

2 August 2017

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## **UPDATED DFS DELIVERS BIGGER AND BETTER CLONCURRY COPPER GOLD PROJECT**

- A standout amongst very few copper development opportunities
- Large scale, permitted, open pit mine located in a high skill and low risk jurisdiction
- Ore Reserve of 426,000 tonnes of copper and 203,900 ounces of gold
- Significant initial annual production of 39,000 tonnes of copper and 17,200 ounces of gold in concentrate
- A\$1.48 billion of cashflow (pre-tax and sustaining capital) over an initial mine life of 14 years
- Development of large Little Eva open pit and 5 smaller satellite pits
- Construction of a 7 million tonnes per annum conventional flotation plant at a capital cost of A\$288 million
- 150,000 tonnes per annum of clean, marketable copper-gold concentrate
- Average annual operating cashflow (pre-tax and sustaining capital) of A\$141 million per annum for first 5 years at full production
- Net present value (pre-tax NPV 7.5%) of A\$462 million at US\$2.95 per pound copper, US\$1,250 per ounce gold, AUD:USD 0.75
- Life of Mine average cash cost of US\$1.65 per pound of copper in concentrate and an all-in-cash cost of US\$1.92 per pound copper in concentrate
- Opportunities identified to improve returns during project optimisation
- Opportunity exists to expand production through inclusion of copper only deposits

Altona Mining Limited ("Altona" or "the Company") today announces an update of the Definitive Feasibility Study ("DFS") of the Cloncurry Copper Project ("Project"), 90 kilometres north-east of Mt Isa in Queensland, Australia.

Altona Managing Director, Dr Alistair Cowden said, "We are delighted with the study update which results in annual operating surplus before tax and sustaining capital of approximately A\$141 million. This highlights the value that will be released once the project is developed."

The study has been completed to provide an up to date status of the Project which consolidates and integrates all technical work of prior studies with a number of significant developments since the initial DFS in May 2012 and the update to the DFS in March 2014 that impact on costs, revenues and design. They include:

- New Resource estimates and geological/geotechnical models for the Little Eva and Bedford deposits. Please note these new estimates have not yet been used to generate new Ore Reserve estimates.
- Mineral Resource and Ore Reserve estimates for the Turkey Creek deposit
- Metallurgical testwork of Turkey Creek ore
- Inclusion of the Turkey Creek deposit in mine plan
- Re-design and re-location of infrastructure and waste dumps to accommodate Turkey Creek pit
- A reduction in engineering and construction costs
- Updated cost estimates
- Updated Environmental Authority to reflect inclusion of Turkey Creek
- Changes to macro-economic assumptions.

The study also identified a number of areas for improvement to be addressed in project optimisation:

- Reserve expansion through converting Inferred Resources below Little Eva pit to Indicated Resources
- RC drilling for better definition of grade control, dilution and ore loss
- Updated Little Eva Resource model
- Geotechnical model constructed indicating opportunity for improvement in mine design
- Little Eva pit optimisation and design using lower current mining costs and upgraded Resource model
- Resource upside at satellite pits
- Consideration of higher plant throughput if Reserve increase warrants expansion
- Increased water resources to support higher throughput.

The study also recommends examining the opportunity of expanding production by inclusion of copper-only deposits not considered in the DFS.

Compared to the 2014 DFS, this study has delivered material improvements:

- Reserves up 14% from 375kt copper to 426kt copper
- Mine life up 27% from 11 years to 14 years
- Life of mine revenue up 24% from A\$2.9 billion to A\$3.6 billion
- NPV (pre-tax) up 34% from A\$346 to A\$462 million
- IRR (pre-tax) up 24% from 29% to 36%.

The Project comprises a large scale open pit mine at Little Eva and five satellite pits; Turkey Creek, Bedford North and South, Lady Clayre and Ivy Ann. Ore will be processed at a 7 million tonnes per annum processing plant adjacent to Little Eva and Turkey Creek. The Little Eva pit has a low strip ratio of 1.8:1 (excluding pre-strip). The Project has an initial 14 year life.

The Little Eva processing plant will have a technically simple crushing, grinding and flotation circuit resulting in the pre-production capital cost including pre-strip, processing plant and associated infrastructure being A\$288 million. The operation will produce 150,000 tonnes per annum of readily marketable, clean copper-gold concentrate containing an average of 39,000 tonnes per annum copper and 17,200 ounces per annum gold for the first 5 years of full production. High metal recoveries of 96% copper and 85% gold are achievable at a coarse grind size of 212 microns. The mill feed grade averages 0.6% copper and 0.1g/t gold excluding marginal grade stockpiles.

Permitting for the Project is largely completed, an Environmental Authority has been received and Mining Leases have been granted.

The Executive Summary of the DFS is appended to this release. A new Table 1 of the JORC 2012 Code has been released separately (ASX release 2 August 2017, Cloncurry Copper Project: JORC 2012 Disclosure). This release consolidates multiple prior disclosures and updates some prior disclosure from JORC 2004 to JORC 2012 compliance.

