

12 February 2020

## West Musgrave Pre-Feasibility Study - a low carbon, long-life, low-cost mine

- Three-fold increase in life of operation to ~26 years with throughput at 10 Mtpa
- Maiden Ore Reserve of 220Mt (100% Probable) at 0.36% Cu and 0.33% Ni<sup>1</sup>
- Annual production of ~28,000tpa copper and ~22,000tpa nickel in concentrates<sup>2</sup>
- Bottom quartile cash cost operation with C1 cost of ~US\$(0.90)/lb Cu and ~US\$1.30/lb Ni (net of by-product credits)
- Net Present Value of ~A\$800 million and IRR of ~20% (post-tax)<sup>3</sup>
- Off-grid renewable power, large scale open pit mining and innovative processing plant underpin low operating costs
- Key critical path activities continue whilst project is assessed against OZ Minerals' capital allocation framework

OZ Minerals Limited (OZ Minerals, ASX:OZL) and Cassini Resources Limited (Cassini, ASX:CZI) today announced the results of the West Musgrave, Nebo-Babel Pre-Feasibility Study (PFS). The project is a joint venture between OZ Minerals (70%) and Cassini (30%) in Western Australia.

The PFS has demonstrated a long life ~26-year open pit copper and nickel sulphide mine. It is the first development opportunity within the broader West Musgrave province which includes a number of additional highly prospective opportunities including the nearby Succoth copper deposit. A Maiden Probable Ore Reserve of 220Mt at 0.36% Cu and 0.33% Ni was also declared, representing ~22 years of the ~26-year life of mine (LOM) demonstrated in the PFS (with the balance of the mine life underpinned by a combination of Indicated and Inferred Mineral Resource).

Critical path activities are continuing whilst the project is being assessed under the OZ Minerals' capital allocation framework. The PFS now gives the partners a solid platform for engaging with potential lenders and advisors on how best to fund and structure the project prior to moving to the next phase.

OZ Minerals CEO, Andrew Cole said "The Pre-Feasibility Study is now complete and has confirmed the project can be a low carbon, low cost, long life mine producing copper and nickel, both in-demand minerals for the renewable and electrification industries."

<sup>1</sup> See OZ Minerals announcement titled "West Musgrave Project Nebo-Babel Deposits Ore Reserve Statement and Explanatory Notes as at 11th Feb 2020", released on 12 February 2020 and available at: [www.ozminerals.com/operations/resources-reserves/](http://www.ozminerals.com/operations/resources-reserves/)

<sup>2</sup> These production targets must be read in conjunction with the production targets cautionary statement on page 4.

<sup>3</sup> Assumes a third party power purchase agreement and therefore no upfront capital associated with the power supply.

"During this study we have partnered with the traditional owners, government agencies and industry experts to design a project to meet our objectives in relation to low carbon intensity, innovation and adding value for our key stakeholders. We thank them all for their contribution and look forward to their ongoing support."

"Building a viable asset in a remote part of Australia is challenging, but through our collaborative approach we have developed innovative off-grid renewable power and processing solutions, increased stakeholder awareness and involvement in the project and we have built confidence in the Mineral Resource itself. Furthermore, we have been able to reduce and eliminate a number of potential project risks."

"During 2019 sufficient drilling has been completed to allow the declaration of a maiden Ore Reserve of 220Mt (100% Probable) at 0.36% Cu and 0.33% Ni which is underpinned by the Pre-Feasibility Study."

"The collaborative process has produced a robust and realisable project. The process has also increased Western Australian government agencies' understanding of the project and this, along with the awarding of "lead agency" status by the State Government, will assist in streamlining the forthcoming approvals process."

"We are pleased the study has identified a means for us to reduce the project's carbon footprint significantly and overcome the historical challenge of affordable power for West Musgrave. We believe, supported by the views of potential renewable energy suppliers, that 70-80% of the power needs for West Musgrave can be supplied by renewable sources, supplemented by battery storage and diesel or trucked gas fired generation. The PFS base case assumes the power solution will be outsourced to a third party, with power purchased back over the life of the asset. However, further work is required in a future Feasibility Study (FS) to maximise the project's power position. A gas pipeline remains a secondary option to be further investigated during the next phase."

"We have been able to achieve a further significant reduction in carbon emissions and power demand through the adoption of vertical roller mills as the grinding mill solution and a flotation flowsheet which achieves metal recovery at a much coarser grind size than was previously considered in the design. This lower power usage has resulted in a reduction in operating costs, while the use of dry grinding from the vertical roller mills has also resulted in an improvement in nickel recovery," he said.

"A remote operations centre will further reduce the site environmental footprint, with fewer people on site, fewer flights and a smaller accommodation village."

"Over the past two years, OZ Minerals and Cassini have worked together with the Ngaanyatjarra People to understand their aspirations and how the Project can align with those aspirations."

OZ Minerals Chief Commercial Officer Mark Irwin said "We have learned a lot from our time in successfully developing, building and commissioning Carrapateena which can be applied to West Musgrave. The Project focus will now be on progressing critical path activities including government approvals, engineering partner selection and field activity preparation."

Cassini Managing Director, Richard Bevan said "Completion of the PFS is a significant milestone for the West Musgrave Project and all its stakeholders. The high quality PFS demonstrates the strategic value of this project by confirming robust economics on a long life, low operating cost copper and nickel mine at the Nebo-Babel deposits. The province offers the potential to add value to the project over time with continued exploration and development activities."

"I'd like to commend our joint venture partner OZ Minerals, their project team, which includes key Cassini technical staff, for their thorough and detailed work and look forward to progressing through the next study phase to production."

OZ Minerals will continue to sole fund the Nebo-Babel studies until the FS and decision to mine are delivered as per the current agreement. In respect of any amount funded by OZ Minerals, Cassini will be loan-carried for its 30% contribution, with principal and capitalised interest to be repaid five years after the commencement of production at West Musgrave.

OZ Minerals wishes to thank the Project team members, contributing consultants and peer reviewers as well as those involved in the collaboration events including Western Australia Government, Ngaanyatjarra community, industry partners and others for their input into the Study.

