Orion Minerals

ASX/JSE RELEASE: 19 December 2018

Scoping Study Confirms a Robust Phase 1 for the Prieska Zinc-Copper Project

Orion Minerals Ltd (**ASX/JSE: ORN**) (**Orion** or **Company**) is pleased to present the outcomes of a scoping study, based on recently updated Mineral Resources, for its Prieska Zinc-Copper Project (**Prieska Project** or **Project**), located in the Northern Cape Province of South Africa (**Scoping Study** or **Study**).

The Study confirms the potential for the Prieska Project to become a significant near-term, low-cost, zinc and copper concentrate producer, whilst laying the foundations for future opportunities. Based on Study assumptions, the Project would provide excellent financial returns, for modest capital investment given the scale of operations envisaged.

Presented in compliance with ASX Listing Rules for Release of Scoping Study outcomes:

The Study referred to in this announcement is a technical and economic investigation of the viability of the Prieska Zinc-Copper Project. It is based on low-level accuracy technical and economic assessments (± 35% accuracy) and is insufficient to support estimation of Ore Reserves, to provide assurance of an economic development case at this stage or to provide certainty that the conclusions of the Study will be realised. The Scoping Study is based on the material assumptions outlined in this report. The Production Target and forecast financial information referred to in this technical document is based on JORC (2012) Mineral Resources which are reported and classified at approximately 64% Indicated and 36% Inferred. 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 additional Indicated Mineral Resources or that the Production Target itself will be realised. Further evaluation work in the form of a Feasibility Study is ongoing. To achieve the outcomes specified in this Study initial funding in the order of AUD 300 million to AUD 330 million (including a 20% contingency) is likely to be required. Investors should note that there is no certainty that Orion will be able to raise funding when needed. It is also possible funding may only be available on terms that may be dilutive to or otherwise effect the value of Orion's shares.

Orion's Managing Director and CEO, Errol Smart, commented:

"We are very pleased to have completed our Resource upgrade that has confirmed what an exceptional deposit we have at Prieska. With nearly two-thirds of the Resource now in the Indicated category, we can present the case for the first ten years of a very attractive mining operation. The Study indicates solid operating margins, with the peak funding of AUD 320m inclusive of 20% contingency, recovered within the first third of mine life all supported by current Indicated Resources yielding an NPV of AUD 420m.

The Study identifies important opportunities for further financial upside, both from extending the life of mine, and from optimising the grade of extraction following further drilling to be conducted from underground. The current Phase 1 Study has examined extracting only 75% of the total Mineral Resource at the mean Mineral Resource grade.

The application of further modernisation, making optimised use of low-cost available renewable energy, also provides an important cost saving opportunity being investigated in depth by the Bankable Feasibility Study which is well advanced."

KEY SCOPING STUDY RESULTS

- Initial 10-year mining scenario supported by 64% of Indicated Mineral Resources, extracting 75% of a combined underground Mineral Resource of 28.73Mt at 3.77% zinc and 1.16% copper.
- 2.4Mtpa operation, producing about 70kt to 80kt of zinc and 22kt of copper in concentrates per annum.
- 43% all-in-sustaining margin, with all-in-unit costs of AUD 1,701/t (USD 1,215/t) zinc equivalent metal sold.
- Estimated AUD 130m annual free cash flow after-tax at steady-state.
- AUD 400m to AUD 440m pre-tax NPV at 12.5% discount rate and approximately 38% pre-tax IRR.
- Payback period of less than 3 years from first production.
- Approximately AUD 300m to AUD 330m peak funding to setup the infrastructural foundation for future expansion.
- Bankable Feasibility Study due for completion in Q2 2019.

Price and FX Assumptions	Unit	Estimated Value	Financial Performance	Unit	Estimated Value
Metal price – Cu (USD3.00/lb)	USD/t	6,614[1]	NPV (pre-tax) @12.5% discount rate	AUD m	400 – 440
Metal price – Zn (USD1.30/lb)	USD/t	2,866[1]	IRR (pre-tax)	%	38%
Exchange rate	ZAR:USD	14 : 1	Payback from first production	years	3
Exchange rate	ZAR:AUD	10 : 1	Undiscounted free cash flow (pre-tax)	AUD bn	1.2 – 1.3
Exchange rate	AUD:USD	1.4 : 1	Peak funding	AUD m	300 – 330
Production Metrics	**Unit**	**Estimated Value**	**Project Cost Metrics**	**Unit**	**Estimated Value**
Life of Mine (Phase 1)	years	10	Average cash operating unit cost (C1)	AUD/t	83
Treatment plant capacity	ktpa	2,400	All-in-sustaining cost per unit ROM t	AUD/t	100
Phase 1 tonnage - ROM	mt	22	All-in-sustaining cost per unit Zn eq t sold	AUD/t Zn	1,701
Phase 1 tonnage - processed	mt	22	All-in-sustaining cost per unit Cu eq t sold	AUD/t Cu	4,949
Concentrate tonnage - Zn	mt	1.4	Price received (net of NSR) - Zn	AUD/t Zn	2,982
Concentrate tonnage - Cu	mt	0.9	Price received (net of NSR) - Cu	AUD/t Cu	8,677
Concentrate grade - Zn	%	50.0%	All-in-sustaining margin	%	43%
Concentrate grade - Cu	%	24.0%	Operating breakeven grade (Zn eq)	%	4.1%
NSR as % of metal price - Zn	%	74.3%			
NSR as % of metal price - Cu	%	93.7%	**Project Cash Flows**	**Unit**	**Estimated Value**
Metal sold (in concentrates) - Zn	kt	686	LoM net revenue	AUD m	3,457
Metal sold (in concentrates) - Cu	kt	206	LoM operating costs	AUD m	1,740
Total sales as Zn equivalent	kt	1,285	Project start-up capital expenditure	AUD m	360 - 390
Total sales as Cu equivalent	kt	442	Sustaining capital expenditure	AUD m	65 - 75

Table 1: Key Scoping Study Results for Phase 1 of the Prieska Zinc-Copper Project. Note that the overall Study accuracy level is ±35%.

The Scoping Study investigated the economic viability of an initial ten-year phase of exploitation of the Prieska deposit. This initial phase will involve underground mining to extract portions of the delineated Mineral

[1] Guided by Afriforesight (Pty) Ltd long-term consensus forecast as of August 2018.

Resources (refer ASX release 18 December 2018). A Bankable Feasibility Study (**BFS**) is well advanced and due for completion in Q2 2019.

Phase 1 of the Project has a potential Net Present Value (**NPV**) of between AUD 400m and AUD 440m pre-tax and post-royalties (AUD 280m to AUD 310m, post-tax, post royalties), using non-inflation-adjusted estimates and a discount rate of 12.5%, and would achieve a pre-tax Internal Rate of Return (**IRR**) of 38%. The NPV is based on long-term forecast metal prices of USD 1.30/lb (USD 2,866/tonne) for zinc and USD 3.00/lb (USD 6,614/tonne) for copper. Peak funding requirements would amount to between AUD 300m to AUD 330m including a 20% contingency allowance. This would occur in the third year of the capital expenditure (**CAPEX**) program. Payback would occur about 5 years from the start of construction or about 3 years from the start of production.

Unit all-in-sustaining costs (**AISC**) over the duration of Phase 1 would be approximately AUD 1,701/t (USD 1,215/t) zinc equivalent metal sold. The realised price (net of smelter charges) would be AUD 2,982/t (USD 2,130/t) zinc equivalent sold, yielding in the order of 43% in all-in-sustaining margin. Operating break-even grade is estimated at 4.1% zinc equivalent, well below the Mineral Resources grade of 6.9% zinc equivalent [Zn eq grade = Zn grade + 2.91 x Cu grade][2], applied in the production schedule.

The NPV estimate is most sensitive to the ZAR-USD exchange rate. Pre-tax NPV ranges from AUD 250m to AUD 550m as the ZAR-USD exchange rate varies from -15% to +15% of the base case assumptions.

PRIESKA SCOPING STUDY TECHNICAL REPORT EXTRACTS

Nature of and Contributions to the Scoping Study

The Scoping Study is based on work carried out by Orion, DRA Projects SA (Pty) Ltd (**DRA**), Fraser McGill (Pty) Ltd, METC Engineering (Pty) Ltd, Precision Capital Development Services (Pty) Ltd, Bluhm Burton Engineering (Pty) Ltd, METS South Africa (Pty) Ltd, ABS Africa (Pty) Ltd, Z* Star Mineral Resource Consultants (Pty) Ltd and the MSA Group (Pty) Ltd. References are also made to historical and other more current Project documents.

The Scoping Study aims to consolidate the learnings from the various studies conducted on the Project and to inform the ongoing BFS. The report complies with Australian Securities Exchange (**ASX**) listing rules and Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (**JORC (2012)**) reporting standards.

Project Context and Overview

Overview

The Project is located in the Northern Cape Province of South Africa. Figure 1 outlines the area of the Company's exploration activities, with the Project located at the southern extent, approximately 60km south-west of the town of Prieska.

As part of the Project, a Scoping Study has been completed and a BFS is underway to evaluate establishing new mining operations at the Prieska Copper Mine (**PCM**) which has been closed since 1991. The mine was previously owned and operated by Prieska Copper Mine Limited, a subsidiary of Anglo-Transvaal Consolidated Investment Company Limited (**Anglovaal**).

[2] Refer to page 16 for Zn equivalent grade assumptions.

Figure 1: Location of the Prieska Zinc-Copper Project, Northern Cape Province, South Africa.

The Scoping Study, as summarised herein, was carried out to an accuracy level of ± 35% and is supported by JORC-compliant Mineral Resources as announced in December 2018 (refer ASX release 18 December 2018). In the Study, a mining scenario was assessed which covers the initial 10-year phase of operations, using underground mining methods (**Phase 1**). Phase 1 excludes any open pit mining, historical pillar extraction and does not exhaust all known deposit extensions. Project financial evaluations have thus been limited to considering Phase 1 only.

Ownership and Mineral Tenements

Orion completed the acquisition of Agama Exploration and Mining (Pty) Ltd (**Agama**) and its subsidiaries in March 2017. Orion now holds, through Agama's subsidiary companies, a 73.3% interest in the Repli Prospecting Right (**Repli**) and a 70% interest in the Vardocube Prospecting Right (**Vardocube**), which together cover an area of 6,766 hectares that encompasses the historic PCM, Figure 2. The remaining project interests are held by various Black Economic Empowerment (**BEE**) entities, in compliance with South African legislation. According to the South African Department of Land Restitution and Reform, there are no land claims on any of the properties covered by the prospecting rights.

Applications to obtain the rights to mine the Repli prospecting right area were lodged in April 2018. These applications include a Mining Work Program (**MWP**), Environmental Authorisation (**EA**), Integrated Water and Waste Management Plan (**IWWMP**) and a Social and Labour Plan (**SLP**). Vardocube Mining Right applications were submitted in September 2018. Granting of the Repli Mining Right, along with associated environmental, water and waste management permitting, is expected in Q3 2019, with granting of the Vardocube Mining Right expected soon thereafter. This would enable construction activities to commence in calendar year 2019, subject to a positive BFS and the availability of funding. Other required land access rights have already been obtained through agreements negotiated with affected landowners and occupiers. Orion also holds other neighbouring prospecting rights granted to Repli and another Orion subsidiary, Bartotrax (Pty) Ltd (**Bartotrax**), Figure 2. These enable extensional exploration to continue delineating the dip and strike extensions beyond the Phase 1 footprint of the Prieska deposit, as well as conduct exploration for satellite deposits.

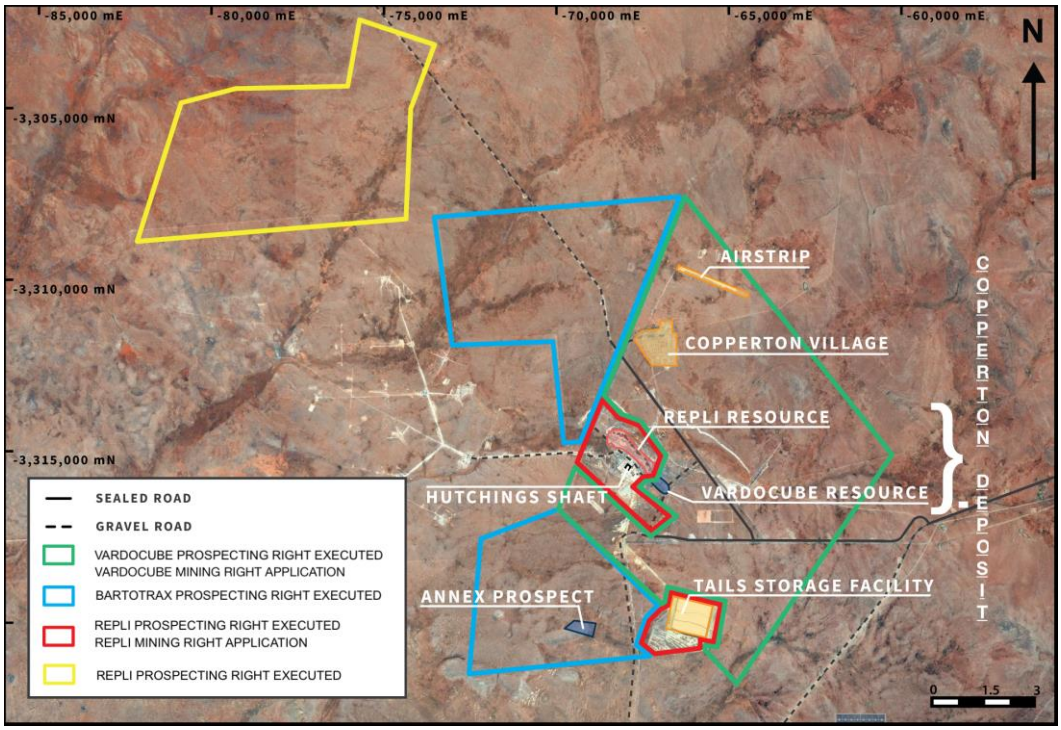


Figure 2: Mineral Tenement Map for the Project Area.

History

PCM operated from 1971 until 1991. During this time, the mine processed 45Mt of run-of-mine (**ROM**) material and produced 1.01Mt of zinc and 0.43Mt of copper as high-grade concentrates, whilst achieving average processing plant recoveries of 84.3% for zinc and 84.9% for copper, (refer ASX release 15 November 2017). Reported 'mineral reserve' grades at the time the original mine was commissioned were 3.8% zinc and 1.7% copper[3]. Pyrite was also intermittently produced as a by-product. The concentrates were sent to either O'kiep or Zincor for smelting or Saldanha Bay for export.

Existing infrastructure

Some of the infrastructure that serviced previous mining operations is still serviceable and can be used for the new Project. This infrastructure includes a 60km-long bulk water supply pipeline transferring water from the Orange River, tarred roads, regional grid power and an airstrip. The town of Copperton, which is located 4km by road from the main rock hoisting shaft, used to be the principal residence for the PCM community. The town is still in use, though only 40 of the original 300 houses remain. The farming service town of Prieska, with a population of 14,000, lies 60km north-east of the Project site via the tarred R357 regional highway.

[3] Note that these were historical estimates not compliant to JORC-Code reporting standards.

The main hoisting shaft, which is 1,024m deep, and its associated concrete headgear, are intact and re-useable. Some 37km of underground tunnels and mined-out stopes are currently flooded to a depth of 330m below surface and so an 18-month pumping program would be required to de-water these workings.

Geology, Exploration and Mineral Resources

Project Geology

The Prieska deposit is a Volcanogenic Massive Sulphide (**VMS**) body situated in the southernmost exposures of the north-northwest trending Kakamas Terrain, which forms part of the Mid-Proterozoic Namaqualand Metamorphic Complex. The deposit is hosted by the Copperton Formation of the Areachap Group. The Areachap Group, also hosts several other smaller VMS deposits such as the Areachap, Boks Puts, Kantien Pan, Kielder, and Annex Vogelstruisbult deposits. The structural sequence at the deposit consist of a footwall Smouspan Gneiss Member, the Prieska Copper Mines Assemblage (**PCMA**), which hosts the sulphide mineralisation, and the hangingwall Vogelstruisbult Gneiss Member, Figure 3. The historically-mined section of the deposit is confined to a tabular, stratabound horizon in the northern limb of a refolded recumbent synform, the axis of which plunges at approximately 5° to the south-east.

The outcrop of the mineralised zone has a strike of 2,400m, is oxidised and / or affected by leached and supergene enrichment to a depth of approximately 100m. It has a dip of between 55° and 80° to the northeast at surface and a strike of 130° to the north. Current drilling indicates that, at depth, the Deep Sulphide Zone has a strike length of at least 2,860m. The thickness of the mineralised zone exceeds 30m in places but averages between 7m and 9m. The mineralised zone persists to a depth of 1,100m (as deep as 1,228m in one section) after which it is upturned due to the folding.

The **Deep Sulphide Zone**, located below the mined-out areas, comprises the steep, down dip continuity, then upturns to its synformal structure, Figure 3 and Figure 4. The morphology of the mineralised horizon in the eastern limb is well mapped out by drilling and historical mining while the western limb up-dip extent is poorly tested and mapped.