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## About Altona and the Cloncurry Copper Project

Altona Mining Limited ("Altona") is an ASX listed company focussed on the Cloncurry Copper Project ("Project") in Queensland, Australia. The Project has Mineral Resources containing some 1.67 million tonnes of copper and 0.43 million ounces of gold. It is envisaged that a 7 million tonnes per annum open pit copper-gold mine and concentrator will be developed at the Project. The development is permitted with proposed annual production<sup>(1)</sup> of 39,000 tonnes of copper and 17,200 ounces of gold for a minimum of 14 years. The Definitive Feasibility Study was refreshed in July 2017.

<sup>1</sup>Refer to the information attached to this ASX release 'Updated DFS Delivers Bigger and Better Cloncurry Copper Gold Project' dated 2 August 2017 which outlines information in relation to this production target and forecast financial information derived from this production target. The release is available to be viewed at [www.altonamining.com](http://www.altonamining.com) or [www.asx.com.au](http://www.asx.com.au). The Company confirms that all the material assumptions underpinning the production target and the forecast financial information derived from the production target referred to in the above-mentioned release continue to apply and have not materially changed.

## Competent Person Statement and JORC Compliance

**Responsibility for Exploration Targets, Exploration Results, Mineral Resources:** The information in this report that relates to Exploration Targets, Exploration Results or Mineral Resources is based on information generated or compiled by Dr Alistair Cowden, BSc (Hons), PhD, MAusIMM, MAIG, Mr Roland Bartsch, BSc(Hons), MSc, MAusIMM, Mr George Ross, BSc, MSc, MAIG and Mr Frank Browning BSc (Hons) MSc, MAIG. Dr Cowden, Mr Bartsch, Mr Ross and Mr Browning are full time employees of the Company and have sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity being undertaking to qualify as a Competent Person as defined in the 2012 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves'. Dr Cowden, Mr Bartsch, Mr Ross and Mr Browning consent to the inclusion in the report of the matters based on their information in the form and context in which it appears.

**Responsibility for Ore Reserves:** The information in this report that relates to Ore Reserves is based on information generated or compiled by Dr Alistair Cowden, BSc (Hons), PhD, MAusIMM, MAIG and Mr Roland Bartsch, BSc(Hons), MSc, MAusIMM. Dr Cowden and Mr Bartsch are full time employees of the Company and have sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity being undertaking to qualify as a Competent Person as defined in the 2012 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves'. Dr Cowden and Mr Bartsch consent to the inclusion in the report of the matters based on their information in the form and context in which it appears.

**Copper equivalence:** When used, copper equivalence (Cueq) refers to copper and gold in concentrate, not resources or reserves, or drill results. Revenue from gold is simply equated to copper revenue using the assumptions reported in the ASX release dated 2 August 2017.

### Summary of Mineral Resource Estimates for the Cloncurry Copper Project

| Deposit                     | Total             |             |             | Contained Metal  |                | Measured         |             |             | Indicated       |             |             | Inferred         |             |             |
|-----------------------------|-------------------|-------------|-------------|------------------|----------------|------------------|-------------|-------------|-----------------|-------------|-------------|------------------|-------------|-------------|
|                             | Tonnes (millions) | Cu (%)      | Au (g/t)    | Copper (tonnes)  | Gold (ounces)  | Tonnes (million) | Cu (%)      | Au (g/t)    | Tonne (million) | Cu (%)      | Au (g/t)    | Tonnes (million) | Cu (%)      | Au (g/t)    |
| <b>Deposit in Mine Plan</b> |                   |             |             |                  |                |                  |             |             |                 |             |             |                  |             |             |
| Little Eva                  | 105.9             | 0.52        | 0.09        | 546,000          | 295,000        | 37.1             | 0.60        | 0.09        | 45.0            | 0.46        | 0.08        | 23.9             | 0.50        | 0.10        |
| Turkey Creek                | 21.0              | 0.59        |             | 123,000          | -              | -                | -           |             | 17.7            | 0.59        |             | 3.4              | 0.58        | -           |
| Ivy Ann                     | 7.5               | 0.57        | 0.07        | 43,000           | 17,000         | -                | -           | -           | 5.4             | 0.60        | 0.08        | 2.1              | 0.49        | 0.06        |
| Lady Clayre                 | 14.0              | 0.56        | 0.20        | 78,000           | 85,000         | -                | -           | -           | 3.6             | 0.60        | 0.24        | 10.4             | 0.54        | 0.18        |
| Bedford                     | 4.8               | 0.80        | 0.21        | 38,000           | 32,000         | -                | -           | -           | 2.3             | 0.95        | 0.23        | 2.5              | 0.66        | 0.19        |
| Sub-total                   | 153.3             | 0.54        | 0.09        | 829,000          | 430,000        | 37.1             | 0.60        | 0.09        | 74.0            | 0.52        | 0.07        | 42.2             | 0.53        | 0.11        |
| <b>Other Deposits</b>       |                   |             |             |                  |                |                  |             |             |                 |             |             |                  |             |             |
| Blackard                    | 76.4              | 0.62        | -           | 475,000          | -              | 27.0             | 0.68        | -           | 6.6             | 0.60        | -           | 42.7             | 0.59        | -           |
| Scanlan                     | 22.2              | 0.65        | -           | 143,000          | -              | -                | -           | -           | 18.4            | 0.65        | -           | 3.8              | 0.60        | -           |
| Longamundi                  | 10.4              | 0.66        | -           | 69,000           | -              | -                | -           | -           | -               | -           | -           | 10.4             | 0.66        | -           |
| Legend                      | 17.4              | 0.54        | -           | 94,000           | -              | -                | -           | -           | -               | -           | -           | 17.4             | 0.54        | -           |
| Great Southern              | 6.0               | 0.61        | -           | 37,000           | -              | -                | -           | -           | -               | -           | -           | 6.0              | 0.61        | -           |
| Caroline                    | 3.6               | 0.53        | -           | 19,000           | -              | -                | -           | -           | -               | -           | -           | 3.6              | 0.53        | -           |
| Charlie Brown               | 0.7               | 0.40        | -           | 3,000            | -              | -                | -           | -           | -               | -           | -           | 0.7              | 0.40        | -           |
| Sub-total                   | 136.7             | 0.61        | -           | 840,000          | -              | 27.0             | 0.68        | -           | 25.0            | 0.64        |             | 84.7             | 0.59        | -           |
| <b>Total</b>                | <b>290.0</b>      | <b>0.58</b> | <b>0.05</b> | <b>1,668,000</b> | <b>430,000</b> | <b>64.1</b>      | <b>0.63</b> | <b>0.05</b> | <b>99.0</b>     | <b>0.55</b> | <b>0.05</b> | <b>126.9</b>     | <b>0.57</b> | <b>0.04</b> |

