nominal local drill spacing.

Local estimates were generated for a total of 29 elements expressed in oxide form, including rare earth oxides of economic interest, the major gangue elements and a suite of minor elements that may have processing or marketing implications. Further details of the estimation process are summarised in the ASX Announcement of 22 February 2016.

**Figure 8:** Section through the Bastnaesite Zone showing some of the major modelling domains and their relationship to REO grade of drill samples and calcium content in the Mineral Resource block model.

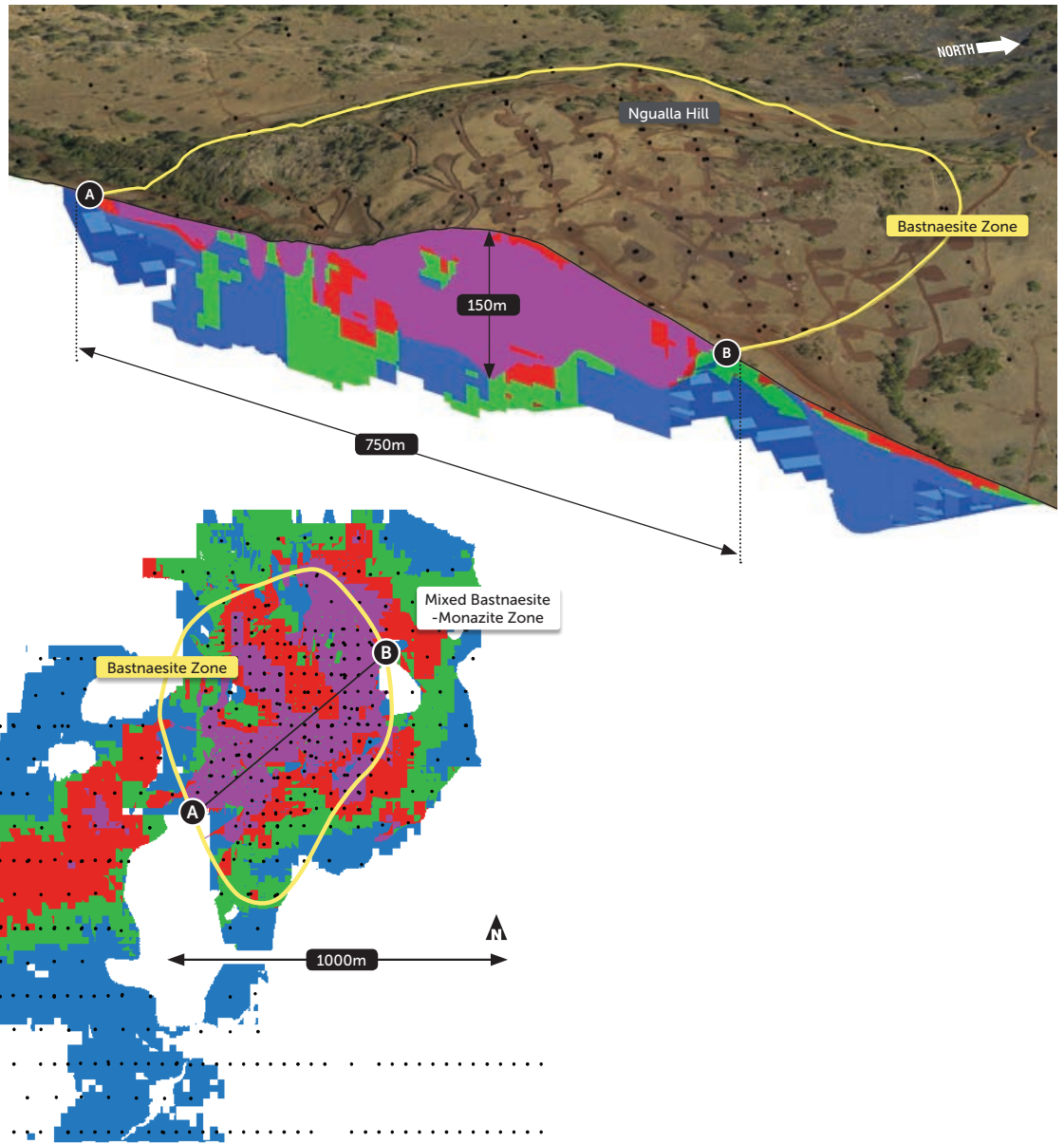


**Figure 9:** Plan and Section of Ngualla Mineral Resource block model >1% REO across the Bastnaesite Zone showing a thick blanket of high grade mineralisation at surface.

**Block Model REO%**

- >4%
- 3 to 4%
- 2 to 3%
- 1 to 2%

• Drill hole



Ngualla is not only an extremely large rare earth deposit but is also of superior quality as a result of high grades, favourable morphology and outcropping nature of the mineralisation for mining, favourable mineralogy for processing, low levels of uranium and thorium and a favourable proportion of high value neodymium and praseodymium (Figure 9).

This combination of fundamental geological characteristics distinguish Ngualla from other rare earth projects and drive the low capital and production costs outlined in the following sections of this report.

**Table 4:** Classification of Total Mineral Resources for the Ngualla Rare Earth Project at 1.0% REO cut-off grade.

Lower cut – off grade	JORC Resource Category	Tonnage (Mt)	REO (%)*	Contained REO tonnes
<b>1.0% REO</b>	Measured	86.1	2.61	2,250,000
	Indicated	112.6	1.81	2,040,000
	Inferred	15.7	2.15	340,000
	<b>Total</b>	<b>214.4</b>	<b>2.15</b>	<b>4,620,000</b>

\* REO (%) includes all the lanthanide elements plus yttrium oxides. See Table 6 for breakdown of individual REO's. Figures above may not sum due to rounding. The number of significant figures does not imply an added level of precision. Reported according to the JORC 2012 Code and Guidelines. The Total Ngualla Mineral Resources includes and contains the +1% REO weathered Bastnaesite Zone Mineral Resource shown in Table 5.

**Table 5:** Classification of Mineral Resources for the Bastnaesite Zone weathered mineralisation at a 1.0% REO cut-off grade.

Lower cut – off grade	JORC Resource Category	Tonnage (Mt)	REO (%)*	Contained REO tonnes
1.0% REO	Measured	18.9	4.75	900,000
	Indicated	1.9	4.85	90,000
	Inferred	0.5	4.43	20,000
	<b>Total</b>	<b>21.3</b>	<b>4.75</b>	<b>1,010,000</b>

\* REO (%) includes all the lanthanide elements plus yttrium oxides. See Table 3 for breakdown of individual REO's. Figures above may not sum precisely due to rounding. The number of significant figures does not imply an added level of precision. The Bastnaesite Zone is a subset of and included within the Ngualla Rare Earth Project Mineral Resource in Table 4. Reported according to the JORC 2012 Code and Guidelines.

**Table 6:** Ngualla 2016 Total Mineral Resource  $\geq$  1% REO. Individual rare earth oxide grades and percentages of total REO.

Rare Earth Oxides		REO Grade (%)				% of Total REO			
		Measured	Indicated	Inferred	All	Measured	Indicated	Inferred	All
Lanthanum	La <sub>2</sub> O <sub>3</sub>	0.704	0.501	0.560	0.587	26.99	27.73	26.08	27.25
Cerium	CeO <sub>2</sub>	1.262	0.871	1.022	1.039	48.38	48.17	47.61	48.23
Praseodymium	Pr <sub>6</sub> O <sub>11</sub>	0.125	0.087	0.105	0.104	4.81	4.80	4.90	4.81
Neodymium	Nd <sub>2</sub> O <sub>3</sub>	0.429	0.285	0.360	0.348	16.44	15.75	16.75	16.16
Samarium	Sm <sub>2</sub> O <sub>3</sub>	0.043	0.030	0.040	0.036	1.66	1.64	1.88	1.66
Europium	Eu <sub>2</sub> O <sub>3</sub>	0.009	0.006	0.009	0.007	0.33	0.34	0.43	0.34
Gadolinium	Gd <sub>2</sub> O <sub>3</sub>	0.019	0.014	0.021	0.016	0.71	0.76	0.99	0.75
Terbium	Tb <sub>4</sub> O <sub>7</sub>	0.002	0.001	0.002	0.001	0.06	0.07	0.09	0.07
Dysprosium	Dy <sub>2</sub> O <sub>3</sub>	0.003	0.003	0.006	0.003	0.13	0.16	0.27	0.16
Holmium	Ho <sub>2</sub> O <sub>3</sub>	0.000	0.000	0.001	0.000	0.02	0.02	0.03	0.02
Erbium	Er <sub>2</sub> O <sub>3</sub>	0.001	0.001	0.002	0.001	0.05	0.06	0.09	0.06
Thulium	Tm <sub>2</sub> O <sub>3</sub>	0.000	0.000	0.000	0.000	0.00	0.00	0.01	0.00
Ytterbium	Yb <sub>2</sub> O <sub>3</sub>	0.001	0.000	0.001	0.001	0.02	0.02	0.04	0.04
Lutetium	Lu <sub>2</sub> O <sub>3</sub>	0.000	0.000	0.000	0.000	0.00	0.00	0.00	0.00
Yttrium	Y <sub>2</sub> O <sub>3</sub>	0.011	0.009	0.018	0.010	0.40	0.48	0.82	0.47
<b>Total REO*</b>		<b>2.61</b>	<b>1.81</b>	<b>2.15</b>	<b>2.15</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

**Table 7:** Ngualla 2016 weathered Bastnaesite Zone Resource  $\geq$  1% REO. Individual rare earth oxide grades and percentages of total REO.

Rare Earth Oxides		REO Grade (%)				% of Total REO			
		Measured	Indicated	Inferred	All	Measured	Indicated	Inferred	All
Lanthanum	La <sub>2</sub> O <sub>3</sub>	1.309	1.345	1.200	1.310	27.57	27.72	27.09	27.58
Cerium	CeO <sub>2</sub>	2.292	2.339	2.128	2.293	48.28	48.18	48.04	48.27
Praseodymium	Pr <sub>6</sub> O <sub>11</sub>	0.227	0.231	0.213	0.227	4.77	4.75	4.82	4.77
Neodymium	Nd <sub>2</sub> O <sub>3</sub>	0.783	0.799	0.763	0.784	16.48	16.45	17.23	16.50
Samarium	Sm <sub>2</sub> O <sub>3</sub>	0.076	0.078	0.071	0.076	1.60	1.61	1.60	1.60
Europium	Eu <sub>2</sub> O <sub>3</sub>	0.014	0.014	0.013	0.014	0.30	0.29	0.29	0.29
Gadolinium	Gd <sub>2</sub> O <sub>3</sub>	0.029	0.030	0.027	0.029	0.62	0.61	0.61	0.61
Terbium	Tb <sub>4</sub> O <sub>7</sub>	0.002	0.002	0.002	0.002	0.05	0.05	0.05	0.05
Dysprosium	Dy <sub>2</sub> O <sub>3</sub>	0.004	0.004	0.003	0.004	0.07	0.07	0.07	0.07
Holmium	Ho <sub>2</sub> O <sub>3</sub>	0.000	0.000	0.000	0.000	0.01	0.01	0.01	0.01
Erbium	Er <sub>2</sub> O <sub>3</sub>	0.002	0.002	0.002	0.002	0.03	0.04	0.04	0.03
Thulium	Tm <sub>2</sub> O <sub>3</sub>	0.000	0.000	0.000	0.000	0.00	0.00	0.00	0.00
Ytterbium	Yb <sub>2</sub> O <sub>3</sub>	0.001	0.001	0.000	0.001	0.01	0.01	0.01	0.01
Lutetium	Lu <sub>2</sub> O <sub>3</sub>	0.000	0.000	0.000	0.000	0.00	0.00	0.00	0.00
Yttrium	Y <sub>2</sub> O <sub>3</sub>	0.010	0.010	0.007	0.010	0.20	0.20	0.16	0.20
<b>Total REO*</b>		<b>4.75</b>	<b>4.85</b>	<b>4.43</b>	<b>4.75</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

\* Figures may not sum due to rounding.

# 6 MINING & MINING INVENTORY

## KEY FEATURES

31 years of operation at a production rate of ~2,300tpa of Nd+Pr Oxide

This update to the previous PFS mining studies indicate the viability of a modest sized but long life open pit operation with a low LOM waste strip ratio of 1.68, which at the proposed production rate can provide sufficient feed for an initial project life in excess of 30 years based solely on the weathered Bastnaesite Zone portion of the greater Ngualla deposit.

Orelogy Consulting Pty Ltd (Orelogy) based in Perth, Western Australia, have undertaken all the previous mining studies on Ngualla and consequently Peak commissioned them to complete this update to the mining component of the Project. As the mineralisation is weathered and at surface, mining will be predominantly (70%) free dig requiring minimal blasting and with low mineralisation to waste stripping ratios. Through the optimisation and scheduling process the mine will also produce higher grade mill feed in the earlier years of production.

The scope of work that formed the basis of this mining study comprised the following:

- Open pit optimisation
- Mining cost estimation
- Mine production scheduling utilising optimal shells
- Mining equipment and personnel requirements

## 6.1 Mining Losses

Mining losses and dilution are expected to be minimal due to the thick blanket morphology of the deposit and the use of small mining equipment operating at a relatively low mining rate of less than 3.0Mt of total material movement (TMM) per annum over the life of mine. Total mining losses comprise just 6.0% of the total Mineral Resource available (Measured + Indicated categories of the  $\geq 1\%$  REO weathered Bastnaesite Zone, see Table 5).

## 6.2 Open Pit Optimisation

The pit optimisation was undertaken using GEMCOM Whittle 4X software utilising the Feb 2016 Ngualla Mineral Resource model completed by SRK Consultants Pty Ltd.

Table 8 provides a summary of the updated optimisation wall slope parameters used for this study.

Table 8: Pit Slope design criteria.

Location	Face Height	Batter Angle	Berm Width	Catch Berm Width	Catch Berm Increment	Overall Slope Angle
	(m)	(°)	(m)	(m)	(m)	(°)
Oxide	10.0	50	7.0	20	30	25
Oxide / Fresh	10.0	50	7.0	20	30	25
Fresh	10.0	85	5.0	14	90	50

The overall slope includes an allowance for a 20m wide catch berm every 30 vertical metres in oxide material and the oxide / fresh transition zone. This results in the very shallow 25° slope applied. As the vertical increment for the berm is small (30m), it was determined that utilising a 20 m wide ramp would have much the same effect, even though this width is considerably more than is necessary for a dual lane ramp based on the articulated dump truck selected.

Open pit mine life of 24 years at a low strip ratio of 1.68

Mining Inventory of 18.4 million tonnes at 4.89% REO

Low total mining rate of less than 3.0Mt per year

First 10 years at an average grade of 5.48% REO



Mining equipment.

The optimisation was run using a production rate of 1,787 tonnes of recovered neodymium oxide ( $\text{Nd}_2\text{O}_3$ ) per annum. Metallurgical recoveries are detailed in Section 7 of this report and capital costs are provided in Section 15. Associated operating cost parameters for mining, processing, and selling can be found in Section 16. The individual rare earth oxide grades, recoveries and prices were used in preference to using an average REO grade, average total recovery and basket price. This level of detail was required to maximise total returns by allowing the optimiser and subsequent mine schedule to focus early production on the highest grade areas of Ngualla's main value drivers of neodymium and praseodymium.