The **+105 Level Resource** area comprises the oxide / supergene / mixed zone / primary sulphide gradation profile situated from above the upper limit of mining at approximately 100m depth below surface, up to surface. This zone has a strike length of 867m, Figure 4.

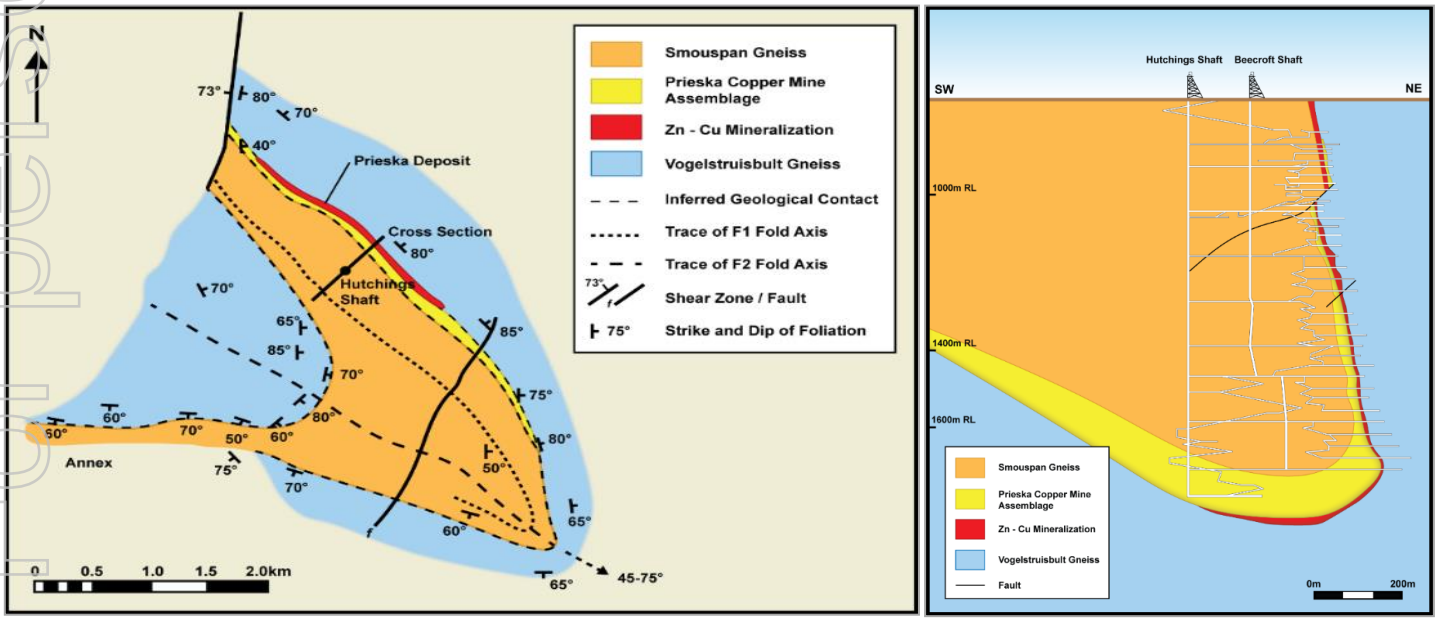


Figure 3: Surface plan and cross-section showing the interpreted strike and dip extents of the known Prieska Deposit (modified after Theart, et. al, 1989 and Wagner and Van Schalkwyk, 1986).

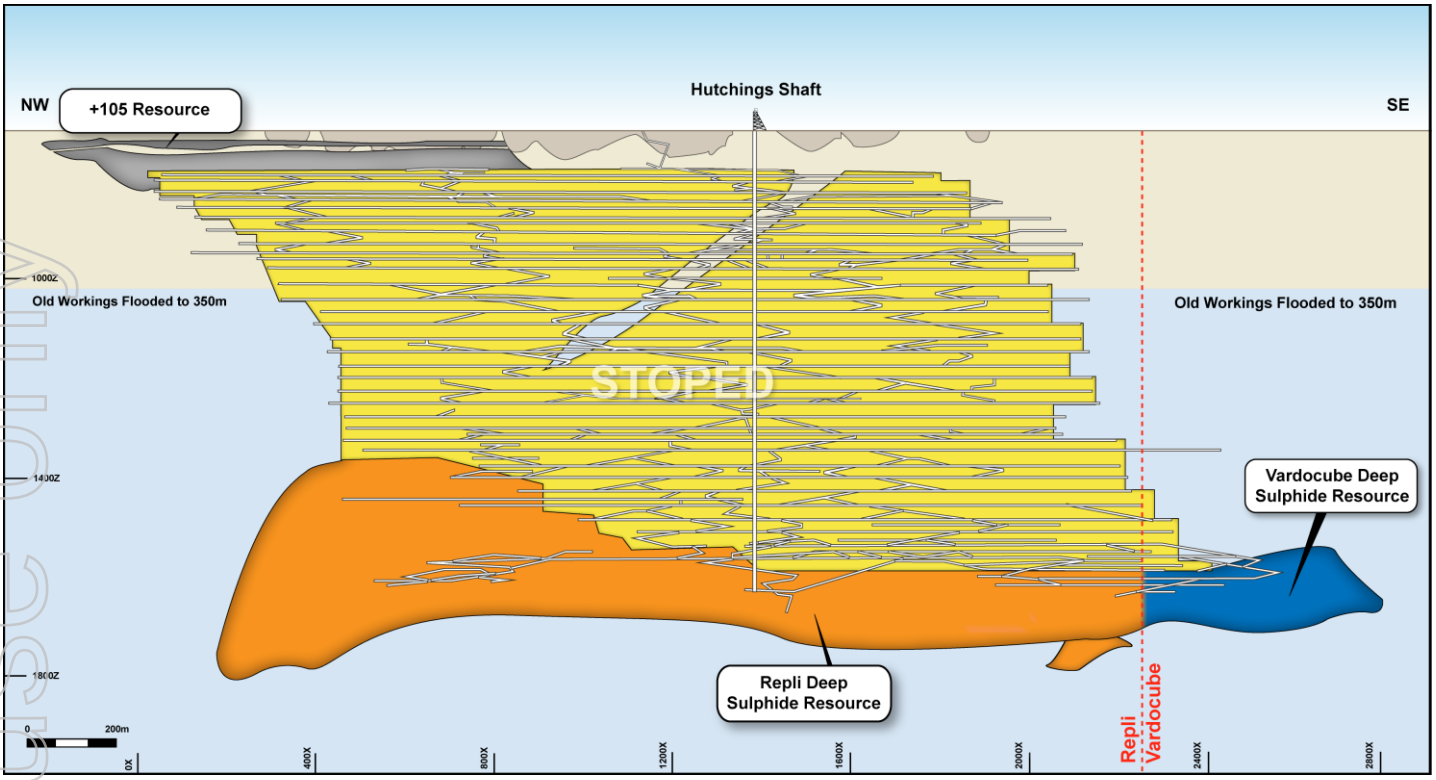


Figure 4: Longitudinal section of the Prieska Project showing the positions of the Mineral Resources.

Exploration

Orion's approach to defining the Mineral Resources for the Project was to initially use infill and verification drilling campaigns from surface. These drilling campaigns targeted the historically-drilled and identified mineralised areas and aimed to delineate sufficient Mineral Resources to motivate an initial phase of mining operations. On re-establishing deep underground access, follow-up extensional exploration and infill drilling programs would be conducted from more advantageous drill platforms located underground. This approach allows for more cost-effective and efficient delineation and upgrading of the sparsely drilled strike and dip extents of the deposit. The latest surface-based drilling campaign was completed in October 2018, culminating in Orion having drilled approximately 85km using predominantly diamond coring drill rigs (refer ASX release 15 October 2018).

Surface-based exploration work, to delineate the strike and dip extents of the Deep Sulphide Zone continues, with downhole EM and SkyTEM™ campaigns in progress and more planned.

Mineral Resources

Total delineated Deep Sulphides Mineral Resources classified and reported in terms of JORC (2012) are 28.73 million tonnes grading 3.77% zinc and 1.16% copper, refer to Table 2. The Mineral Resources comprise of:

- Indicated Mineral Resources amounting to 18.51 million tonnes and grading 3.60% zinc and 1.17% copper[4] (refer ASX release 18 December 2018); and
- Inferred Mineral Resources, amounting to 10.22 million tonnes and grading 4.08% zinc and 1.14% copper[4] (refer ASX release 18 December 2018).

[4] Mineral Resource reported in ASX release of 18 December 2018: "Landmark Resource Upgrade Sets Strong Foundation" available to the public on www.orionminerals.com.au/investors/market-news. Competent Person Orion's exploration: Mr. Pottie Potgieter. Competent Person: Orion's Mineral Resource: Mr. Sean Duggan. Orion is not aware of any new information or data that materially affects the information included above. For the Mineral Resources, the company confirms that all material assumptions and technical parameters underpinning the estimates in the ASX release of 18 December 2018 continue to apply and have not materially changed. Orion confirms that the form and context in which the Competent Person's findings are presented here have not materially changed.

The Deep Sulphide Mineral Resources were modelled based on a 3% to 4% Zn equivalent [Zn Eq = Zn% + (Cu% x 2)] threshold range to constrain the mineralisation. All mineralisation within the modelled boundaries has been reported.

License	Classification	Volume (m^3)	Density (tonnes/m^3)	Tonnes	Zn (tonnes)	Zn (%)	Cu (tonnes)	Cu (%)
Repli	Indicated	4,414,000	3.41	15,052,000	510,000	3.38	170,000	1.15
	Inferred	2,044,000	3.42	6,998,000	270,000	3.86	80,000	1.09
	Total	**6,458,000**	**3.41**	**22,050,000**	**779,000**	**3.53**	**249,000**	**1.13**
Vardocube	Indicated	1,018,000	3.39	3,455,000	158,000	4.57	44,000	1.27
	Inferred	933,000	3.45	3,221,000	147,000	4.56	41,000	1.27
	Total	**1,951,000**	**3.42**	**6,676,000**	**305,000**	**4.57**	**85,000**	**1.27**
Deep Sulphide Total	Indicated	5,432,000	3.41	18,507,000	667,000	3.60	217,000	1.17
	Inferred	2,977,000	3.43	10,219,000	417,000	4.08	117,000	1.14
	Total	**8,409,000**	**3.42**	**28,726,000**	**1,084,000**	**3.77**	**334,000**	**1.16**
Rounding, as required by reporting guidelines, may result in apparent differences between tonnes, grades and contained metal content.								

Table 2: Mineral Resource Estimate for the Prieska Zinc-Copper Project.

Mining Operations

Mining Methods and Layouts

Tunnel development established during previous operations allows for early access to underground production areas. Phase 1 layouts extend approximately 600m down-dip of existing workings in the north-west section of the deposit and some 250m down-dip of existing workings in the south-eastern section of the deposit, Figure 5.

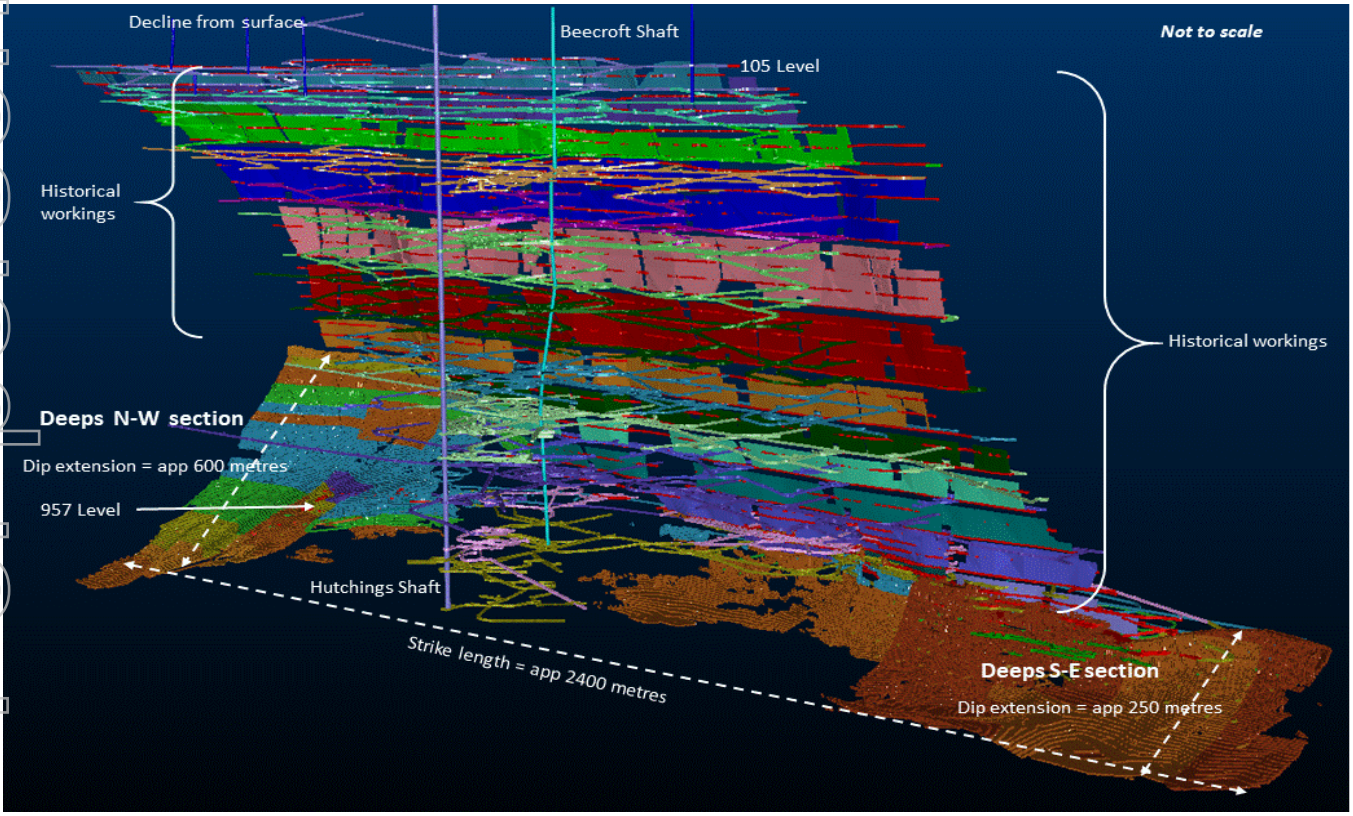


Figure 5: Isometric View of the Conceptual Deep Sulphide Zone Underground Design Layout.

Whilst access development layouts were considered with the whole Phase 1 in mind, the layouts allow the zones of Indicated Mineral Resources to be prioritised for mining, whilst upgrading of Inferred Resources is completed by infill drilling from underground. Indicated Mineral Resources are contiguous across large areas allowing efficient mining, Figures 6 and 7.

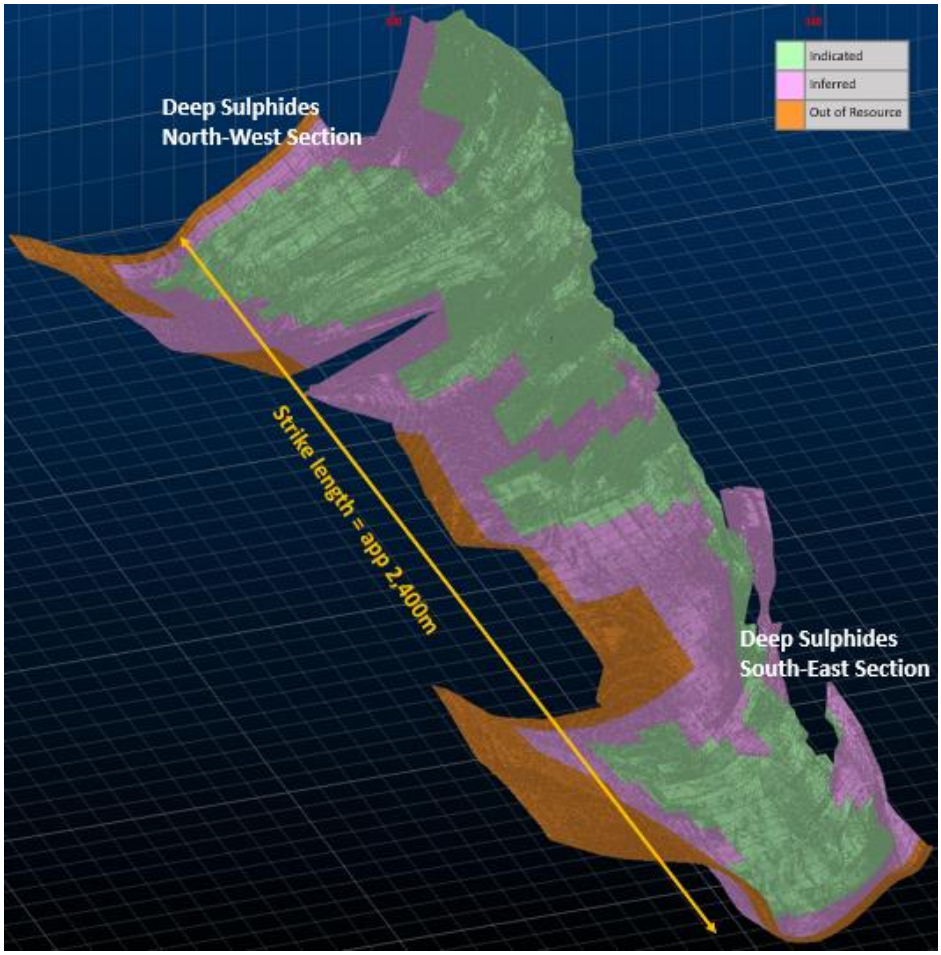


Figure 6: Isometric View of the Deep Sulphide Zone showing the distribution of Indicated and Inferred Zones. The contiguous nature of Indicated Mineral Resources is highlighted.