The key project metrics compared to the Further Scoping Study are shown in table 1 below. Key improvements in the project metrics are explained in the study summary below and in the commentary above.

**Table 1: Key project metrics compared to Further Scoping Study**

Key Financial and Production Metrics <sup>#</sup>	Unit	Further Scoping Study Nov'17 <sup>*</sup>	Pre-Feasibility Study Feb'20 <sup>**</sup>
Processing capacity	Mtpa	10+	10
Life of Operation	Years	8	~26
Copper recovery / Nickel recovery	%	73% / 59%	~78% / ~69%
Average Ni Production	ktpa	20-25	~22
Average Cu Production	ktpa	25-30	~28
C1 cost payable Cu (net of by -product credits)	US\$/lb	0.20 – 0.40	~(0.90)
C1 cost payable Ni (net of by -product credits)	US\$/lb	2.00 – 2.30	~1.30
Pre-production capital (excl. study) <sup>^</sup>	A\$M	730-800	~995
Average net cash flow (post tax)	A\$Mpa	120-150	~190
Post Tax NPV	A\$	-	~800
Post Tax IRR	%	20-25	~20
Project payback			
From commencement of production	Years	3-4	
From decision to mine	Years		~6

<sup>#</sup> All project values in real terms as at 1 January 2020

<sup>^</sup> Assumes a third party power purchase agreement and therefore no upfront capital associated with the power supply; a Power Purchase Agreement has been included as an operating expense. Ownership options for power infrastructure will be investigated further. Current estimates to build the power solution is circa A\$275 million.

<sup>\*</sup> The Scoping Study was prepared at a ±35% level of accuracy

<sup>\*\*</sup> The Pre-Feasibility Study was prepared at a ±25% level of accuracy; these production targets must be read in conjunction with the production targets cautionary statement on page 4

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### **Forward Looking Statements**

Some statements in this document may be forward-looking statements. Such statements include, but are not limited to, statements with regard to capacity, future production and grades, projections for sales growth, estimated revenues and reserves, targets for cost savings, the construction cost of new projects, projected capital expenditures, the timing of new projects, future cash flow and debt levels, the outlook for minerals and metals prices, the outlook for economic recovery and trends in the trading environment and may be (but are not necessarily) identified by the use of phrases such as "will", "expect", "anticipate", "believe" and "envisage".

By their nature, forward-looking statements involve risk and uncertainty because they relate to events and depend on circumstances that will occur in the future and may be outside OZ Minerals' control. Actual results and developments may differ materially from those expressed or implied in such statements because of a number of factors, including levels of demand and market prices, the ability to produce and transport products profitably, the impact of foreign currency exchange rates on market prices and operating costs, operational problems, political uncertainty and economic conditions in relevant areas of the world, the actions of competitors, activities by governmental authorities such as changes in taxation or regulation.

### **Production Targets Cautionary Statement**

The Production Target and forecast financial information derived from the Production Target referred to in this ASX release is based on 84% Probable Ore Reserves, 5% Indicated Mineral Resources and 11% Inferred Mineral Resources. The modifying factors used in the estimation of the Ore Reserve were also applied to the Indicated Resources and Inferred Resources.

There is a low level of geological confidence associated with Inferred Mineral Resources and there is no certainty that further exploration work will result in the determination of Indicated Mineral Resources or that the Production Target itself will be realised.

The material assumptions used in the estimation of the Production Target and associated forecast financial information are set out in West Musgrave Project Nebo-Babel Mineral Resource and Ore Reserve Statements and Explanatory Notes as at 11<sup>th</sup> February 2020 Table 1.

The Ore Reserve and Mineral Resource estimates underpinning the Production Target were prepared by a Competent Person in accordance with the JORC Code 2012.

### **West Musgrave Ore Reserve and Mineral Resource**

The information on the West Musgrave Mineral Resources and Ore Reserves estimates in this document are extracted from the document entitled "West Musgrave Project Nebo Babel Mineral Resource and Ore Reserve Statements and Explanatory Notes as at 11<sup>th</sup> February 2020" that was also released today. The West Musgrave Mineral Resource and Ore Reserve estimates in this document should be read in conjunction with that release.

## West Musgrave Pre-Feasibility Study Summary

### OZ Minerals Strategy

Creating value for stakeholders is at the centre of the OZ Minerals strategy. Creating Value along with all elements of the strategy - Lean and Innovative, Agile and Devolved, Partnering and Investing Responsibly - underpinned the approach taken for the PFS to explore new ways of operating a remote mine, in a part of Australia with low levels of infrastructure and access. The vision for West Musgrave is to set an example to the rest of the world for what a mining project can be in terms of community engagement, building partnerships, respect for the environment and the workforce of the future. The PFS has been prepared with a view to creating opportunities across the Musgraves for OZ Minerals' stakeholders today, and for future generations of the traditional owners of the land.