Only material from the weathered Bastnaesite Zone and with a REO grade above 1% was used in the optimisation. Of this material 90% is in the Measured JORC category and 8% at an Indicated level. The Inferred portion of the Mineral Resource was excluded from the optimisation process.

### 6.3 Mine Inventory

A final mine design was not completed for this study. Internal interim stage designs were completed and determined to be acceptable in relation to the optimisation update. Consequently the initial years of mining are scheduled within these designs and can therefore be considered robust. However an Ore Reserve cannot be updated at this stage as a final mine design has not been completed.

An optimal shell was selected as the basis for the LOM scheduling. In line with previous studies, it is assumed mining is via two successive 5 metres mining flitches with a final wall batter height of 10 metres and a face slope angle of 50 (weathered material) or 85 degrees (fresh material). An overall wall slope angle of 25 degrees for oxide material was utilised in the optimisation process. This slope angle is considered conservative and on completion of the geotechnical investigations by Golders to be undertaken during the BFS (6 diamond drill holes for geotechnical analysis) it is anticipated that this angle will increase.

The location of the optimal pit shell and the interim pit designs are shown in Figure 10. The ultimate shell contains the following mining inventory:

- Plant Feed of 18.4 million tonnes at 4.89% REO comprised of 16.9 million tonnes at 4.86% REO Measured Resource and 1.5 million tonnes at 5.16% REO Indicated Resource (see Table 9).
- The average LOM strip ratio is 1.68.
- Provides for 31 years of mill feed at a production rate output of approximately 2,300 tonnes per year of Neodymium and Praseodymium Oxide.

Previous mining studies have indicated that the pit design process generally converts > 95% of optimal shell inventories to a subsequent Ore Reserve, with an associated 5% - 10% increase in waste. The small amount of additional waste included within any design is the result of ensuring a practical design is achieved whilst capturing all the mineralisation.

Figure 10: Perspective view of staged pit designs, Ngualla weathered Bastnaesite Zone.

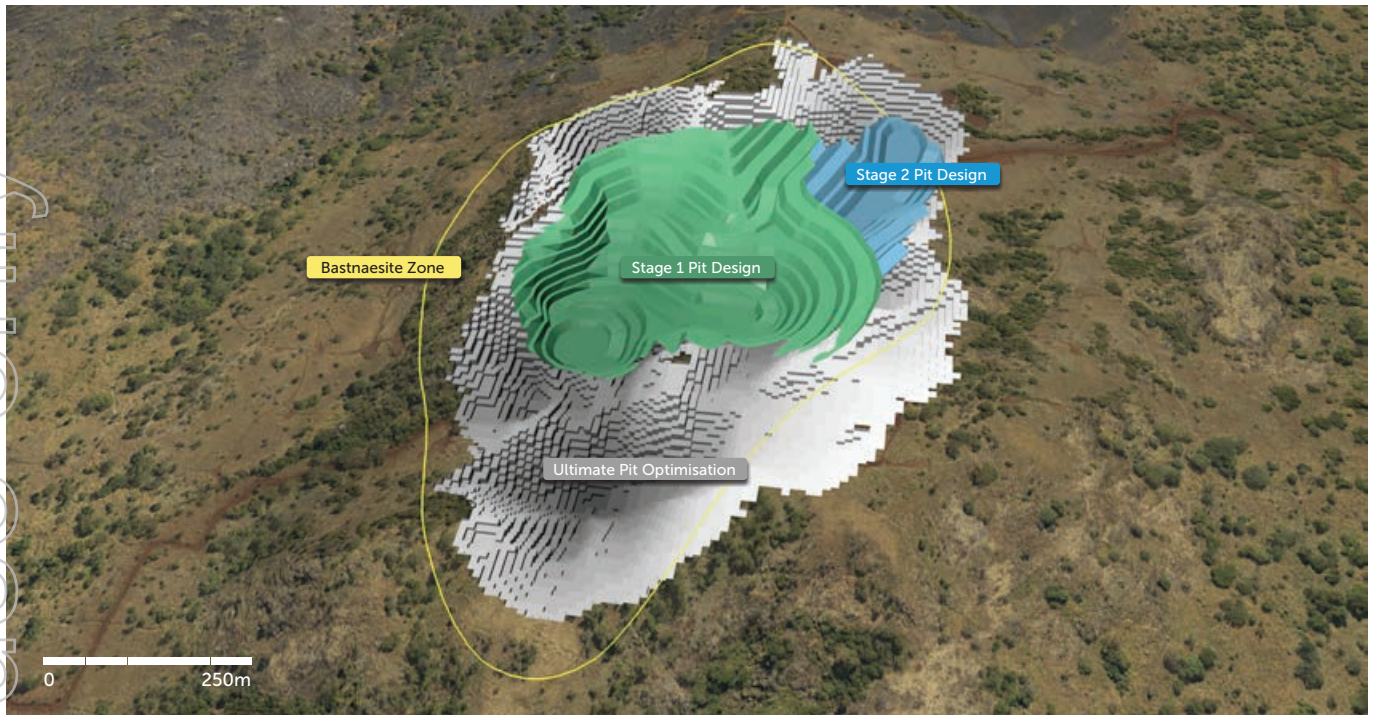


Table 9: Ngualla Project Shell Inventory.

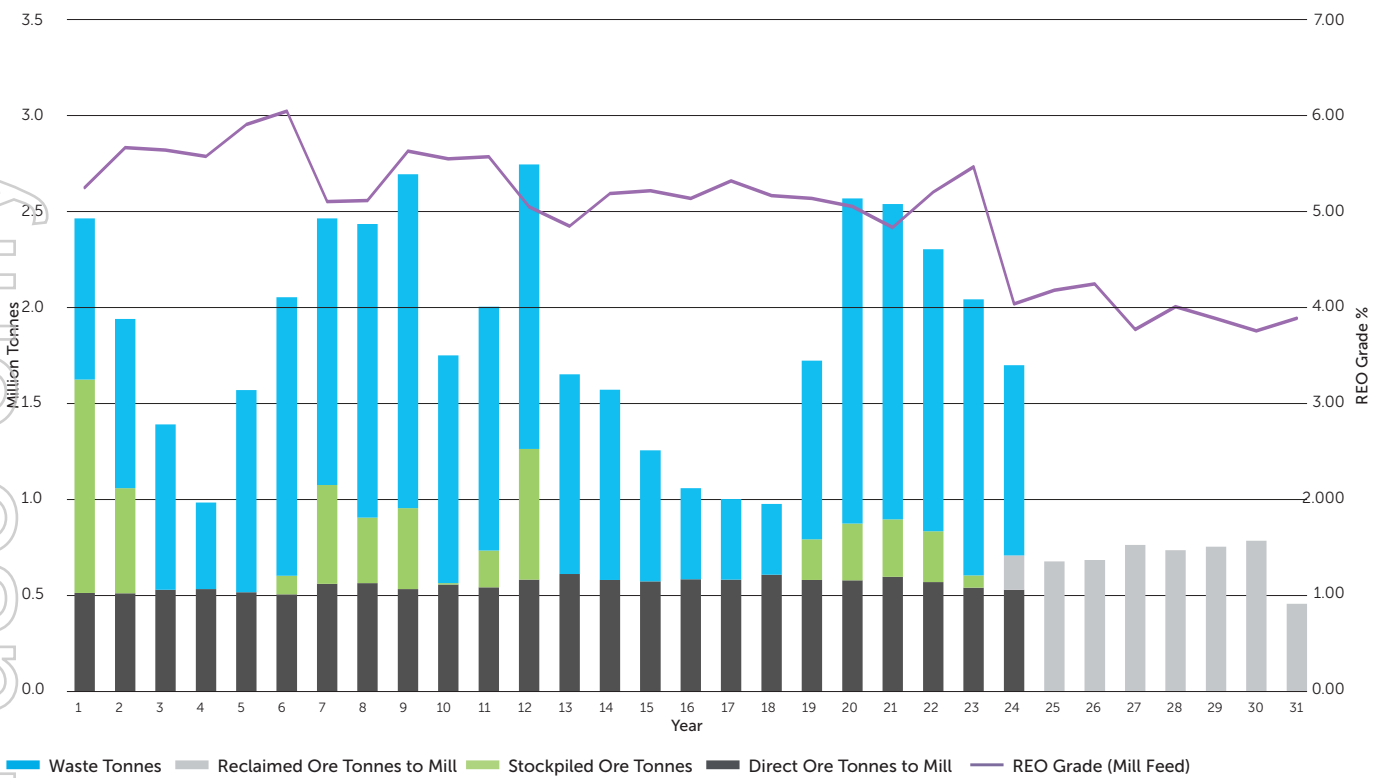
Classification	Ore Tonnes (Mt)	REO %	Contained REO tonnes
Measured	16.9	4.86	822,000
Indicated	1.5	5.16	77,000
<b>Total</b>	<b>18.4</b>	<b>4.89</b>	<b>899,000</b>

To further enhance the mining returns in the first years, and as project economics are not sensitive to total mining costs, the slightly lower value (lower grade) ore >1% REO mined is selectively stockpiled for later processing to allow access to higher value material earlier in the processing schedule. This can be seen in the mine schedule shown in Table 10 and Figure 11, with the stockpiled material shown to be processed from Year 24 on.

Table 10: Life of Mine (LOM) Material Movement and Plant Throughput.

	Total LOM	Year(s)						
		1	2	3	4 to 5	6 to 10	11 to 20	21 to 31
Total (Mt)	49.34	2.73	1.95	1.46	3.27	13.06	17.61	9.25
Waste (Mt)	30.96	1.12	0.90	0.93	2.22	8.97	10.42	6.40
Ore (Mt)	18.38	1.62	1.06	0.53	1.05	4.09	7.18	2.86
Strip Ratio	1.68	0.69	0.85	1.76	2.12	2.19	1.45	2.24
Direct Ore Feed to Mill (Mt)	13.32	0.51	0.51	0.53	1.05	2.72	5.81	2.20
Ore to Stockpile (Mt)	5.06	1.11	0.54	0.00	0.00	1.37	1.37	0.66
Ore Feed from Stockpile (Mt)	5.06	0.00	0.00	0.00	0.00	0.00	0.00	5.06
Total Ore Feed (Mt)	18.38	0.51	0.51	0.53	1.05	2.72	5.81	7.25
REO grade (%) through Mill	4.89	5.22	5.64	5.61	5.71	5.45	5.14	4.23

Figure 11: Mine material movement tonnes and REO grade by year.



## 6.4 Mining Fleet and Personnel Requirements

The mining method is conventional open pit, load, haul and dump using a fleet of small sized owner operated earthmoving equipment centred around one 70 tonne excavator and seven 40 tonne six wheel drive articulated dump trucks (Figure 12).

Personnel requirements for the mining operation are quite modest. A total of 23 operators will be required and 29 management, technical services and maintenance personnel. The majority of the required staff and all the plant operators will be sourced within Tanzania.



Figure 12: Volvo EC300E excavator and A25G articulated dump truck.



# BENEFICIATION DEVELOPMENT AND PILOT PLANT

Peak has developed and successfully demonstrated at pilot plant scale a multistage beneficiation treatment process for upgrading the weathered Bastnaesite Zone mineralisation through to high grade rare earth concentrate utilising conventional milling and flotation technology.

## 7.1 Introduction

An initial program of evaluation and sighter test work across the deposit was undertaken on a range of rare earth mineralisation styles. This work identified that the weathered bastnaesite mineralisation should be initially targeted as it will respond well to metallurgical treatment. This is due to:

- A high in-situ rare earth grade.
- A relatively good liberation of the rare earth host minerals (predominantly bastnaesite) from gangue minerals.
- The low content of carbonate and phosphate gangue minerals which would consume acid in the downstream recovery process.

A simple, multistage beneficiation process has been developed consisting of:

1. Comminution – the physical liberation of rare earth minerals from host gangue minerals by crushing and grinding.
2. An initial flotation to target and reject the major gangue mineral of barite which accounts for approximately 40% of the mass of the mineralisation.
3. A regrind stage to further liberate the rare earth minerals.
4. Rare earth flotation to target, separate and concentrate the rare earth bastnaesite from the remaining iron and silicate gangue minerals.

## 7.2 Background

The beneficiation process originally developed during the PFS, consisted of wet magnetic separation followed by flotation to achieve a modest three times upgrade of rare earths into a mineral concentrate grade of approximately 16% REO.

Through extensive further testwork on different flowsheet options both in Australia and China, Peak made a breakthrough in successfully developing a more effective flowsheet consisting of a multiple stage flotation process with a regrind stage. The new flowsheet achieves a 95% mass reduction with a concentrate grade of 45% REO. This offers significant advantages over the previous flowsheet including:

- A significantly lower mass reduces both rare earth concentrate transportation costs and the size of the downstream refinery.
- A greater rejection of acid consuming impurities (mainly iron minerals) that has a marked effect on reducing reagent consumption in the downstream refinery.

## KEY FEATURES

Demonstrated robust flowsheet with 95% mass rejection

Produces mineral concentrate containing >40% REO

Subsequently reduces downstream capital and operating costs



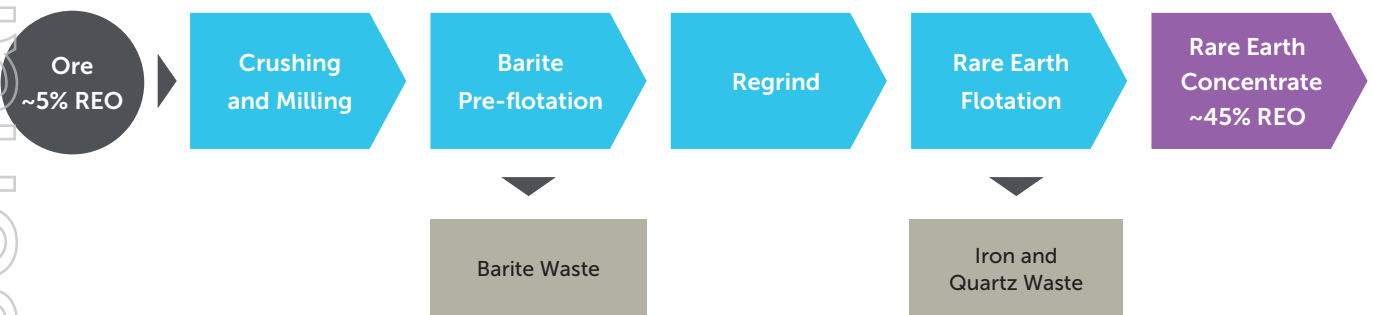
Beneficiation Pilot Plant, ALS.

## 7.3 Beneficiation Flowsheet Development

The beneficiation flowsheet has been developed and optimised through laboratory bench scale, bulk scale and piloting metallurgical testwork working with Independent Metallurgical Operations Pty Ltd (IMO) and ALS Metallurgy in Perth, Western Australia. The revised flowsheet consists of a multistage process, with a Barite Pre-flotation Circuit, a regrind stage and finally a Rare Earth Flotation Circuit. A simplified overview of the beneficiation flowsheet is presented in Figure 13.

Laboratory bench scale testwork was conducted on multiple ore samples (which varied in both head grade and mineralogy) to assist with flowsheet refinement and verify the robustness of the process.

Figure 13: Simplified beneficiation flowsheet.



