



# NORTHERN MINERALS

Powering Technology.



## Quarterly Activities Report

DECEMBER 2017

During the quarter, mining was completed and assembly of the \$56 million Browns Range pilot plant project in the East Kimberley, WA, was progressing well.

**UNDERWAY**



Northern Minerals Limited (ASX: NTU; Northern Minerals or the Company) is developing the Browns Range Heavy Rare Earth Pilot Plant Project in northern Western Australia. Through the development of its flagship project, the Browns Range Project (the Project), Northern Minerals aims to be the first significant world producer of dysprosium outside of China.

The three-year pilot plant project will commence first production of heavy rare earth carbonate in H1 2018. The pilot plant development will continue with its R&D development and will provide the opportunity to gain production experience, surety of supply for our offtake partner and assess the economic and technical feasibility of the larger full scale development.

Corporate Overview

## Highlights:

- Majority of modular plant and equipment arrived on site from China and is being assembled.
- ASX-listed MACA Limited, the Browns Range mining and bulk earthworks contractor, completed the mining campaign, with an additional 25,000t ore mined during the program.
- The Company announced a \$9.74 million funding package, including a \$4.74 million Placement and a \$5 million drawdown under the Lind Facility.
- A Share Purchase Plan (SPP) was launched, with eligible shareholders invited to apply for up to \$15,000 worth of shares at 7.8 cents per share. Offer closes 12 February 2018.
- Subsequent to the end of quarter, the Company announced high grade rock chip sample results (including 7.19% TREO).



# Browns Range Project Update

Northern Minerals continued fabrication, mining and siteworks at the Pilot Plant Project for its 100% owned, dysprosium-rich Browns Range Heavy Rare Earth Project, located 160km south east of Halls Creek in the Tanami region of Western Australia and the Northern Territory.

The Company will become the first significant dysprosium producer outside of China through the development of the high-grade Browns Range Project. This will place Northern Minerals in a unique position to capitalise on the growing demand for the production of the dysprosium neodymium iron-boron magnets commonly used in the motors for the burgeoning electric vehicles sector, where industry commentators now agree demand has reached an inflection point.



## Browns Range – Site Activities

During the December quarter, the plant site continued to take shape, with Primero Group well progressed on the assembly of the pilot plant equipment and modules on site. ASX-listed MACA Limited demobilised from site following the completion of the trial mining campaign at the Gambit West and Wolverine deposits.

Mining of the Gambit West and Wolverine starter pits is now completed, with 205,000t<sup>1</sup> ore mined and stockpiled on the ROM pad. This is 25,000t more than originally planned and was made possible due to modifications to the mining method and favourable geotechnical conditions. Ore will be drawn down from the ROM pad over three-years.



<sup>1</sup> Based on contractor's truck factors, subject to final survey and physicals reconciliation



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Various processing plant components under construction

WA-based Primero Group Limited, appointed for the concrete works and installation component of the project, were largely complete with the concrete works and continued the assembly program of equipment and modules during the quarter. The scope of work for Primero includes the concrete works, installation, testing and commissioning of the Browns Range Pilot Plant Project. Two shipments of equipment and modular components of the processing plant arrived on site during the quarter, with the third major shipment completed in January.

## Fabrication Update

Sinosteel MECC, the EPC contractor responsible for the Browns Range Pilot Plant Project, essentially completed fabrication of the equipment and modular components for the project during the December quarter. All of the components were fabricated in the Republic of China before being shipped to Australia for installation.

Two main shipments were received in Australia in the December quarter, with the third and final main shipment completed in January. There are two individual sets of components, related to the mill that are still being fabricated and will be dispatched to site in February and March 2018.



Components arriving at port

## Project Enhancement Initiatives

During the quarter the Company announced four new enhancement initiatives to increase the value of the Browns Range Project.