See tabulation in ASX release dated 2 August 2017: Appendix 4 for source information and Appendix 5 for details of supporting data and estimation methodology (Table 1 of the JORC Code 2012).

Little Eva is reported above a 0.2% copper lower cut-off grade, all other deposits are above 0.3% lower copper cut-off.

Resources have been reported as inclusive of Reserves.

## Summary of Ore Reserves Estimates for the Cloncurry Project

| Reserve Classification                                       | Tonnes            | Copper (%)  | Gold (g/t)  | Copper (tonnes) | Gold (ounces)  |
|--|-------------------|-------------|-------------|-----------------|----------------|
| <b>Little Eva</b>  |                   |             |             |                 |                |
| Proved   | 31,000,000        | 0.64        | 0.08        | 198,200         | 84,700         |
| Probable   | 22,100,000        | 0.50        | 0.09        | 109,900         | 62,600         |
| <b>Turkey Creek</b>  |                   |             |             |                 |                |
| Probable   | 11,300,000        | 0.46        | 0           | 52,100          | 0              |
| <b>Ivy Ann</b>   |                   |             |             |                 |                |
| Probable   | 3,500,000         | 0.59        | 0.08        | 21,000          | 9,100          |
| <b>Lady Clayre</b>   |                   |             |             |                 |                |
| Probable   | 920,000           | 0.56        | 0.27        | 5,100           | 8,100          |
| <b>Bedford</b>   |                   |             |             |                 |                |
| Probable   | 1,350,000         | 0.85        | 0.20        | 11,600          | 8,500          |
| <b>Total Proved and Probable Reserves (excl. stockpiles)</b> | <b>70,200,000</b> | <b>0.57</b> | <b>0.08</b> | <b>397,400</b>  | <b>173,000</b> |
| <b>Little Eva Low Grade Stockpile</b>                        |                   |             |             |                 |                |
| Probable   | 15,400,000        | 0.18        | 0.06        | 28,100          | 30,900         |
| <b>Total (including stockpile)</b>                           | <b>85,600,000</b> | <b>0.50</b> | <b>0.07</b> | <b>426,000</b>  | <b>203,900</b> |

See tabulation in ASX release dated 2 August 2017 : Appendix 4 for source information and Appendix 5 for details of supporting data and estimation methodology (Table 1 of the JORC Code 2012).

Little Eva and Turkey Creek are reported above a 0.16% copper lower cut-off grade, for Bedford 0.17% copper, for Lady Clayre 0.20% copper and for Ivy Ann 0.22% copper.

All data has been rounded to two significant figures. Discrepancies in summations may occur due to rounding. Minor rounding discrepancies or inconsistencies in summaries since initial publication in 2012 have been updated.

## **APPENDIX 1**

# **CLONCURRY COPPER PROJECT DEFINITIVE FEASIBILITY STUDY STATUS REPORT JULY 2017**

## **EXECUTIVE SUMMARY**

## 1. EXECUTIVE SUMMARY

### 1.1. Key Facts

| Mineral Resources and Ore Reserves*                     | Tonnes<br>(million) | Copper<br>(%) | Gold<br>(g/t) |
|---|---------------------|---------------|---------------|
| Global Measured, Indicated and Inferred (MII) Resources | 290.0               | 0.58          | 0.05          |
| Contained metal in Global Resources                     |                     | 1,668,000(t)  | 430,000(oz)   |
| Project Resources (MII) Included in Study               | 153.3               | 0.54          | 0.09          |
| Contained metal in Study Resources                      |                     | 829,000(t)    | 430,000(oz)   |
| Total Reserves  | 86.8                | 0.50          | 0.07          |
| Contained metal in Reserves                             |                     | 426,000(t)    | 203,900(oz)   |
| Inferred Resources in mine plan                         | 5.50                | 0.49          | 0.08          |
| <b>Total production target**</b>                        | <b>92.3</b>         | <b>0.49</b>   | <b>0.07</b>   |