## 7.4 Beneficiation Flowsheet Description

The run of mine (ROM) material is crushed, ground and classified through a comminution circuit targeting the initial liberation of the major gangue mineral barite. The classified slurry is then conditioned before proceeding to the Barite Pre-flotation Circuit consisting of roughing and two stages of cleaning. This circuit targets and removes greater than 90% of barite which is the major gangue mineral present. This circuit rejects approximately 45% of the ROM mass for a minimal loss of rare earths. The tailings stream from this circuit, which is almost pure barite, is thickened and pumped to a dedicated cell within the Tailings Storage Facility (TSF).

The product from the Barite Pre-flotation is sent to a regrind stage to improve liberation of bastnaesite from the iron gangue minerals (predominantly goethite/limonite) before proceeding into the Rare Earth Flotation Circuit. This circuit, consisting of roughing and four stages of cleaning, targets bastnaesite directly with the iron and silica rich, rare earth depleted stream being rejected to tails. The overall beneficiation process achieves a mass rejection of 95% to produce a 45% REO grade concentrate.

## 7.5 Beneficiation Pilot Plant

A beneficiation flowsheet piloting program was conducted at ALS from September to December 2015. A total of 56 dry tonnes of typical weathered bastnaesite mineralisation was transported from Ngualla to Perth. The mineralisation was initially coarse crushed and homogenised to form a single bulk sample grading 5.9% REO. The bulk sample was piloted at a feed rate of 250 kg/hour using the new milling and two stage flotation flowsheet developed by Peak.

The Pilot Plant successfully accomplished the following criteria:

- Sustained operation in steady state demonstrating the beneficiation process is both robust and reproducible on mineralisation selected to be representative of the first five years of mill feed
- Provision of vital operating and design parameters to AmecFW for incorporating into the BFS
- The production of two tonnes of concentrate grading >40% REO in preparation for piloting of the next stage recovery process at ANSTO Minerals (ANSTO) in Sydney
- Continuous production runs of up to five days

Representatives of Peak's lead engineer, AmecFW, assisted in the planning and supervising of the pilot program. During the piloting, stream products were collected for vendor testwork with the focus on areas of regrinding, thickening and filtration. Flotation cell vendors also inspected the piloting to gain an understanding into equipment requirements.

Metallurgical performance data was collected from shift composite results and circuit surveys conducted over the course of the piloting. This operational information and shift and survey metallurgical performance data has proven invaluable to AmecFW in the engineering of the beneficiation flowsheet.

Photos of the piloting are shown in Figure 14.

For personal use only



1



2



3



4



5



6

**Figure 14:** Beneficiation piloting at ALS. **1.** Crushed sample prior to primary grinding and Barite Pre-flotation circuit; **2.** Crushing Circuit Layout; **3.** Barite Pre-flotation Circuit (Roughing stage); **4.** Rare Earth Flotation - final concentrate (Cleaner 4 Concentrate); **5.** Rare Earth Concentrate grading ~45% REO; **6.** Two tonnes of Rare Earth Concentrate ready for delivery to ANSTO.



# NGUALLA MULTISTAGE PROCESSING PLANT

Peak has designed the Multistage Processing Plant that will be located on site at Ngualla to produce 28,000 t/a of rare earth concentrate grading 45% REO. The plant comprises of the following:

- A ROM pad to receive mine production and blend plant feed to predefined specifications
- A comminution circuit incorporating primary crushing, grinding and classification
- Beneficiation of the ground feed utilising reverse gangue flotation, regrinding and rare earth flotation to produce a high grade/low mass concentrate
- A segmented TSF for safe disposal of waste solids and water reclaim

The Multistage Processing Plant layout and flowsheet is shown in Figures 15 and 16 respectively.

The entire flowsheet has been modelled by AmecFW using SysCAD software to provide a detailed mass and energy balance model. Operating and capital costs have been determined on the basis of the model outputs.

The key Basis of Design parameters are given in Table 11.

**Table 11:** Processing Plant Basis of Design Parameters

Annual mill throughput (dry tonnes)	556,000t
ROM grade (%REO)	5.29%
Annual rare earth concentrate production (dry tonnes)	27,900t
Rare earth concentrate grade (% REO)	45%

## 8.1 Comminution Circuit

The ROM feed is delivered to stockpiles allowing for blending based on grade and mineralogy. A front end loader reclaims from the stockpile and feeds directly to a ROM bin which is fitted with a static grizzly to scalp out oversize rock. Feed is withdrawn at a controlled rate from the bin by an apron feeder, which in turn transfers onto a vibrating grizzly feeder to scalp out fines. Scalper oversize is fed to a toothed rolls mineral sizer, which breaks rocks down to a notional top size of 200mm and is combined with scalper undersize on the discharge conveyor. The feed is then conveyed directly to the grinding circuit.

The crushed material is initially milled in a high aspect open circuit SAG mill, with slurry passing through discharge grates and a trommel. Oversize pebbles are diverted into a bunker for periodic re-handling whilst the trommel undersize slurry flows into a common hopper shared with the closed circuit secondary ball mill. The hopper discharge is pumped to a pack of hydrocyclones with the underflow reporting back to the secondary mill. The final product (cyclone overflow) has a particle size of 80% passing 53µm.

## KEY FEATURES

Multistage Processing  
Plant produces high  
grade rare earth  
concentrate

Utilises standard  
crushing, milling  
and flotation  
technology



Rare Earth Concentrate containing 45% REO.

## 8.2 Barite Pre-flotation Circuit

The ground material is conditioned in two high intensity conditioning tanks with flotation reagents prior to being presented to barite flotation. The circuit consists of a rougher bank, with the rougher concentrate being further upgraded in two stages of cleaner flotation.

## 8.3 Barite Pre-flotation Dewatering and Tailings Disposal

The waste stream from the Barite Pre-flotation, which is almost pure barite, is dewatered in a high rate thickener and pumped to a dedicated cell within the TSF. The thickener overflow water is recycled back to this circuit.

The barite depleted stream, which contains the majority of rare earth minerals along with gangue iron and silica minerals, is dewatered in a high rate thickener to recover the process water. The thickened slurry is pumped to a surge tank to provide a buffer between flotation circuits.

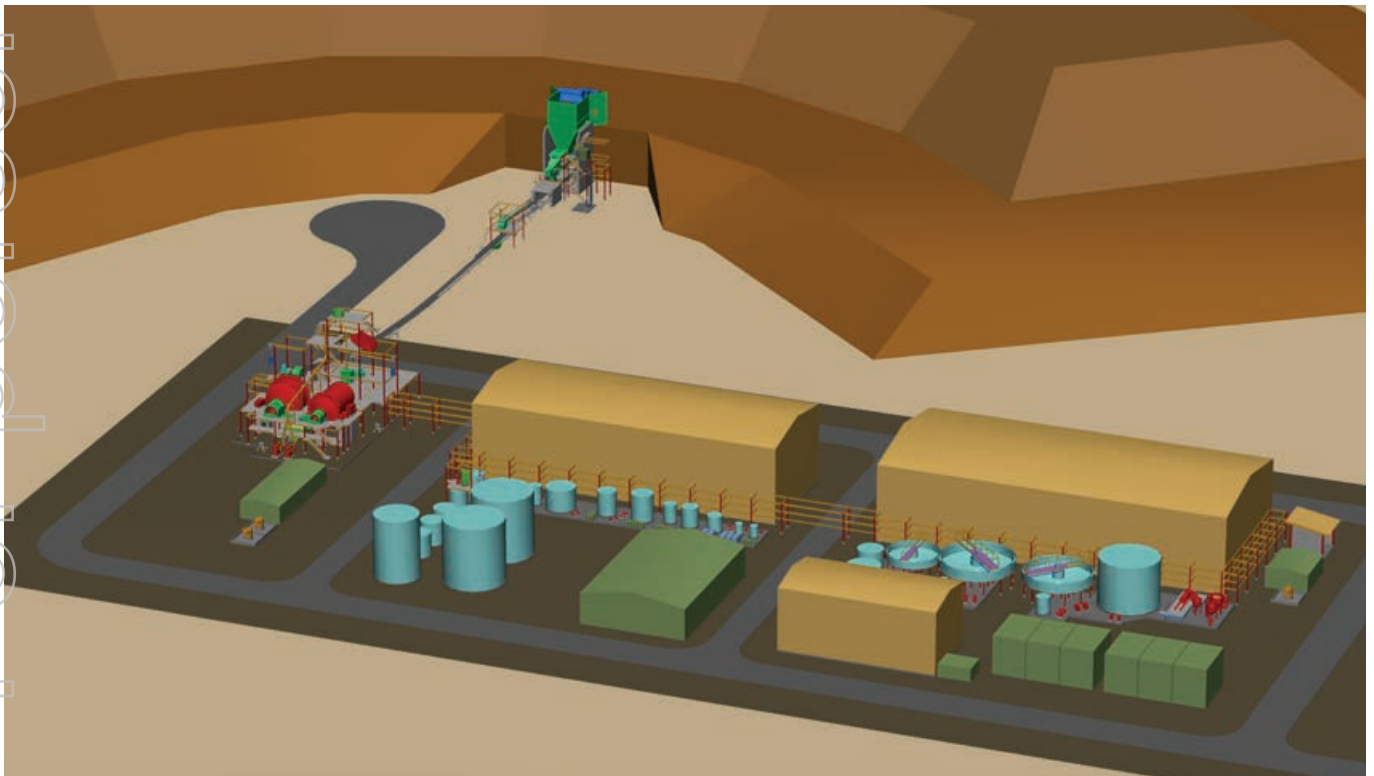
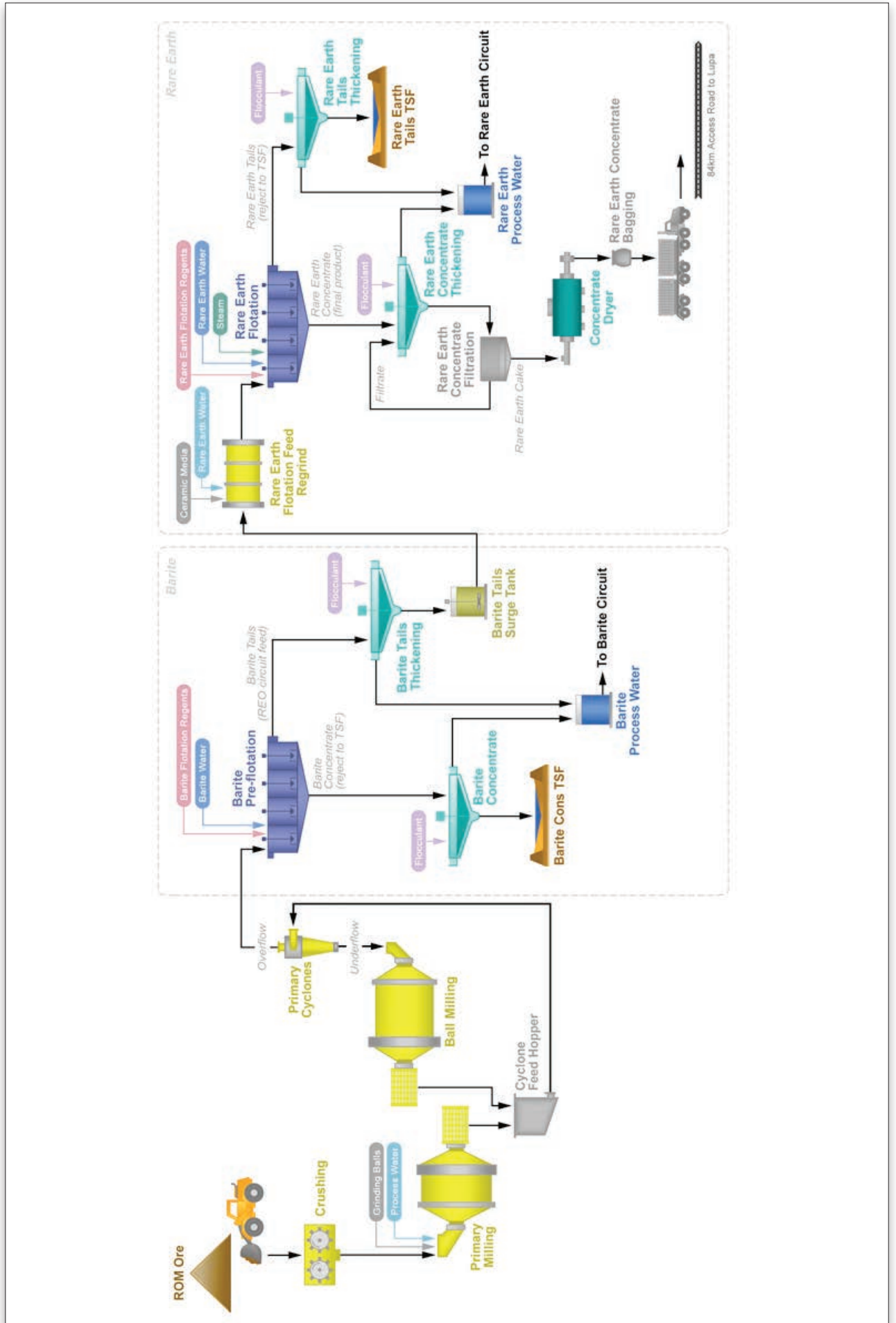


Figure 15: 3D view of the Ngualla Multistage Processing Plant design.

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## 8.4 Regrind and Rare Earth Flotation Circuit

Slurry is pumped from the surge tank through an open circuit regrind mill in order to grind coarse particles and mechanically reactivate mineral surfaces ahead of rare earth flotation. The milled slurry is diluted with process water and heated with steam injection in conditioning tanks where flotation reagents are added prior to flotation. The Rare Earth Flotation circuit is of higher complexity than the Barite Pre-flotation Circuit due to the comparatively difficult separation of rare earth minerals from iron minerals which require stage wise depression with starch to achieve an adequate final concentrate grade. The circuit consists of a rougher train followed by four stages of counter-current closed circuit cleaner flotation. Steam is added stage wise through the cleaner circuit in order to improve selectivity against the iron minerals.

## 8.5 Concentrate and Tailings Dewatering

The final concentrate is dewatered in a high rate thickener to recover water from the overflow with the thickened slurry reporting to a filter surge tank. Slurry is then pumped through a pressure filter which operates on a batch cycle, with the filter cake discharging onto a conveyor belt and then into a drying and bagging facility. The bagged concentrate is then containerised for land and sea transport to the Refinery or for direct sale. The tailings from this circuit, comprising mainly of iron minerals, are dewatered in a high rate thickener to recover water and then pumped to a dedicated cell within the TSF.



# 9 NGUALLA SITE INFRASTRUCTURE AND SERVICES

The site infrastructure layout has been arranged to keep the physical footprint of the operation to a minimum, with all required infrastructure, the accommodation village, process buildings and stockpiles being positioned within the current Prospecting Licence boundaries. It is not anticipated that Peak will need to acquire any land over and above the land it already has access to in order to accommodate the entire required infrastructure for the operation. Figures 19 and 20 show the preliminary layout design for the Mine and Multistage Processing Plant.

## 9.1 Electrical Power Supply

The total electrical power requirements of the operation including the multi-step process plant, accommodation village and infrastructure of 7.5MW will be produced entirely on site. Power will be produced by a combination of diesel and heavy fuel oil powered generator sets. Peak is also investigating the possibility of installing a solar panel farm at the site to further reduce power costs and carbon emissions from the site.