The initiatives include an increase in the exploration budget aimed at extending the life of the potential large-scale project from 11 to 20+ years, studies of downstream processing options focused on increasing the suite and value of revenue products, optimisation of mining from learnings of the Pilot Plant Project to date as well as the potential for new acquisitions in the rare earth sector.

### Exploration

While the Company's recent focus has been on developing the Browns Range Pilot Plant project to evaluate the economic and technical feasibility of the full-scale project, it has always been the intention to reinvigorate the exploration program and assess the 170+ targets that have been identified in the region along with exploring at the John Galt and Boulder Ridge Projects.

Subsequent to the end of the December quarter the Company announced further high-grade rock chip samples from regional sampling completed in December. A total of 8 rock chip samples were collected in December 2017 from 7 prospect areas. Some of the samples were collected from known prospects, while others were from new target areas. The location of all samples is shown on Figure 1 below.



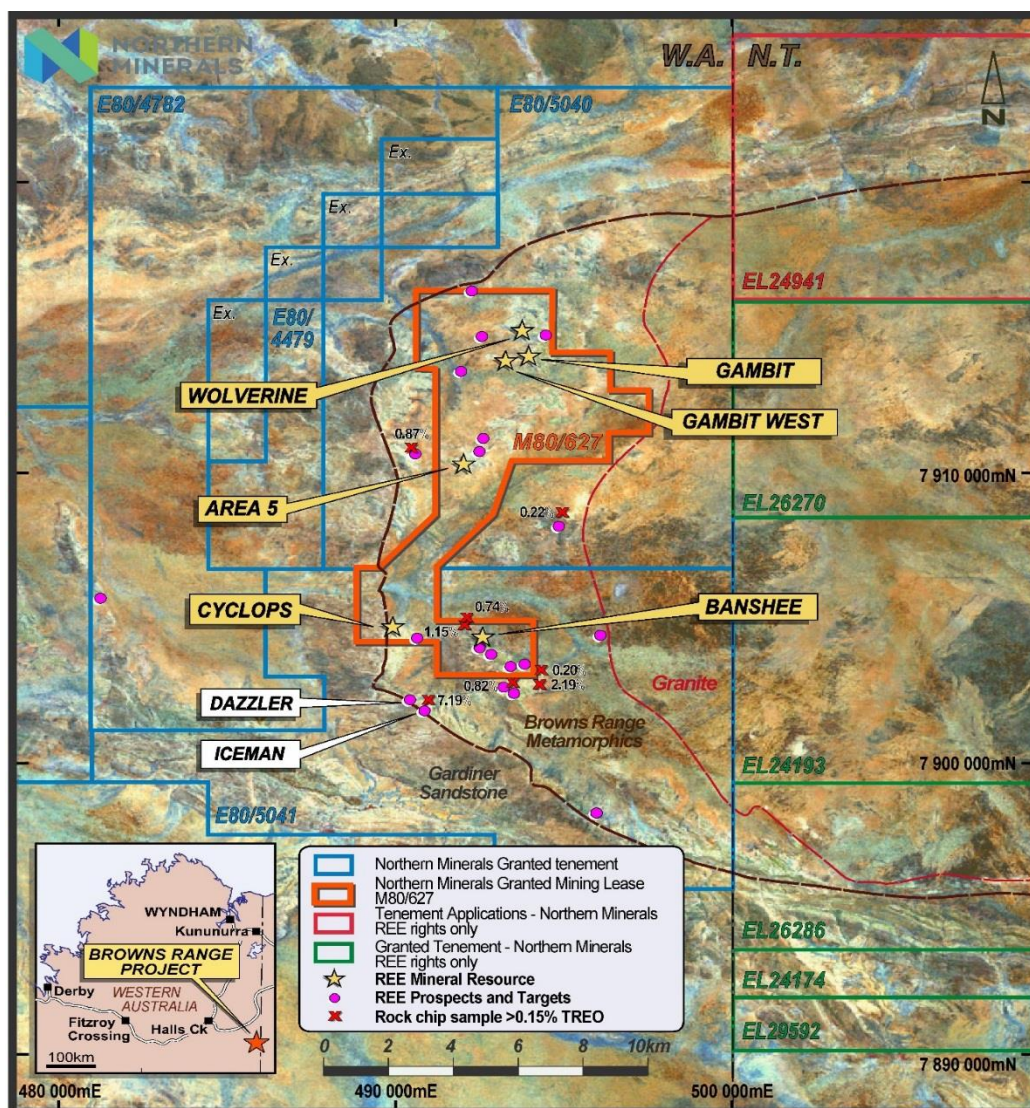


Figure 1 – Browns Range Project – Location of regional rock chip samples

The results are significant, given the average grade of the Browns Range deposits is 0.66% TREO. The high proportion of Heavy Rare Earths for nearly all of the samples indicates that the rare earth mineral is likely to be xenotime, the same as that at Gambit West and Wolverine, the Company's first two open pit mines. Of particular note is the very high-grade sample (7.19% TREO) at Iceman, a prospect with a strong geochemical surface anomaly over 200m in length, which is yet to be drill tested.

A program of RAB and/or RC drilling will commence in the June quarter, aimed at providing a first pass assessment of several of the new prospects and targets. If successful, a program of RC drilling will be undertaken in the September quarter aimed at increasing the Mineral Resources at Browns Range and extending the potential mine life at Browns Range from 11 years to more than 20 years.



### Downstream Processing Opportunities

The Pilot Plant Project is planning on producing 573,000kg of mixed heavy rare earth carbonate, containing both dysprosium and terbium as key revenue products. All the Pilot Plant production is being sold to JFMAG under an offtake agreement for the three-year Pilot Plant project.

The Company has received many approaches from permanent magnet producers in the US, Europe, South Korea and Japan regarding the potential for the sale of separated rare earth oxide products from the potential large-scale project. This includes dysprosium oxide, terbium oxide, neodymium and praseodymium as well as other rare earth oxides.