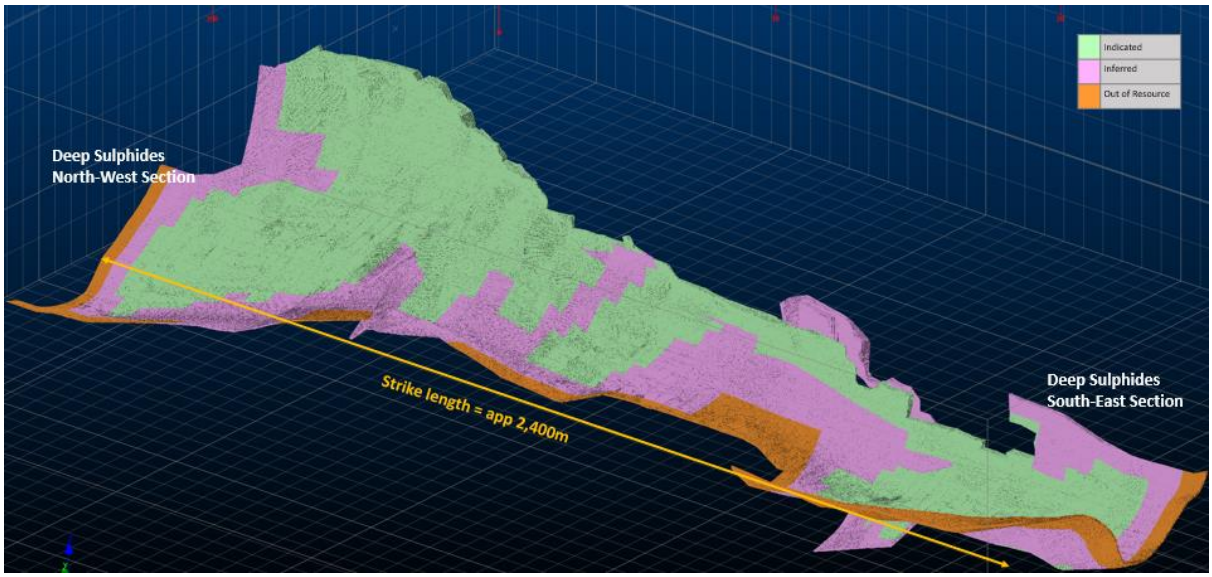


Figure 7: Isometric View of the Deep Sulphide Zone showing contiguous nature of Indicated Mineral Resources.

A combination of longhole stoping with paste fill (**LHSF**) and Drift-and-Fill mining with paste fill have been selected as the preferred mining methods. Generally, LHSF would predominate in the steeper sections of the mining area and Drift-and-Fill would be employed in the flatter dipping areas. Longhole open stoping (**LHOS**) was successfully employed during historical operations down to an approximate depth of 900m below surface.

Using paste fill, as well as Drift-and-Fill methods would cater for mining at greater depths and would accommodate the changing dip of the deposit. These methods would also allow increasing the mining extraction ratio compared to historical mining. Other improvements on historical mining practices would be the use of a more technologically-advanced mining fleet to provide faster tunnel development and more accurate production drilling. Layouts and sequencing would be formulated to reduce the need for rib and sill pillars, resulting in mining extraction ratios of between 75% to 80% being achievable.

LHSF would be applied in both a transverse or longitudinal orientation, depending on the shape and width of the mineralisation. Typically stope widths would range between 5m to 20m, with strike spans of a maximum of 60m. Inter-level spacings were designed at 20m.

Approximately 65% of monthly production would come from LHSF (130,000 tonnes) and 35% (70,000 tonnes) from Drift-and-Fill mining. LHSF stope capacities range from 26,000 tonnes to 52,000 tonnes per stope. This indicated that three to five stopes would need to be extracted each month to meet the required monthly LHSF production volumes. Five to seven stopes would be kept in production, ready for blasting, at any one time as a contingency measure.

Underground Mining Fleet

Underground development and production operations are planned to be fully mechanised, with all development headings being advanced using twin boom jumbos and supported using bolting rigs. Load-haul dump units (**LHDs**) would be used to load blasted development and production rock into ore passes in the upper levels and into a truck fleet, which would haul up 1 in 7-inclined roadways to the central crusher location, the excavations of which already exist. Rock is planned to be hoisted to surface via the Hutchings Shaft, using existing skip-loading chambers already excavated below the 957 level. New crushing, conveying and skip-loading plant would need to be installed.

The underground mining fleet has been selected assuming mechanical availability of 90% for all mobile equipment, Table 3. The use of electric-drive and automated vehicles is being investigated as part of the BFS and may present significant efficiency, safety and health and cost improvement opportunities.

Units	Quantity
Drill Rigs	
Development Drilling Rig	3
LHSF Drilling Rig	3
Drift-and-Fill Drilling Rig	4
	10
Bolters	
Waste Development Bolter	2
Production Development Bolter	2
	4
Underground Trucks	
Development Truck (40t)	4
Production Truck (40t)	5
	9
LHD Units	
Waste development (12t)	3
Production LHD (14t)	4
	7

Units	Quantity
Utility Vehicles	
Development Scissor lift	2
Production Scissor lift	2
LHSF Explosives Charging Unit	2
Dev Explosives Charging Unit	2
Men Transporter (cassettes)	2
	10
General and Supervision Vehicles	
Development Supervision Vehicle	2
Production Supervision Vehicle	3
Scissor Lift UV	2
Shotcreter	2
Agi cars (shotcrete)	1
Mobile Crane	1
Grader (UG)	1
Scaler	3
	15
Total underground mobile units	**55**

Table 3: Underground Mining Fleet for the Prieska Zinc-Copper Project.

Underground Crushing and Hoisting

The existing crusher chamber would be rehabilitated and re-equipped, Figure 8. Crushed rock, at -140mm, would then be discharged via two vibrating feeders onto two skip-loading flask conveyors. The loading flasks would be located on the 957m level.

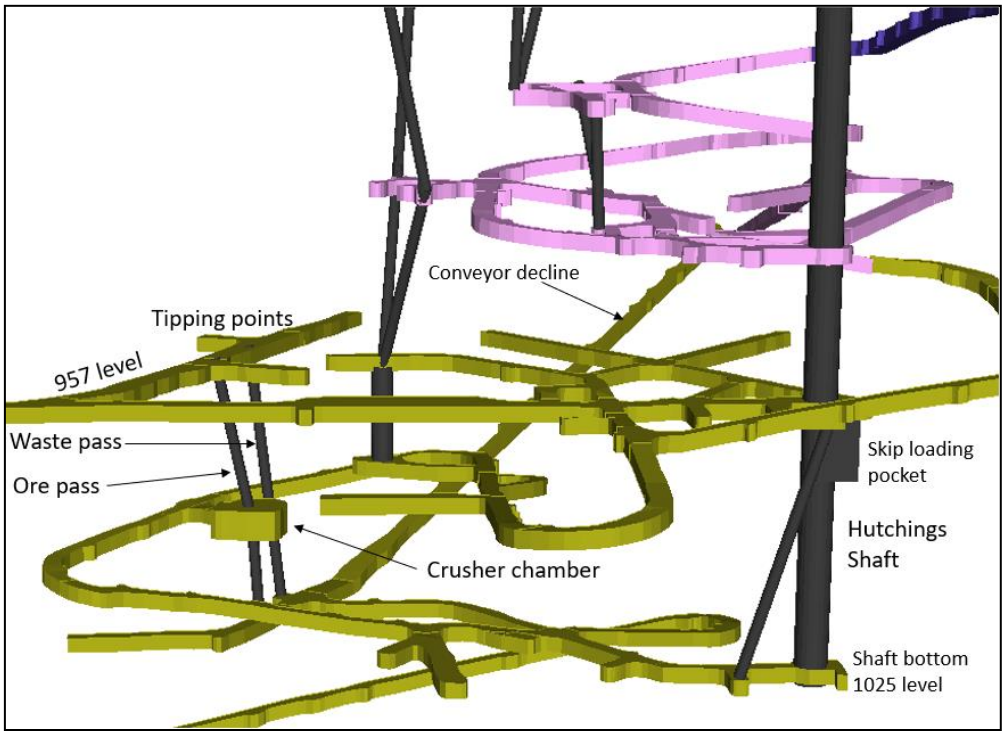


Figure 8: Crusher and Shaft Loading Arrangement – existing excavations.

The main shaft would be equipped with a rock hoisting capacity of 2.4Mtpa, utilising two 14-tonne skips with a hoisting speed of 12m/s. A Koepe winder would be used for rock hoisting and would have a power rating of approximately 1.8 MW. A ground-mounted double-drum, 4.9m-diameter winder would be used for the men-and-materials cage which would have an estimated power rating of 2.7 MW. Scope exists for centralised control and automation of processes within the crushing and hoisting functions being assessed as part of the BFS.

Geotechnical Investigations

Observations from the existing tunnels in the upper levels of the historical mine indicate very competent rock and very little tunnel support was previously installed. Localised roof-bolting was carried out in isolated areas where small amounts of fracturing was observed.

Eight geotechnical drill holes provided test samples for 30 compressive and tensile strength tests, culminating in the determination of Rock Quality Designations (**RQD**), Geological Strength Indices (**GSI**), Rock Mass Ratings (**RMR**) and Q Index ratings (**Q**) for the areas targeted for development. The results confirm competent ground conditions are to be expected and commensurate stope spans and support regimes have been assumed, Table 4.

Rock type	RQD	Average compressive strength (MPa)	Average RMR	Min RMR	Max RMR	Q
Hangingwall gneiss	89	312	82	67	97	21.7
Foot-wall gneiss	90	312	81	63	92	19.4
Mineralised zone	88	197	78	59	89	19.4

Table 4: Rock Quality Metrics for the Deep Sulphide Zone Rock Regime.

Back-fill Design

Paste back-fill has been selected as the most effective fill type for the LHSF and Drift-and-Fill areas. Plant tailings would be used with cement at various mix ratios depending on the fill and strength requirement. Development waste would also be used to back-fill stopes where possible. Test results show one assumed design mix achieving 500kpa uniaxial compressive strength after 7 days for a 7% cement mix.

Ventilation Design

Based on the underground diesel-powered fleet selected, approximately 600m^3/sec of ventilation would be needed, using the legislated requirement of 0.06m^3/sec/kW of engine rating and an estimated 8,000 kW engine power rating for the truck and LHD units. To cater for other smaller mining vehicles, workshops and crusher stations, ventilation losses and leakage, a total requirement of 0.1m^3/sec/kW for the rated engine output was assumed. If electric vehicles are employed, then it is expected that significant reductions in ventilation requirements may be expected due to reduced heat and exhaust fume loads. The option exists to centrally control, monitor and automate the operation of key ventilation fans via fibre optic-linked remotely-controlled systems.

The Hutchings Shaft and Main Decline would be used as the primary intakes. The Boehmke and Beecroft Shafts would be refurbished as up-cast ventilation shafts. New ventilation fans would be erected on the upcast shaft collars. Further capital is allowed for the deepening of both upcast shafts using raise-boring techniques.

Underground Workings Rehabilitation

The existing main decline from surface into the underground workings is an estimated 7.1km and a provision for rehabilitation of 30% of the total decline length has been allowed for. Rehabilitation would consist of cleaning and making areas safe and replacing missing or inadequate roof support. The same approach was followed for the crusher-station, station breakaways, underground workshops, pump stations and refuge chambers.

Shaft and Winder Housing Refurbishment

Visual inspections, non-destructive testing and thickness testing was carried out on the main shaft's steelwork and the majority of steel is in good order. For Scoping Study purposes, it has been estimated that 30% of the steelwork would need to be replaced.

The Koepe rock winder housing on top of the shaft was removed at mine closure and must be replaced, along with the installation of a new Koepe winder. A new winder room and a double-drum, ground-mounted, men-and-materials winder would also be installed. It is intended to source a refurbished winder on the second-hand market. There are a relatively large number of suitable winders available on the local market due to the recent closure of gold and platinum mines. Assumed second hand winder costs were used for the Scoping Study. New winder automation systems, conveyances, counterweights with all the required attachments, sheaves and ropes have been provisioned for installation with the respective winders. This function will be automated.

Dewatering of Underground Workings

The Hutchings Shaft and underground workings are currently flooded with water to a depth of 330m below surface. The water has accumulated over a 26-year period and is estimated at a volume of 8 to 10 million m^3. This accumulated water would be pumped out, over an 18-month period, using a system of cascading submersible pumps lowered into the shaft barrel with multi-stage centrifugal pumps established in existing pump chambers adjacent to the shaft barrel.

A separate mud pumping system is planned to be temporarily installed from the 957 level to the 720 level settlers. Dewatering between the 957 level and the shaft-bottom would be done using submersible slurry pumps as it is anticipated that the water at these levels will be muddy.

All pumped water would report to a 1 million m^3 capacity, lined, dewatering dam on surface, where the water would be evaporated, using a combination of natural and mechanically-assisted evaporation. This method of using evaporators is in wide use globally as a means of accelerating the disposal of excess water. Evaporation of excess water is expected to be particularly efficient at Prieska due to very high natural evaporation rates exceeding 2,700mmpa.

Hydrogeology and Pumping

Historically the underground workings were exceptionally dry, with no significant groundwater inflows being recorded. This has been borne out by recently compiled ground water models. Hence, the underground pumping system has been designed to cope with a 1:50-year storm event, which could be 127mm in 24 hours or 26.7 million litres over 24 hours.

Cut-off Grade and Metal Equivalent Estimation

To estimate an economic cut-off grade for planning purposes, a break-even grade was estimated at 4.1% zinc equivalent, using assumptions as shown in Table 5.

Zn break-even cut-off grade	Units	Value
Cash operating cost per tonne treated	AUD/t	83
Foreign currency exchange rates	ZAR:AUD:USD	14 : 1.4 : 1
On-mine cash operating cost per tonne treated	USD/t	59
Transport cost per tonne treated	USD/t	12
Total cash operating cost per tonne treated	**USD/t**	**71**
Metal price – zinc	USD/t	2,866
Net smelter return (NSR) – zinc	% price	74.3%
Net metal price received – zinc	USD/t	2,130
Mining dilution		5%
Plant recovery factor (PRF) – zinc		85%
Break-even cut-off in-situ zinc grade		**4.1%**

Table 5: Underground Break-even Cut-off Grade Estimate[5]

The metal zinc equivalent grade was estimated as follows:

$$1\%\ Cu = \frac{(Cu\ price \times Cu\ NSR^{6})}{(Zn\ price \times Zn\ NSR^{6})} \times \frac{(Cu\ PRF)}{(Zn\ PRF)}$$

$$= \frac{(6{,}614^{7} \times 93.7\%)}{(2{,}866^{7} \times 74.3\%)} \times \frac{85\%}{85\%}$$

$$= 2.91\%\ Zn$$

Therefore, Zn equivalent grade = [Zn grade + (2.91 x Cu grade)].

Mining Schedule and Modifying Factors

Underground mining access would be established 24 months after project commencement, with initial mining targeting the upper levels, whilst shaft refurbishment is being completed lower down the shaft. Build up to full-scale production would take 15 to 18 months to reach the steady-state output of 2.4Mtpa of ROM material processed and would be scheduled to run for ten years. Mining production operations would be carried out on a continuous roster, 24-hours a day, 7-days a week, using a 12-hour shift. Owner-mining has been assumed as the base case operating philosophy.

[5] Referenced in JORC Table
[6] Refer Table 9.
[7] Guided by Afriforesight (Pty) Ltd long-term consensus forecast as of August 2018.

Preliminary mine stope layouts were designed using the Mineral Resource model reported in April 2018 utilising Mine Shape Optimiser (**MSO**) Datamine© Software and estimated modifying factors. Calculated break-even cut-off grades and planned stope dimensions were used as inputs in order to derive estimated dilution and economic stope limits. Assumptions were then made for geological and pillars losses, as well as mining recovery as shown below, Table 6.

Parameter	Source	Tonnage	Zn equivalent metal contained
Mineral Resources (below Cut-off: 4.5% Zn Eq.)	Estimated	12%	8%
Mine design losses	MSO	10%	11%
Design stope dilution	MSO	10%	n/a
Geological/pillar losses	Assumed	5%	5%
Mining extraction factor (Mining recovery factor)	Assumed	95%	95%

Table 6: Production Schedule Modifying Factors.