## 9.2 Water Supply

Total water draw from the planned weir and borefield for the process plant and site infrastructure including accommodation village is estimated at 350ML per annum. A water exploration exercise including drilling programme carried out by Knight Piésold in 2015 has confirmed that these requirements can be comfortably met through the combination of a modest sized borefield and an existing creek (Figure 17). Water from the tailings facility will also be recycled into the process plant. An estimate of \$1.58 million is included in the Capex for the development of the borefield, weir with pumping station and associated pipelines and powerlines.



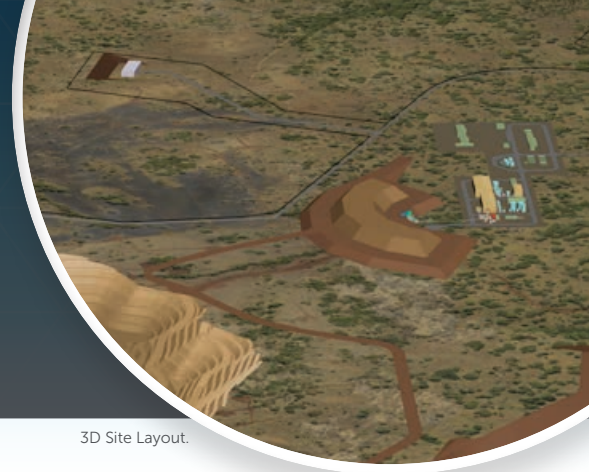
Figure 17: Water intersected in bore NWB008, September 2015.

#### KEY FEATURES

Multistage  
Processing  
on site

Available land  
and water  
for entire  
operation

Independent  
power generation  
on site



3D Site Layout.

### 9.3 Accommodation Village

Peak has a commitment to train and employ as many people from the local community as practicable. This will be to the mutual benefit of the company and the local region as the approach will reduce labour costs as well as enhancing the local economy. A further advantage is a reduction in the size of the accommodation village required, as the majority of staff will continue to live with their families in the local villages. Expatriate staff and staff that cannot be sourced locally will be housed in a purpose built accommodation village. The village is expected to house approximately 216 people in both shared and private dwellings.

Personnel levels in the initial construction phase of the project are likely to peak at three times higher than at steady state operation. Additional accommodation will be supplied by an expansion of the existing exploration camp and the potential early construction of the accommodation village with supplemental temporary capacity.

### 9.4 Tailings Storage Facility

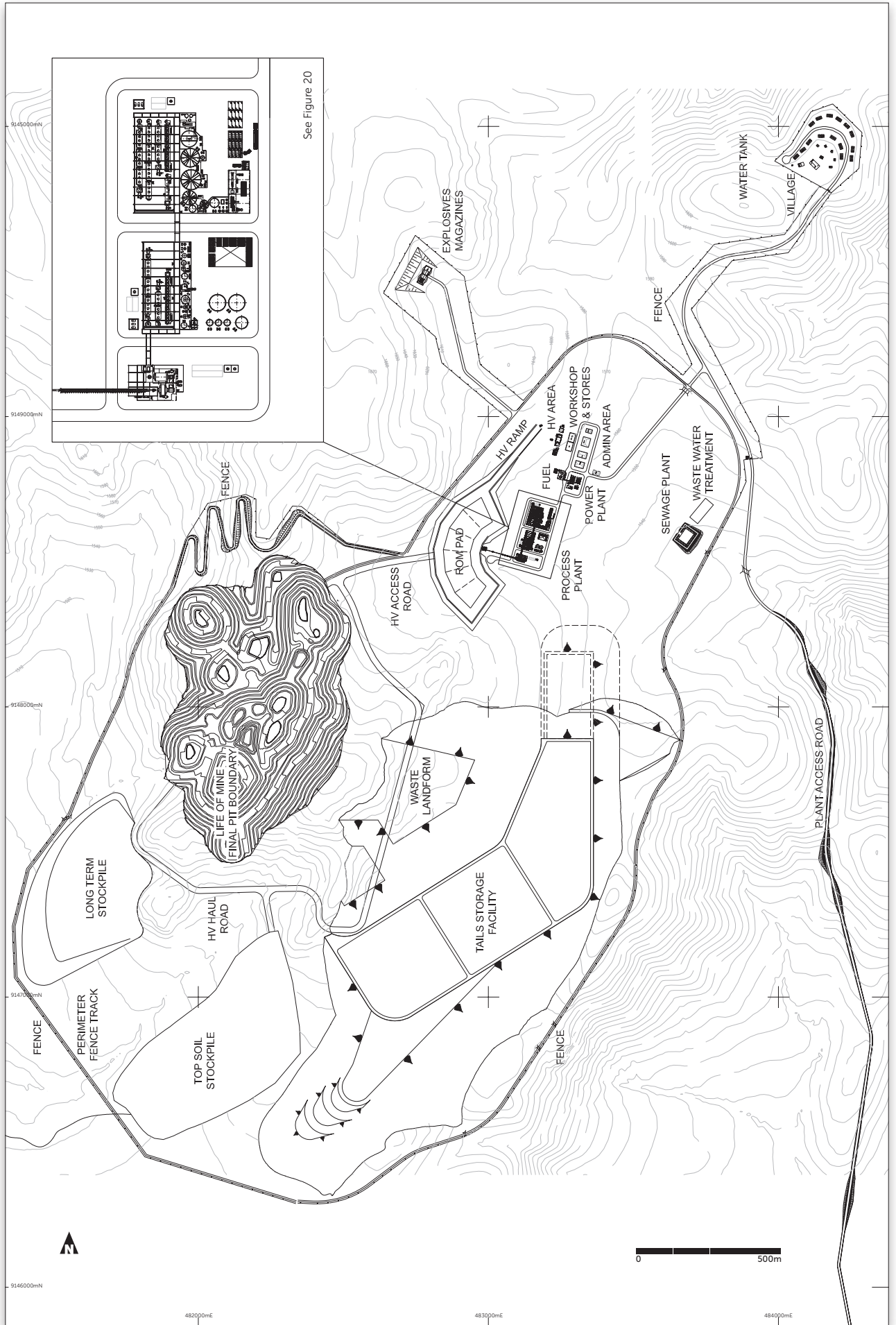
The tailings storage facility has been designed by Knight Piésold to be constructed within and using the overburden waste from the mine (Figure 19). This design will significantly reduce the overall footprint of the disturbed area and hence reduce the overall environmental impact of the operation. This approach is considered best practice and has significant cost benefits through the reduction of the need for quarrying construction materials. The ability to locate the dam closer to the processing plant also results in reduced pumping and operating costs.



Figure 18: Ngwala air strip.

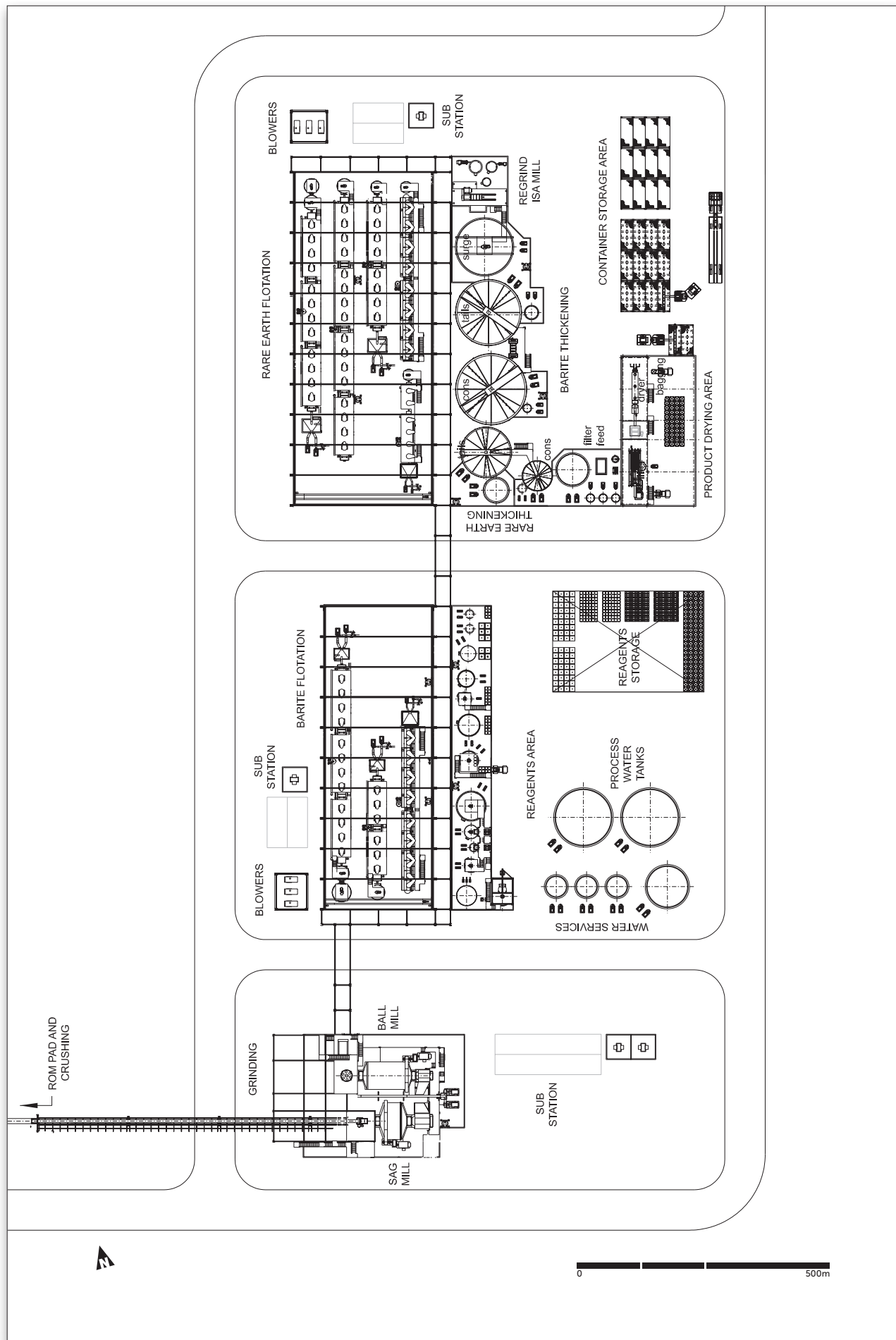
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Figure 19: Ngualla Rare Earth Project, Mine and Multistage Processing Plant Design Layout.



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Figure 20: Multistage Processing Plant Design Layout.



# 10 ENVIRONMENT & SOCIAL, TANZANIA

Peak is committed to assisting the communities in which it operates whilst maintaining best practice environmental management and health and safety standards. The project development area at Ngualla is free of any habitation, farming or grazing and there are no reserves of any kind over the area.

The location of the mine and process facilities within the rim of the carbonatite structure will enable the final site drainage design to minimise water run-off from the project area and negate any possible environmental impact on the surrounding areas. Water will be recycled for re-use in the plant where practicable.

An assessment of the radiation levels of the mineralisation to be mined indicates that the levels of uranium (15ppm) and thorium (53ppm) are well below levels set by the International Atomic Agency to be regarded as radioactive and as such there is no concern of any environmental or health and safety issues arising from radiation.

## 10.1 Social

Peak has established and maintained an excellent relationship with the local people, village council (representatives for the local community), local government and the central government ministries since the commencement of exploration in the Ngualla area in 2009. Peak is an active member of the local community, which is in full support of the development of the mine and processing plant and has actively assisted the development by providing labour, local produce, access to land and security.

Through its community and social responsibility (CSR) program Peak has funded, assisted with, and donated to many community projects in the local area (see Figures 21 to 24). Projects are identified by the Ngwala Village Council based on the needs and priorities of their constituents. These projects are then brought to Peak's attention at village meetings and developed through further discussion and consultation that includes the broader levels of local administration to ensure they are aligned with the established programs of the district government.



**Figure 21:** One of the new Ngwala Primary School classrooms and desks built by Peak in 2011.



**Figure 22:** First bucket of water from the Itiziro water bore and pump accepted by Itiziro villager in 2015.

## KEY FEATURES

Small mining and operation footprint

Site is free from reserves, parks and habitation

Strong local support for the project development



Ngwala football team.

Individual projects completed to date include the building of two new classrooms and refurbishment of several more for the Ngwala Primary School, provision of text books, school equipment and desks to three schools in the Ngwala district and the construction of six teachers' houses. Other projects have included completion of water bores and pumps, provision of sporting equipment for local teams, construction of clinic waiting area and assistance with the establishment of an airstrip at Ngwala (Figure 18).

## 10.2 Environmental and Social Impact Assessment (ESIA)

Peak has appointed in-country environmental consultants Align Environment and Risk ("Align") and Paulsam Geo-engineering Company Ltd to complete studies and reports necessary to obtain the Environmental Certificate that is required to support a mining licence application for the Ngualla Rare Earth Project. An additional part of Align's role is to assist Peak to continue to meet IFC's best practice standards of operation and to complete the reporting required by IFC and international banks in environmental and social responsibility.

Wet and dry season baseline surveys have been completed and the project was formally registered with the Tanzania regulatory body National Environment Management Council (NEMC) in October 2015. The ESIA process is well established and generally takes between 6 to 12 months. Initial stakeholder meetings have been held and the ESIA is on track for completion later in 2016 to enable a mining licence application for the project before year end.



Figure 23: Duplex Ngwala school teachers' houses nearing completion in October 2014.



Figure 24: Peak Resources staff in front of two new classrooms for the Ngwala Primary School constructed in 2011 by the Company.

# 11 PROJECT LOGISTICS

## 11.1 Location and transport

The Ngualla Project is located 150km to the northwest of the city of Mbeya. The city is the economic centre for the southern region of Tanzania and the gateway to the landlocked neighbouring countries of Malawi, Zambia and the Democratic Republic of the Congo. There is a major link from Mbeya to Dar es Salaam with the 827km long bitumen T1 highway between the two cities being well maintained and serviced. The Project's location close to Mbeya also provides additional logistic advantages through access to all weather sealed road and a direct link via the TAZARA railway to the deep water sea port of Dar es Salaam (Figure 26).



**Figure 25:** Upgraded bitumen road surface on the T8 east of Chunya, October 2013.

Dar es Salaam port is Tanzania's principal port with a rated capacity of 4.1 million (dwt) dry cargo and 6.0 million (dwt) bulk liquid cargo. The port handles 95% of Tanzania's international trade and also serves the landlocked countries of Malawi, Zambia, Democratic Republic of Congo, Burundi, Rwanda and Uganda.

The 3.3km long, asphalt surfaced Mbeya Songwe International Airport was opened in December 2012 and daily commercial flights service the region. Ngwala village and the mine site itself are currently serviced by a Tanzanian Civil Aviation licensed dirt airstrip suitable for light aircraft such as the Cessna Caravan. Peak have included in its capital expenditure estimate to upgrade this strip to an all-weather strip.

The road access to Ngualla from Mbeya is along the T8 currently undergoing significant upgrades through a Tanzanian and Chinese Government partnership (Figure 25). From the T8, access to the Project will be along an 80km stretch of local road which will be upgraded to an all-weather road and is included in the capital costs.

## 11.2 Consumables Supply

Most process reagents and consumables will be shipped through the port at Dar es Salaam and trucked to site by contracted transport companies. Tanzania and neighbouring Zambia have mature mining and mineral processing industries, which facilitates the supply of required reagents and consumables. Peak is already in discussions with a number of reagent suppliers and logistics companies willing to provide their services at globally competitive rates.