While the Company has investigated the potential for downstream processing as far back as 2012, recent improvements in technology and licencing opportunities has increased the potential for Northern Minerals to value-add to extract additional benefits for shareholders.

The Company has commenced initial discussions with potential licencing partners for the application of downstream processing technologies as well as investigating a potential site for the optimal location of a downstream processing operation. The potential site requires low cost power and access to the chemicals used in the process.

### Stage 2 Project Refinements

The Browns Range Pilot Plant Project is being developed to assess the technical and economic feasibility of a large full-scale project.

Over the three-year project, various initiatives and scenarios will be assessed, all aimed at improving the project for the future.

With the mining program for the Pilot Plant Project now successfully completed, the project team is reviewing the campaign to improve and refine mining methods in the future. An example of this is the application of steeper pit walls during the mining campaign, which resulted in a decrease in the volume of waste removed. AMC Mining Consultants will monitor the pit walls before and after the next few wet seasons to assess the long-term stability and geotechnical implications.

Subsequent to the DFS, it was identified that a longitudinal sub level cave mining method could replace the DFS selected method of longhole open stoping with post extraction backfill and has the potential to significantly reduce pre-production mining capital and operating costs. Feasibility study work needs to be conducted to confirm this.

### New Project Opportunities

The Company is currently assessing several opportunities in the rare earth sector that are complementary to the Browns Range Project.

In order to fully capture the rare earth potential in the permanent magnet sector, which is forecast to grow with increasing electric vehicle penetration, the Company is exploring acquisitions in the light rare earth sector, including projects with identified neodymium and praseodymium resources.

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All the investigations are at an early stage and no agreements have been entered into. The Company will make an announcement when such a transaction is progressed.

### Project timetable

Works for the Browns Range Pilot Plant Project are on schedule. The construction period for the pilot project is 11 months, with first mixed rare earth carbonate production in mid-2018.