| Production Summary   |           |
|--|-----------|
| Project life   | 14 years  |
| Little Eva pit strip ratio (after pre-strip)               | 1.8:1     |
| Little Eva pit strip ratio including pre-strip             | 2.0:1     |
| Annual processing rate (tonnes)                            | 7,000,000 |
| Copper recovery  | 96%       |
| Gold recovery  | 85%       |
| Milled tonnes (million tonnes)                             | 91.5      |
| Recovered copper, life of mine (tonnes)                    | 432,513   |
| Recovered gold, life of mine (ounces)                      | 184,184   |
| Copper in concentrate for first 5 years (tonnes per annum) | 39,000    |
| Gold in concentrate for first 5 years (ounces per annum)   | 17,200    |

| Costs   |                    |
|---|--------------------|
| Capital cost (A\$ million)                              | 288                |
| Operating costs per tonne                               | A\$23.07/t         |
| Operating (C1) cash cost per pound copper after credits | US\$1.65/lb        |
| Life of mine sustaining capital                         | US\$0.11/lb        |
| Royalties   | US\$0.16/lb        |
| <b>Total Costs</b>                                      | <b>US\$1.92/lb</b> |

| Project Economics  | A\$ (million) |
|--|---------------|
| Life of mine Revenues after smelter charges (NSR)                      | 3,629         |
| Pre-tax and pre sustaining capital LOM operating cash flow             | 1,483         |
| Average pre-tax and sustaining capital operating cash flow (Yr 1 to 5) | 141           |
| Pre-tax NPV (unleveraged at 7.5% real discount rate)                   | 462           |
| Pre-tax IRR  | 36%           |
| A\$:US\$   | 0.75          |
| Copper price (US\$/lb)   | 2.95          |
| Gold price (US\$/ounce)  | 1,250         |
| TC/RC (US\$/tonne/US\$/lb)   | 80 / 0.08     |

\* Resources are inclusive of Reserves. \*\* The production target is based largely on Ore Reserves (94% of production) with Inferred Resources in mine plan comprising 6% of production.

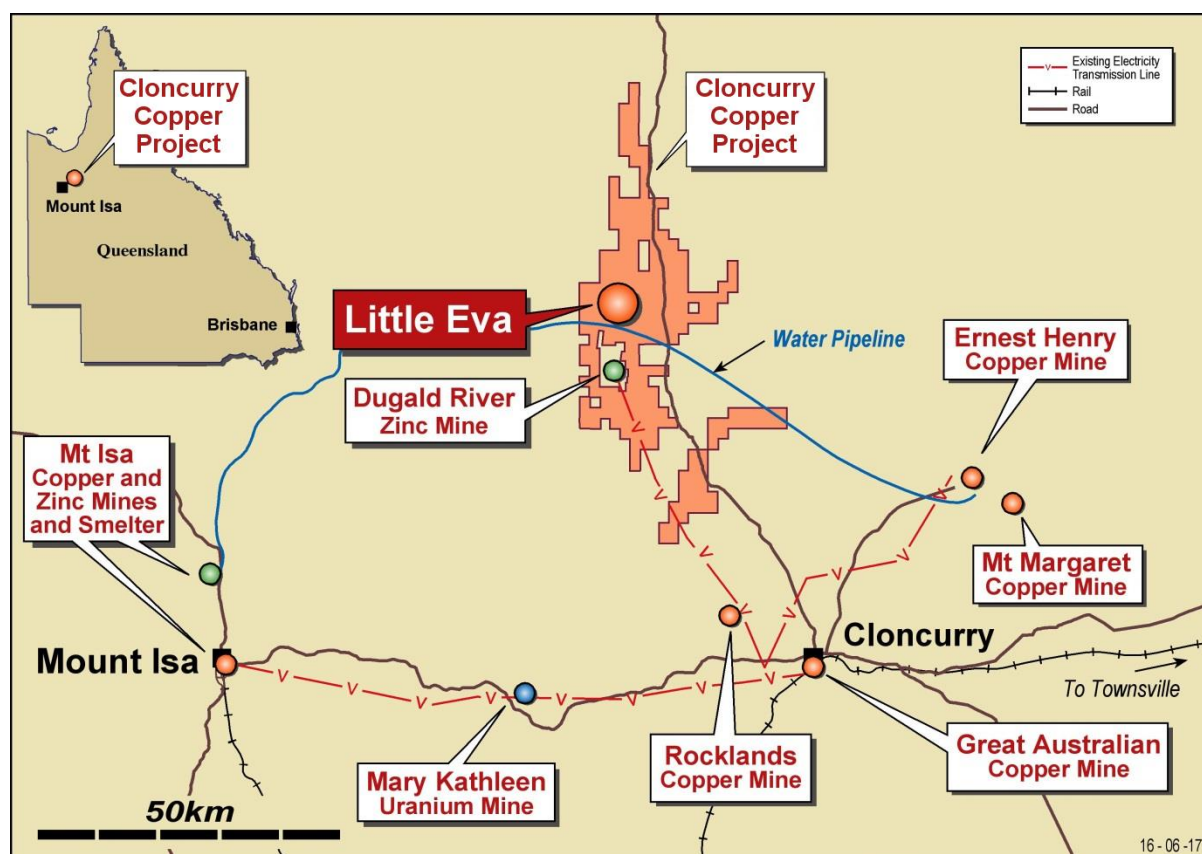


## 1.2. Introduction

The Cloncurry Copper Project ("Project") is a large, low-risk proposed copper-gold open pit mining operation and processing plant similar to other current and former operations in the Mt Isa - Cloncurry area in Queensland. The Project comprises the large Little Eva open pit and five smaller satellite pits which will deliver sulphide ore to a 7 million tonnes per annum processing plant adjacent to the Little Eva and Turkey Creek pits. Little Eva is a typical Iron Oxide Copper Gold ("IOCG") deposit similar to Ernest Henry and Osborne.