## KEY FEATURES

Project located close to the regional city of Mbeya

Established road and rail infrastructure to port

Additional national infrastructure improvements in progress



Dar es Salaam port

### 11.3 Rare Earth Concentrate Product Transport

Rare earths are not a bulk commodity with Ngualla planning to ship only 28,000 tonnes of high grade rare earth concentrate from site each year. The product will be packed in sealed containers and transported by third party transport companies on reagent delivery backloads from site in 20ft cargo containers. The packed containers will be loaded with minimal rehandling directly onto waiting ships at the port at Dar es Salaam for shipping to either Peak's refinery within the European Union or to a third party refinery for further processing.

The very low uranium and thorium contents of the Ngualla mineralisation and the subsequent multistage processing results in the separated rare earth product being completely benign and non-radioactive and thus no additional regulatory permitting is required for transport.

### 11.4 National Infrastructure Improvements

The Tanzanian government, with the backing of a number of countries such as China, is currently focusing a large effort into the improvement of infrastructure within the country such as the national highway network and the main rail links.

The current study assumes transport costs for reagents coming to site and product leaving Ngualla are based solely on road transport from Dar es Salaam port. There is however the opportunity to utilise the TAZARA railway for bulk transport in the future, which has the potential to reduce transport costs.

Figure 26: Location of the Ngualla Project and the city of Mbeya, with road and rail links to the port at Dar es Salaam.





# 12

# RARE EARTH REFINING DEVELOPMENT AND PILOT PLANT

## 12.1. Recovery Process Development

Multiple flowsheet options have been identified and evaluated for the extraction and purification of rare earths from the high grade rare earth concentrate produced by the multistage beneficiation process. Extensive bench scale testwork was undertaken at Nagrom in Western Australia and ANSTO in New South Wales with three possible routes identified:

- Sulphuric acid leaching with recovery via double sulphate precipitation - Double Sulphate Route
- Caustic cracking with recovery via selective hydrochloric acid dissolution - Caustic Cracking Route
- Alkali roasting with recovery via selective acid dissolution - Alkali Roast Route

The Alkali Roasting Route proved superior with respect to:

- Significant reduction in processing steps
- Requirement for only a single stage, low strength acid leach
- Early rejection of the majority of low value cerium and deleterious iron without consuming acid
- A robust and repeatable process
- All leach and purification processes can be undertaken in low cost, modular FRP tanks

The simplified process is shown in Figure 27.

The process entails mixing the high grade bastnaesite concentrate with soda ash and roasting in a kiln at approximately 700°C for one hour. The roasted solids are then water washed to remove fluorine and filtered. The filtered solids are subsequently acid leached in a low strength solution of hydrochloric acid to selectively target the desired rare earths (neodymium and praseodymium) whilst rejecting large amounts of low value cerium along with gangue elements such as iron. Undesired impurities that dissolve in the solution are removed by precipitation using lime and filtered out leaving a high concentration (but cerium depleted) rare earth solution suitable for feeding to the Separation Circuit.

At the time of writing, ANSTO was commissioning a pilot plant to demonstrate the Alkali Roast flowsheet on approximately two tonnes of high grade (41% REO) rare earth concentrate produced by the Beneficiation Pilot Plant from 56 tonnes of Ngualla's mineralisation.

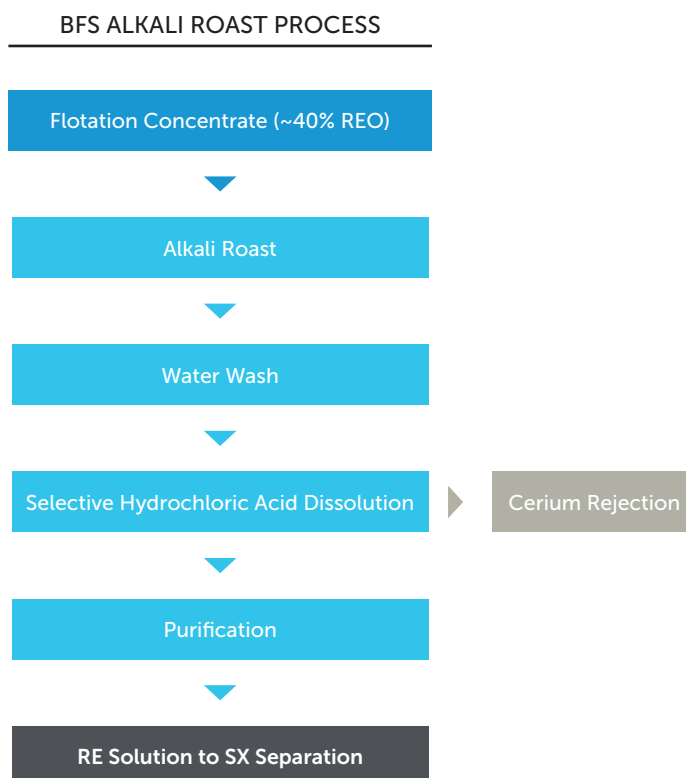


Figure 27: Simplified Recovery Flowsheet.

## KEY FEATURES

A new, selective recovery process has been developed

Smaller modular plant with reduced reagent consumption compared to PFS

Demonstrated Separation Pilot Plant produced high value REO products at up to 99.9% purity



ANSTO Pilot Plant in Construction.

## 12.2 Separation Pilot Plant

The ability to produce high purity separated rare earth products adds significant value to Ngualla's products and allows access to wider end use markets. To this end, Peak commissioned Australia's leading rare earth separation experts, ANSTO, to undertake a Separation Pilot Plant at their research facility in Lucas Heights, near Sydney (Figure 28).

The program commenced in February 2013 with the preparation of a feed for the Pilot Plant from a 1.3 tonne bulk sample of weathered Bastnaesite Zone mineralisation from Ngualla.

By the completion of the Pilot Plant operation in October 2013, four high purity separated rare earth oxide products were successfully produced as follows:

1. Mid+Heavy RE Oxide (+99.9% purity)
2. Neodymium – Praseodymium Oxide (+99.9% purity)
3. Lanthanum Oxide (+99% purity)
4. Cerium Oxide (options include 90% and 99% oxide products)

The Separation Pilot Plant was important in providing operating data to allow for the determination of plant capital and operating costs for the BFS. In addition to the data, final product samples for evaluation by potential offtake partners were generated.



Figure 28: Solvent Extraction Lab at ANSTO Minerals.

# 13 RARE EARTH REFINERY

The Rare Earth Refinery consists of the Recovery Circuit, for the extraction and purification of rare earths from the rare earth concentrate, and the Separation Circuit that uses solvent extraction (SX) for the separation and finishing of the rare earth products. The Rare Earth Refinery also includes ancillary areas such as reagent storage and waste treatment.

An overview of the Rare Earth Refinery flowsheet is presented in Figures 29 and 30.

## 13.1 Recovery Circuit

The Recovery Circuit takes advantage of the fact that the multistage beneficiation process has produced a high grade/low mass rare earth concentrate and therefore has a low treatment rate of less than four dry tonnes per hour. This results in a very modest size circuit consisting mainly of low cost Fibreglass Reinforced Plastic (FRP) tanks, pumps and filters.

### Concentrate Handling

The dried rare earth concentrate arrives to site in two tonne bags within standard shipping containers. The bags are discharged into a hopper and mixed with soda ash with a paddle mixer in preparation for roasting.

### Alkali Roast

This is a "dry" process that doesn't have the intrinsically difficult materials handling problems associated with the acid baking processes used for monazite and xenotime hosted rare earth processing.

The concentrate/soda ash mixture is fed to an indirect fired rotary kiln operating at 700°C. This process converts the bastnaesite to easily leachable oxides whilst rendering the cerium and iron minerals less soluble. The fluoride naturally present in the bastnaesite is converted to a water-soluble form due to the added soda ash.

### Water Leach

The roasted rare earth concentrate is repulped with water to solubilise the fluoride. The removal of fluoride is important to eliminate potential issues with downstream leaching and purification. The slurry is then filtered to achieve separation of the fluoride rich effluent with the rare earth bearing solids progressing to leaching. The fluoride effluent is treated with lime to form stable calcium fluoride suitable for disposal.

### Dilute Acid Leach

The washed filter cake is leached in a series of agitated tanks using a dilute hydrochloric acid solution at less than 1% strength. Low pressure steam is used to maintain a leach temperature of 80°C to improve leach kinetics. The leach process has been optimised to maximise the recovery of the high value neodymium and praseodymium whilst the majority of the contained cerium and iron remains unleached.

The leached slurry is then dewatered via a high rate thickener and filter press before the barren solids are transferred to the waste disposal facility. The filtrate reports to the Purification Stage.

## KEY FEATURES

Refinery focused on recovery and production of high value, high purity Nd-Pr oxide product

Plant utilises simple proven technology of dry roasting, tanks, pumps and filters



Pilot rotary kiln and off-gas scrubbing.

## Purification

In addition to the leached rare earths, the filtrate contains some of iron and to a lesser extent aluminium and fluorine. This impure solution is pumped to agitated reaction tanks where lime is dosed to raise the pH in order to precipitate the impurities. The impurities are removed by filtering leaving a purified rare earth liquor.

Although the mass of the filtered solids is very small (less than 500 kg/h), there is a small amount of contained rare earths which warrants additional treatment to recover these values. The rare earths in the solids are first converted to hydroxides by a hot caustic wash and then recovered by water washing and then selective hydrochloric acid leaching in a very weak acid solution. The resulting filtrate is combined with the purified rare earth liquor and progresses to the separation plant. The solid waste is disposed with the effluent treatment waste.

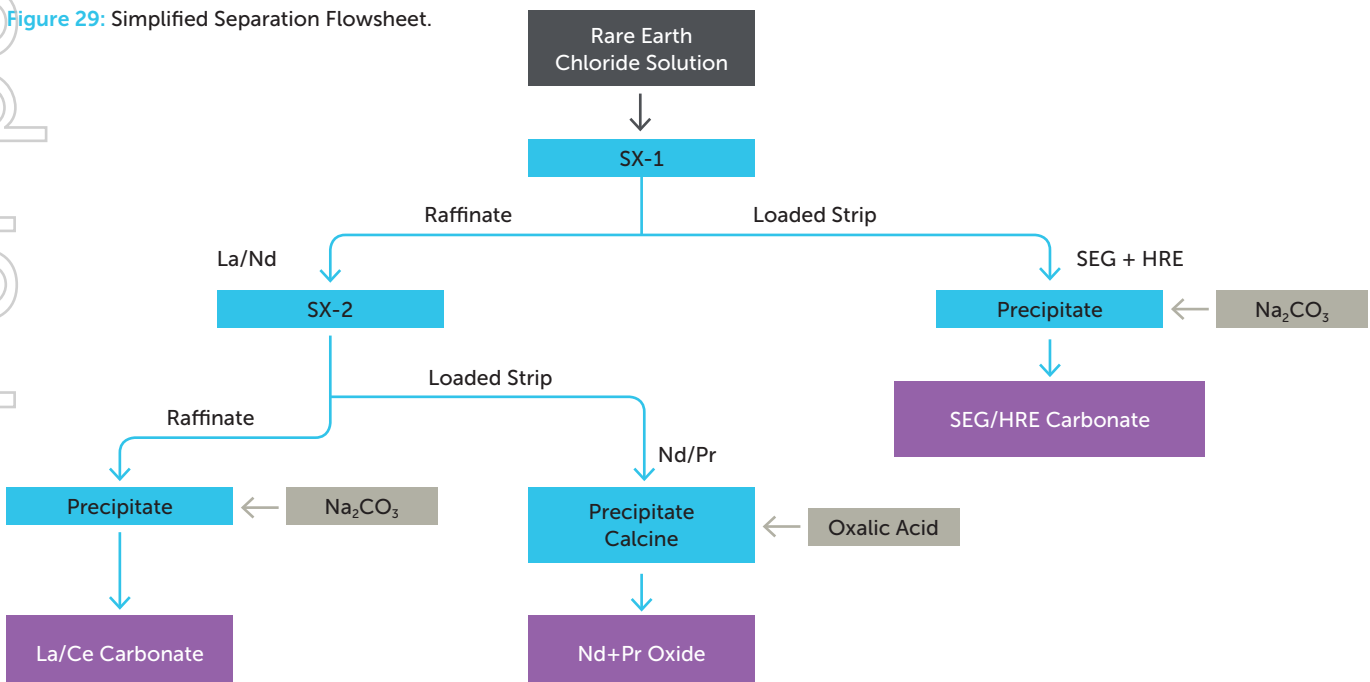
The combined purified rare earth liquor will be held in a surge tank allowing buffer capacity between the two stages such that they can operate relatively independently.

## 13.2 Rare Earth Separation Plant

Whilst Peak demonstrated the ability to produce four high purity oxide products during the Separation Pilot Plant (see Section 12) the growth in the high value magnet metals has dictated that only a combined praseodymium and neodymium product is warranted in this form. The intended three products from the separation plant are:

- A combined mid/heavy rare earth carbonate
- A high purity (99.9%) Nd+Pr oxide product
- A combined La+Ce carbonate product

Figure 29: Simplified Separation Flowsheet.



## Plant Description

Separation of the rare earths into groups of elements is achieved using solvent extraction (SX). This process principally relies on the tendency of rare earths to bond to specific organic solvents rather than stay in the aqueous solution. As the aqueous and solvent liquids are immiscible, a process of decantation is used to separate the two liquids.

Selectivity of extraction, and therefore separation, is achieved by controlling the pH of the system. Once the desired rare earth(s) are loaded onto the solvent, the solvent is stripped of the rare earths using strong acid solutions.

The commercial separation plant utilises specially designed cells (mixer settlers) constructed of conductive FRP. Overall, the plant consists of 3 stages, with each stage producing the following targeted products:

1. **SX 1:** Separation and precipitation of a mixed rare earth carbonate product containing the middle and heavy rare earths (samarium to lutetium and yttrium).
2. **SX 2:** Separation and precipitation of a 99.9% rare earth oxide product of neodymium and praseodymium.
3. **Ce Trimming:** Precipitation of a proportion of the cerium with sodium hypochlorite addition, followed by precipitation of a mixed rare earth carbonate product containing lanthanum and cerium.

Each SX stage consists of multiple series of mixer settler cells operated in a counter current mode where the organic liquid travels in the opposite direction to the aqueous liquid. The repeated sequential extraction and stripping process achieves the required separation and purity of rare earths, resulting in pure separated solutions with high rare earth concentrations.

The rare earths are then recovered from the strip solutions by precipitating with either oxalic acid (for Nd+Pr) or sodium carbonate (for Middle-Heavy rare earths and La+Ce) in stirred reaction tanks to form rare earth precipitates, which are recovered using filter presses.