Applying the same modifying factors to the updated Mineral Resources resulted in the following proportions of the Mineral Resources being used in the assumed production schedule, Table 7:

Proportion of Mineral Resources used in Production Schedule	Conversion Ratio (% of Resources)
Tonnage	78%
Metal Contained (zinc and copper)	75%

Table 7: Proportion of Mineral Resources used in the Conceptual Production Schedule.

The conceptual production profile is shown in Figure 9. It was assumed that the mining and treatment plant feed schedules would be identical.

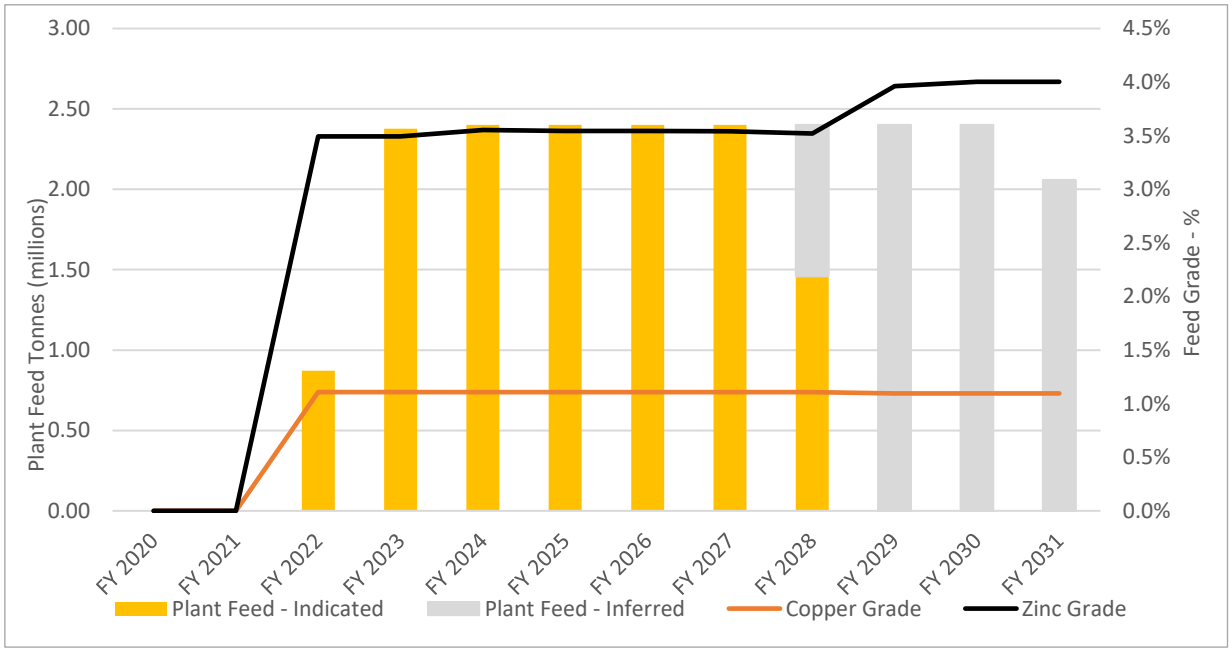


Figure 9: Conceptual Phase 1 Production Schedule.

The average ROM grades for the duration of Phase 1 are 3.7% zinc and 1.1% copper, with the average ROM grades for the Indicated portion being 3.5% zinc and 1.1% copper and for the Inferred portion being 4.0% zinc and 1.1% copper. Total production during Phase 1 would amount to approximately 22 million ROM tonnes.

Note that this production target includes 36% of Inferred Mineral Resources scheduled in the later years of the Project. There is potential to significantly improve project returns by earlier scheduling of high grade zones of the Inferred Resource. Additional drilling and optimising of the schedule would be required.

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 referred to herein will be realised.

Mineral Processing

Metallurgical Testing

The metallurgical characteristics of the Deep Sulphide Zone are well known, given the long production history from the deposit. Mine records show that over the 20-year mine life, average metal recoveries of approximately 85% were achieved for both metals, (refer ASX release 15 November 2017). The metallurgical test work program for the Project aimed to confirm the amenability of the Deep Sulphide Zone material to conventional flotation as was previously used. The flowsheet tested incorporates crushing, milling and sequential flotation stages to produce separated copper and zinc concentrates.

Approximately 800kg of mineralised hypogene samples from underground were collected from diamond drill hole cores across the deposit. Bench-scale, lock-cycle metallurgical tests achieved targeted total metal recoveries, ranging from 80% to 94% for zinc and 80% to 86% for copper into separated concentrates (refer ASX releases 1 March and 12 June 2018).

The resultant concentrates had metal grades ranging between 45% and 54% for zinc and between 20% and 26% for copper in the respective products. Gold and silver reported to the copper concentrates at levels that would qualify them as valuable by-products.

Detailed elemental analyses of the concentrates confirmed that several key deleterious elements are at negligible levels with, notably amongst others, arsenic, bismuth, cadmium, cobalt, tellurium, thorium and uranium at levels well below thresholds that may attract material penalty charges from most smelters or exclude some markets.

Test results to date have generally equalled or exceeded the metal recoveries and concentrate grades achieved during historical mining operations. Hence historical plant recoveries were assumed for the Scoping Study.

Processing Plant Design

The proposed copper flowsheet has the following main processes:

- primary crushing;
- secondary crushing and screening followed by milling;
- a rougher flotation stage;
- re-grind of the rougher concentrate;
- a cleaner flotation stage;
- a re-cleaner flotation stage to produce a copper concentrate.

The zinc recovery section of the plant would start from the copper rougher tails and would have the following main processes:

- a rougher flotation stage;
- a rougher low-grade concentrate re-grind stage;
- a low-grade cleaner stage;
- a low-grade re-cleaner flotation stage to produce a zinc concentrate;
- a rougher high-grade concentrate cleaner circuit producing a zinc concentrate;
- the high-grade cleaner tails would be sent to the low-grade re-cleaner flotation stage.

A schematic production flowsheet is shown in Figure 10.

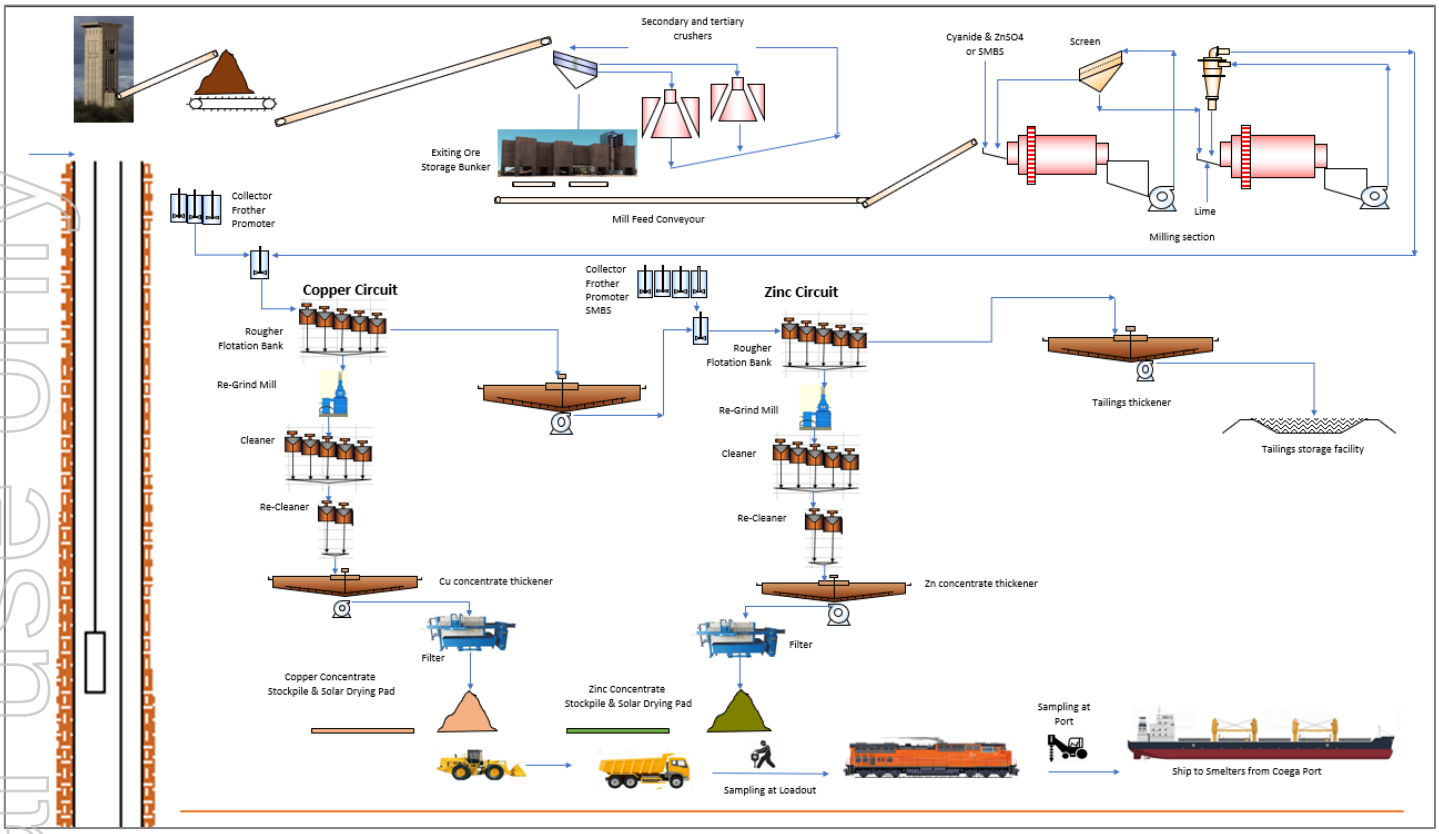


Figure 10: Schematic Production Flowsheet.

Processing Plant Production

Process plant recoveries would range between 80% to 88% for both zinc and copper. Production would be approximately 145 ktpa of zinc concentrates at a grade of 48% to 52% zinc and 94ktpa of copper concentrates at a grade of 22% to 26% copper, Table 8.

Parameters	Units	Totals	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Total stoping tonnage	kt	**20,294**	725	2,070	2,115	2,160	2,160	2,170	2,275	2,280	2,280	2,059
LHSF	*kt*	***13,191***	*471*	*1,346*	*1,375*	*1,404*	*1,404*	*1,411*	*1,479*	*1,482*	*1,482*	*1,338*
Drift-and-Fill	*kt*	***7,103***	*254*	*725*	*740*	*756*	*756*	*760*	*796*	*798*	*798*	*721*
On-reef development	kt	**1,814**	147	307	285	240	240	230	125	120	120	
Total ROM tonnage	**kt**	**22,108**	**872**	**2,377**	**2,400**	**2,400**	**2,400**	**2,400**	**2,400**	**2,400**	**2,400**	**2,059**
Waste Development	**kt**	**2,477**	**216**	**347**	**400**	**397**	**308**	**263**	**243**	**236**	**68**	
Plant Feed (ROM) Grade												
Copper	%	**1.1%**	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%
Zinc	%	**3.7%**	3.5%	3.5%	3.6%	3.5%	3.5%	3.5%	3.5%	4.0%	4.0%	4.0%
Plant Recovery Factor (PRF)												
Copper	%	**85%**	84%	85%	85%	85%	85%	85%	85%	85%	85%	85%
Zinc	%	**85%**	84%	85%	85%	85%	85%	85%	85%	85%	85%	85%
Concentrates Produced												
Copper	kt	**858**	29	93	94	94	94	94	94	93	93	80
Zinc	kt	**1,372**	43	141	145	145	145	145	144	162	163	140
Total	**kt**	**2,230**	**72**	**234**	**239**	**239**	**239**	**239**	**238**	**255**	**256**	**220**
Metal Produced - in concentrates												
Copper	kt	**206**	7	22	23	23	23	23	23	22	22	19
Zinc	kt	**686**	22	71	72	72	72	72	72	81	82	70
Total	**kt**	**892**	**28**	**93**	**95**	**95**	**95**	**95**	**94**	**103**	**104**	**89**

Table 8: Conceptual Project Production Schedule.

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 referred to herein will be realised.

Net Smelter Return and Concentrate Sales

The base payabilities for zinc and copper have been assumed at 84.0% and 95.8% respectively. This is the percentage of metal paid for by smelter customers before any deductions are made based on concentrate grade supplied. A combined factor has been used to account for TC/RCs, by-product credits and contingency for other deductibles. These factors are estimated at -9.7% of the metal price for zinc and -2.1% of the copper price for copper. Based on concentrate grades of 50% for zinc and 24% for copper, the NSR is approximately 74.3% for zinc and 93.7% for copper, Table 9. Gold and silver credits are expected in the copper concentrates.

NSR Estimate	units	Zinc	Copper
Concentrate grade	%	50.0%	24.0%
Smelter payability	% metal price	84.0%	95.8%

Table 9: Metal Payabilities.

Transport charges have been estimated at approximately USD 120 per tonne of concentrate, which includes trucking and rail from the Project site to port and shipping to a final smelter destination. The transport costs are excluded from the NSR and are accounted for in off-site costs.

Tailings Storage Facility (TSF)

The existing TSF would be left untouched and a new TSF would be constructed in compliance with the South African Code of Practice for Mine Residue Deposits (SANS 10286). Three possible sites were investigated. The design of the TSF was carried out by Knight Piésold Consulting. The new TSF is designed to cater for Phase 1, with a capacity to accommodate 15.5 million tonnes. The storage capacity has been designed after allowing for 40% of the tailings to be returned underground as paste back-fill over the duration of Phase 1 operations. The outside slopes of the TSF would be at 1:4 with a 1.6m high starter wall and the footprint area would be covered with a 1.5mm thick, high-density polyethylene liner.

General Surface Infrastructure

Surface Layout of the Project

The overall conceptual site layout, showing general infrastructure, offices and Project site services for the Scoping Study mining scenario is shown in Figure 11.

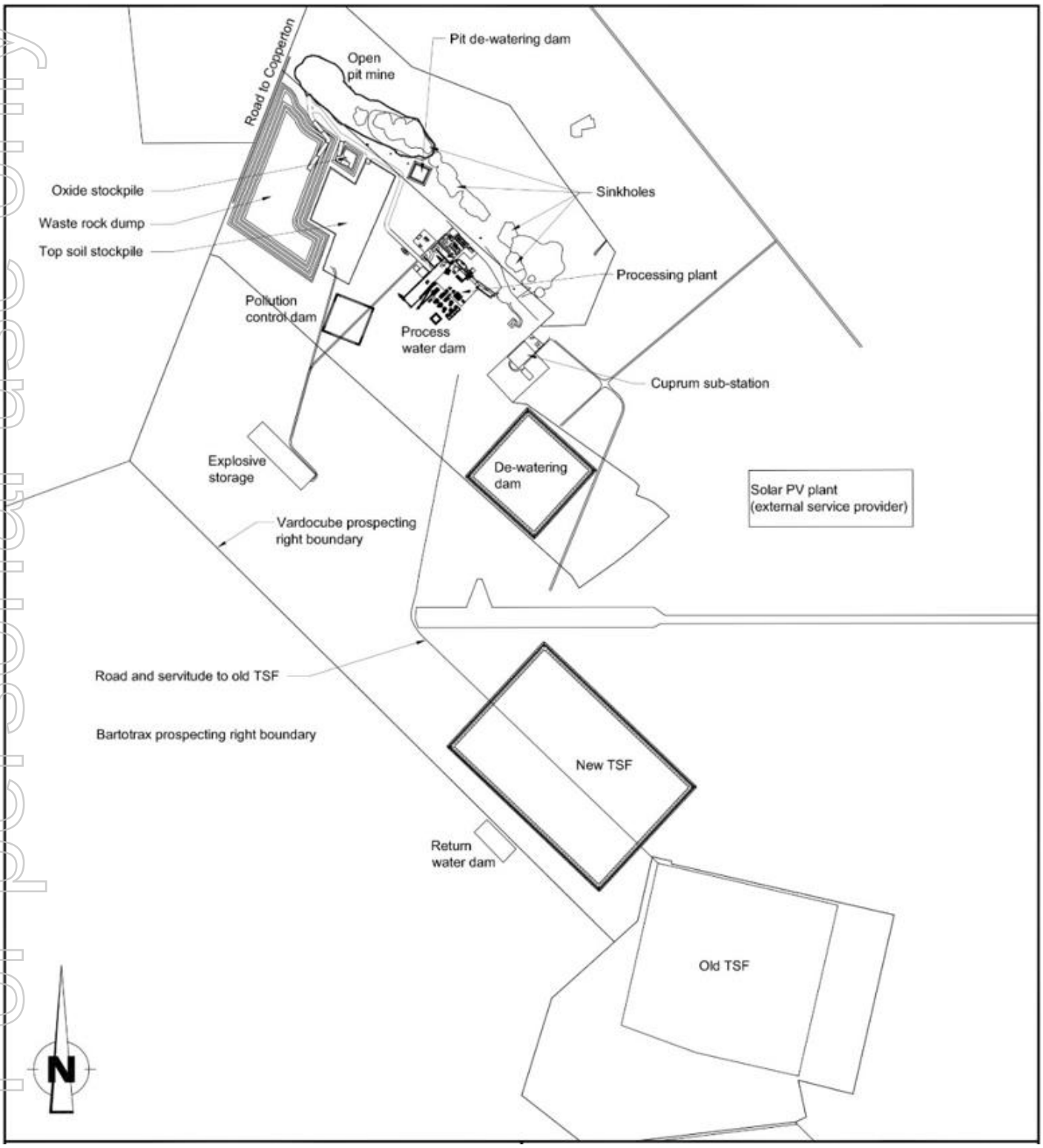


Figure 11: Conceptual Surface Layout of the Project Site.