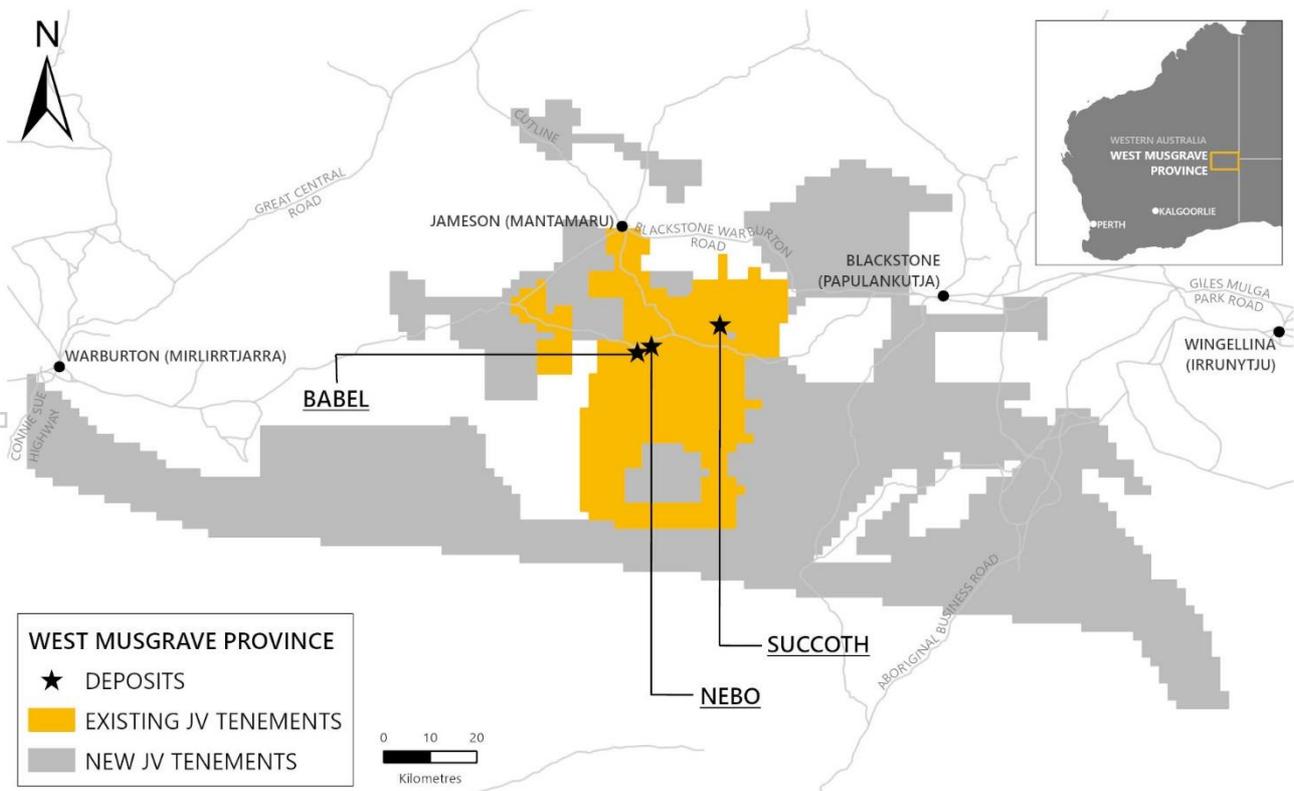
### Context

The Nebo-Babel deposits were discovered by Western Mining in 2000 and acquired by BHP in 2005. In 2014 Cassini Resources acquired the project and set about an extensive drilling and study program culminating in a 2015 Scoping Study. In 2016 OZ Minerals entered into a Joint Venture with Cassini and a Further Scoping Study was completed in late 2017. Since then OZ Minerals has increased its ownership of the project to 70% by reaching expenditure thresholds.

### Location

The West Musgrave Project is 500 km west of Uluru, near the intersection of the borders between Western Australia, South Australia and Northern Territory. The project is 30km south of the community of Jameson (Mantamaru).

Figure 1: Project Location



**Table 2: Project Overview**

<b>Mining</b>	Resource	280Mt Indicated and 63Mt Inferred at a combined grade of 0.33% Ni and 0.36% Cu
	Pits	Nebo and Babel to a maximum depth of ~500m
	Ore Reserve	220Mt (100% Probable) at 0.33% Ni and 0.36% Cu
	Mining Rate	~ 31Mtpa (pre-strip & stockpiling), ~34Mtpa (Yr1-5), ~43Mtpa (Yr6-LOM)
	Strip Ratio	~3.3 LOM average
	Life of Mine	~25 Years
	Mining Profile	~0.5-year pre-strip & stockpiling, ~25 years from first production
	Operations	Contractor Mining Yr1-5, Owner Operate Yr6-LOM
<b>Processing</b>	Flowsheet	Crushing, Vertical Roller Mill, Flotation producing separate nickel and copper concentrates
	Operation Life	~26 Years from first production
	Nickel Grade	~0.42% (Yr1-5) ~0.31% (Yr6-LOM)
	Copper Grade	~0.45% (Yr1-5) ~0.34% (Yr6-LOM)
	Recoveries	~69% Ni and ~78% Cu LOM
	Concentrate Grades	~10-11% Ni in Ni Con, ~25-26% Cu in Cu Con
	Nickel Production <sup>4</sup>	~27,000tpa (Yr1-5) ~22,000tpa (Yr6-LOM)
	Copper Production <sup>5</sup>	~33,000tpa (Yr1-5) ~27,000tpa (Yr6-LOM)
<b>Infrastructure</b>	Roads	Upgrade of existing ~30km road from site to Jameson
	Tailings Storage Facility	Two cells with water recycled back to process Upstream raises with downstream buttressing with mine waste rock
	Village and Airstrip	400-person operations village and airstrip located at site
	Water	7GLpa. Northern borefield ~15km from site
	Power	50MW Power Purchase Agreement, Hybrid Renewables (Wind, Solar, Battery + Diesel or Gas)
	Logistics	Containerised road transport to Leonora, Rail to Esperance for bulk shipping to customers
	Customers	Nickel and copper smelters in Australia, Asia and Europe Potential to expand customer base to include battery manufacturers subject to results of study into production of nickel-cobalt mixed hydroxide product

**Cost Estimate**

The estimate was compiled by OZ Minerals using inputs from a range of engineering consultants, in particular Australian Mining Consultants (AMC) for mining costs and GR Engineering Services (GRES) for process plant and elements of the infrastructure costs. As this is a PFS estimate it has an accuracy of circa +/- 25%. The cost estimate has a base date of October 2019. Engineering has been completed on packages to an advanced PFS

<sup>4</sup> These production targets must be read in conjunction with the production targets cautionary statement on page 4

<sup>5</sup> See footnote 4 above

level of definition including sufficient drawings to allow material take off for bulk materials. All major equipment and bulk materials have been quoted directly for this project, while minor equipment costing, and labour rates have been sourced from the GRES database of recently executed projects. Contingencies have been determined through risk assessment, with an allowance of ~12% including ~A\$65 million for inherent risks (uncertainties due to estimate immaturity) built into each package and a project contingency of A\$50 million determined for contingent risks that may eventuate during construction.