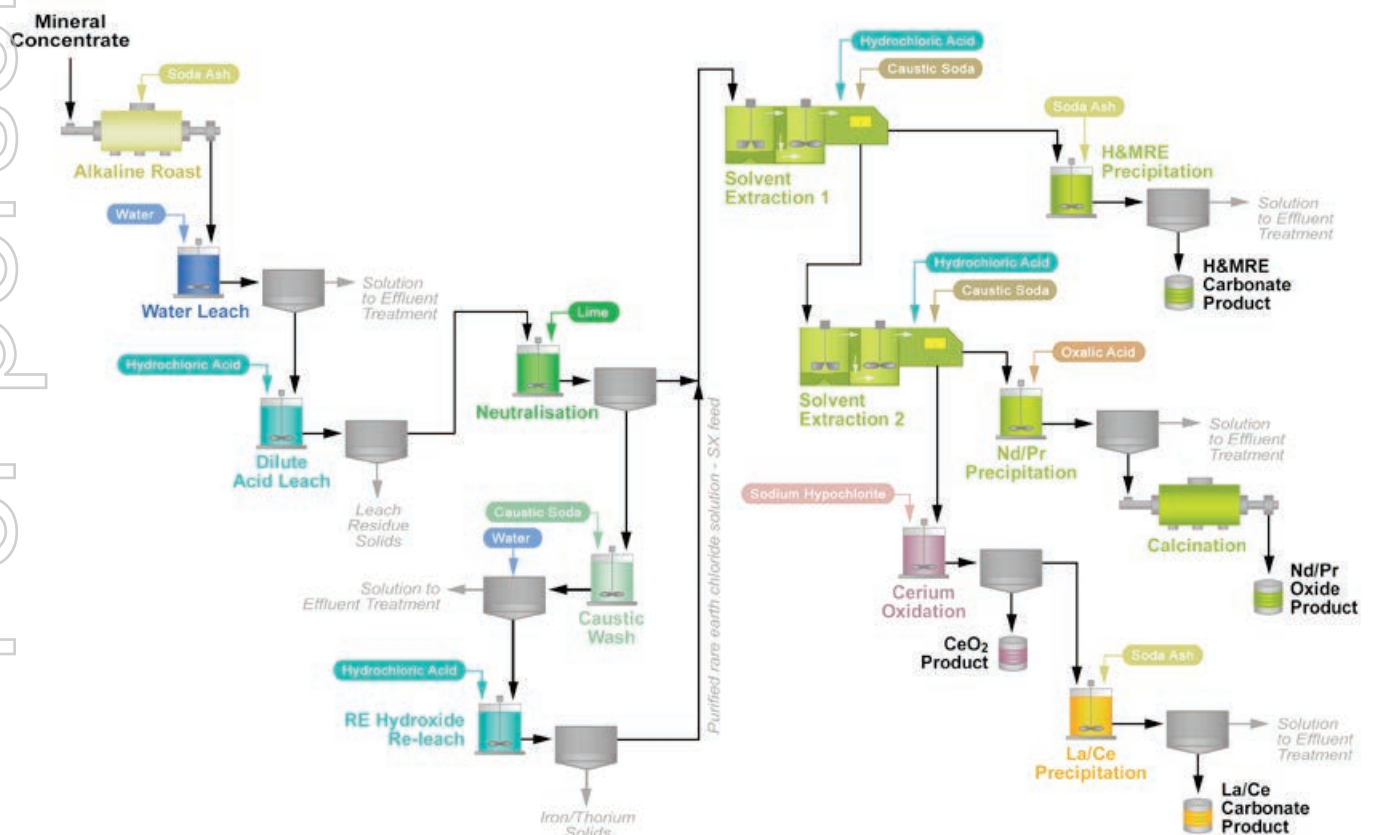


Figure 30: Rare Earth Refinery.

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The rare earth carbonates are then dried using a mechanical dryer before being bagged and shipped to market. The Nd/Pr oxalate precipitate is dried using a mechanical dryer and subsequently calcined at high temperatures in a rotary kiln to convert the oxalates to a high purity (99.9% REO) oxide product. Upon cooling, the Nd/Pr oxide is packaged into lined 200 litre drums for export to customers.

### 13.3 Ancillary Services

A number of industrial sites in the European Union (EU) have been evaluated that have existing support services well suited to the Refinery's requirements.

#### Logistics

Access to port facilities for rare earth concentrate delivery as well as heavy vehicle access has been taken into account in the site selection criteria for the Refinery.

#### Power and Water Supply

The required power and water infrastructure to meet the Refinery's requirements has been allowed for in the site selection criteria. This will save on the need for significant capital expenditure on Peak's part for these services.

#### Effluent Treatment

Acidic streams generated within the Recovery and Separation circuits will be pumped to an effluent treatment plant for neutralisation; metal precipitation and solution clarification using Best Available Techniques (BAT).

#### Reagents

The main reagent of hydrochloric acid will be supplied from a third party storage facility within the vicinity of the EU industrial site. Only modest onsite storage tanks will therefore be required.

Bulk solid reagents (lime, soda ash) will be delivered by pressurised tankers and stored on site in small silos.

Minor liquid reagents, such as solvents, will be transported and dispensed directly from 1m<sup>3</sup> standard Intermediate Bulk Containers (IBC) containers.

# 14 SALES AND MARKETING

## 14.1 Marketing strategy

Overall, the world, our governments and society are becoming more concerned about the global challenges which we are due to face. Compounding this is the context of the growth of emerging markets in Africa, Asia and Latin America. It is predicted that approximately more than one billion people in Asia are in the transition of advancing from low socio-economic circumstance to a middle-income class. Subsequently the desire to increase their mobility will cause their consumer behaviour to change. At the same time we see that these emerging markets, in particular China but also the rest of the world, are becoming aware of the toll that this growth requires and they have acknowledged alarming developments in the area of climate change, health and resources scarcity. Therefore we can anticipate more and more stringent laws will be rolled out globally and established e.g. emission control standards linked to the recently held climate change conference in Paris 2015.

Derived from these concerns, there are 3 major megatrends in our society which will drive and increase the demand for rare earths and in consequence underpin the growth strategy of Peak and the identified value drivers for the Ngualla Project - the magnet metal rare earths neodymium and praseodymium.

### Megatrend 1:

▶ Increasing demand for sustainable clean mobility and in particular electric/ hybrid vehicles and bikes. This trend provides a tremendous growth opportunity for the players in the field of electrification and in consequence Peak, who will produce the raw materials needed for the rechargeable batteries and magnets required in the electric motors of this new power train technology. In the current generation of hybrid cars, each vehicle requires 1 to 8 kilograms of rare earth metals. Demand for magnet metals in the production of hybrid and electric vehicles is set to increase at a 3-year trailing volume growth CAGR of 32.4%\*.



### Megatrend 2:

▶ Increasing demand for sustainable, clean, green energy supply such as wind turbines. This trend provides a huge growth opportunity for the players in the field of alternative energy providers especially wind turbine manufacturers and in consequence Peak. A modern direct-drive gearless wind turbine uses approximately 130 kilograms of neodymium per megawatt. The International Energy Agency recognises wind energy as being one of the most mature and low cost green electricity technologies and it is being invested heavily in Europe, China and America, driven by legally binding targets to reduce CO2 emissions. Demand for magnet metals in the production of onshore wind turbines is set to increase at a 3-year trailing volume growth CAGR of 10.3%\*.



\*Goldman Sachs, 15 November 2015. The Low Energy Carbon Economy Report.

KEY FEATURES

Products aligned to high-tech magnet market

85% of revenue from Nd-Pr

Projected growth of 6 to 10% pa



Incorporating rare earth magnets in air conditioners results in improved power efficiency.

Megatrend 3:

Increasing demand for sustainable, easily accessible cloud data storage and digital technology/mobile devices. This trend provides a huge growth opportunity for storage media- & mobile device-manufacturer and in consequence for Peak. In portable electronics, including Apple's iPod or iPhone, tiny neo-magnets are used to miniaturize the solutions in these devices and therefore allow, for example, smaller speakers in earphones and vibration units. A standard hard drive contains approximately 10-15 grams of REO. Such technology would not be possible without the role played by rare earths.



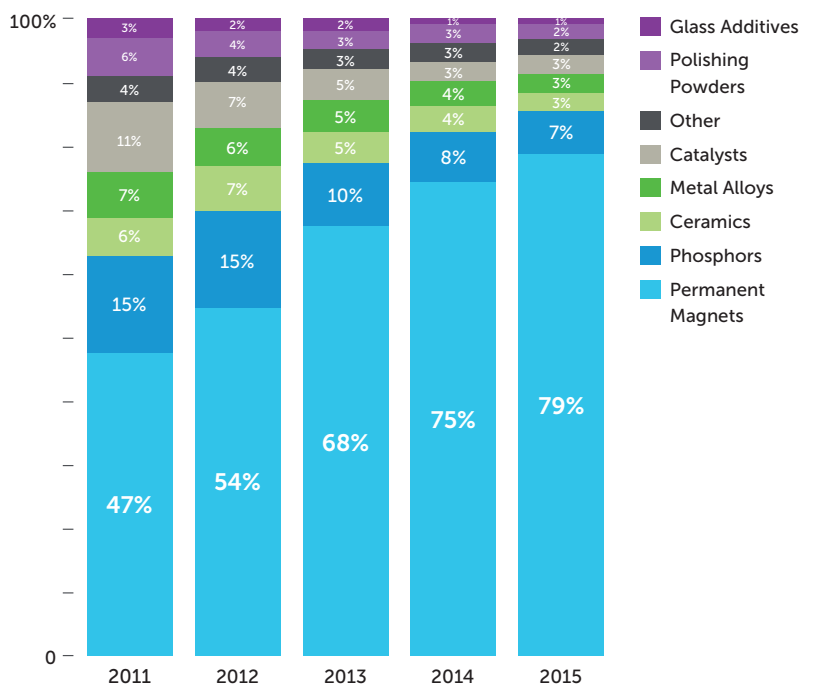
These applications all require neodymium magnets that are 10 times more powerful and stronger, and 3 times lighter than traditional ferric magnet alternatives. These magnets provide much better performance under a wider range of operating conditions, so allowing effective miniaturization and production of compact, lightweight and powerful motors which represents the overall trend in the industrial manufacturing industry.

- Peak's value drivers are neodymium and praseodymium and will represent approximately 85% of Ngualla's future revenue.
- Based on the above megatrends the magnet industry is forecast to show the highest growth of 6% to 10%pa and support future neodymium and praseodymium prices

Taking these trends into account, Peak is confident that its products are strongly aligned with the highest growth and value sectors of the rare earth market and the Company is well positioned to become an established supplier as these technologies continue to advance and demand for them subsequently increases. The permanent magnet rare earth market is rapidly becoming the only sector that matters in terms of value (see Figure 31).

Peak aims to become a **cost effective and long term business partner** of high quality rare earth products for the global rare earth processing industry. Peak will be well placed as a low cost and competitive producer of high quality rare earth products compared to other producers both within and outside of China.

Figure 31: Rare earth market value proportion by sector.





Peak will produce and market the following three products\*:

- A high purity neodymium+praseodymium oxide (99.9%) product, 2,300tpa
- A combined mid+heavy rare earth carbonate, 250tpa (equivalent to 180tpa of contained REO)
- A combined lanthanum+cerium rare earth carbonate, 5,900tpa (equivalent to 4,240tpa of contained REO)

The Company is targeting a modest production level of 6,720 tpa REO equivalent\*, which makes the marketing of production more achievable than many projects that need a high production profile in order to realize an adequate return on higher capital and operating costs.

Peak has held discussions with a large number of potential offtake customers and has received strong interest from several. Potential customers include industrial conglomerates for the neodymium-praseodymium 'magnet metal' product, rare earth refiners for the mid+heavy product, and Fluid Catalytic Cracking (FCC) and/or auto catalyst manufacturers for the lanthanum and cerium products.

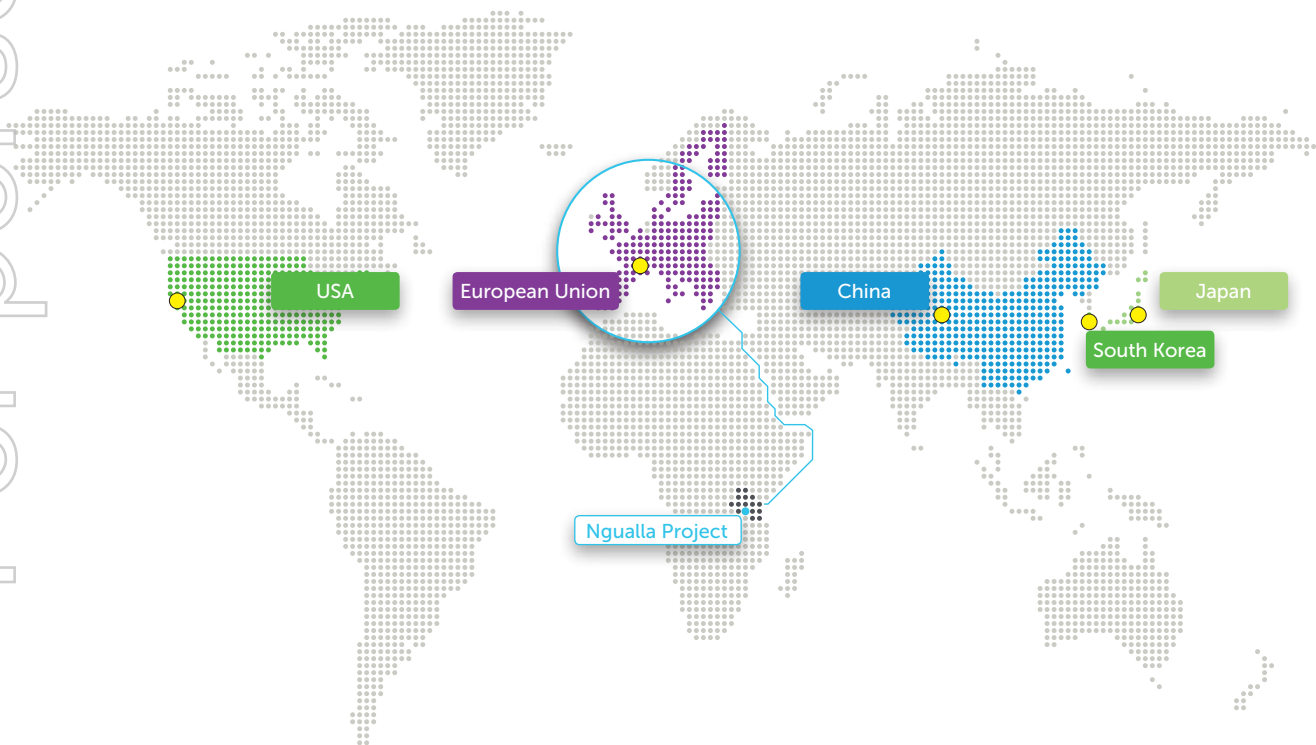
Peak aims to complete formal agreements with offtake customers in the medium term.

## 14.2 Future Predicted Service Level

Under consideration of our base case scenario where Peak will have a refinery located somewhere in the European Union (Figure 32), we are confident that we can offer to our customers a best in class service level with our supply chain especially to the Central European rare earth processing industry where we can deliver within 24 hours to any location by truck.

Figure 32: Major global rare earth markets and processing centres.

● Rare Earth Refining Markets & Centres



\* Based on approximate LOM average, actual annual tonnages may vary.

## 14.3 Rare Earth Markets

Rare earths have a variety of end uses and are not equal in terms of demand, production or price. They therefore cannot be considered as a single commodity. Table 12 summarises some of the main applications and Table 13 summarises the range of prices, consumption and global market value for individual rare earths.