Transportation Infrastructure

A tarred road, the R357 regional highway, runs from the town of Prieska, 60km away, to the Project site. Tarred roads link Prieska with the city of Kimberley (240km away) to the north-east and the town of Upington (260km away) to the north. Existing road intersections on the Project site would be upgraded to cater for the additional traffic anticipated during the construction and operational phase of the Project. A new road access to the Project site would be constructed from the existing sealed road that provides access to Copperton and the Project site.

Regional airports are situated at both Upington and Kimberley with daily flights to Cape Town and Johannesburg. A 1.7km-long gravel airstrip is located 5km north of the Project area. This airstrip is operated and maintained by Alkantpan and Orion has perpetual usage rights.

Power Supply and Reticulation

National grid power is available at the Cuprum Substation located adjacent to the Project site and owned by Eskom, the State utility company. Eskom has confirmed the availability of the 33MW of power required for the Project. A feasibility level costing exercise indicates that establishing a connection to the substation will cost AUD 0.5 million for the Eskom infrastructure.

Power supply would also be supplemented by supply from a dedicated 33MW renewable energy source, (likely a photo voltaic (**PV**) solar farm or wind energy farm), adjacent to the Project site, to be built and operated by an independent power producer. Significant cost savings (in the order of 20%) are anticipated from the grid power costs assumed for the Study of AUD 0.10 per kwhr. PV supplemented power costs are in the order of AUD 0.08 per kwhr.

Water Supply and Reticulation

Bulk water supply for the Project would be pumped from the Orange River 60km away via the Prieska Water Works and existing 450 mm diameter steel pipeline. The planned water consumption for the Project and all other water users supplied by the same pipeline is estimated at 6.2 million litres per day. To supply this volume of water, a number of upgrades and replacements would be carried out at both the Prieska Water Works and on the pipeline. The total cost of this upgrade is estimated to be approximately AUD 1.8 million and is included in the Project capital construction budget.

Other water management infrastructure to be constructed would include:

- a 1 million m^3 dewatering dam, to be used for the forced evaporation during mine de-watering;
- a 5,000m^3 process water dam, to service the treatment plant; and
- a 163,000m^3 pollution control dam.

Buildings, Facilities and Explosives Storage

New buildings and surface facilities would consist of the following amenities:

- a management office block for approximately 60 people (this includes general management, mining management, treatment plant management and engineering management);
- one change-house facility and adjoining lamp-room;
- a mine rescue room;
- an induction and first aid room, and training centre;
- a central control room housing the supervisory control and data acquisition (**SCADA**) systems for the processing plant and for underground engineering;
- an engineering work-shop for surface engineering vehicles with an adjacent paint and oil store;
- a bunded diesel storage area;
- security and access control buildings at the two planned entrances to the Project site; and
- a mine village in Copperton or Prieska to accommodate the commuting workforce.

All offices and accommodation would be portable and containerised where possible.

There are eight serviceable explosive storage magazines and three accessories magazines on site. These would be used for the planned operations.

Communications and Control Systems

The Project area is currently served by South Africa's two largest telecom operators, which provide mobile phone and data coverage via a 60m-high communications tower at the Project site. It is expected that these services will remain in place over the foreseeable future.

A dustproof, air-conditioned surface control room would be built housing the SCADA system and a centralised programmable logic control (**PLC**) system using an Industrial Ethernet 1 Gbit/s fibre optic network. The SCADA would control and monitor the processing plant and underground rock handling, pumping and ventilation functions. The SCADA system would also interface with MCCs across the site for power monitoring via the plant engineering module.

Digital connectivity infrastructure to prepare the mine for future digitalisation would be considered.

Human Resources

A workforce of approximately 850 people would operate the mine as an owner-mined venture. Continuous roster work schedules are planned, with personnel housed in a commuters' work village located in Prieska. Some project construction and shutdown maintenance crews will be housed in Copperton, closer to the Project site on an ad-hoc basis.

Marketing and Transportation Logistics

Concentrates would be transported from the Project site in covered side tipper trucks or in sealed shipping containers to either Groveput, Prieska or Kimberley railheads. The concentrates would then either be loaded into shipping containers at a dedicated loading facility managed by the transport contractor or the shipping containers arriving from site would be loaded on rail cars. The shipping containers would be railed to the Coega Port near Port Elizabeth as the primary exporting port facility. The ports of Cape Town, Port Elizabeth and Saldanha are considered as secondary options.

Operating Costs

Underground Unit Mining Costs

Underground mining costs including labour for Phase 1 were estimated at approximately AUD 48/t based on numbers derived using a combination of zero-based build-up and benchmarking against similar activities in other projects. The unit costs as applied for the various proposed mining activities are shown in Table 10.

Description	AUD/t ROM
Labour	8.84
Fuel	1.40
Electricity	0.40
Water	0.28
Plant and equipment	16.70
Ventilation	0.52
Consumables	3.32
Stores and materials	4.71
Explosives	1.81
Backfill	9.71
Total Cost (±20%)	**47.69**

Table 10: Underground Mining Operating Costs.

Processing Unit Operating Costs

Processing operating costs of AUD 15/t were compiled by DRA from a combination of zero-based costing and benchmarking of similar operations. The cost build-up is shown in Table 11.

Description	AUD/t ROM
Labour	3.47
Fuel	0.15
Electricity	4.50
Crushing and milling	2.51
Flotation reagents	2.99
Water	0.50
Maintenance	0.83
Laboratory	0.05
TSF operations	0.20
Total Cost (±20%)	**15.20**

Table 11: Processing Operating Costs.

Other Operating Costs

Cost items making up general and administration are:

- management, general and engineering staff not directly related to mining or processing and including specialist consultants and external service providers, safety and health.

Cost items making up off-mine costs are:

- head office, social and labour commitments, environmental, insurance and marketing costs. Marketing costs are a fixed amount of AUD 1.25 million based on preliminary discussions with a concentrate logistics management company.

Total Operating Costs

A summary of the total operating cost structure for the Project is shown in Table 12. All-in-sustaining costs were estimated at approximately AUD 100/t.

AISC - Operating costs	AUD/t ROM
Mining - Underground	47.69
Processing	15.20
General and administration	2.77
Concentrate transport	17.01
Off-mine costs	2.72
Royalty (Government)	9.77
Marketing costs	0.54
Sustaining CAPEX	3.19
Total Operating Cost (±20%)	**98.89**

Table 12: Total Operating Costs.

Over the Phase 1 duration, the all-in sustaining cost (**AISC**) per tonne of zinc metal sold is estimated at approximately USD 1,215/t (USD 0.55/lb) or in terms of equivalent copper sold, approximately USD 3,535t (USD 1.60/lb).

Capital Cost Estimate and Construction Schedule

Whilst the anticipated total capital cost of construction is approximately AUD 360m to AUD 390m which includes a 20% contingency, peak funding required is about AUD 300m to AUD 330m. The construction period, to first mining underground, is estimated to be about 24 months, Figure 12.

Detailed engineering design would be the first workstream to begin once the project is approved and would run for three months. Thereafter, on-site activities would commence in month 4 and continue until month 28. The major Project milestones are Shaft dewatering complete – month 23; Access to upper levels gained in – month 24; Shaft refurbishment and winder commissioning – month 28; Processing plant commissioning –28; and Mining from below 957 starts – month 32.

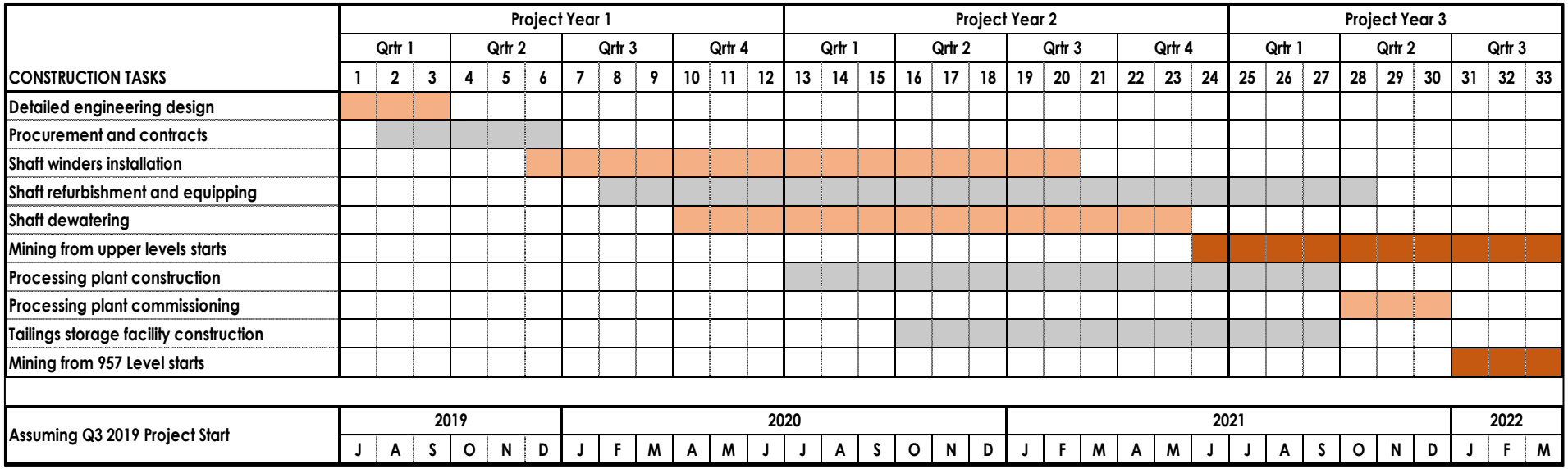


Figure 12: Conceptual Project Construction Schedule.

Table 13 outlines a summary of the capital expenditure estimated over the construction period. Contingency has been estimated at 20% of the underlying capital cost items.

Capital Area	Year 1	Year 2	Year 3	Year 4	Total in AUD m
1. Shaft de-watering	13.8	9.2			**23.0**
2. Shaft winders	12.9	14.6			**27.5**
3. Shaft refurbishment	3.6	3.6	1.8		**9.0**
4. Underground establishment		15.8	36.9		**52.7**
5. Underground mining fleet			16.0	24.0	**40.0**
6. Surface infrastructure	11.9	12.6	8.9		**33.3**
7. Process plant		72.2	18.0		**90.2**
8. Tailings facility		8.4	2.8		**11.2**
9. EPCM	3.4	10.9	5.5		**19.8**
10. Owner's costs	2.3	2.3	2.3		**7.0**
11. Contingency	9.6	29.9	18.4	4.8	**62.7**
Total (± 35%)	**57.5**	**179.5**	**110.7**	**28.8**	**376.4**

Table 13: Estimated Capital Budget Summary (AUD).

Financial Evaluation

Metal Price Forecasts

The following metal prices were used as the base case assumption, informed, for the base metals, by a view of the Afriforesight long-term forecasts for zinc and copper as of August 2018, Table 14.

Metal Prices	USD/lb	USD/tonne	**Source**
Copper	3.00	6,614	Afriforesight
Zinc	1.30	2,866	Afriforesight
Precious Metals	USD/oz	USD/g	**Source**
Gold	1,350	41.99	Orion
Silver	17	0.53	Orion

Table 14: Metal Price Assumptions applied in Scoping Study.

Foreign Currency Exchange Rates

Table 15 lists the foreign currency exchange rates assumed. Exchange rates and ZAR-based commodity prices are in constant money terms.

FX Rate	USD	AUD	ZAR
USD	1.00	1.40	14.00

Table 15: Foreign currency exchange rate assumptions.

Taxes

A flat corporate tax rate of 28% was assumed, the current applicable corporate tax rate in South Africa. CAPEX was assumed to be expensed 100% in the year in which it has been spent for tax purposes.

Discount Rates

A discount rate of 12.5% was applied in the base case scenario on constant money terms.

Cash Flow

Phase 1 would be expected to generate about AUD 1.3bn (ZAR 12.7bn) in free cash pre-tax, AUD 930m post-Tax, Table 16 and Figure 13. Zinc contributes about 52% of the net revenue (after allowing for concentrate logistics, treatment costs and refining charges).

Parameter	Unit	Phase 1 Totals	Capex Yr1	Capex Yr2	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
ROM Tonnage	kt	22,108	0	0	872	2,377	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,059
Concentrates Sold - Zn	kt	1,372	0	0	43	141	145	145	145	145	144	162	163	140
Concentrates Sold - Cu	kt	858	0	0	29	93	94	94	94	94	94	93	93	80
Metal Contained - Zn	kt	686	0	0	22	71	72	72	72	72	72	81	82	70
Metal Contained - Cu	kt	206	0	0	7	22	23	23	23	23	23	22	22	19
Revenue (Post-NSR)	AUD m	3,833	0	0	124	405	412	412	412	411	410	435	437	375
Selling & Realisation	AUD m	-376	0	0	-12	-40	-40	-40	-40	-40	-40	-43	-43	-37
Net Revenue	**AUD m**	**3,457**	**0**	**0**	**112**	**365**	**372**	**371**	**371**	**371**	**370**	**392**	**394**	**338**
Mining Cost	AUD m	-1,054	0	0	-51	-112	-113	-113	-113	-113	-113	-113	-113	-100
Processing Cost	AUD m	-336	0	0	-17	-36	-36	-36	-36	-36	-36	-36	-36	-32
General & Admin.	AUD m	-61	0	0	-6	-6	-6	-6	-6	-6	-6	-6	-6	-6
Off-mine Costs	AUD m	-72	0	0	-6	-7	-7	-7	-7	-7	-7	-7	-7	-7
Royalties (Govt.)	AUD m	-216	0	0	-1	-2	-13	-29	-26	-29	-29	-30	-31	-26
Cash Operating Costs	**AUD m**	**-1,740**	**0**	**0**	**-81**	**-163**	**-176**	**-191**	**-189**	**-191**	**-191**	**-193**	**-193**	**-172**
Cash Operating Profit	**AUD m**	**1,717**	**0**	**0**	**31**	**202**	**196**	**180**	**182**	**180**	**179**	**199**	**201**	**167**
Project Capital	AUD m	-376	-57	-180	-111	-29	0	0	0	0	0	0	0	0
Sustaining Capital	AUD m	-71	0	0	-5	-5	-5	-5	-30	-5	-5	-5	-5	-5
Net Cash flow pre-Tax	**AUD m**	**1,270**	**-57**	**-180**	**-84**	**169**	**192**	**176**	**152**	**175**	**174**	**195**	**197**	**162**
Income Tax	AUD m	-343	0	0	0	0	0	-47	-43	-49	-49	-55	-55	-45
Net Cash flow after Tax	**AUD m**	**928**	**-57**	**-180**	**-84**	**169**	**192**	**128**	**110**	**126**	**126**	**140**	**141**	**117**

Table 16: Prieska Project Phase 1 Conceptual Cash Flow Summary.

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 or financial forecast information referred to in this release will be realised.

