

17 February 2022

## **PFS UPDATE - CARAVEL COPPER PROJECT**

### **Highlights**

- **Pre-Feasibility Study is on track for delivery end of March. Work is largely complete on mine design and planning with all other areas progressing as planned**
- **The mine plan is now based on diesel-electric trucks, drill rigs and shovels, utilising grid connected electric power (trolley assist for trucks and cable connection for rigs and excavators). These proven technologies allow substantial advantages in fuel cost, emissions reduction, performance and availability**
- **The mine fleet also utilises autonomous control systems for all trucks and drill rigs, with potential to extend this to other services such as blast hole sampling and charging**
- **‘ACE’ technologies - the combination of Automation, Communication and Electrification - enable substantial cost savings, reduced operating risks and improved safety. New pit designs incorporate provision for autonomous vehicles and electric trolley infrastructure**
- **Preliminary mine schedules from the new designs show strip ratios and ore grades consistent with the previous scoping study model. Further work is planned (in DFS) to access higher-grade ores earlier in the schedule**
- **The new mine schedule sources all materials for construction of the Tailings Management Facility from the overburden pre-strip, allowing significant efficiencies in material costs**
- **Appointment of major construction contractor CIVMEC to review construction planning and provide advice on modularisation and other strategies to maximise the Project’s close proximity to Perth and reduce costs and implementation risks**
- **PFS completion (Q1 2022) will position the Project to enter the Definitive Feasibility study phase in a strong copper market and timed to meet forecast rising demand**

## Caravel Copper Project

Pre-Feasibility Studies for the Caravel Copper Project are progressing as planned and due for completion at the end of March 2022. This update reports on progress with the studies and information on changes to the scope, particularly in relation to details of the mine design and planning.

The project overview is outlined below describing the main components of the Project on which the PFS is based.

### Overview

<b>Location</b>	12km west of Wongan Hills, 150km north-east of Perth, Western Australia
<b>Tenements</b>	Exploration licences E70/2788, E70/3674, E70/3680, R70/0063
<b>Mineralisation</b>	'Porphyry style' chalcopyrite sulphide mineralisation associated with foliated granitic gneiss
<b>Mineral Resources</b>	1.18 billion tonnes @ 0.24% Cu and 48 ppm Mo for <b>2.84Mt of contained copper</b> (0.1% Cu cut-off)
<b>Mining Method</b>	Conventional open-pit at Bindi (approximately 15 years) then Dasher post year 15. Diesel-electric trucks and shovels using trolley assist and cable
<b>Operating Structure</b>	Owner-operator
<b>Processing Method</b>	Standard crush, grind, flotation circuit
<b>Processing Capacity</b>	12Mtpa of ore (years 1 – 5), ramping up to 24Mtpa from year 6
<b>Recovery</b>	~90% Cu
<b>Conc. Production</b>	~35,000 tonnes per annum (years 1 – 5), ~55,000 tonnes per annum (from year 6)
<b>Royalties</b>	Estimated \$810 million
<b>Workforce</b>	150 – 250 long term jobs, 500 – 700 construction jobs
<b>Power</b>	Existing access to grid-power from WA State (SWIS) grid
<b>Water</b>	Remote borefield and 60km pipeline
<b>Conc. Export</b>	Concentrate trucked by public road to Bunbury Port (340km)

### Mine Design

The PFS mining studies are based on the new Resource released in November 2021 (see ASX Announcement 23 November 2021). Substantial parts of the Resource are based on approximately 50m by 50m infill drilling and have been classified as Measured, providing high confidence for the mine planning and early grade schedules.

Key changes from previous studies are the adoption of new, but well proven, 'ACE' technologies for electrical drive systems and autonomous control. Access to the South-West Interconnected System electricity grid (SWIS) allows an electric mining fleet to utilise low-cost grid power in substitution for diesel fuel. Modern diesel-electric power trains can be driven by either diesel or external electrical power. The electric drives offer substantial advantages in power, efficiency and availability with significant reduction in diesel consumption and emissions when connected to the grid. The diesel motor allows flexibility to operate whilst not connected to the grid power and is also more efficient than conventional drives.