**Table 12:** Rare earth applications: Permanent magnet applications are set to drive demand.

Use	Elements used
Magnets	Neodymium and praseodymium are key components in permanent magnets, which have widespread and growing application in 'green' and renewable energy such as wind turbines, hybrid and electric vehicles and also personal audio and electronic equipment.
Phosphors	Europium, terbium and yttrium are important in new, low energy lighting (fluorescent and LED), TV's and computer displays.
Batteries	Lanthanum is a component of nickel metal hydride (NiMH) batteries used in electric and hybrid cars and cordless power tools.
Catalysts	Cerium and lanthanum are important in the manufacture of auto and petroleum industry catalysts for pollution control and refining of oil.
Polishing	Cerium based polishing powders are preferred for high finish applications including flat panel displays, optics, electronics, smart phones and touch screen computers.
Alloys	Cerium-rich mischmetal, yttrium and neodymium strengthen steels and super-alloys for aerospace and military applications.
Glass	Cerium and other rare earths are used as additives to colour glass and screen UV light in optical and medical applications.

**Table 13:** Rare earths are not equal: Neodymium and praseodymium dominate global market value.

	REO	2015 Demand [Tonnes]	Price [US\$/kg]	2015 World Market	
				Value [US\$M]	Proportion
Light Rare Earths	Lanthanum	37,625	2.97	112	3%
	Cerium	51,975	2.86	149	4%
	Praseodymium	9,295	75.89	705	21%
	Neodymium	35,875	48.39	1,736	52%
	Samarium	1,215	3.44	4	0%
Heavy Rare Earths	Europium	215	344.84	74	2%
	Gadolinium <sup>1</sup>	1,390	21.17	29	1%
	Terbium	265	563.48	149	5%
	Dysprosium	1,025	278.41	285	9%
	Erbium <sup>1</sup>	790	21.17	17	1%
	Yttrium	6,130	7.83	48	1%
	Ho-Tm-Yb-Lu	200	NA	-	-
<b>Total</b>		<b>146,000</b>		<b>\$3,309</b>	<b>100%</b>

Source: IMCOA, Rare Earths Quarterly Bulletin 13, January 2016.  
<sup>1</sup> Prices for Gadolinium and Erbium are assumed to be the same.

## 14.4 Supply

China has dominated supply since the 1990's. It has however signalled its intention to support domestic downstream industry by limiting the amount of rare earth raw materials available for export. China cut the amount of rare earths available for export in 2010 by nearly 40% and temporarily suspended shipments of rare earths to Japan to support a territorial dispute in the South China Sea. This sent shockwaves through the industry and resulted in the massive price increases seen in 2010 and 2011.

The world recognises rare earths to be a strategic commodity, with many – including neodymium and praseodymium – considered 'critical' to important industries. Prices have now stabilised after the price shock but China still controls 85-90% of world production. Neodymium and praseodymium are forecast to remain in undersupply in coming years (Table 14). Peak is capable of meeting this demand as a long term source of low cost rare earth products..

**Table 14:** Predicted shortfall in world supply of neodymium and praseodymium.

	2017	2020
Praseodymium	4,575t	6,655t
Neodymium	525t	725t

Source: IMCOA, 2016. Rare Earth Quarterly Bulletin #13.

## 14.5 Demand/Market Outlook

Since the early 2000's there has been a significant increase in demand for rare earths due to the many growth areas of application. The global Financial Crisis of 2007 and 2008 affected demand in 2009, as did the price shock of 2010 and 2011, but a return to long term growth is forecast. Forecast global rare earth demand for 2020 and 2025 is presented in Table 15.

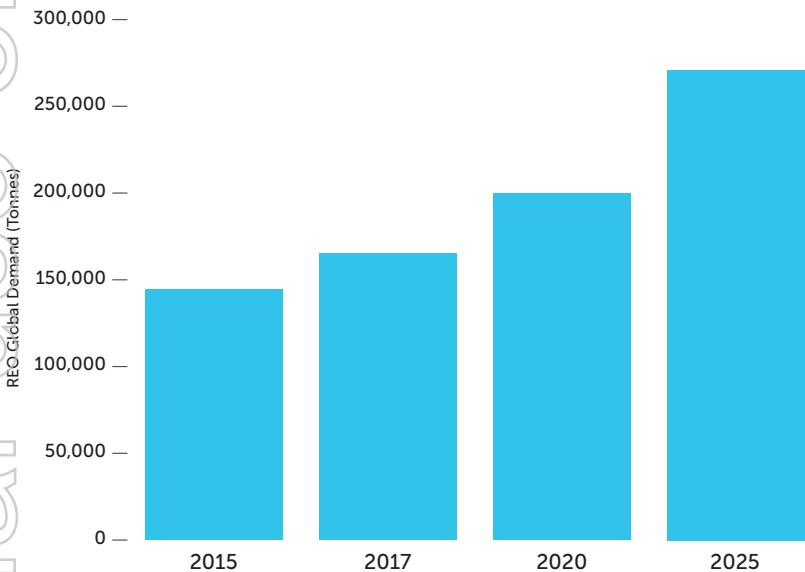
**Table 15:** Global rare earth demand in 2020 and 2025 (tpa REO  $\pm$  30%)

Application	Consumption tpa REO		Rate of Growth	Market Share
	2020 <sup>f</sup>	2025 <sup>f</sup>	2020-25	2025
Catalysts	33,000	40,000	4-7%	15%
Glass	12,500	17,500	5-10%	7%
Polishing	25,000	30,000	3-6%	11%
Metal Alloys	38,000	55,000	6-12%	17%
Magnets (excluding recycling at 12-15%)	65,000	90,000	6-8%	33%
Phosphors (including Pigments)	5,500	6,000	Minimal	3%
Ceramics	7,000	9,000	5-7%	4%
Other	14,000	25,000	10-15%	10%
Totals	200,000	272,500	6-8%	100%

Source: IMCOA, 2016. Rare Earth Quarterly Bulletin #13.

Estimated global rare earth demand of 146,000t in 2015 is expected to grow to 167,000t by 2017 (Figure 33). Annual rates of growth for rare earths are predicted to be in the range of 3 to 15% overall, with the demand of the magnet metals, neodymium and praseodymium, expected to increase 6 to 10% per annum as a result of high growth in end use applications. Furthermore it is forecast that this growth will be continuous for the next 5-10 years.

Figure 33: Forecast global rare earth demand growth.



Source: IMCOA, 2016. Rare Earth Quarterly Bulletin #13. 2017-2025 represent forecast demand.

# 15 CAPITAL COST SUMMARY

## 15.1 Basis of Capital Costs

The capital cost estimate is based on a mine and process facilities processing 560,000 tpa ROM material producing 2,300 tonnes per annum of high purity neodymium and praseodymium rare earth oxides. The estimate is current as of the first quarter of 2016 and is presented in US\$.

Capital costs have been estimated to a 25% level of accuracy and are based on:

- **Mining:** Orelogy estimated the open pit mining equipment requirements based on the pit optimisation and mining schedule scenarios.
- **Process Plants:** The entire end to end mineral process capital estimate is based on updated laboratory and pilot plant test work data incorporated by AmecFW into process and mass balance modelling using SysCAD software. Preliminary equipment lists were developed and sized consistent with the defined level of accuracy.
- **Recovery:** Recovery estimates were derived from the recently completed piloting program. These estimates have been interpreted by CDMet Consulting Pty Ltd and AmecFW and incorporated into the overall process mass balance. The separation plant is based on the testwork and solvent extraction pilot plant operation completed at ANSTO and Nagrom.
- **Infrastructure:** AmecFW has developed the infrastructure designs and provided the capital costs for the construction of all mine facilities, accommodation village and site project services at both sites. Knight Piésold has provided estimates for the tailings facilities at Ngualla. Ngualla power supply has been included as a heavy fuel oil power package while the EU Refinery will purchase power from local providers. The required upgrade to the 80km eastern access road has been reviewed and jointly estimated by COWI A/S and AmecFW.

## 15.2 Capital Cost Estimate

The total estimated capital cost including indirect costs is, as detailed on Table 16, US\$330 million including 25% growth and contingency (US\$63 million).

## KEY FEATURES

US\$330 million Capex including 25% estimate growth and contingency

Lowest capital cost of all equivalent development projects

Includes rare earth refinery



Ngualla Hill, looking north.

Table 16: Capital Cost Estimate: Ngualla Rare Earth Project.

Project Direct Costs	US\$ Million
<b>NGUALLA</b>	
Mining	20.6
Multistage Process Plant	37.8
Tailings Storage Facility	5.3
Infrastructure	22.8
Access Road	18.1
Services	20.2
Miscellaneous	6.7
Indirect Costs	24.0
<b>Total Ngualla Costs</b>	<b>155.6</b>
<b>EU REFINERY</b>	
Process Plant	51.0
Plant Infrastructure	13.2
Regional Infrastructure	4.7
First Fill Reagents and Consumables	6.0
Miscellaneous	6.8
Indirect Costs	13.8
<b>Total EU Refinery Costs</b>	<b>95.6</b>
<b>TOTAL CAPITAL COST</b> (Excluding Contingency)	<b>251.2</b>
Growth and Contingency (25%)	63.0
Owners Costs	15.7
<b>TOTAL PROJECT COSTS</b> (Including Contingency)	<b>329.9</b>

### 15.3 Direct costs

Direct Costs are those costs that can be specifically and easily assigned to a specific capital item such as the purchase price of the equipment, manufacturing costs, labour associated with the construction and delivery of the equipment to site.

### 15.4 Indirect costs

Indirect costs are those costs that are not easily assigned to a specific capital item and are costs that are shared by a number of capital items such as engineering costs, procurement costs, management costs, construction accommodation costs, insurances, overheads and commissioning costs.

### 15.5 Build Own Operate Components

Build, own and operate (BOO) components are those areas of the operation where a third party will at their own expense supply and operate a particular part of the operation. In turn Peak will pay a usage fee for the service or goods that are supplied. No components in the current estimate have been costed as BOO however opportunities of using the BOO model will be investigated during the BFS including for the power generation and the accommodation village to potentially reduce the initial capital investment requirement.

### 15.6 Growth and Contingency

Contingency is defined as the amount added to a cost estimate to allow for items, conditions, or events for which the state, occurrence, or effect is uncertain and that experience shows will likely result, in aggregate, in additional cost.

The contingency provision makes allowance for such factors as:

- Planning and estimating omissions
- Minor price fluctuations
- Design developments and changes within the scope
- Variations in market conditions
- Material and labour rate accuracy

A growth and contingency provision of 25% has been calculated and is considered to be appropriate for the Ngualla Project at this stage of development.

### 15.7 Execution Strategy

Where practical all processing plant will be modularised, prefabricated off site and skid mounted to allow for fast, efficient construction and installation on site. This technique will reduce the amount of skilled labour required on-site during construction as well as improve the quality control of the equipment to ensure a smooth ramp-up period.

Peak plans to undertake a contracting strategy for each site of the project to reduce project costs and better control project risks. In areas such as the access road, local Tanzanian contracting companies have been approached to undertake the construction on a design and build contracting basis directly for Peak. In areas requiring greater technical ability such as the separation and recovery plants, it is envisaged that an EPC contracting strategy will be used.

# 16

# OPERATING COST SUMMARY

## KEY FEATURES

The unique combination of project fundamentals and focus on high value rare earths drives low operating costs

18% reduction in operating costs from PFS

Average annual costs for the life of mine after start-up by operating area are shown in Table 17 and Figure 34 below in US\$.

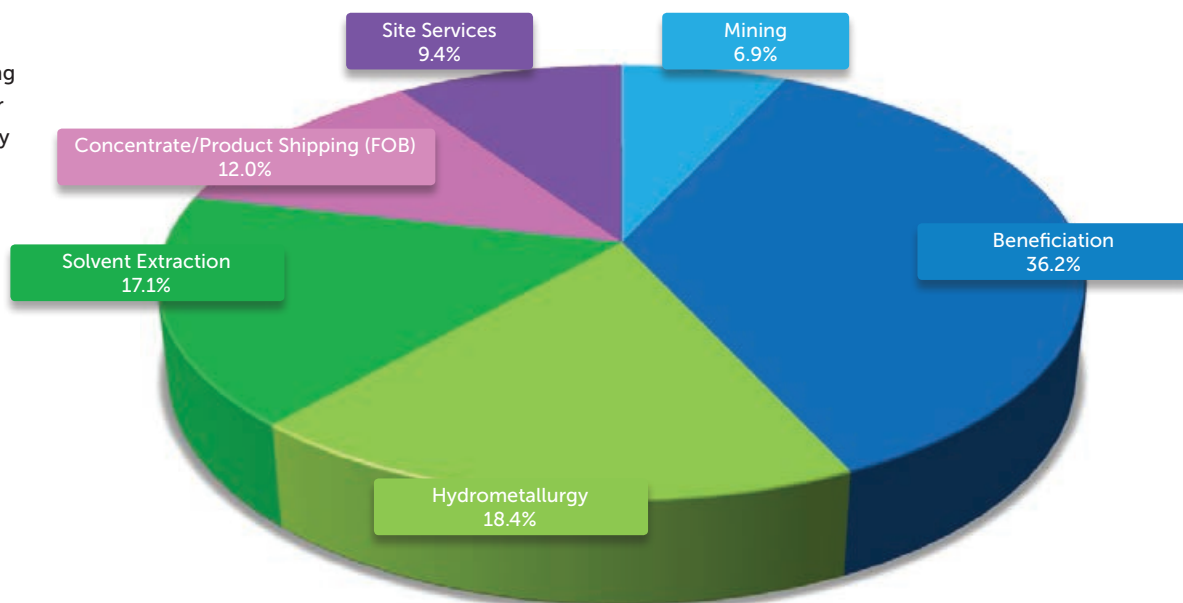
Costs are inclusive of mining, processing, infrastructure, site services, administration, and shipping to a free on board (FOB) basis.

**Table 17:** Average Operating cost summary for the first 5 years by operating area.

Area	Percentage of Total Cost %	Annual Cost US\$ million
Mining	6.9%	6.7
Beneficiation	36.2%	35.1
Hydrometallurgical	18.4%	17.8
Solvent Extraction	17.1%	16.6
Concentrate/Product Shipping (FOB)	12.0%	11.6
Site Services	9.4%	9.1
<b>TOTAL</b>	<b>100</b>	<b>97.0</b>

Figures may not sum due to rounding.

**Figure 34:** Average Operating cost summary for the first 5 years by category.





## 16.1 Mining Costs

The operating costs for mining and haulage were developed by Orelogy. The mining costs including drilling and blasting, grade control, fuel, load and haul costs excluding labour average US\$6.7 million per annum, or US\$4.17/t (ore + waste) mined. A diesel cost of US\$1.35 per litre is assumed.

## 16.2 Personnel

Personnel requirements for management, operations and maintenance have been estimated by Orelogy, AmecFW and Peak. All personnel costs are fully loaded and inclusive, where applicable of all taxes and statutory charges, travel and site accommodation. A breakdown of employee numbers by area is shown in Table 18 below.

**Table 18: Personnel numbers by area.**

Area	Number of Personnel (Ngualla)	Number of Personnel (EU Refinery)
Mining	46	-
Beneficiation	108	-
Recovery	-	41
Separation	-	41
Site Services	47	38
<b>TOTAL EMPLOYEES</b>	<b>201</b>	<b>120</b>

Figures may not sum up due to rounding. Costs are LOM after start-up.

## 16.3 Power

Electrical power consumption has been calculated across the process plants by AmecFW from the preliminary mechanical equipment lists including estimates for infrastructure power requirements. Power rates per kWh are based on a heavy fuel oil power plant package similar to other Tanzanian operations. Ngualla power costs are estimated at US\$0.20/kWh.