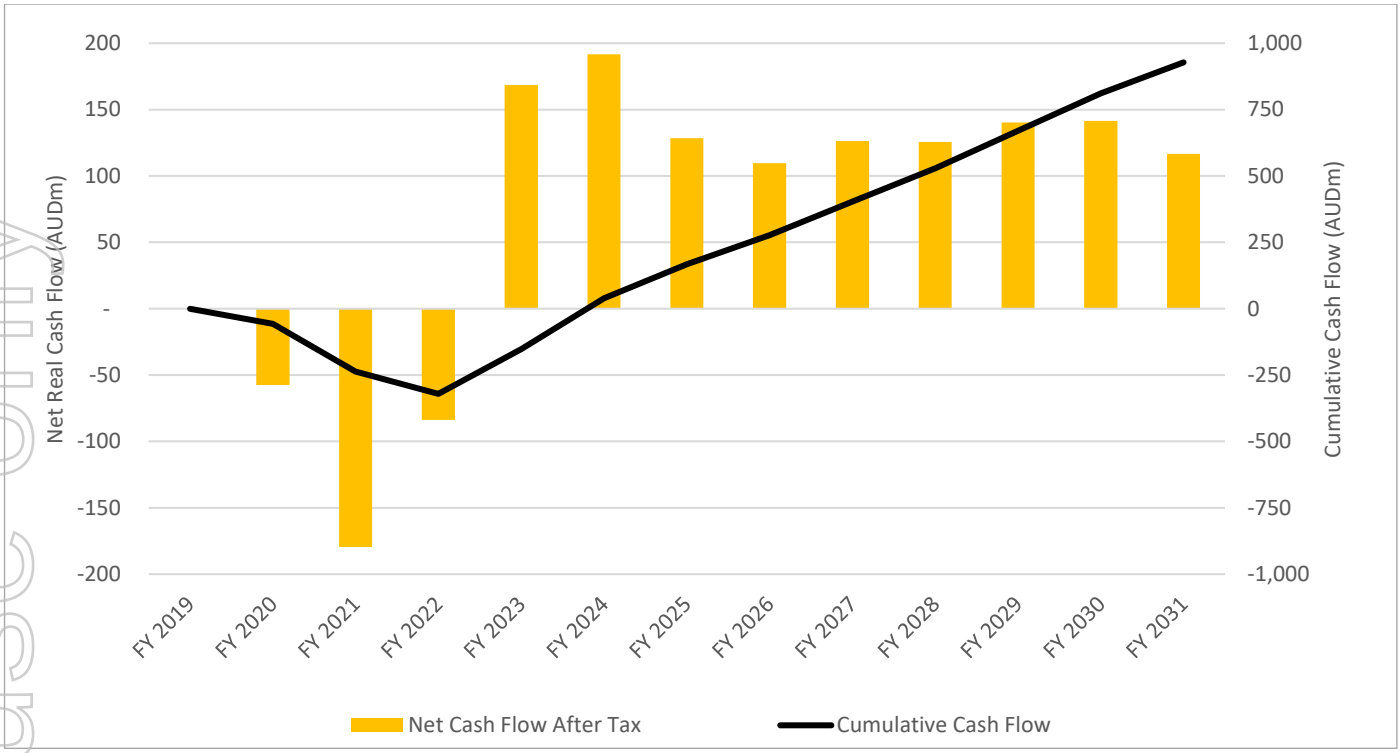


Figure 13: Profile of the Prieska Project Phase 1 Conceptual Cash Flow Post-Tax. The right axis shows the Cumulative Cashflow; the left axis shows the Annual Net Cash Flow.

Financial Forecast Evaluation

The main production and financial metrics are shown in Table 17. In keeping with the low level technical and economic assessment criteria for a Scoping Study, the estimated amounts are considered approximations and key assumptions are provided within the report.

Price and FX Assumptions	Unit	Estimated Value	Financial Performance	Unit	Estimated Value
Metal price – Cu (USD 3.00/lb)	USD/t	6,614[8]	NPV (pre-tax) @12.5% discount rate	AUD m	400 - 440
Metal price – Zn (USD1.30/lb)	USD/t	2,866[8]	IRR (pre-tax)	%	38%
Exchange rate	ZAR:USD	14 : 1	Payback from first production	years	3
Exchange rate	ZAR:AUD	10 : 1	Undiscounted free cash flow (pre-tax)	AUD bn	1.2 – 1.3
Exchange rate	AUD:USD	1.4 : 1	Peak funding	AUD m	300 – 330
Production Metrics	**Unit**	**Estimated Value**	**Project Cost Metrics**	**Unit**	**Estimated Value**
Life of Mine (Phase 1)	years	10	Average cash operating unit cost (C1)	AUD/t	83
Treatment plant capacity	ktpa	2,400	All-in-sustaining cost per unit ROM t	AUD/t	100
Phase 1 tonnage - ROM	mt	22	All-in-sustaining cost per unit Zn eq t sold	AUD/t Zn	1,701
Phase 1 tonnage - processed	mt	22	All-in-sustaining cost per unit Cu eq t sold	AUD/t Cu	4,949
Concentrate tonnage - Zn	mt	1.4	Price received (net of NSR) - Zn	AUD/t Zn	2,982
Concentrate tonnage - Cu	mt	0.9	Price received (net of NSR) - Cu	AUD/t Cu	8,677
Concentrate grade - Zn	%	50.0%	All-in-sustaining margin	%	43%
Concentrate grade - Cu	%	24.0%	Operating breakeven grade (Zn eq)	%	4.1%
NSR as % of metal price - Zn	%	74.3%			

[8] Guided by Afriforesight (Pty) Ltd long-term consensus forecast as of August 2018, converting to a copper price of USD 6,614/tonne and a zinc price of USD 2,866/tonne.

NSR as % of metal price - Cu	%	93.7%	**Project Cash Flows**	**Unit**	**Estimated Value**
Metal sold (in concentrates) - Zn	kt	686	LoM net revenue	AUD m	3,457
Metal sold (in concentrates) - Cu	kt	206	LoM operating costs	AUD m	1,740
Total sales as Zn equivalent	kt	1,285	Project start-up capital expenditure	AUD m	360 - 390
Total sales as Cu equivalent	kt	442	Sustaining capital expenditure	AUD m	65 - 75

Table 17: Key Scoping Study Results for Phase 1 of the Prieska Zinc Copper Project. Note that the overall Study accuracy is level ± 35%.

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 or financial forecast information referred in this release will be realised.

Sensitivity

The Phase 1 NPV estimate is most sensitive to the ZAR-USD exchange rate variations, followed by zinc price and copper price changes. The NPV is also more sensitive to operating costs than capital expenditure. Pre-tax NPV ranges from AUD 250m to AUD 550m as the ZAR-USD exchange rate varies from -15% to +15% of the base case assumptions, Figure 14.

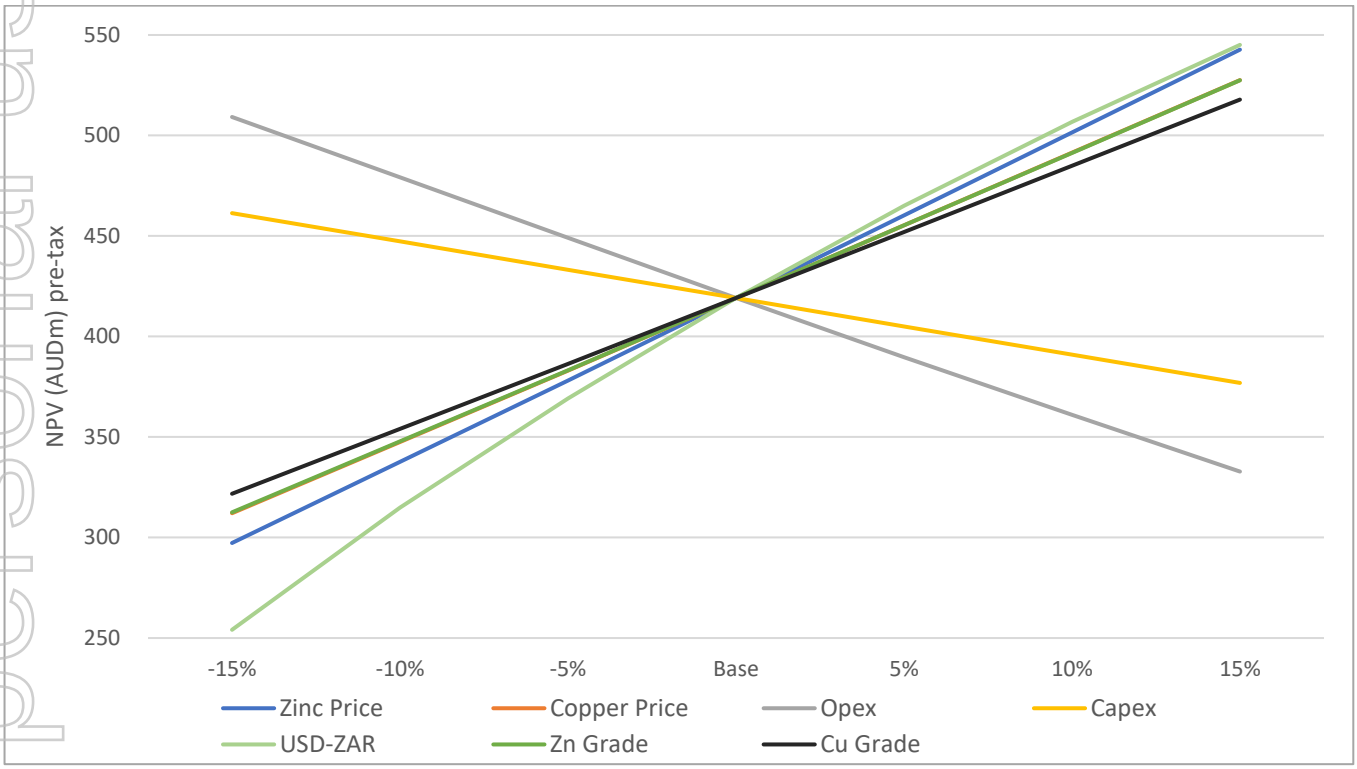


Figure 14: Sensitivity Analysis Chart.

Funding

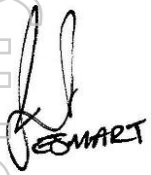
Orion is listed on the Australian Securities Exchange (ASX: ORN) and it has a secondary listing on the Johannesburg Stock Exchange (JSE: ORN). Orion currently intends to fund the development of the Project by means of a combination of debt and equity.

Project Closure Provisioning

In compliance with South Africa legislation and guided by international best practice guidelines, financial provision for mine rehabilitation and closure has been made for an amount of AUD 18m (ZAR 180m).

Future Activities

A BFS is in progress and due for completion in Q2 2019. Based on a positive project outcome and assuming funding is available, construction could begin in the second half of 2019. Underground mining would then begin 24 months thereafter, with the plant being commissioned from Month 28. Open-pit mining of shallow targets is being considered as a potential opportunity once Phase 1 is under way and is the subject of a separate feasibility study.



Errol Smart
Managing Director and CEO

ENQUIRIES

Investors	**Media**		**JSE Sponsor**
Errol Smart – Managing Director & CEO	Nicholas Read	Barnaby Hayward	Rick Irving
Denis Waddell – Chairman	Read Corporate, Australia	Tavistock, UK	Merchantec Capital
T: +61 (0) 3 8080 7170	T: +61 (0) 419 929 046	T: +44 (0) 787 955 1355	T: +27 (0) 11 325 6363
E: info@orionminerals.com.au	E: nicholas@readcorporate.com.au	E: orion@tavistock.co.uk	E: rick@merchantec.co.za

Suite 617, 530 Little Collins Street
Melbourne, VIC, 3000

Competent Person's Statements

The information in the ASX release of 18 December 2018 that relates to the Production Targets is based on mining-related information incorporated under the supervision of Mr Walter Shamu, a Competent Person who is a member of the Australasian Institute of Mining and Metallurgy. Mr Shamu takes overall responsibility for the release as Competent Person. Mr Shamu is an employee of Orion. Mr Shamu has sufficient experience that is relevant to the type of mining and type of deposit under consideration and to the activities being undertaken to qualify as a Competent Person as defined in the 2012 Edition of the JORC Code. Mr Shamu consents to the inclusion in this release of the matters based on his information in the form and context in which it appears.

The information in the ASX release of 18 December 2018 that relates to the Production Targets is based on mining information independently reviewed by Mr. John Edwards, Fellow of South African Institute of Mining and Metallurgy, (a Recognised Overseas Professional Organisation, (**ROPO**), a Competent Person. Mr. Edwards is a consultant to Orion. Mr. Edwards has sufficient experience that is relevant to the type of mineral processing 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 JORC Code. Mr Edwards consents to the inclusion in this release of the matters based on his information in the form and context in which it appears.

Disclaimer

This release may include forward-looking statements. Such forward-looking statements may include, among other things, statements regarding targets, estimates and assumptions in respect of metal production and prices, operating costs and results, capital expenditures, mineral reserves and mineral resources and anticipated grades and recovery rates, and are or may be based on assumptions and estimates related to future technical, economic, market, political, social and other conditions. These forward-looking statements are based on management's expectations and beliefs concerning future events. Forward-looking statements inherently involve subjective judgement and analysis and are necessarily subject to risks, uncertainties and other factors, many of which are outside the control of Orion. Actual results and developments may vary materially from those expressed in this release. Given these uncertainties, readers are cautioned not to place undue reliance on such forward-looking statements. Orion makes no undertaking to subsequently update or revise the forward-looking statements made in this release to reflect events or circumstances after the date of this release. All information in respect of Exploration

Results and other technical information should be read in conjunction with Competent Person Statements in this release (where applicable). To the maximum extent permitted by law, Orion and any of its related bodies corporate and affiliates and their officers, employees, agents, associates and advisers:

- disclaim any obligations or undertaking to release any updates or revisions to the information to reflect any change in expectations or assumptions;
- do not make any representation or warranty, express or implied, as to the accuracy, reliability or completeness of the information in this release, or likelihood of fulfilment of any forward-looking statement or any event or results expressed or implied in any forward-looking statement; and
- disclaim all responsibility and liability for these forward-looking statements (including, without limitation, liability for negligence).

Section 4 Estimation and Reporting of Ore Reserves modified for a Scoping Study which includes an approximate Production Target and/or Forecast Financial Information (as advised in the ASX Scoping Study Interim Guidelines). No JORC (2012) Ore Reserves are being reported.

(Criteria listed in Section 1, and where relevant in Section 2, also apply to this section.)

Criteria	JORC Code explanation	Commentary
Mineral Resource estimate for conversion to Ore Reserves	• *Description of the Mineral Resource estimate used as a basis for the conversion to an Ore Reserve.* • *Clear statement as to whether the Mineral Resources are reported additional to, or inclusive of, the Ore Reserves.*	• No JORC (2012) Ore Reserve estimate is classified and reported. • The preliminary production target is based on the total underground Mineral Resources for the Prieska Project of 28.73 Mt 3.77% Zn and 1.16% Cu, classified and reported in terms of JORC 2012[9] in ASX release 18 December 2018. The modifying factors, preliminary designs and schedules were done using then Mineral Resources classified and released in February (refer ASX release 8 February 2018) and April (refer ASX release 9 April 2018; with the December Mineral Resource (refer ASX release 18 December 2018) retrofitted. • The Mineral Resources are based on drilling data available as at 30 November 2018. • The Competent Person for the Mineral Resource is Mr Sean Duggan of Z* Consultants, RSA.
Site visits	• *Comment on any site visits undertaken by the Competent Person and the outcome of those visits.* • *If no site visits have been undertaken indicate why this is the case.*	• No JORC (2012) Ore Reserve estimate is classified and reported.
Study status	• *The type and level of study to enable Mineral Resources to be converted to Ore Reserves.* • *The Code requires that a study to at least Pre-Feasibility Study level has been undertaken to convert Mineral Resources to Ore Reserves. Such studies will have been carried out and will have determined a mine plan that is technically achievable and economically viable, and that the material Modifying Factors have been considered.*	• Feasibility studies are in progress but have not been completed; accordingly, an Ore Reserve is not being classified and reported. • A Scoping Study Technical Report has been completed at a low level of confidence relative to a BFS. • The Scoping Study has been prepared to an accuracy level of ± 35% using Indicated and Inferred Mineral Resources; appropriate mine planning and modifying factors have been applied commensurate to a Scoping Study level of accuracy and are deemed to have reasonable prospects of being technically achievable and economically viable. • Section 4 of JORC Table 1 is being completed as part of the Scoping Study requirement to disclose material modifying factors and assumptions underpinning a conceptual Production Target estimates are linked to forecast financial Information.
Cut-off parameters	• *The basis of the cut-off grade(s) or quality parameters applied.*	• The cut-off grade of 4,1% Zn equivalent was estimated based on appropriate metal prices, anticipated plant recovery factors, metal payability factors, mining dilution and cost inputs. • The cut-off grade table and Zn equivalent grade estimation is found in the body of the release. • The payability factors stated in the above estimates assume recovery of silver (Ag) and gold (Au) from the two concentrate streams. It is estimated from metallurgical testwork that the Cu concentrate will produce 50 to 60g/tonne Ag and 2 to 3 g/tonne of Au while the Zn concentrate will produce 15 to 20 g/tonne Ag and 1 to 2 g/tonne of Au. Due to the anticipated smelter payment terms for the Zn concentrate, no revenue would be received for the Ag produced.
Mining factors or assumptions	• *The method and assumptions used as reported in the Pre-Feasibility or Feasibility Study to convert the Mineral Resource to an Ore Reserve (i.e. either by application of appropriate factors by optimisation or by preliminary or*	• No JORC (2012) Ore Reserve estimate is classified and reported. • The Scoping Study used the preliminary design to determine an indication of the viability of the proposed mining project using Datamine© Mining Software and a Mine Shape Optimiser (MSO) as detailed in the body of the ASX release. Deductions were made for material excluded by the MSO,

[9] Mineral Resource reported in ASX release of 18 December 2018: "Landmark Resource Upgrade Sets Strong Foundation for Development of Prieska Zinc-Copper Project" available to the public on www.orionminerals.com.au/investors/market-news. Competent Person Orion's exploration: Mr. Pottie Potgieter. Competent Person: Orion's Mineral Resource: Mr. Sean Duggan. Orion is not aware of any new information or data that materially affects the information included above. For the Mineral Resource, the company confirms that all material assumptions and technical parameters underpinning the estimates in the ASX release of 18 December 2018 continue to apply and have not materially changed. Orion confirms that the form and context in which the Competent Person's findings are presented here have not materially changed.