	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Final Investment Decision	✓														
Mining & Bulk Earthworks			✓	✓	✓	✓	✓	✓							
Design & Fabrication		✓	✓	✓	✓	✓	✓	✓							
Installation						✓	✓	✓	✓						
R&D Testing															





## Corporate and Financial

### \$9.74 million funding package

During the quarter, the Company announced that it has raised approximately \$9.74 million, through equity and debt, for further development of the Browns Range Pilot Plant and has commenced a program consisting of four enhancement initiatives aimed at increasing the economic potential of the Browns Range Heavy Rare Earths Project in the East Kimberley, WA and its other projects.

The Browns Range Pilot Plant development is progressing on time and on budget and the funds raised to progress its development will be raised through:

(a) the issue of 60,769,231 fully paid ordinary shares (Shares) at an issue price of \$0.078 per Share to investors under a private placement out of its placement capacity under the ASX Listing Rule 7.1 (without shareholder approval and not utilising Listing Rule 7.1A capacity) to raise approximately \$4.74 million (Placement). Investors under the Placement will also be issued free attaching unlisted options on a 1 for 10 basis, with an exercise price of \$0.12 and an expiry date of 31 December 2019. \$3.74 million has been received with a further \$1 million received in January 2018; and

(b) a further drawdown of \$5 million under the Lind facility, previously announced on 14 June 2017.

### Share Purchase Plan and Proposed Bonus Listed Option Issue

During the quarter, the Company announced the launch of a Share Purchase Plan (SPP), giving eligible shareholders the opportunity to acquire up to \$15,000 worth of Shares at \$0.078 per Share.

The funds raised under the SPP will be used to fund the Company's further project development initiatives. Participation in the SPP is entirely optional and is available exclusively to shareholders who were registered as holders of Shares at 5.00pm (Perth time) on 22 December 2017, and whose registered address is in Australia or New Zealand (Eligible Shareholders).

Eligible Shareholders are able to participate in the SPP by choosing to invest \$5,000, \$10,000 or \$15,000 under the SPP.

The Closing Date for the SPP was extended by the Company following strong demand and will now close at 5pm AWST on Friday 12<sup>th</sup> February 2018.

Eligible shareholders can click on the following link to request their personal application form: <http://www.northernmineralsspp.com.au/INVESTMENT/NorthernMinerals.aspx>





### Listed Option Bonus Issue

The Board also proposes to undertake a bonus issue of new listed options to eligible shareholders in February 2018 on a 1 for 5 basis and with an exercise price of \$0.12 and an expiry date of 31 December 2019, subject to a prospectus being prepared and lodged with ASIC.

The record date for the proposed issue has not been finalised but will allow eligible shareholders who have been issued Shares under the SPP to participate in the bonus issue on the basis of their post-SPP shareholding.

## March Quarter Activities

Key news flow expected during the March quarter includes:

- Arrival of final modular components on site for installation
- Advancement of installation activities on site
- Completion of SPP and bonus listed option issue
- Development of prioritisation of exploration plan, ahead of drilling in June quarter

– ENDS –

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### Compliance Statement

The information in this report relating to Exploration Results is extracted from the report entitled 'High grade exploration results underpin regional potential at Browns Range Heavy Rare Earth Project' created on 24 January 2018 and is available to view on the Northern Minerals website, [northernminerals.com.au](http://northernminerals.com.au). The company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcement. The company confirms that the form and context in which the Competent Person's findings are presented have not been materially modified from the original market announcement.'