For the EU Refinery, energy pricing is based on purchasing grid power and piped natural gas. For the updated operating cost the electricity cost is estimated at US\$0.12/kWh, and natural gas at US\$6.62/GJ.

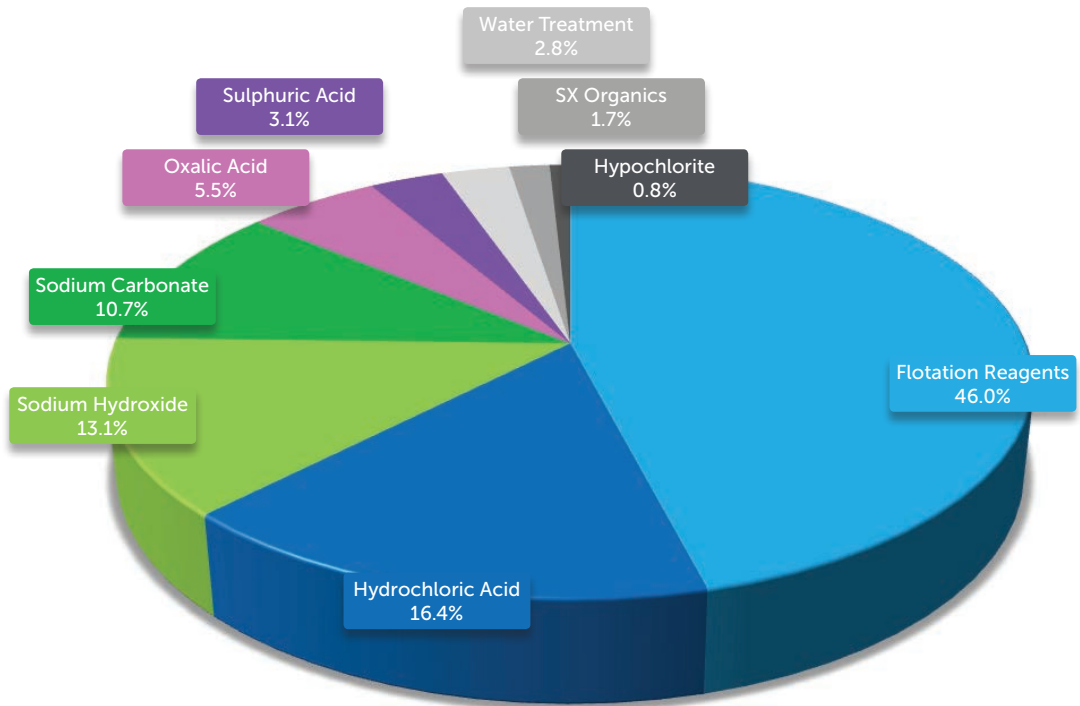
## 16.4 Reagents

Reagent consumption is based on updated testwork results and the associated updated SysCAD mass balance Model (Figure 35).

For Ngualla, reagents rates are based on quoted prices ex China, Australia and South Africa, with some items including costs landed in Dar es Salaam. Shipping and transport costs by road of reagents to site are included in the total reagent cost and has been quoted by Alastair Logistics in Tanzania. The total cost of reagents is estimated at \$18 million per annum average for the first five years.

For the EU Refinery, reagent rates are based on quoted prices delivered to Europe plus transport to site. The total cost of reagents is estimated at \$20 million per annum average for the first five years.

**Figure 35:**  
Annual reagent  
cost breakdown.



## 16.5 Consumables

Estimated costs associated with concentrate and product packaging, replacement of mill liners, grinding media, filter cloths, demineralised water, cooling tower and boiler chemicals, natural gas (EU Refinery) and over the fence services (EU Refinery) have been provided by AmecFW. An allowance for site safety and other general consumables has been made by AmecFW, included as part of salary on costs.

## 16.6 Maintenance

Maintenance costs for each part of the process are factored from the direct capital cost of the equipment. Factors range depending on the location of the equipment and area process conditions from 2 to 5% per annum.

## 16.7 General Administration

General administration costs have been detailed for each site.

## 16.8 Concentrate and Product Transport

Concentrate transport costs based on road haulage and shipping rates and have been obtained by Peak and AmecFW and include transport from Ngualla to Dar es Salaam port, port loading and port clearing fees, wharfage, sea freight to Europe and destination port clearing fees plus road haulage to the EU Refinery.

Product transport costs based on road haulage and shipping have been estimated by AmecFW and include transport from the EU Refinery to the associated European port, port loading, port clearing fees and sea freight to Asia, with associated port clearing fees at destination.

# 17 PROJECT DEVELOPMENT PATHWAY

The BFS is currently in progress and is on schedule for completion by the end of 2016. The BFS has already delivered significant improvements over the PFS of March 2014.

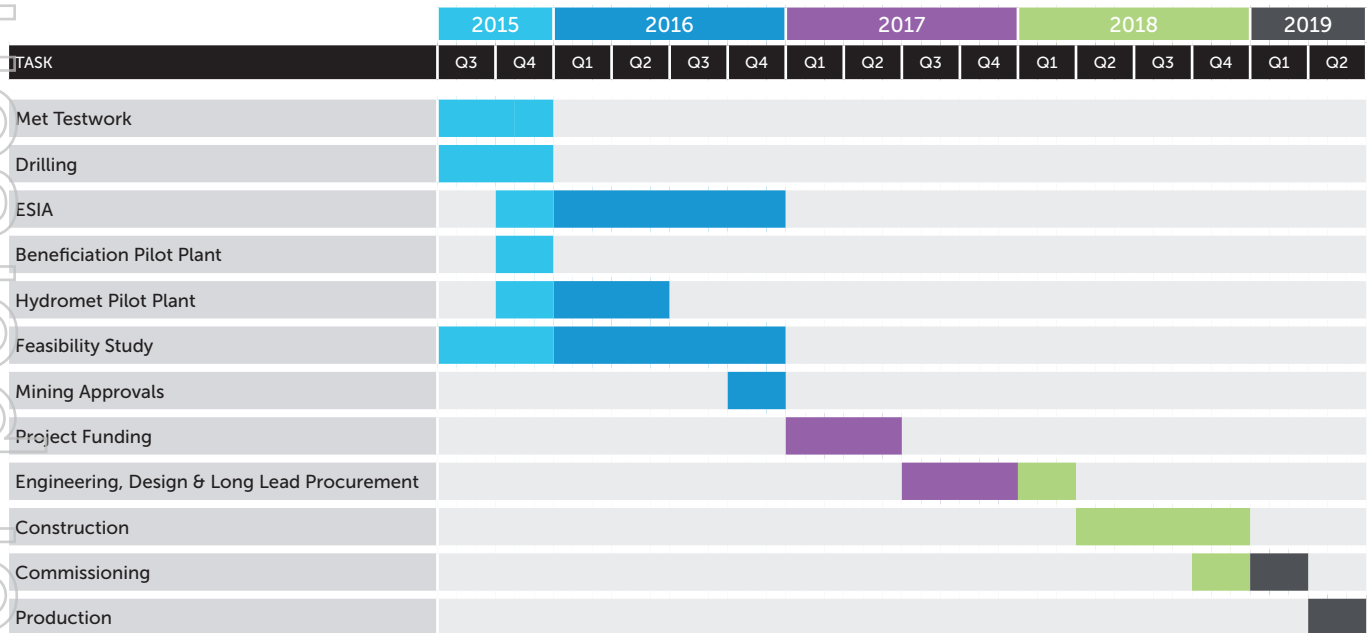
Since the PFS a number of major milestones have been completed including:

- Securing cornerstone investors in Appian and the IFC
- The commencement of the Environmental and Social Impact Assessment (ESIA)
- The continuous operation of the Beneficiation Pilot Plant resulting in a high grade mineral concentrate (up to 52% REO with an average of 40% REO)
- A revised Mineral Resource Estimate with an increase in REO grade for the weathered Bastnaesite Zone

By the end of 2016 and the completion of the BFS the following milestone will be achieved:

- The operation of the Leach Recovery Pilot Plant
- Completion of the ESIA and award of the environmental certificate
- The application for the Ngualla mining licence
- Securing of key offtake agreements

Table 19: Ngualla Project Summary Development Schedule



## Ngualla Project Milestones

The rapid development of the Ngualla Project from discovery to completion of the current Study in approximately 5 years is without comparison in the rare earth industry.

Whereas many projects are still in the study phase after 7 to 14 years of development and investments sometimes over \$100 million, Peak has been able to rapidly and successfully progress the development of Ngualla at a low cost due simply to the Project's unique combination of favourable geological, mineralogical and metallurgical characteristics. The table opposite summarises some milestones in the rapid development of the project:

KEY FEATURES

Bankable feasibility study delivering strong improvements

Clear pathway to development

On schedule for production in 2019



SX Pilot Plant, ANSTO Minerals

Year	Month	Milestone
2016	February	Revised Mineral Resource estimate represents an increase in tonnes, grade and contained REO over previous 2013 estimate. New Recovery Flowsheet developed allowing a smaller modular plant with reduced reagent consumption, and focused on the extraction of high value Nd and Pr.
	January	2 tonnes of high grade mineral concentrate delivered to ANSTO for Leach Piloting
2015	December	Successful continuous operation of Beneficiation Pilot Plant at ALS producing high grade mineral concentrate
	November	Completion of drilling programs at Ngualla in support of the BFS
	October	Ngualla Project registered with National Environmental Management Council (NEMC) in Tanzania
	February	Formal agreement signed with Appian and IFC for BFS Funding
	January	Improved beneficiation results on a three-fold improvement of the mineral concentrate grade assumed in the PFS
2014	August	Improvements in beneficiation testwork results in a double of the PFS concentrate grade with increased mass rejection.
	March	Maiden Reserve
	March	PFS and economic assessment
2013	October	Successful completion of SX Pilot Plant and production of fourth high purity separated product
	August	Third separated product produced at ANSTO SX pilot plant
	July	Second high purity separated rare earth oxide produced at ANSTO pilot plant
	May	Revised Scoping Study and economic assessment reduces Opex
	May	First high purity separated rare earth oxide produced at ANSTO pilot plant, together with high purity mixed rare earth carbonate
	April	Revised Mineral Resource estimate indicates higher grades
	March	Independent confirmation of sulphuric acid leach process by ANSTO on bulk sample of Ngualla mineralisation
	March	Beneficiation process optimisation improves mineral concentrate grades
	January	SX Pilot Plant at ANSTO Minerals near Sydney commissioned
	2012	December
December		Completion of resource infill drilling program
November		Beneficiation test work produces high grade mineral concentrate
September		First renewal of Ngualla Prospecting Licence granted in September 2015
August		Metallurgical 'proof of concept' test work successfully completed, demonstrating a simple sulphuric acid leach and purification process for Ngualla's weathered bastnaesite mineralisation
May		Fourth drilling program commences: in-fill on the Bastnaesite Zone and for metallurgical samples
May		Commencement of detailed Scoping Study and initial economic assessment
February		Maiden Resource estimate
February		Peak completes acquisition of 100% of the Ngualla Project
February		Early beneficiation and simple sulphuric acid leach test work success on weathered bastnaesite mineralisation
2011	December	Completion of third (maiden Resource) drilling program
	August	Drill results confirm major rare earth discovery at Ngualla
	May	Third (maiden Resource definition) drill program commences
	February	Wide, high grade rare earth drill results reported from second exploration drilling program at SREZ. Wide zones of niobium and phosphate also reported from Northern Zone

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Year	Month	Milestone
2010	December	Second exploration drilling program completed on SREZ and Northern Zone
	November	Second (follow up) reconnaissance exploration drilling program commences SREZ and Northern Zone
	September	First (discovery) drill results from SREZ (rare earth) and Northern Zone (niobium-tantalum, rare earth and phosphate)
	August	First drill results received from SW Alluvial Zone mark the discovery of rare earth mineralisation at Ngualla
	July	Maiden drilling program completed
	June	First exploration drilling program commences at Ngualla, focusing on alluvials, with four reconnaissance holes in central SREZ and Northern Zone completed at the end of program
	March	Assays from three test pits in alluvials received, plus additional soil sampling results
	January	Peak reports extensive high tenor rare earth, niobium and phosphate anomalism identified from soil sampling
2009	December	Initial soils results identify extensive rare earth as well as phosphate anomalism and the priority focus changes from phosphate exploration to include rare earths, niobium
	November	Reconnaissance rock and soil sampling results confirm historic reports of phosphate, niobium-tantalum and rare earths at Ngualla
	September	Ngualla licence PL6079/2009 granted to Peak's JV partner Zari Exploration Ltd on 22 September 2009 allowing exploration to commence with Peak to earn up to 80% in mineral rights

### Competent Persons Statements

The information in this report that relates to Exploration Results is based on information compiled and/or reviewed by David Hammond, who is a Member of The Australian Institute of Mining and Metallurgy. David Hammond is the Technical Director of the Company. He has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and the activity which he is undertaking to qualify as a Competent Person in terms of the 2012 Edition of the Australian Code for the Reporting of Exploration Results, Mineral Resources and Ore Reserves. David Hammond consents to the inclusion in the report of the matters based on his information in the form and context in which it appears.

The information in this statement that relates to the Mineral Resource Estimates is based on work conducted by Rod Brown of SRK Consulting (Australasia) Pty Ltd, and the work conducted by Peak Resources, which SRK has reviewed. Rod Brown takes responsibility for the Mineral Resource Estimate. Rod Brown is a Member of The Australian Institute of Mining and Metallurgy and has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration, and to the activities undertaken, to qualify as Competent Person in terms of the Australian Code for the Reporting of Exploration Results, Mineral Resources and Ore Reserves (JORC Code, 2012 edition). Rod Brown consents to the inclusion of such information in this report in the form and context in which it appears.

The information in the announcement that relates to estimated mine operating costs and mineral inventory was based on information compiled by Mr Ryan Locke, a Principal Consultant with Orelogy Consulting Pty Ltd, Orelogy are an independent consultant to Peak Resources. Mr Locke, who is a Member of the Australasian Institute of Mining and Metallurgy, has sufficient experience that is relevant to the style of mineralization and type of deposit under consideration and to the activity being undertaken to qualify as a Competent Person as defined in the 2012 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves'. Ryan Locke consents to the inclusion in the report of the matters based on his information in the form and context in which it appears. It should however be noted that no Ore Reserve has been reported as part of this study and therefore there is not a specific requirement for a CP in relation to the findings of this study.

The information in this report that relates to metallurgical test work results is based on information compiled and / or reviewed by Mr Gavin Beer who is a Member of The Australasian Institute of Mining and Metallurgy and a Chartered Professional. Gavin Beer is the General Manager Metallurgy of the Company and has sufficient experience relevant to the activity which he is undertaking to be recognized as competent to compile and report such information. Gavin Beer consents to the inclusion in the report of the matters based on his information in the form and context in which it appears.

The information in this report that relates to infrastructure, project execution and cost estimating is based on information compiled and / or reviewed by Lucas Stanfield who is a Member of the Australian Institute of Mining and Metallurgy. Lucas Stanfield is the General Manager - Development for Peak Resources Limited and is a Mining Engineer with sufficient experience relevant to the activity which he is undertaking to be recognized as competent to compile and report such information. Lucas Stanfield consents to the inclusion in the report of the matters based on his information in the form and context in which it appears.

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