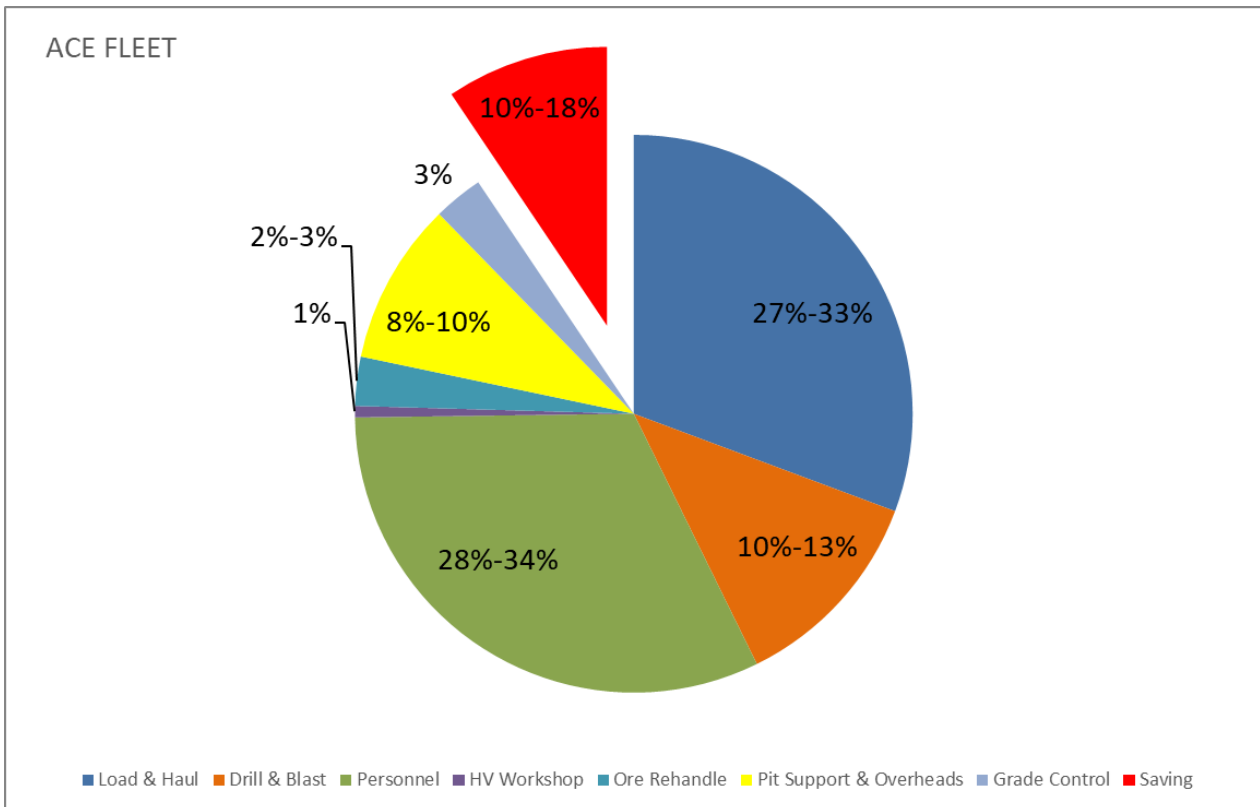
The Mine Plan will be based on electric shovels (waste mining), electric blast-hole drill rigs and electric trolley assist on trucks in the haulage fleet – Figure 1. Modelling based on a 28+ year project life and pit depth of over 360 metres shows the increased speeds and efficiencies from trolley assist allow a reduction of at least two haul trucks compared to a standard diesel-powered truck fleet. The capital cost savings on trucks are expected to be roughly equivalent to the capital cost for installing trolley assist.



**Figure 1: A trolley assist overhead transmission line for a haul truck. Photo supplied by Komatsu Australia.**

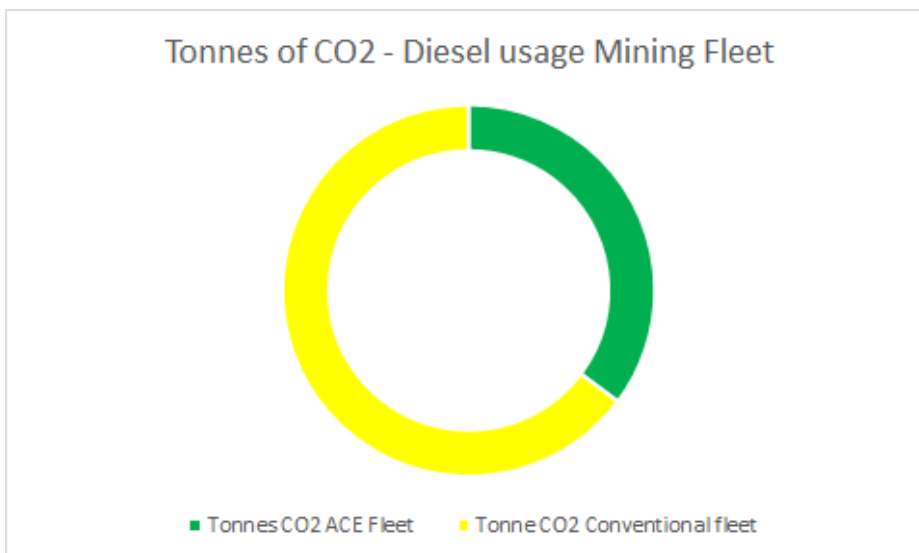
Mine planning is also incorporating the use of autonomous vehicles as part of a broader adoption of remote control and supervision in both the mine and the mill. Autonomous operation of blast hole rigs and haul trucks is now an established practice in the WA mining industry with well-established operating procedures and technical support from both the equipment vendors and independent consultants. Excellent communications services are available through the local optic fibre connection as well as an operating methodology that takes advantage of the ability to mobilise people and equipment to site in less than 2 hours.