The Little Eva deposit was the subject of a major drill programme in 2010 to 2012 and consequently contained Mineral Resources more than doubled. The enlarged Little Eva deposit was the focus of a Definitive Feasibility Study ("DFS") of a simple operation treating copper-gold sulphide ore that was completed in May 2012. The November 2011 costings from that study were updated by GR Engineering Services Limited ("GRES") for a 2014 update of that study. The large Turkey Creek deposit was delineated subsequent to that update.

This report has been completed to provide an up to date status of the Project. It consolidates and integrates all technical work of prior studies together with a number of significant developments that impact on costs and revenues since the March 2014 DFS.



**Location of the Cloncurry Copper Project tenure, the Little Eva plant and regional infrastructure**

The Little Eva deposit has been included in feasibility studies in the past (2005 and 2008) where it was envisaged to be mined in conjunction with two copper-only deposits; Blackard and Scanlan. The earlier studies indicated that the processing characteristics and metal recoveries of sulphide ore from Little Eva and satellite deposits were far superior to the copper-only deposits which, as a result, have

been excluded from Altona's recent studies. The copper-only deposits will be re-evaluated once the Project is established.

It is estimated that over 27 years, a total of A\$60 million has been expended on exploration, resource development, metallurgical and engineering studies, compensation payments and government fees and charges by Altona's predecessor, Universal Resources Limited ("Universal"), Universal's partners and by parties who held the Project prior to Universal. Altona has expended some A\$25 million from February 2010 to 31 December 2016.

### 1.3. Definitive Feasibility Study

The initial study was completed in May 2012 and was managed by GRES. The principal consultants and inputs are attributed as follows:

|                                    |                                    |
|------------------------------------|------------------------------------|
| Mineral Resources:                 | Altona Mining Limited              |
| Geotechnical:                      | George, Orr and Associates         |
| Tailings storage facility ("TSF"): | Knight Piésold                     |
| Mine costing:                      | IQE                                |
| Mine design and Ore Reserves:      | Optiro                             |
| Hydrology:                         | KH Morgan & Associates / Rockwater |
| Process design:                    | GRES / Ozmet                       |
| Metallurgical testwork:            | GRES / ALS Ammtec Laboratories     |
| Plant and infrastructure:          | GRES                               |
| Logistics:                         | Gilbride Management                |
| Environment:                       | MBS Environmental                  |

For the March 2014 update; construction, plant and processing costs were reviewed and updated by GRES and mining costs were updated by IQE. Macro-economic assumptions were updated by Altona.

Significant changes made since the 2014 study include:

- New Resource Estimate and geotechnical model for the Little Eva deposit (Altona)
- New Resource Estimate and geological model for the Bedford deposit (Altona)
- Initial Mineral Resource and Ore Reserve Estimates generated for the Turkey Creek deposit (Optiro and Altona)
- Inclusion of the Turkey Creek deposit in the mine plan (Orelogy)
- Redesign of waste dumps for the Environmental Authority ("EA") (Orelogy)
- Redesign and relocation of infrastructure impacted by Turkey Creek pit development (Knight Piésold / GRES)
- A reduction in engineering and construction costs based on estimate review (GRES)
- Provision for project power supply increased by 20%
- Changes to the macro-economic assumptions (Altona)
- Updated mining cost estimates from market enquiry (IQE)
- Updated EA lodged and approved (MBS Environmental)
- Development of a detailed implementation plan.

The Project comprises the following components:

- Pre-strip of oxidised rock and copper oxide mineralisation
- Construction of a 7 million tonnes per annum capacity process plant, infrastructure and TSF
- Power via a 33kV overland high voltage ("HV") power line from a substation at Dugald River mine site

- Open pit mining of between 7 and 9 million tonnes per annum of ore
- Stockpiling of marginal grade ore for processing toward end of mine life
- Direct tip of run-of-mine ("ROM") ore to a single-stage gyratory primary crusher or to a ROM pad
- Processing of 7 million tonnes per annum of ore
- Two stage grinding via a primary semi-autogenous grinding ("SAG") mill and ball mill to 212µm
- Flotation of copper-gold concentrate
- Concentrate re-grind to 38µm
- Gravity gold recovery
- Thickening and filtration of concentrate
- Trucking of concentrates in containers to a rail siding at Cloncurry or to the Mt Isa smelter
- Flatbed rail to Townsville port for concentrate unloading and export.