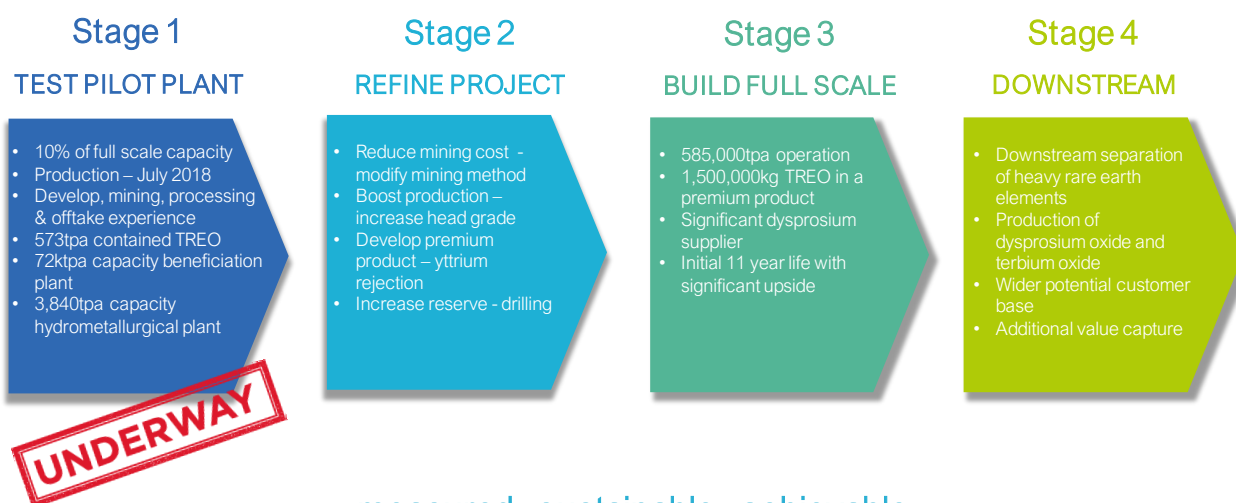
## About Browns Range

The Browns Range Project is internationally considered a best in class, shovel ready deposit with well understood mineralogy. Northern Minerals plans to develop the Browns Range Project in three stages. Stage one will be the development of a Pilot Plant operation; Stage Two the development of the project to bankable feasibility study level; and Stage Three the building of the project to full scale production.

The pilot plant, at a scale of 10%, has a designed front end of 60,000 tonnes per annum beneficiation circuit and a 3,200 tonnes per annum hydrometallurgical plant aimed at producing 570 tonnes per annum of TREO in a mixed rare earths carbonate, including 49 tonnes per annum of dysprosium.

The pilot plant is scheduled to operate for three years, in which time a decision to commit to the full-scale operation will be taken based on economic and technical feasibility, which if approved would take an additional two years to construct.

### Four stage approach to full scale production



measured . sustainable . achievable



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Project	Location	Tenement ID	State	Change of Status in Quarter	Status	Holder Application	Interest
	Browns Range	E80/4479	WA		Granted	Northern Minerals	100%
	Browns Range	E80/4725	WA		Granted	Northern Minerals	100%
	Browns Range	E80/4726	WA		Granted	Northern Minerals	100%
	Browns Range	E80/4806	WA		Granted	Northern Minerals	100%
	Browns Range	E80/4782	WA		Granted	Northern Minerals	100%
	Browns Range	E80/5040	WA		Granted	Northern Minerals	100%
	Browns Range	E80/5041	WA		Granted	Northern Minerals	100%
	Browns Range	M80/627	WA		Granted	Northern Minerals	100%
	Browns Range	L80/76	WA		Granted	Northern Minerals	100%
	Browns Range	L80/77	WA		Granted	Northern Minerals	100%
	Browns Range	L80/78	WA		Granted	Northern Minerals	100%
	Browns Range	L80/79	WA		Granted	Northern Minerals	100%
Browns Range NT	Browns Range	EL24193	NT		Granted	Northern Star Resources	REE rights only
	Browns Range	EL24174	NT		Granted	Northern Star Resources	REE rights only
	Browns Range	EL24941	NT		Application	Northern Star Resources	REE rights only
	Browns Range	EL26270	NT		Granted	Northern Star Resources	REE rights only
	Browns Range	EL26286	NT		Granted	Northern Star Resources	REE rights only