Internal studies supported by vendor operational data and studies by Orelogy estimate the adoption of ACE (Automation, Communication, Electrification) technologies will result in operating cost savings of around 10-18% compared to conventional diesel only options, with labour reduction, diesel savings and improved operating efficiencies as the key factors – Figure 2.



**Figure 2: Caravel Copper Project PFS level mining cost model (as at 17 February 2022) cost savings in red based on utilisation of 'ACE' compared to a conventional fleet.**

The use of electrification in the mining fleet allows a significant reduction in diesel usage compared to a conventional fleet with a proportional reduction in carbon emissions – Figure 3. Overall emissions will need to account for those related to sources of electricity generation, which is not yet determined and will be examined in more detail in the PFS report.



**Figure 3: Estimated CO<sub>2</sub> comparison for diesel-electric fleet and conventional diesel fleet.**

## **Mining Schedule**

The PFS mining schedule has matched the grade from the 2021 Scoping Study in the first 5 years at 0.32% with the detailed mine design now incorporating allowances for the operation of autonomous vehicles and provision for electrification infrastructure.

The design and schedule also incorporates construction of the Tailings Management Facility (TMF) to utilise the significant clay resources within the Bindi overburden. Ensuring the highest standards for tailings management is a key focus for the mine design and permitting process. The identification of suitable construction materials within the overburden pre-strip has allowed scheduling the removal of overburden to be incorporated into the construction of the TMF. This provides substantial efficiencies in the construction process and also allows more conservative designs for the TMF taking advantage of the availability of material.

Once these key aspects of the design are finalised, the focus during the DFS will move to detailed scheduling and accessing higher grades ores earlier in the mine schedule.

## **Metallurgy**

Metallurgical test work is based on the revised process flowsheet where ore is primary crushed, ground in a SAG-ball circuit including pebble crushing followed by roughing and cleaning flotation before filtering. A P80 of 185 µm has been selected as the optimum grind size for the circuit however recent test work has also explored the opportunity for fully autogenous grinding and coarse particle flotation (CPF). This technology may allow for lower operating costs and increased throughput. Further work is being planned to evaluate the economic viability of the CPF as feasibility progresses.

Current work is evaluating the optimum regrind size for the flotation cleaning circuit. Larger mass flotation tests are underway to provide samples for thickening test work as well as tailings characterisation. This work is also providing larger masses of concentrate for further test work.

There has been minimal variability seen in the test work to date however further testing this month will evaluate the recoveries of paying metals and deportment of deleterious species utilising composites that represent the various zones and structure of the deposit including those materials that will make up the early years of production.

Additional diamond drill holes are currently being drilled for expanded metallurgical testing during the DFS.

## **Engineering**

Ausenco has performed a detailed review of existing and new test work and data to optimise the Caravel flowsheet. This includes selection of a robust comminution circuit design that allows for staged expansions during the life of the project. Furthermore, a review of flotation and regrind technology took place. This review resulted in an optimised configuration of the flotation circuit and included coarse particle flotation that allowed for additional circuit throughput without increasing mill size, improving project NPV.

Ausenco has also considered overall developments to the Caravel Copper Project (in areas such as mining and tailings) and worked with Caravel Minerals to optimise the location of the process plant and associated infrastructure to address anticipated needs over the life of project. Furthermore, Ausenco has introduced a compact process plant layout, resulting in an anticipated reduction in bulk materials required to build the process plant without negatively impacting on plant operability or maintainability.

On the basis of the revised flowsheet and optimised plant layout and location, priced mechanical and major electrical equipment lists have been generated. Material take-offs for earthworks, concrete and

structural steel are currently being completed. These outputs are being generated in preparation of the PFS capital cost estimate. Ausenco has also worked with Caravel Minerals to develop a preliminary PFS operating cost estimate, which will be finalised in coming weeks alongside the capital cost estimate.