**Table 3: Capital Cost**

Capital Cost Estimate*	A\$M
Mining	~90
Process Plant	~285
Infrastructure	~265
Project Execution	~170
Owners Costs	~70
Contingency	~115
Total	~995

\* Excludes FS costs

**Table 4: LOM Average Operating Cost**

Operating Cost Estimate	A\$/t Ore
Mining	~12.70
Process Plant	~13.90
G&A	~0.80
Concentrate Logistics	~6.90
Total	~34.30

Post-production growth capital of \$72 million is assumed in Year 6 to purchase the mining contractor's mining fleet and transition to owner operate, realizing a lower mining cost. Life of mine sustaining capital of \$370 million has been determined, covering tailings storage facility lifts, process plant and mining fleet.

The capital cost excludes inflation and sunk costs up to 31 December 2019. Given the current assumption that power is purchased over the fence under a Power Purchase Agreement arrangement, the capital cost excludes any capital associated with power generation (current estimate is circa A\$275 million) but does include capital for power distribution on site.

The financial analysis includes an estimate of \$99 million for closure costs and a \$7 million per year corporate charge.

## Financial Analysis

**Table 5: Key Financial Metrics**

Metric		
Nickel Price	US\$/lb	7.60
Copper Price	US\$/lb	2.91
Exchange Rate	A\$ : \$US	0.67
Discount Rate		8.5%
Net Present Value	A\$M	~800*
Internal Rate of Return		~20%*

\* Assumes a third party power purchase agreement and therefore no upfront capital associated with the power supply.

**Table 6: Sensitivities**

Base Case NPV: ~\$800M*		
	-25%	+25%
Nickel Price	~\$200M	~\$1,400M
Copper Price	~\$500M	~\$1,100M
Exchange Rate	~\$1,900M	~\$100M
Capital Cost	~\$1,000M	~\$600M
Operating Cost	~\$1,300M	~\$300M

\* Assumes a third party power purchase agreement and therefore no upfront capital associated with the power supply.

### Mineral Resource

A detailed explanation of the Nebo-Babel geology can be found in the Mineral Resource and Ore Reserve Statements<sup>6</sup>.

Since the previous Mineral Resource update provided on 12 April 2019, an additional 46,000m of drilling has been incorporated into the Nebo-Babel Mineral Resource estimate.

The Mineral Resource has been reported above a 1.2 times multiplier (revenue factor) Net Smelter Return (NSR) cut-off at A\$23/t. The A\$23/t value represents the 2020 Ore Reserve mill limited break-even cut-off of A\$19.60/t ore plus an approximate mining cost of A\$3.40/t material moved. The 1.2 revenue factor NSR is generated by multiplying assumed metal prices by 1.2 to allow for reasonable prospects for eventual economic extraction. All NSR assumptions including metal prices, recovery, concentrate payability, mining and processing costs are based on the PFS study as at October 2019 and align with 2020 Ore Reserve optimisation inputs. Mineral Resources were further constrained within "reasonable prospects" pit shells generated using a cut-off NSR of A\$28/t and utilising a 1.2 times revenue factor. The A\$28/t value represents the 2020 Ore Reserve optimised NSR cut-off. Further details of the NSR calculation can be found in the Mineral Resource and Ore Reserve Statements<sup>7</sup>.

**Table 7: Nebo-Babel Mineral Resource as at 11<sup>th</sup> February 2020**

Category	Deposit	Tonnes	Ni	Cu	Au	Ag	Co	Pd	Pt	Ni Metal	Cu Metal
		(Mt)	(%)	(%)	ppm	ppm	ppm	ppm	ppm	(kt)	(kt)
Indicated	Babel	240	0.31	0.35	0.06	1	120	0.10	0.08	760	850
	Nebo	38	0.40	0.35	0.04	0.8	150	0.08	0.06	150	130
	<b>Sub-total</b>	<b>280</b>	<b>0.32</b>	<b>0.35</b>	<b>0.06</b>	<b>1</b>	<b>120</b>	<b>0.10</b>	<b>0.08</b>	<b>910</b>	<b>990</b>
Inferred	Babel	62	0.34	0.38	0.07	1	120	0.11	0.09	210	230
	Nebo	1	0.38	0.44	0.05	0.6	140	0.09	0.07	3.6	4.1
	<b>Sub-total</b>	<b>63</b>	<b>0.34</b>	<b>0.38</b>	<b>0.07</b>	<b>1</b>	<b>120</b>	<b>0.11</b>	<b>0.09</b>	<b>210</b>	<b>240</b>
Ind + Inf	Babel	300	0.32	0.36	0.06	1	120	0.10	0.09	960	1,100
	Nebo	39	0.40	0.35	0.04	0.8	150	0.08	0.06	150	140
<b>Total</b>		<b>340</b>	<b>0.33</b>	<b>0.36</b>	<b>0.06</b>	<b>1</b>	<b>120</b>	<b>0.10</b>	<b>0.08</b>	<b>1,100</b>	<b>1,200</b>

Table is subject to rounding errors. Data is reported to significant figures to reflect appropriate precision in the estimate and this may cause some apparent discrepancies in totals.

<sup>6</sup> See OZ Minerals announcements titled "West Musgrave Project Nebo-Babel Deposits Ore Reserve Statement and Explanatory Notes as at 11th Feb 2020" and "West Musgrave Project Nebo-Babel Deposits Mineral Resource Statement and Explanatory Notes as at 11th Feb 2020", released on 12 February 2020 and available at: [www.ozminerals.com/operations/resources-reserves/](http://www.ozminerals.com/operations/resources-reserves/)

<sup>7</sup> See footnote 6 above

A significant increase in Mineral Resource tonnes from the previous Mineral Resource is mainly due to the relative reduction in reporting cut-off grade. The previous Resource utilised a 0.25% Ni cut-off based on the Further Scoping Study<sup>8</sup>. The updated Resource utilises an NSR cut-off based on the concurrent PFS study. This NSR cut-off approximates to using a 0.18% Ni cut-off, however, using an NSR cut-off was determined to better reflect the variable metal recoveries of material types and the multi-metal revenue inputs.