#### 1.4. Geology and Mineral Resources

##### Mineral Resource Estimate

The Resource Estimate for the Little Eva deposit is based on 8,088 metres of diamond drilling (42 holes) and 59,183 metres of Reverse Circulation ("RC") drilling (390 holes). Mineralisation is hosted in a variably altered (albite-carbonate-hematite-magnetite) amygdaloidal intermediate unit. The majority of the unit is altered, quartz-carbonate veined and mineralised with sulphides occurring predominantly as chalcopyrite with only minor amounts of pyrite and bornite. Sulphide minerals comprise on average only 2 to 3% of the rock but locally can range up to 25%.

The Resource Estimates for the Little Eva, Turkey Creek and Bedford deposits were reported according to the 2012 Edition of the JORC Code whereas the other deposits were reported according to the 2004 Edition of the JORC Code. This study consolidates all disclosure to JORC 2012 standards and this was disclosed to ASX on 2 August 2017.

##### Mineral Resource Estimate for the Cloncurry Copper Project

| Deposit                      | Tonnes<br>(million) | Copper<br>(%) | Gold<br>(g/t) | Copper<br>(tonnes) | Gold<br>(ounces) |
|------------------------------|---------------------|---------------|---------------|--------------------|------------------|
| <b>Deposits in Mine Plan</b> |                     |               |               |                    |                  |
| Little Eva                   | 105.9               | 0.52          | 0.09          | 546,000            | 295,000          |
| Turkey Creek                 | 21.0                | 0.59          | -             | 123,000            | -                |
| Ivy Ann                      | 7.5                 | 0.57          | 0.07          | 43,000             | 17,000           |
| Lady Clayre                  | 14.0                | 0.56          | 0.20          | 78,000             | 85,000           |
| Bedford                      | 4.8                 | 0.80          | 0.21          | 38,000             | 32,000           |
| Sub-total                    | 153.3               | 0.54          | 0.09          | 829,000            | 430,000          |
| <b>Other Deposits</b>        |                     |               |               |                    |                  |
| Blackard                     | 76.4                | 0.62          | -             | 475,000            | -                |
| Scanlan                      | 22.2                | 0.65          | -             | 143,000            | -                |
| Longamundi                   | 10.4                | 0.66          | -             | 69,000             | -                |
| Legend                       | 17.4                | 0.54          | -             | 94,000             | -                |
| Great Southern               | 6.0                 | 0.61          | -             | 37,000             | -                |
| Caroline                     | 3.6                 | 0.53          | -             | 19,000             | -                |
| Charlie Brown                | 0.7                 | 0.40          | -             | 3,000              | -                |
| Sub-total                    | 136.7               | 0.61          | -             | 840,000            | -                |
| <b>Total</b>                 | <b>290.0</b>        | <b>0.58</b>   | <b>0.05</b>   | <b>1,668,000</b>   | <b>430,000</b>   |

## Satellite Deposits

Five satellite deposits have been included in the mine production plans; Bedford (north and south), Lady Clayre, Ivy Ann and Turkey Creek. These deposits have been included as they host high metallurgical recovery sulphide ore that is able to be co-treated with Little Eva ore. Resource Estimates are based on 8,257 metres of diamond drilling (33 holes) and 39,716 metres of RC drilling (247 holes).

## Copper-Only Deposits

Seven copper-only deposits, in particular Blackard and Scanlan, were included in a DFS completed in 2005 and a subsequent study in 2008. These deposits contain some 840,000 tonnes of copper. Mineralisation is hosted in deeply weathered (clay) sediments with copper occurring as fine-grained disseminated native copper metal. Conventional sulphide mineralisation in fresh rock underlies the native copper mineralisation in weathered rocks. Native copper mineralisation whilst soft, has metallurgical recoveries of 55 to 65% and consequently these deposits were not considered in the initial development plan. The sulphide mineralisation in fresh rock is likely to have high metallurgical recoveries (90%+).

## 1.5. Mining

### Mine Design

George, Orr & Associates conducted a full stability analysis of the planned Little Eva pit based on geotechnical analysis of 21 oriented diamond drillholes covering both an earlier starter-pit design and the final pit design utilised in this study. The north-west portion of the deposit has poor to moderate ground conditions, however, for the majority of the planned pit ground conditions are good to moderate. Overall slope angles of 43 degrees, inclusive of pit ramps, have been recommended and are used in the Little Eva pit design. The eastern pit wall has the best ground conditions and therefore all access ramps have been placed on this wall.

Pit optimisation was completed by Optiro. The parameters used to generate the optimised pit designs were based on mining costs obtained from market enquiry in November 2011. The metallurgical recoveries used in optimisation were derived by GRES and OZMET from all pre-existing testwork and testwork carried out by ALS Ammtec in 2011 and 2012. Economic and other assumptions were current in 2011 and were supplied by Altona. These optimisations formed the basis of pit designs and the Project Ore Reserves.

The Little Eva mine design includes a 30 metre wide dual lane in-pit haul road at a 10% gradient on the eastern wall of the final pit. The pit is approximately 1,500 metres long, 700 metres wide and 240 metres deep.

The mining dilution factor assumed was 6% at zero grade and an ore loss factor of 4% was applied. These reflect the large scale 'bulk' nature of the deposit.

The degree of selectivity in mining is relatively low and varies in differing domains of the deposit. Reserve modelling is based upon a minimum mining unit of 6.25 metres x 6.25 metres x 5 metres. Ore is classified in grade control either as ROM feed to be sent directly to the mill or marginal ore to be sent to a stockpile for later treatment. Mine equipment has been scaled to permit selective mining this

size of mining unit. The opportunity exists to improve grade control practice and thus reduce unit costs.