### **ECI - CIVMEC**

Caravel has engaged Henderson (WA) based construction firm CIVMEC under an Early Contractor Involvement (ECI) scope to assess the Project's construction methodology and opportunities. CIVMEC will assess pre-assembly and modularisation construction options maximising the existing public road access and short distance (150km) from Perth to site. CIVMEC will also provide an indicative level 2 construction schedule. CIVMEC will assist Caravel's optimisation of the Project schedule during feasibility.

### **Site Layout**

Significant field investigations (geotechnical, groundwater, soil analysis, sterilisation drilling, environmental baseline studies and stakeholder engagement) have either been completed or substantially progressed to further define the Project's site layout. Tenure applications covering project requirements have been lodged with DMIRS. Diamond drilling is ongoing to gather geotechnical information for pit walls and other infrastructure that will be further assessed during the DFS.

### **Approvals**

- **Environmental Approvals**

Baseline studies for flora, vegetation, aquatic ecology, and fauna have now been completed and the Company is preparing to commence the formal environmental assessment process.

- **Power**

An Access Application for mine and processing stage 1 power requirements (65MW) has been submitted and accepted by Western Power. Studies are in progress to assess the engineering requirements for the optimum connection to the SWIS grid.

- **Water**

Groundwater field work and associated licence applications are advancing. A number of areas with potential for sustainable yields have been identified and processes are underway to further define and secure these resources.

- **Heritage**

Caravel has entered into Heritage Agreements with the Yued and Ballardong Traditional Owners for the mine and processing area and heritage surveys for the mine and processing area are scheduled for March 2022.

### **Stakeholder Engagement**

Stakeholder engagement is continuing with landowners, the Shire of Wongan-Ballidu, surrounding Shires and relevant Government Departments. All engagements have been constructive and positive toward the Project's development and no substantive impediments have been identified.

This announcement is authorised for release by Executive Director, Alasdair Cooke.



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**Competent Persons Statements**

*The information in this report that relates to Exploration Results is based on and fairly represents information compiled by Mr Peter Pring. Mr Pring is Senior Exploration Geologist with Caravel Minerals. Mr Pring is a shareholder of Caravel Minerals and is a member of the Australasian Institute of Mining and Metallurgy. Mr Pring has sufficient experience of relevance to the styles of mineralisation and types of deposits under consideration, and to the activities undertaken to qualify as a Competent Person as defined in the 2012 Edition of the Joint Ore Reserves Committee (JORC) Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves. Mr Pring consents to the inclusion in this report of the matters based on information in the form and context in which they appear.*

*The information in this report that relates to Mineral Resources is based on and fairly represents information compiled by Mr Lauritz Barnes, (Consultant with Trepanier Pty Ltd). Mr Barnes is a shareholder of Caravel Minerals. Mr Barnes is a member of both the Australasian Institute of Mining and Metallurgy and the Australasian Institute of Geoscientists. Mr Barnes has sufficient experience of relevance to the styles of mineralisation and types of deposits under consideration, and to the activities undertaken to qualify as a Competent Person as defined in the 2012 Edition of the Joint Ore Reserves Committee (JORC) Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves. Mr Barnes consents to the inclusion in this report of the matters based on information in the form and context in which they appear.*

**Previous Disclosure** The information in this report is based on the following Caravel Minerals ASX Announcements, which are available from the Caravel Minerals website [www.caravelminerals.com.au](http://www.caravelminerals.com.au) and the ASX website [www.asx.com.au](http://www.asx.com.au):

- 25 August 2021 "Bindi Deposit – Updated Geological Model"
- 4 November 2021 "Scoping Study – Caravel Copper Project"
- 23 November 2021 "Major Mineral Resource Upgrade – Caravel Copper Project"
- 18 January 2022 "Drilling Results – Bindi Copper Deposit"

*The Company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcement and that all material assumptions and technical parameters underpinning the relevant market announcement continue to apply and have not materially changed. The Company confirms that the form and context in which the Competent Person's findings are represented have not been materially modified from the original market announcement.*

**Forward Looking Statements** This document may include forward looking statements. Forward looking statements include, but are not necessarily limited to, statements concerning Caravel Minerals planned exploration programmes, studies and other statements that are not historic facts. When used in this document, the words such as "could", "indicates", "plan", "estimate", "expect", "intend", "may", "potential", "should" and similar expressions are forward looking statements. Such statements involve risks and uncertainties, and no assurances can be provided that actual results or work completed will be consistent with these forward looking statements.