There has also been a significant conversion of Inferred to Indicated Resource based on recent infill drilling with 82% of the reported Mineral Resource now Indicated.

## Mining

The deposits are near-surface and easily accessible by open pit mining with a pre-strip and initial ore stockpile for process plant commissioning of approximately 31Mt, some of which will be free dig. Processing rates between 6Mtpa and 23Mtpa have been thoroughly examined and an optimised rate of 10Mtpa selected. Stockpile strategies and in-pit dumping of waste have all been optimised to minimise operating cost and optimise mill feed grade.

Mining is modelled to be conventional drill, blast, load and haul and is assumed to be contractor operated during the first five years of operation, transitioning to owner operate in year six. The haulage fleet will comprise up to twenty-five 220t haul trucks and optionality is being maintained to allow for these trucks to be fully autonomous in the future.

Babel will be mined for the first two years to access higher grade, near-surface mineralisation, with Nebo then started in year 3. The Ore Reserve is shown in Table 8.

In addition to the Ore Reserves which are entirely based on Indicated Resources, the mine plan includes an additional 40Mt at 0.34% Ni and 0.36% Cu derived from Indicated and Inferred Resources which are predominantly towards the end of the current mine plan. Production targets and forecast financial information set out in the PFS are based on 84% Probable Ore Reserve, 5% Indicated Mineral Resource and 11% Inferred Mineral Resource. There is a low level of geological confidence associated with Inferred Mineral Resources and there is no certainty that further exploration work will result in the determination of Indicated Mineral Resources or that the Production Target itself will be realized. The quantity of Inferred material within the mine plan is minimal, will be mined at the back end of the mine life and is not considered material to the project.

**Table 8: Nebo-Babel Ore Reserve as at 11<sup>th</sup> February 2020<sup>9</sup>**

Deposit	Classification	Ore (Mt)	Ni (%)	Cu (%)	Au (ppm)	Ag (ppm)	Co (ppm)	Pd (ppm)	Pt (ppm)	Ni Metal (kt)	Cu Metal (kt)
Nebo	Probable	20	0.48	0.40	0.04	0.8	180	0.10	0.10	100	80
Babel	Probable	200	0.32	0.36	0.06	1	120	0.10	0.10	630	700
<b>Total</b>	Probable	<b>220</b>	<b>0.33</b>	<b>0.36</b>	<b>0.06</b>	<b>1</b>	<b>120</b>	<b>0.10</b>	<b>0.10</b>	<b>720</b>	<b>790</b>

Table is subject to rounding errors. Data is reported to significant figures to reflect appropriate precision in the estimate and this may cause some apparent discrepancies in totals.

## Metallurgy and Processing

Significant improvements in metallurgical performance have been achieved through the PFS via the optimisation of reagent regimes and applying a mineralogical based approach to deliver optimum mineral liberation, concentrate grade and metal recovery. The process flowsheet design has been significantly de-risked through testing of three master composites, 37 variability samples, locked cycle tests and pilot planting. This work

<sup>8</sup> See announcement titled "West Musgrave Project to progress to Pre-Feasibility Study" released on 14 November 2017 and available at [www.ozminerals.com/media/west-musgrave-project-to-progress-to-pre-feasibility-study/](http://www.ozminerals.com/media/west-musgrave-project-to-progress-to-pre-feasibility-study/)

<sup>9</sup> See OZ Minerals announcement titled "West Musgrave Project Nebo-Babel Deposits Ore Reserve Statement and Explanatory Notes as at 11th Feb 2020", released on 12 February 2020 and available at: [www.ozminerals.com/operations/resources-reserves/](http://www.ozminerals.com/operations/resources-reserves/)

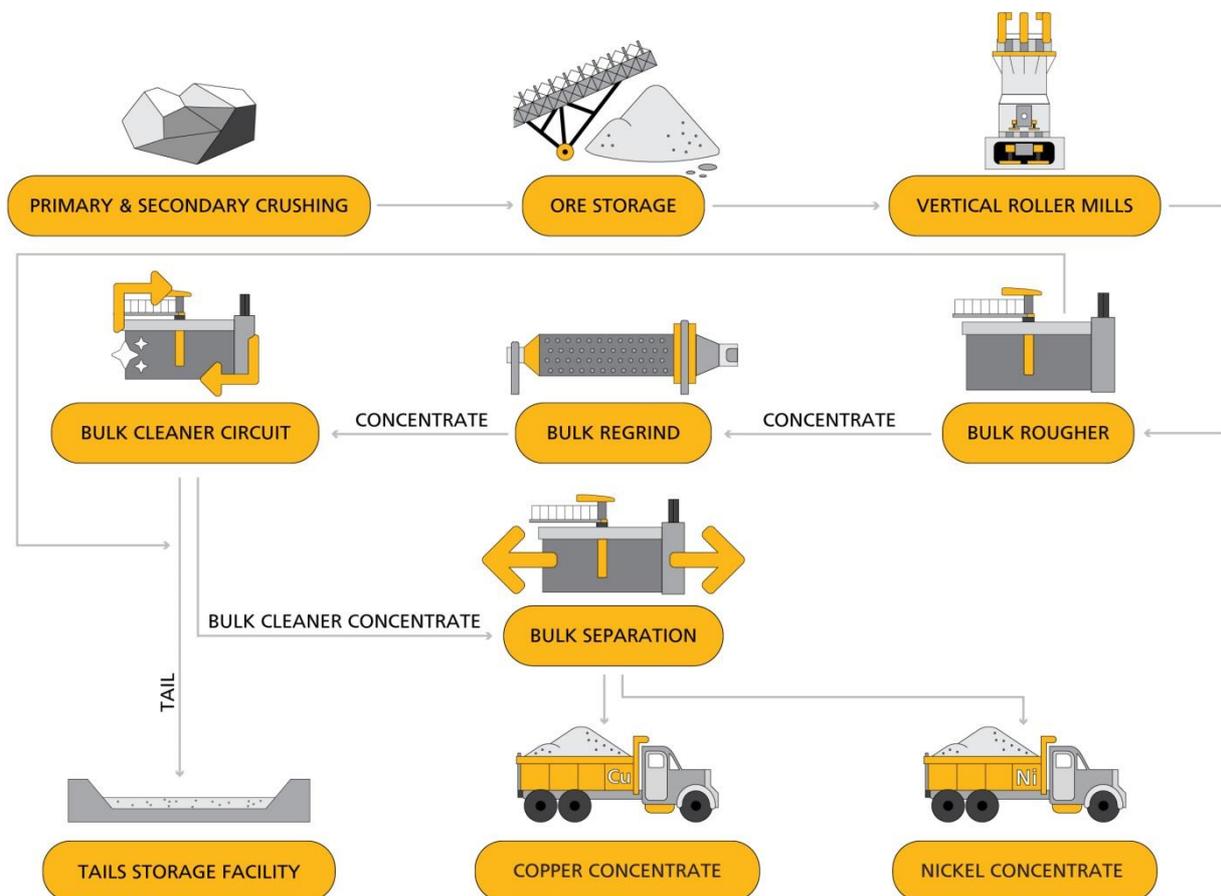
strongly supports the metallurgical assumptions used for financial modelling. Additional testing has covered comminution, regrinding, thickening, filtration, site water, ore ageing and tails property testing all in support of the process design criteria.