The Turkey Creek pit was optimised and designed by Orelogy in 2016 using similar parameters to Little Eva.

Optimisation of the Bedford, Lady Clayre and Ivy Ann deposits was completed utilising the same late 2011 inputs as used at Little Eva. However, it was assumed that fixed costs were covered by the Little Eva mine and the cost of haulage to the mill was added. Metallurgical testwork on these deposits indicate that metallurgical characteristics and recoveries are not materially different from Little Eva. Scheduling of ore extraction from the satellite deposits was set at approximately 750,000 tonnes per annum taking into account the size of the pits and the rate of bench advance. Marginal ore from the satellite pits is assumed treated as waste and not transported to the Little Eva mill.

Pits at the other satellite deposits were not designed to the same level of detail as Little Eva and Turkey Creek as their contribution is small (9% of Ore Reserves). New pit optimisations and designs will be completed utilising current mining contract rates once new Resource Estimates and geotechnical models are completed.

### **Mining Costs**

For this study, two mining contractors responded to a market enquiry to review previously supplied contract rates and provide current pricing for contract mining services. The indication from the contractors was that rates had not significantly changed since 2014 however where relevant, revisions to mining unit rates have been incorporated into the current financial analysis. Current mining rates are materially lower than those obtained in late 2011 for the 2012 DFS.

In order to maximise cost effectiveness, Altona intends to directly lease the majority of the mine equipment and to provide the fuel and explosives to the contractor. The fleet will be operated and maintained by the mining contractor.

Current mining costings were used to generate new pit optimisations to test the potential impact of the footprint of enlarged pits on infrastructure layout. These optimisations indicate a substantial opportunity to increase the Reserves and will be examined as a part of a future project review and optimisation.

### **Mining Strategy**

The mining strategy involves a 13.4 million tonnes pre-strip of a starter-pit at Little Eva. After the pre-strip is completed the pit will have a strip ratio of 1.8:1. To sustain a 7 million tonnes per annum production rate, stripping is planned to continue at elevated rates for several months after the commencement of production. The pit requires a pushback towards the end of mine life to reach its design depth of 240 metres.

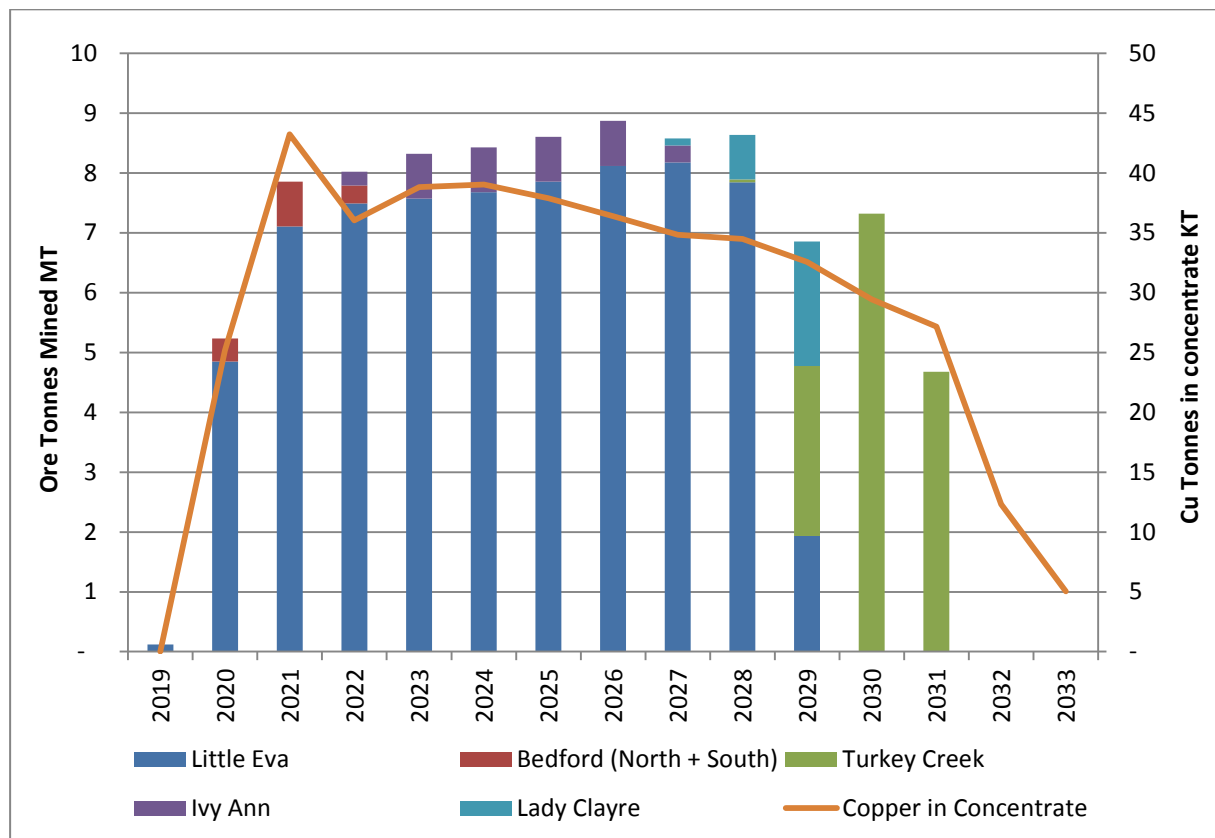
Mining will be carried out using conventional drill and blast ("D&B") rigs with backhoe excavation being undertaken by diesel excavators and dump truck haulage. The main mining fleet consists of two EX2600 250 tonne excavators matched to fourteen CAT 785 136 tonne trucks. This fleet is supplemented by one EX1900 190 tonne excavator matched to five CAT 777 100 tonne trucks.