<table>
<tr><th>Criteria</th><th>JORC Code explanation</th><th>Commentary</th></tr>
<tr>
<td></td>
<td>
detailed design).

The choice, nature and appropriateness of the selected mining method(s) and other mining parameters including associated design issues such as pre-strip, access, etc.
The assumptions made regarding geotechnical parameters (e.g. pit slopes, stope sizes, etc.), grade control and pre-production drilling.
The major assumptions made, and Mineral Resource model used for pit and stope optimisation (if appropriate).
The mining dilution factors used.
The mining recovery factors used.
Any minimum mining widths used.
The way Inferred Mineral Resources are utilised in mining studies and the sensitivity of the outcome to their inclusion.
The infrastructure requirements of the selected mining methods.

</td>
<td>
geological and pillars losses and a mining extraction factor. Dilution is included during the MSO process. The Mineral Resource conversion factors are listed below:

Mineral Resources Conversion Factors for Production Scheduling
<table>
<tr><th>Parameter</th><th>Source</th><th>Tonnage</th><th>Zn equivalent metal contained</th></tr>
<tr><td>Mineral Resources (below Cut-off: 4.5% Zn Eq.)</td><td>Estimated</td><td>12%</td><td>8%</td></tr>
<tr><td>Mine Design Losses</td><td>MSO</td><td>10%</td><td>11%</td></tr>
<tr><td>Design stope dilution</td><td>MSO</td><td>10%</td><td>n/a</td></tr>
<tr><td>Geological/pillar Losses</td><td>Assumed</td><td>5%</td><td>5%</td></tr>
<tr><td>Mining extraction factor (Mining recovery factor)</td><td>Assumed</td><td>95%</td><td>95%</td></tr>
</table>

The above factors result in a 78% conversion of Mineral Resource tonnes to tonnes used in the production scheduling and a 75% Resource conversion to Zn equivalent metal in the production schedule.
The modifying factors, preliminary designs and schedules were done using then Mineral Resources classified and released in February (refer ASX release 8 February 2018) and April (refer ASX release 9 April 2018) and the same factors were then applied to the December Mineral Resource (refer ASX release 18 December 2018).
Material assumptions regarding timeframe for development and production: It is assumed that the BFS is positive, water may be realistically and economically pumped from underground and that the Mining Right is granted by the authorities.
The conceptual mine model scenario for the Scoping Study can be summarised as the establishment of underground operations to extract the extensions of the Indicated and Inferred Mineral Resource from the hypogene Deep Sulphides (the Deeps) at > 1,000m accessed via existing underground mine infrastructure which would require dewatering and some refurbishment. Preliminary observational and non-destructive testing studies by specialists on exposed underground infrastructure as well as water tests suggest a 15% replacement would probably be required (refer ASX release 2 February 2018). During historical operations, water was not required to be pumped from the mine. The current water-level is at 330m and it is assumed that successful dewatering of the operation will then reveal the actual conditions for mining at >1,000m. This factor has been built into the conceptual mine schedule and anticipated estimated costs. Gas hazards, equipment, backfill design, crushing and hoisting, mine ventilation and underground rehabilitation of existing structures also formed part of these mining studies.
Mining Method: Historically a tabular body of mineralisation was almost continuously economically mined over a strike length of 2,400m, between 1971 and 1991, from levels -100m to approximately -850m using the LHOS mining method. Assuming successful dewatering, refurbishment and new mine infrastructure are realised, preliminary mining scenarios propose Drift-and-fill (an estimated 75% of monthly production) for the flatter dipping sections in areas and Long-hole-open-stoping-with-fill (LHSF) (an estimated 25% of monthly production) for the steeper sections - based on the shape and layout of the Mineral Resource. Blasted rock from both operations is loaded into trucks and trammed back the existing crusher station at 920 Level.
Geotechnical: Observations from the existing tunnels in the upper levels of the historic mine indicate very competent rock with very little tunnel-support. Localised roof bolting was carried out in fractured sections. Geotechnical studies were carried out by the Company. 30 compressive and tensile strength tests were carried out on the hanging wall, mineralised zone and footwall rocks from 8 drill holes to

</td>
</tr>
</table>

Criteria	JORC Code explanation	Commentary

		estimate rock mass ratings at depth. The results indicate competent rock for all three rock-types.
		• Mining Dilution Factors: 10%
		• Mining Recovery Factors: 95%
		• Minimum Mining Widths: Drift-and-Fill: 4m by 4m high stope dimensions with access drives of 4.5m by 4.5m (estimated at approximately 70,000 tonnes/month). LHSF: 5-20m with a strike span of 60m giving approximate stope capacities ranging between 26,000 tonnes and 52,000 per stope (estimated at approximately 130,000 tonnes/month). Planning assumed at least two operating stopes at a time. Inter-level spacing is designed at 20m. Tunnel dimensions designed at 5 by 6m for main ramps and footwall tunnels and 4m-4.5m by 4m-4.5m for stope access drives.
		• Mineral Resource Model: It is important to note that the Inferred Mineral Resource lies at the base of a tabular mineralised body which was previously successfully mined. In the Scoping Study mining scenario, Indicated and Inferred are interspersed in the Mineral Resource model (refer ASX release 18 December 2018) mainly defined by drill spacing constraints and the mine modelling follows suit.
		• Inferred Mineral Resources are only scheduled in the latter years of the production forecast, beyond the payback period.
		• Infrastructure Requirements for the chosen mining methods:
		  ○ Existing Infrastructure (remaining from previous mine operation): The project area is well serviced by infrastructure that was originally established for the historical mine; this includes the old mine roads on the site itself, some accommodation, telecommunications, water and electricity provision which are in use. On surface there remain the Hutchings Shaft, the main portal and decline which is operational. Underground, the mine tunnels and stopes are mainly accessible to 330m. It is assumed that the old mine infrastructure below water level at 330m such as the existing underground workshop at 957 Level, the crushing and shaft loading arrangement at 920 Level and the pre-existing mine ventilation facilities (Boehmka and Beecroft Shafts (note the surface structure and fans have been removed and the shaft collars made safe) would be refurbished or rebuilt. Preliminary mining studies on these aspects have been included in the Scoping Study process and to inform the BFS studies underway.
		  ○ Additional Infrastructural Requirements for the chosen mining methods: the following were considered as part of the Scoping Study. The refurbishment or rebuilding of existing mine infrastructure including a Koepe Man-and-Winder for the Hutchings Shaft and new or second-hand equipment for the remaining shafts; additional water and electrical provisions from existing structures; deepening of the ventilation shafts and additional ventilation airways constructed; additional power reticulation; the additional availability of power from neighbouring renewable solar and wind plants presently in the process of construction; water dams (including effluent dams, potable water facilities, sewerage treatment plant, process water and storm water management) are considered at a high-level. New buildings and facilities: management and office block, underground change and ablution facility, mine rescue room, training centre, central control room for the mine and processing plant; engineering workshop; a bunded diesel storage area; security and access control for mine safety.

Metallurgical factors or assumptions	• *The metallurgical process proposed and the appropriateness of that process to the style of mineralisation.* • *Whether the metallurgical process is well-tested technology or novel in nature.* • *The nature, amount and representativeness of metallurgical test work undertaken, the nature of the metallurgical domaining applied and the corresponding metallurgical recovery factors applied.*	The design of the processing plant allows for the Phase 1 treatment of the hypogene (underground) feed and the optional, later stage, supergene (open-pit) with modifications. Unit processing costs and plant design and equipment assumes underground feed only in Phase 1. Only Phase 1 is addressed in the Scoping Study. • Metallurgical Process: conventional, crushing, grinding and differential froth flotation processing is proposed for the hypogene material which should produce saleable concentrates of Zn and Cu with the potential for Ag and Au as by-products. • Appropriateness: appropriate for the type of material anticipated from the mining operation. • Tested Technology: Not only is the technology in common use in the industry but it was successfully

Criteria	JORC Code explanation	Commentary
	• *Any assumptions or allowances made for deleterious elements.* • *The existence of any bulk sample or pilot scale test work and the degree to which such samples are considered representative of the orebody as a whole.* • *For minerals that are defined by a specification, has the ore reserve estimation been based on the appropriate mineralogy to meet the specifications?*	used during the previous operation of the Prieska Mine. Over the 20-year mine life, metal recoveries averaged 85% for both zinc and copper into concentrate grades ranging between 28% to 30% for copper (in the copper concentrates) and 51% to 53% for zinc (in the zinc concentrates) (refer ASX release 15 November 2017). • Metallurgical Testwork: Specialists: Mintek Laboratories under the guidance of the DRA Metallurgical team undertook the metallurgical testing. Open and closed circuit testwork on the copper-circuit and zinc-circuit. Process flow tests to determine the optimal recovery processes based on the metallurgical characteristics of the material. 800kg of test sample was used from 7 drill holes ensuring representivity from various zones of the deposit (the NE and SW zones). Using geological logging and assay values for the drill holes, the sample would be split further into a zinc-dominant and copper-dominant material each of which were tested independently. These hypogene zones contain, in decreasing order of abundance, pyrite, sphalerite, chalcopyrite, pyrrhotite, and minor amounts of galena. Accessory minerals include magnetite, molybdenite, marcasite, arsenopyrite, minor gold and silver. Testwork achieved higher-than-anticipated recoveries. Flow-sheet development was carried out on blended samples. • Recovery Factors: Testwork indicates metallurgical recovery rates of approximately 80-88%, resulting in higher zinc and copper concentrates of 48-52% and 22 to 26%, respectively. • Assumptions or allowances made for deleterious elements: historic sales of the PCM concentrates were recorded as clean with low concentrations of penalty elements. Detailed elemental analyses of the concentrates confirmed that several key deleterious elements are at negligible levels with, notably amongst others, arsenic, bismuth, cadmium, cobalt, tellurium, thorium and uranium at levels well below thresholds that may attract material penalty charges from most smelters or exclude some markets. • Bulk sample testwork and representivity: discussed under "testwork" above. • With respect to minerals that are defined by a specification and used in the Production Target estimate, the metallurgical testwork was done to produce saleable products. • Metallurgical testing is still in ongoing. Results are reported in the Scoping Study to 22 October 2018. Metallurgical results were released to the ASX on 17 November 2017, 8 February 2018, 1 March 2018, 12 June 2018 and 22 October 2018.
Environmental	• *The status of studies of potential environmental impacts of the mining and processing operation. Details of waste rock characterisation and the consideration of potential sites, status of design options considered and, where applicable, the status of approvals for process residue storage and waste dumps should be reported.*	• The previous mine owner, PCML, obtained a Conditional Closure Certificate in 1996 from the authorities in terms of the Minerals Act, 1991, in terms of which rehabilitation of the old mine is legally considered complete; with the condition that a fund, be provided to rehabilitate any residual or deleterious aspects related to the closure of the mine and the remaining old Tailings Storage Facility (TSF) which potentially may occur in the future. The Nature Conservation Trust No. 723/89 Fund currently stands at ZAR20,550,812 (end July 2018 - Financial Year End). • The existing Repli Prospecting Right has an Approved **EMPlan** (Environmental Management Plan) and the Vardocube Prospecting Right has the newer, Environmental Authorisation (**EA**), which form part of the prospecting rights and compliance therewith. • The new Mining Right Application (**MRA**) of the Repli Prospecting Right area was submitted on 6 April 2018 together with an Environmental Authorisation Application in terms of the NEMAct, 1998, which runs concurrent to the Mining Right Application. Similarly, the EA application linked to the Vardocube MRA was submitted to the authorities on 27 September 2018. Specialist studies to inform the Environmental Impact Reports (**EIR**), Environmental Impact Assessments (**EIA**) and **EMPrs** (Environmental Management Programme), Integrated Water and Waste Management Plan (**IWWMP**) and Water Use Licenses (**WUL**) for the EA application process are underway. The EA process also integrates the concerns raised during the Public Participation Process and incorporates mitigation measures for issues raised by affected parties. Some agreements have already been concluded including for the solar energy projects located nearby. • A preliminary estimate for the Financial Provision for the LoM is ZAR 180 million. This total amount is in

Criteria	JORC Code explanation	Commentary
		line with specialist recommendations and the EIA; • In accordance with legislated timelines, the grant decision by the authorities for the Environmental Authorisations are anticipated by Q1 2019 for the Repli EA and Q3 2019 for the Vardocube EA.
Infrastructure	• *The existence of appropriate infrastructure; availability of land for plant development, power, water, transportation (particularly for bulk commodities), labour, accommodation; or the ease with which the infrastructure can be provided or accessed.*	• The combined area for the Repli and Vardocube Prospecting Rights upon which the mine and mine infrastructure is planned, is approximately 6,766 hectares in extent. • Surface Rights: Repli Trading No. 27, an indirect subsidiary of Orion Minerals Ltd, and the entity which holds the Prospecting Right and the Mining Right application, controls the surface use for the farm Vogelstruis Bult 104 and Slimes Dam 154 (Prieska District, Northern Cape Province) primarily in the form of direct surface right ownership (97.5% shareholding in PCML (Prieska Copper Mining Limited); servitude rights written into the property deed for land owned by the Request Trust as well as a long-term Surface Users Agreement signed in November 2018 between the latter in which users rights for prospecting and mining operations are guaranteed and the land-owner compensated. In addition, the holder of a prospecting and mining right is entitled to carry out the relevant operations for the winning of minerals in terms of Section 54 of the MPRDAct, 2002. To date, Orion is aware of no Land Claims that have been registered for the properties. The Company has used reasonable endeavours to confirm that land is therefore available for the building of new or use of any existing infrastructure. • Infrastructure Requirements: o Existing Infrastructure (remaining from previous mine operation): This is discussed in the body of the ASX release. o It is assumed that the old mine infrastructure below the 330masl water level would be refurbished or rebuilt. Preliminary mining studies on these aspects have been included in the Scoping Study process and inform the BFS studies currently underway. o Additional Infrastructural Requirements: This is discussed in the body of the ASX release.
Costs	• *The derivation of, or assumptions made, regarding projected capital costs in the study.* • *The methodology used to estimate operating costs.* • *Allowances made for the content of deleterious elements. The derivation of assumptions made of metal or commodity price(s), for the principal minerals and co-products.* • *The source of exchange rates used in the study.* • *Derivation of transport charges.* • *The basis for forecasting or source of treatment and refining charges, penalties for failure to meet specification, etc.* • *The allowances made for royalties payable, both Government and private.*	• Conceptual Capital Cost (**CAPEX**) Assumptions: o CAPEX used: AUD 376 million, then a range was reported. o Conceptual Construction Schedule for the first 28 months. o Initial Life of Mine (LoM) of about 10 years. o Contingency of 20% of the underlying capital cost items. o Target accuracy of ±35%. o The base currency is the South African Rand (**ZAR**) and an exchange rate has been fixed at ZAR 14 : USD 1 and ZAR 10 : AUD 1. o Estimate is base dated to August 2018. • Source of CAPEX estimated costs: o Process Plant: A costed Mechanical Equipment List (**MEL**) with the remainder of the costs factorised from the MEL. o Surface Infrastructure: items sized and quantified off preliminary assumptions, designs or previous projects. Costs determined from similar recent projects or databases (often supplied by consultants) relative to quantified components. Independent pricing obtained as follows: TSF and Return Water Dam by a specialist consultancy; bulk power supply upgrade from a specialist consultancy; water supply pipe-line upgrade from a specialist consultant. o Underground Mining: quotes received for the underground fleet, the evaporators; the winders (man-winder) costed as new but optimised the configuration, rock-winder costed as second-hand, ventilation fans by a ventilation consultant. All remaining items were sized or quantified off preliminary assumptions, designs or previous projects. o Open-pit Mining: Not included in the financial forecast estimates. o General: EPCM and consultant costs are factorised off the various capital estimates in each of the above areas at a percentage as observed across various projects done by consultants, transport during construction, first fills, consumables and spares are allowances based off previous projects done by consultants. Project owner's costs are from Orion Minerals.