An innovative mineral processing plant will be built on site. The grinding circuit consists of two stages of crushing followed by two parallel vertical roller mills treating nominally 5Mtpa each. The second stage of crushing and vertical roller mills replace a traditional SAG Mill, Ball Mill and Pebble Crushing circuit. Vertical roller mills are widely used in the grinding of cement plant feeds and products, slag, coal and other industrial minerals, with thousands currently in operation worldwide. The mill has benefits in reducing power consumption by ~15%, no ball charge grinding media, higher flotation recovery and can be ramped up and down in response to the availability of low-cost renewable energy. The Vertical Roller Mill utilises compression style comminution principles taking 75mm rock to flotation feed size in the one machine. The application of the Vertical Roller Mill has reduced processing costs and provided a ~2% improvement in nickel recovery. The technology has been peer reviewed for West Musgrave by an independent expert and has been substantially de-risked through a series of pilot tests whereby 5 tonnes of West Musgrave ore has been tested.

A Bulk Separation flotation flowsheet producing separate copper and nickel concentrates will be used. The flowsheet has been developed to minimise primary grinding requirements with the primary separation size at 165 microns, saving significant grinding capital and operating expenditure in terms of grinding consumables and power draw. The flowsheet uses bulk rougher flotation, regrinding, 2 stages of bulk cleaning, then copper nickel separation at elevated pH. The nickel concentrate is a high-quality product with a low MgO content, is low in arsenic other impurities. The copper concentrate is also low in impurities and includes minor by-products of gold and silver.

With optimised mine scheduling, the first five years of operation will achieve higher production of circa 33ktpa of copper in concentrate and circa 27ktpa of nickel in concentrate. From year six onwards, production will average circa 27ktpa and circa 22ktpa for copper and nickel, respectively.

**Figure 2: Flowsheet**



## Mine Waste Management

Tailings will be stored in a two-cell Tailings Storage Facility (TSF) built as a hybrid system which includes upstream raises and downstream buttressing using mine waste. The facility will be unlined with underdrainage designed to capture seepage for return to the process during operations. Both static and kinetic geochemical test work has confirmed that the tailings are unlikely to generate problematic leachate. Solute fate modelling is underway to demonstrate that there will be no offsite or enduring impacts as a result of seepage. The Nebo pit will be utilised for tailings disposal from year 20 onwards. Utilising the Nebo pit will have an added benefit in minimising long-term ground water drawdown by avoiding the development of a pit lake.

The final design of the TSF will depend on demonstrating to the Regulator that all risks are adequately managed and as such the design is subject to change. TSF design, environmental baseline studies and impact assessments are progressing with a view to submitting a referral under Part 4 of the WA Environment Protection Act early in Q2 2020.

Mine waste rock will be stored adjacent to each pit with potentially acid forming material fully encapsulated. In-pit dumping of waste will be utilised for Babel in years 8 to 10 to minimise haulage distances and improve environmental outcomes.

## Water Supply

The groundwater drilling program completed in 2018 and subsequent ground water modelling completed in 2019 demonstrated a sustainable, high quality water supply from local palaeochannels of 7 GLpa, sufficient to supply the 10Mtpa processing plant. The Nebo pit intersects one such palaeochannel and as such requires dewatering prior to mining. The borefield will be located approximately ~15km north east of the operation and be supplemented by water recovered during pit dewatering.

Alternate water supply has also been considered with paleochannels immediately south of the proposed development area having confirmed water supply, and the Officer Basin 40km south of the proposed development area presenting a number of geophysical anomalies which represent strong conceptual target.

## Power Supply

A 50MW base case power supply (with a BOOM capital estimate of circa A\$275 million) is proposed utilising a hybrid solar-wind-battery-diesel solution, although a gas pipeline remains a secondary option. Baseline data collected since 2018 has demonstrated a high quality, consistent solar and wind resource is available, with higher wind velocities at night offsetting the lack of solar. The current base case assumes that power is purchased over the fence under a Power Purchase Agreement arrangement which is included in operating costs and therefore not in the capital estimate. However, the final ownership structure for the power assets will be further considered during the next phase of project development.

Modelling has demonstrated that circa 70 – 80% renewables penetration can be achieved for the site, with the current mix modelled to be an optimised mix of wind, solar and diesel supported by a battery installation. There remains considerable upside in power cost through matching plant power demand with the availability of renewable supply (load scheduling), haulage electrification to maximise the proportion of renewable energy utilised and the continued improvement in the efficiency of renewable energy solutions.

Should the renewables option be implemented, this innovative power supply solution would make West Musgrave one of the largest fully off-grid, renewable powered mines in the world. The solution would result in the avoidance of in excess of 220,000tpa of carbon dioxide emission compared to a fully diesel-powered operation.

## Operating Philosophy

The project will operate as a fly-in-fly-out operation. An airstrip and 400-person operations accommodation village will be constructed at the site. Approximately 60 staff are to be employed in operations monitoring, control and planning functions located in an offsite Integrated Operations Centre.