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John Galt	John Galt	E80/4298	WA		Granted	Northern Minerals	100%
	John Galt	E80/4671	WA		Granted	Northern Minerals	100%
	John Galt	E80/4779	WA		Granted	Northern Minerals	100%
	John Galt	E80/5070	WA	Granted	Granted	Northern Minerals	100%
Boulder Ridge	Boulder Ridge	EL24177	NT		Granted	Northern Star Resources	REE rights only
	Boulder Ridge	EL25171	NT		Granted	Northern Star Resources	REE rights only
	Boulder Ridge	EL29594	NT		Granted	Northern Minerals	100% (excluding gold rights)
	Boulder Ridge	EL24849	NT		Application	Northern Minerals	100% (excluding gold rights)
	Boulder Ridge	EL24935	NT		Application	Northern Minerals	100% (excluding gold rights)
	Boulder Ridge	EL28868	NT		Application	Northern Star Resources	REE rights only
	Boulder Ridge	EL30132	NT		Application	Northern Star Resources	REE rights only
	Boulder Ridge	EL27590	NT		Granted	Northern Star Resources	REE rights only
Gardiner-Tanami NT	Tanami	EL23932	NT		Granted	Northern Star Resources	REE rights only
	Tanami	EL25009	NT		Granted	Northern Star Resources	REE rights only

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	Ware Range	EL26498	NT		Granted	Northern Star Resources	REE rights only
	Ware Range	EL26541	NT		Granted	Northern Star Resources	REE rights only
	Pargee	EL27367	NT		Granted	Northern Star Resources	REE rights only
	Tanami	EL29592	NT		Granted	Northern Star Resources	REE rights only
	Tanami	EL29593	NT		Granted	Northern Star Resources	REE rights only
	Tanami	EL29595	NT		Granted	Northern Star Resources	REE rights only
	Tanami	EL23933	NT		Application	Northern Star Resources	REE rights only
	Ware Range	EL24179	NT		Application	Northern Star Resources	REE rights only
	Ware Range	EL24947	NT		Application	Northern Star Resources	REE rights only
	Ware Range	EL25003	NT		Application	Northern Star Resources	REE rights only
	Ware Range	EL25004	NT		Application	Northern Star Resources	REE rights only
	Tanami	EL25172	NT		Application	Northern Star Resources	REE rights only
	Tanami	EL29619	NT		Application	Northern Star Resources	REE rights only
	Tanami	EL29621	NT		Application	Northern Star Resources	REE rights only
	Tanami	EL26635	NT		Granted	Northern Star Resources	REE rights only



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Rabbit Flats	Rabbit Flats 1	EL25157	NT		Application	Northern Star Resources	REE rights only
	Rabbit Flats 2	EL25158	NT		Application	Northern Star Resources	REE rights only
	Rabbit Flats 3	EL25159	NT		Application	Northern Star Resources	REE rights only
	Rabbit Flats 4	EL25160	NT		Application	Northern Star Resources	REE rights only
	Rabbit Flats 5	EL23935	NT		Application	Northern Star Resources	REE rights only
Kurundi	Kurundi	EL29616	NT		Granted	Horn Resources	REE rights only



# NORTHERN MINERALS

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Yanchung Wang  
Non-executive Director  
Nan Yang  
Non-executive Director  
Bin Cai  
Alternate Director

Management  
Robin Jones  
Chief Operating Officer

Robin Wilson  
Exploration Manager

Mark Tory  
Chief Financial Officer/  
Company Secretary

Tony Hadley  
General Manager

Eben Van Rooyen  
Project Manager

## About Northern Minerals

Northern Minerals Limited (ASX: NTU; Northern Minerals or the Company) is focussed on the development of the Browns Range Heavy Rare Earth Pilot Plant Project in northern Western Australia. The Browns Range Project has the potential to be the first significant world producer of dysprosium outside of China.

Work has commenced on a three-year pilot plant project with first production of heavy rare earth carbonate expected in H1 2018. The pilot plant development will continue with its R&D development and will provide the opportunity to gain production experience, surety of supply for our offtake partner and assess the economic and technical feasibility of the larger full scale development.

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