Criteria	JORC Code explanation	Commentary

		• Conceptual Operating Cost (OPEX) Methodology and Assumptions:
		  ○ Operating costs of approximately AUD1.8bn with AISC (all-in-sustaining-costs) of AUD100/t.
		  ○ Total Conceptual Operating Cost Summary are provided in the body of the ASX release.
		  ○ For the underground feed, 30% re-handling has been allowed for.
		  ○ OPEX costs for the scenario were estimated by modified numbers using a combination of zero-based build-up and benchmarking against similar activities in other projects.
		  ○ Underground Mining: AUD 48/t. Mining carried out by contractor services; geotechnical, geology and grade-control by Orion staff. Unit mining costs supplied by DRA using a combination of zero-based build up and benchmarking against similar activities in other projects. Costing includes trackless equipment, mining consumables, services, labour, trucking and backfill.
		  ○ Open-Pit: not included in financial forecast estimations.
		  ○ Material Processing: Compiled by reputable contractor from a combination of zero-based costing and benchmarking of similar operations. Labour rates are current industry norms for an operation of the same scale. Processing costs for hypogene (underground) material = AUD 15/t. Costs include labour, fuel, power, crushing & milling, flotation & reagents, water costs, maintenance, laboratory and TSF operations.
		  ○ General and Admin and Off-mine costs are discussed in the body of the ASX release.
		  ○ Marketing costs are a fixed amount of AUD1.25 million based on preliminary discussions with a concentrate logistics management company.
		• Exchange Rate: Base currency is ZAR with a fixed exchange rate at ZAR 14 : USD 1 and ZAR 10 : AUD 1. The rates of exchange used have been empirically estimated and are based on exchange rates at the time of this report.
		• Commodity price assumptions and source: see "revenue below".
		• Derivation of Transport charges: for the purposes of this Study it is assumed that the concentrate will be trucked from the processing plant at the mine to Kimberley daily. Shipping containers will be railed to Coega Port near Port Elizabeth. Cape Town or Saldanha Bay are options. Charges estimated at USD120 per tonne of concentrate.
		• Forecasting Treatment & Refining Charges (and penalties): The conceptualised scenario anticipates that an unrefined product will be sold to the market.
		• Penalties and allowances for deleterious elements: refer to the NSR estimate detailed in this release.
		• Royalties:
		  ○ Government Royalties: the royalties were set at the formula for "unrefined minerals", in terms of the Royalties Act, 2010, linked to the MPRDA, 2002. Where Y = 0.5 + [EBIT/(gross sales of unrefined minerals) x9] x 100 {maximum Y is 7.0%}.
		  ○ Private Royalties: No private royalties were included in the estimate.
		• The estimates are for the total project and do not take into account the percentage of the Company's ownership of the right holding companies (i.e. between 70% and 73.67%).

Revenue factors	• *The derivation of or assumptions made regarding revenue factors including head grade, metal or commodity price(s), exchange rates, transportation and treatment charges, penalties, net smelter returns, etc.* • *The derivation of assumptions made of metal or commodity price(s), for the principal metals, minerals and co-products.*	• Head Grade Assumptions: Mining modifying factors were applied to Mineral Resources grades as covered in the report.

<table>
<tr><th>Criteria</th><th>JORC Code explanation</th><th>Commentary</th></tr>
<tr><td></td><td></td><td>

Metal Price Assumptions

<table>
<tr><th>Metal Prices</th><th>USD/tonne</th><th>USD/lb</th><th>Source</th></tr>
<tr><td>Copper</td><td>6,614</td><td>3.00</td><td>Afriforesight</td></tr>
<tr><td>Zinc</td><td>2,866</td><td>1.30</td><td>Afriforesight</td></tr>
<tr><th>Precious Metals</th><th>USD/oz</th><th></th><th>Source</th></tr>
<tr><td>Gold</td><td>1,350</td><td></td><td>Orion</td></tr>
<tr><td>Silver</td><td>17</td><td></td><td>Orion</td></tr>
</table>

Contribution by the co-products of silver and gold were included in the estimates for the Phase 1 scenario.
Foreign Currency Exchange Rate Assumptions:

<table>
<tr><th>FX Rate</th><th>USD</th><th>AUD</th><th>ZAR</th></tr>
<tr><td>USD</td><td>1.00</td><td>1.40</td><td>14</td></tr>
</table>

The rates of exchange used have been empirically estimated and are based on exchange rates at the time of this report.
Assumptions or allowances made for deleterious elements: historic sales of the PCM concentrates were recorded as clean with low concentrations of penalty elements which were cadmium, iron (applicable for zinc concentrates only), mercury and bismuth. Detailed elemental analyses of the concentrates confirmed that several key deleterious elements are at negligible levels with, notably amongst others, arsenic, bismuth, cadmium, cobalt, tellurium, thorium and uranium at levels well below thresholds that may attract material penalty charges from most smelters or exclude some markets.
Payabilities: The payabilities for zinc and copper have been assumed at 84.0% and 95.8% respectively. This is the percentage of metal paid for by smelter customers. A combined factor has been used to account for TC/RCs, by-product credits and penalty elements. These factors are estimated at -9.7% of the zinc price for zinc and -2.1% of the copper price for copper. The smelter payabilities and combined factors have been selected based on the discussions mentioned above. Based on concentrate grades of 50% for zinc and 24% for copper, the NSR is estimated at approximately 74.3% and 93.7% respectively.
The conceptual NSR Estimate table is provided in the body of the ASX release.
Derivation of Transport charges: Charges assumed at USD120 per tonne of concentrate.
Derivation of assumptions made for metal for commodity price(s) for the principal metals, minerals and co-products: Independent estimates for Zn and Cu; guided by Afriforesight (Pty) Ltd long-term consensus forecast as of August 2018.

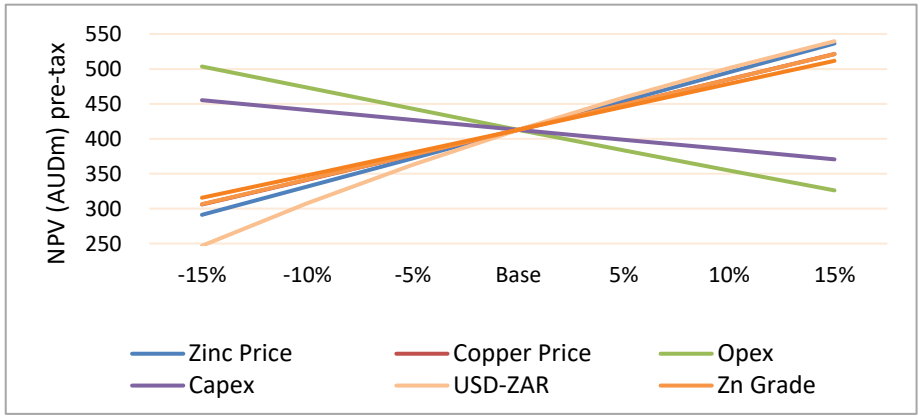
</td></tr>
<tr><td>Market assessment</td><td>

The demand, supply and stock situation for the particular commodity, consumption trends and factors likely to affect supply and demand into the future.
A customer and competitor analysis along with the identification of likely market windows for the product.
Price and volume forecasts and the basis for these forecasts.
~~For industrial minerals the customer specification, testing and acceptance requirements prior to a supply~~

</td><td>

Demand, supply and stock situation for zinc and copper: the global supply and demand balance for zinc is at a deficit forecasted to be balanced by an increase in smelter production and several new mines; non-the-less it is anticipated that there will be an overall strong demand for zinc concentrates over the coming years. Copper is consistently in demand. The supply of copper is presently in surplus but reserve depletion in existing mines is anticipated to create an increase in demand after 2020.
Customer Analysis: historically the concentrates produced from the PCM were regarded as clean products with few and low-levels of impurities. Current assay results support this and it is concluded that the concentrates will be in demand to blend down impurities in other concentrates. Nine zinc smelters and ten copper smelters are listed in the Scoping Study as potential customers.

</td></tr>
</table>

Criteria	JORC Code explanation	Commentary
	~~*contract*~~.	• No formal <u>competitor analysis</u> has been included at the Scoping Study stage. • <u>Metal price and volume forecasts:</u> Metal price assumptions for copper and zinc as supplied by Afriforesight, August 2018 and consensus forecasts were the guideline used to estimate Study prices.
Economic	• *The inputs to the economic analysis to produce the net present value (NPV) in the study, the source and confidence of these economic inputs including estimated inflation, discount rate, etc.* • *NPV ranges and sensitivity to variations in the significant assumptions and inputs.*	• The inputs for the NPV estimation are tabulated in the body of the ASX release. • <u>Valuation Methodology</u> The Discounted Cash Flow ("DCF") method of valuation which is commonly used to determine the attractiveness of an investment opportunity, discounts future free cash flow projections to arrive at an NPV. For the purposes of this Scoping Study, a discount rate commonly used for similar projects of 12.5% has been used. In generating the financial model, the following parameters and assumptions were used: ○ The financial model is in real terms; ○ The model was set up in months for the first three years, and annual increments for the remainder of the mine life. The financial year ending of the Company is June; ○ No escalation has been applied; ○ The operation is valued as a single tax entity; ○ Royalties were set at the formula applicable for unrefined minerals; ○ No salvage value was included for plant and mining equipment remaining at the end of operations. ○ South Africa corporate tax rate of 28% has been applied. ○ NPV ranges: AUD 250m to AUD 550m. ○ Sensitivity analysis for the economics shows the Project most sensitive to the ZAR-USD exchange-rate, followed by zinc-price, copper-price and zinc-grade.  • Using the assumed factors and inputs, Zinc contributes 52% of the LoM revenue post net smelter return and concentrate logistics costs.
Social	• *The status of agreements with key stakeholders and matters leading to social licence to operate.*	• <u>Surface Use:</u> The Company, through Repli Trading No. 25 (Pty) Ltd controls Prieska Copper Mines Limited which owns some of the surface rights. The Company has a long-term Surface user Agreement, signed November 2018, with the remaining surface right holder for the area of the proposed mine infrastructure. • <u>Social License to operate</u>: ○ This aspect is guided by the **Mining Charter** and regulated by the Social and Labour Plan (**SLP**) which was compiled and submitted as part of the Repli and Vardocube Mining Right Applications. The SLP is currently being evaluated by the South African regulatory authorities.

Criteria	JORC Code explanation	Commentary
		○ The Company signed an **MOU** (Memorandum of Understanding) with the Siyathemba Municipality for the Prieska District in February 2018 in which the Municipality endorsed the SLP. ○ Several significant social investment initiatives proposed in the SLP, designed to and agreed between the Company and the Siyathemba Municipality have already been started including the provision of internet facilities to the public in Prieska assisting the local community with application for work and/or as service providers for the proposed mining operation. The Company views the SLP as being a dynamic document that will continue to be revised as the Project develops and the needs and understanding of the local community change.
Other	• *To the extent relevant, the impact of the following on the project and/or on the estimation and classification of the Ore Reserve* • *Any identified material naturally occurring risks.* • *The status of material legal agreements and marketing agreements.* • *The status of governmental agreements and approval critical to the viability of the project, such as mineral tenement status, and government and statutory approvals. There must be reasonable grounds to expect that all necessary Government approvals will be received within the timeframes anticipated in the pre-feasibility of Feasibility study. Highlight and discuss the materiality of any unresolved matter that is dependent on a third party on which extraction of the reserve is contingent.*	• Identified material natural occurring risks: nil. • Status of material legal agreements: all agreements are current and active. Detail of the status of the legal agreements was not addressed in the Scoping Study Technical Report. • Status of material marketing agreements: no marketing agreements are in place at the Scoping Study stage. • Tenement Status: Mineral tenure in South Africa is regulated by the MPRDA (2002) with the environmental aspects regulated by NEMA (1998), both managed under the authority of the DMR. The Project mineral tenure or tenement holding comprises a set of contiguous prospecting rights surrounding the old PCM area: the Repli-Copperton Prospecting Right (Repli Prospecting Right), the Vardocube Prospecting Right, the Bartotrax Prospecting Right and the Repli-Doonies Pan Prospecting Right. Applications for mining rights have been submitted to the DMR for both the Repli Prospecting Right area and the Vardocube Prospecting Right area. The primary tenement licenses and applications are detailed below: **Repli Prospecting Right:** ○ NC 30/5/1/1/2/2105PR (NC10445PR): A prospecting right renewal and a Section 102 (addition of further minerals), have been granted to Repli, in terms of section 17(1) of the MPRDA for copper, zinc, lead, silver, gold, sulphur, cobalt, barytes, limestone, stone aggregate, gravel, sulphur in pyrite, pyrite, molybdenum ore, tungsten ore, sand (general) and iron ore in respect of the farm Vogelstruis Bult No 104, portion RE25 and portion 26 and the farm Slimes Dam 154, in the Prieska District, Northern Cape Province. The date of expiry is 2 November 2019 by which time Repli is anticipating having been granted the Mining Right which has been applied for. ○ Orion effectively holds a 73.3% interest in the project, with the remaining 26.7% as BEE ownership in compliance with existing legislation. **Vardocube Prospecting Right:** ○ NC 30/5/1/1/2/11841PR: Vardocube has been awarded a prospecting right, in terms of section 17(1) of the MPRDA, for copper ore, zinc ore, lead, gold, cobalt, sulphur in pyrite, barytes, limestone, pyrite, tungsten and molybdenum in respect of the farm Vogelstruis Bult No 104, portion RE1 in the Prieska District, Northern Cape Province. The date of grant is 25 April 2018; valid for five (5) years. The Prospecting Right has been notarially executed and registration is in process. ○ Orion effectively holds a 70% interest in the Vardocube Prospecting Right, with the remaining 30% as BEE ownership in compliance with existing legislation. **Repli Mining Right Application** ○ Mining Right: NC30/5/1/2/2/10138MR. The Repli Mining Right Application (MRA), in terms of Section 22 of the MPRDA, 2002, for the Repli Prospecting area and commodities was submitted to the authorities, together with the pre-requisite EA application, on 6 April 2018. The application includes the proposed Mine Works Program and the SLP. The MRA application has been officially accepted and is in process. **Vardocube Mining Right Application** ○ Mining Right: NC30/5/1/2/2/10146MR. The Vardocube Mining Right Application (MRA), in terms

Criteria	JORC Code explanation	Commentary
		of Section 22 of the MPRDA, 2002, for the Repli Prospecting area and commodities was submitted to the authorities, together with the pre-requisite EA application, on 27 September 2018. The application includes the proposed Mine Works Program and the SLP. The MRA application is in process. • Tenure Compliance: At the time of writing, the prospecting rights were compliant with statutory fee payments, annual reporting and financial provision audits up to date. • According to the Department of Land Restitution and Reform, there are no land claims on any of the properties covered by the prospecting rights. • The Conditional Closure Certificate is discussed under "environmental", above. • Government and statutory approvals: There are reasonable grounds to expect that all necessary government approvals will be received within the timeframes anticipated in the Scoping Study. • Status of government agreements: Apart from the tenement status (addressed above) the Company is not aware of any government agreements necessary for the project to continue. • Discussions continue with the South African Department of Science and Technology to ensure compliance with technical aspects which may impact on the Square Kilometre Array ("SKA") radio telescope, being built near Carnarvon over 40km from the Project. • In 1987, Armaments Corporation of South Africa (SOC) Ltd ("Armscor"), a State-owned enterprise for acquiring defence capabilities for the South African Defence Force and other State agencies, established the Alkantpan ballistic test range on ground neighbouring the Project area ("Alkantpan") These surface rights are unlikely to interfere with mine development and operating activities. • Unresolved matters with 3rd parties which would materially affect the results of the Scoping Study – none.
Classification	• *The basis for the classification of the Ore Reserves into varying confidence categories.* • *Whether the result appropriately reflects the competent Person's view of the deposit.* • *The proportion of Probable Ore Reserves that have been derived from Measured Mineral Resources (if any).*	• Ore Reserves have not been classified and reported. • Section 4 of JORC Table 1 is being completed as part of the Scoping Study requirement to disclose a conceptual Production Target estimate linked to forecast financial information.
Audits or reviews	• *The results of any audits or reviews of the Ore Reserve estimates.*	• No audits or reviews of the ore reserves have been undertaken.
Discussion of relative accuracy/confidence	• *Where appropriate a statement of the relative accuracy and confidence level in the Ore Reserve estimate using an approach or procedure deemed appropriate by the Competent Person. For example, the application of statistical or geostatistical procedures to quantify the relative accuracy of the reserve within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors which would affect the relative accuracy and confidence of the estimate.* • *The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnages, which should be relevant to technical and economic evaluation. Documentation should include assumptions made and procedures used.* • *Accuracy and confidence discussions should extend to specific discussions of any applied Modifying Factors that may have material impact on Ore Reserve viability, or for which there are remaining areas of uncertainty at the*	• Ore Reserves have not been classified and reported. • The level of accuracy for the Scoping Study Technical Report is ± 35%. • The level of confidence for the preliminary estimates used in the conceptual production schedule is too low to classify and report Ore Reserves in terms of JORC 2012. • For the Deep Sulphide Mineral Resource (underground mining), a 64% Indicated Mineral Resource and 36% Inferred Mineral Resource was used for the purposes of the Scoping Study. The Company is confident in using the Inferred Mineral Resource to guide the Scoping Study process as it has considered that this Mineral Resource is a continuation of a historically-mined deposit and a large amount of infrastructure remains on site - which lends confidence to the assumption made that the Mineral Resource has the potential to be economically mined. • Mining studies in preparation for a Bankable Feasibility Study are in progress. • A sensitivity analysis has been included in the Scoping Study and is included in the "economic" section above. • The data compares very favourably with historical production records for the Anglovaal Prieska Copper Mine which operated between 1971 and 1991 on the Prieska Copper Project.

Criteria	JORC Code explanation	Commentary
	current study stage. • *It is recognised that this may not be possible or appropriate in all circumstances. These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.*	