## Logistics

The logistics route to market includes road transport along the Great Central Road to a central hub at Leonora, followed by rail transport to Esperance. Copper and nickel concentrates are expected to be sold to a mix of domestic and international customers. Super Quad road trains will be used to carry concentrate in half height containers, with empty concentrate trucks returning to site being utilised for backhaul of reagents, diesel and other consumables. The Great Central Road is a well formed, but unsealed road. Both the Federal and Western Australian State Governments have publicly committed to funding the sealing of this road during the timeframe of the West Musgrave Project; however, sealing is not essential for the project and would only have a minor, non-material impact on costs. The capital cost estimate includes an upgrade of the existing 30km access track from site to Jameson.

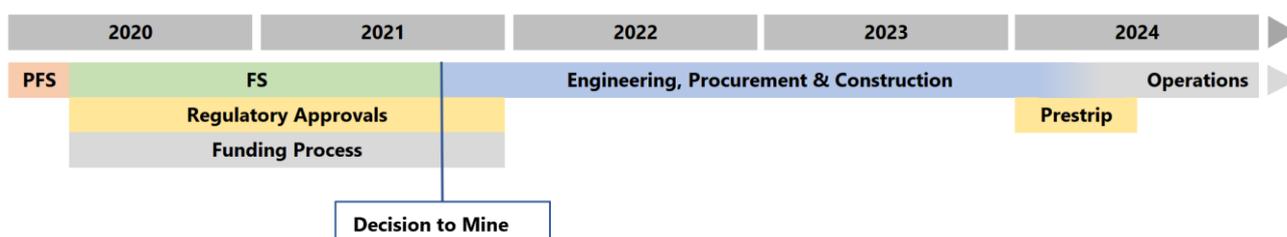
## Execution

The capital cost estimate has been developed assuming an Engineering, Procurement, Construction Management (EPCM) delivery model, however, OZ Minerals will further investigate execution models. The key elements of the execution strategy are:

- Engineering sufficient to inform tendering of each construction package.
- Project Management by an Integrated Project Management Team consisting of the current core OZ Minerals project delivery team augmented by engineering and Project Management Office capability from a Project Management contractor.
- Engineering, Procurement, Construction (EPC) delivery of the process plant package.
- Other vertical packages to be delivered by specialist design and construct contractors.
- Final delivery model for the power solution is still to be decided.

The current project timeline is shown below.

**Figure 3: Indicative Project Timeline (to be finalised)**



## Project funding

The availability of funding to support the capital requirement for the development of the Project is assumed in the PFS, with funding for the Project considered by the existing Joint Venture agreement. The Joint Venture partners have been working collaboratively on potential funding structures through the course of the PFS and indicative financing proposals have been received from a number of interested parties covering a variety of funding options including debt financing, traditional bank resource project financing, offtake funding and streaming mechanisms. The partners intend to continue to explore options to determine the optimal quantum and structure.

Completion of the PFS provides the partners with a sound basis on which to expand those discussions and engage further with a range of potential market and finance partners. Investors should note that there is no certainty that the partners, either individually or jointly, will be able to raise the funding required, or that funding may only be available on terms that may be dilutive to or otherwise affect the value of each company's existing shares. It is also possible that the partners, either individually or jointly, could pursue other value realisation strategies.

## Community

The Traditional Owners are the Yarnangu People with a total population of circa 2,000 people living in 10 communities within the Ngaanyatjarraku Shire. The people who have the strongest connection with the land within the Project area live in Jameson (Mantamaru) followed by Blackstone (Papulankutja) and Warburton (Mirlirtjarra). Jameson is located 30km north of the Project and has a population of circa 130 people. Warburton, which is the largest community within the Shire, is located 120km west of Jameson via the Blackstone-Warburton Road and has a population of circa 600 people. Blackstone is located 70km east of Jameson by road with a population of circa 150 people.

The focus during the PFS has been to secure land access and building relationships with the community. Four main heritage surveys occurred in 2018 to secure land access for the project. The surveys typically occurred in blocks of 10 days with an average of 30 people engaged each day. The heritage surveys provided an opportunity to build a strong relationship between project members and the community.

Project infrastructure has been designed to avoid culturally sensitive areas identified during surveys. Flexibility has been provided such that infrastructure locations can change without the need for further specific heritage surveys, ongoing consultation and co-design of the site layout will occur. Further heritage surveys will be required outside the immediate project area for other infrastructure corridors such as roads and water pipelines as the level of engineering designs progress.

A Genealogy study was commissioned in 2019 by the Ngaanyatjarra Council (Aboriginal Corporation) who represent the interests of traditional owners. The study documents the Ngaanyatjarra People who are connected to the land within the project area who are eligible to be part of the future mining agreement process. The study identified circa 700 people with a connection to the land. A Steering Committee comprising 34 senior community members (60% women and 40% men) from Jameson, Blackstone and Warburton has been formed to become the main mechanism for communication and consultation. Meetings have been held with the Steering Committee every 2-3 months to provide project updates, seek feedback and co-develop a Partnering Statement which documents how the two parties will work together to achieve shared value.

The Partnering Statement is a prelude to the mining agreement-making process which will commence in 2020.

A series of separate community meetings were also held to provide an opportunity for the broader community to be informed about the project and provide feedback. A delegation of community members visited the OZ Minerals' Prominent Hill Operation in South Australia as well as a solar farm and wind farm near Port Augusta to better understand the scale of the infrastructure planned as part of the design for the West Musgrave Project.

## Regulatory Approvals

Prior to May 2018 very little was known about the West Musgrave environment however, since this time an intensive environmental baseline program has been undertaken. The primary purpose of this program has been to identify constraints to inform responsible project layout / design and to acquire the necessary information to inform the project's regulatory approvals.

Since May 2018, some 40 studies have been completed, building a comprehensive understanding of the environment and the potential impacts associated with the project. Based on the extensive baseline dataset project environmental risks are considered manageable.

The first of three primary approvals submissions, assessment under Part 4 of the Western Australian Environment Protection Act (EP Act) is anticipated for early Q2 2020. Information obtained in the environmental baseline work program to date does not indicate any material threats to the obtainment of this approval.

Applications under the Western Australian Mining Act (i.e. Mining Proposal) and EP Act, Part 5 are planned for submission in H2 2020 once further detailed engineering and design have been completed. To date the planned approvals schedule indicates that all required regulatory approvals will be obtained in advance of the planned decision to mine.

## Government Engagement

A dedicated government engagement strategy has been developed and is ongoing. The key objectives of this strategy include building OZ Minerals and the West Musgrave Project profile in Western Australia, working with government stakeholders to realise shared value opportunities for the West Musgrave region and maintaining momentum for the project's regulatory pathway.

In November 2018 the West Musgrave Project was assigned lead agency status by the Western Australia Department of Mines, Industry Regulation and Safety (DMIRS). Selected projects in Western Australia that are considered significant and/or complex in nature can apply for and be assigned to a Lead Agency. The assigned Lead Agency then works with project proponents to manage government interactions and statutory approvals; helping improve efficiency and reduce time taken to deliver projects.

Key Lead Agency facilitated meetings to date include a 'West Musgrave Government Hub' which included senior government officials from 13 Western Australian Government departments relevant to the project. The Government Hub successfully built the profile of the West Musgrave Project and created an opportunity for the Joint Venture and Government to explore future shared value opportunities for the region.

## Risks

OZ Minerals considers risks as both opportunities and threats. The August 2019 PFS Update<sup>10</sup> outlined a number of risks remaining to be addressed. In large part the work undertaken since has addressed these risks, either adding them to the project base case or removing them. The risks described below are still outstanding and will be addressed further during the next phase of the project.

### Opportunities not included in the current base case

#### Increased Payability of Nickel in Concentrate

Indicative market terms have been received from potential customers in Australia and Asia. An independent peer review of these terms has indicated the potential for higher nickel payability given an ongoing tightening of the concentrate market. Discussion with potential customers will continue, with the possibility of negotiating improved terms relative to those assumed in the PFS valuation.

#### Mixed Nickel Hydroxide Product (MHP)

A concept study and market analysis has determined that there is potentially significant upside value in processing the nickel sulphide concentrate onsite to produce MHP containing nickel and cobalt. MHP is a precursor material in the production of nickel sulphate for use in batteries but can equally be fed to a variety of downstream processes to make nickel metal. The market for nickel sulphate is forecast to grow to circa one million tonnes per annum over the next five years in response to the growing demand for EV batteries. MHP is a relatively high-grade nickel product which will have reduced transport costs and increased nickel payability relative the sulphide concentrate. A number of process routes have been identified, with metallurgical test work and process development required in the next phase of the project.

## Succoth

The Succoth copper deposit is located only 13 km north east from Nebo.

Cassini has previously reported an Inferred Resource at Succoth of 156Mt at 0.6% Cu<sup>11</sup> with drilling including a highlight of 148m at 0.94% Cu from 30m including 42m at 1.38% Cu from 102m (drill hole CZC0118).

A new structural interpretation of the mineralisation has been developed demonstrating the potential for upside at Succoth. With Nebo-Babel justifying the establishment of supporting infrastructure, Succoth can potentially add upside in mine life or production rate. An integrated targeted geophysics and drilling program is being developed and will be considered in the next phase of the project.

<sup>10</sup> See OZ Minerals announcement titled "West Musgrave Pre-feasibility Study Progress Update", released on 28 August 2019 and available at: [https://www.ozminerals.com/uploads/media/190828\\_OZL\\_ASX\\_Release\\_-\\_West\\_Musgrave\\_PFS\\_Progress\\_Update.pdf](https://www.ozminerals.com/uploads/media/190828_OZL_ASX_Release_-_West_Musgrave_PFS_Progress_Update.pdf)

<sup>11</sup> See Cassini Resources Limited ASX release titled "Maiden Succoth Resource Estimate", dated 7 December 2015 and available at: [https://www.cassiniresources.com.au/images/files/151207\\_Succoth\\_Resource.pdf](https://www.cassiniresources.com.au/images/files/151207_Succoth_Resource.pdf)

## Power Cost

There remains considerable upside in power cost through matching plant power demand with the availability of renewable supply (load scheduling), the potential use of storage technology, haulage electrification to take advantage of renewable energy and the continued improvement in the efficiency of renewable energy solutions. An initiative already underway is to potentially source funding for the innovative renewable power solution through government agencies, including ARENA. In addition to the renewables solution a gas pipeline remains a potential secondary solution that will require further examination during the next phase of the project.

## Threats to the current Base Case

### Regulatory Approvals Delay

OZ Minerals has been working closely with the Environment Protection Authority, Department of Water and Environmental Regulation and Department of Mines, Industry Regulation and Safety to understand the approval requirements (including Western Australia Environment Protection Act Part 4, Part 5 and Western Australia Mining Act, Mining Proposal) and we believe that the approvals delay risk is manageable. We have developed a regulatory approvals schedule aligned with the indicative project timeline, and are confident in the positive results we have seen from our extensive environmental baseline study program. However it is recognised that an approval delay of up to 12 months still presents a risk.

### Nickel Concentrate Sales

It has been assumed that a portion of the nickel concentrate will be sold to domestic customers, realising lower freight costs. It is possible that the assumed customer mix will not eventuate, resulting in higher freight costs to international customers. This may be offset by more favourable terms. Discussion with potential customers will continue in the next phase of the project.

## Next Steps

The Project focus will now be on critical path activities including government approvals, engineering partner selection and field activity preparation.

For further information, please contact:

### Investors

Tom Dixon

T 61 8 8229 6628

M 61 450 541 389

[tom.dixon@ozminerals.com](mailto:tom.dixon@ozminerals.com)

### Media

Sharon Lam

T 61 8 8229 6627

M 61 0438 544 937

[sharon.lam@ozminerals.com](mailto:sharon.lam@ozminerals.com)

This announcement is authorised for market release by OZ Minerals' Managing Director and CEO, Andrew Cole.