Mine waste will be transported to a dump adjacent to the pit and to construct the TSF. Waste will also be used to construct an engineered flood protection bund around the Little Eva pit. The bund will re-direct wet season water flows in Cabbage Tree Creek away from the Little Eva pit.

The ROM ore will be delivered to the ROM pad where there is the capability to direct feed from mine trucks to a gyratory crusher with 375kw of installed power capable of accepting 1 metre ROM rock at a rate of 1,100 tonnes per hour.

Mining of ore from the Bedford pits is scheduled to commence prior to process plant commissioning and will initially supplement Little Eva ore feed. The current mining schedule then prioritises the mining of ore sequentially from Ivy Ann then Lady Clayre with mining at Turkey Creek commencing towards the end of the mine life. The proximity of Turkey Creek to the mill may make it preferable to mine it earlier in the mining schedule however preliminary investigation indicates that the lower grade of this ore makes it a lower priority for processing. Further investigation and rescheduling will be carried out prior to project commencement.

The mining schedule and schedule of production of copper in concentrate is shown in the chart below.



**Annual mine production by pit**

Mining will deliver 7 million tonnes per annum of approximately 0.6% copper ROM feed to the processing plant over the first 5 years whilst stockpiling marginal grade material for later treatment.



## Life of mine production

| Production  | Financial Year Ending |      |      |      |      |      |      |      |      |      |      |      |      |      |
|-------------|-----------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|             | 20                    | 21   | 22   | 23   | 24   | 25   | 26   | 27   | 28   | 29   | 30   | 31   | 32   | 33   |
| Ore milled* | 4.6                   | 7.0  | 7.0  | 7.0  | 7.0  | 7.0  | 7.0  | 7.0  | 7.0  | 7.0  | 7.0  | 7.0  | 7.0  | 2.9  |
| Copper (%)  | 0.62                  | 0.64 | 0.54 | 0.58 | 0.58 | 0.56 | 0.54 | 0.52 | 0.51 | 0.48 | 0.44 | 0.40 | 0.18 | 0.18 |
| Gold (g/t)  | 0.09                  | 0.10 | 0.10 | 0.08 | 0.09 | 0.08 | 0.08 | 0.09 | 0.09 | 0.10 | 0.01 | 0.01 | 0.06 | 0.06 |

\* Million tonnes.

## Ore Reserves

Ore Reserves were initially reported according to the 2004 Edition of JORC Code in an ASX release dated 14 May 2012. Turkey Creek Ore Reserves were reported in an ASX release dated 21 June 2016 according to the 2012 Edition of the JORC Code. This study consolidates all disclosure to JORC 2012 Standards and was disclosed to ASX on 2 August 2017.

The Ore Reserve Estimate is included within the Resource Estimate. Ore Reserves for Little Eva Ivy Ann, Bedford and Lady Clayre were estimated by Optiro. Turkey Creek Reserves were estimated by Altona based on Oreology's mining inventory.

## Ore Reserve Estimate for the Cloncurry Copper Project

| Deposit                               | Tonnes            | Copper (%)  | Gold (g/t)  | Copper (tonnes) | Gold (ounces)  |
|---------------------------------------|-------------------|-------------|-------------|-----------------|----------------|
| Little Eva ROM ore                    | 53,100,000        | 0.58        | 0.08        | 308,100         | 147,300        |
| Little Eva marginal grade (stockpile) | 15,400,000        | 0.18        | 0.06        | 28,100          | 30,900         |
| Turkey Creek                          | 11,300,000        | 0.46        | -           | 51,200          | -              |
| Ivy Ann                               | 3,500,000         | 0.59        | 0.08        | 21,000          | 9,100          |
| Lady Clayre                           | 920,000           | 0.56        | 0.27        | 5,100           | 8,100          |
| Bedford                               | 1,350,000         | 0.85        | 0.20        | 11,600          | 8,500          |
| <b>Total</b>                          | <b>85,600,000</b> | <b>0.50</b> | <b>0.07</b> | <b>426,000</b>  | <b>203,900</b> |

There are Inferred Resources that are included in the mining schedule but are not included in the Ore Reserve Statement. Infill and extension drilling will be completed to convert Resource Estimates to Indicated Resources.

## 1.6. Processing

### Metallurgical Testwork and Process Design

The metallurgical and mineralogical classification of the Little Eva deposit reflects the geological domains used in resource modelling. Core holes were drilled to ensure complete spatial and grade variance coverage of metallurgical samples for testwork through the deposit. Testwork is representative of each of three major geological domains; north, central and south.

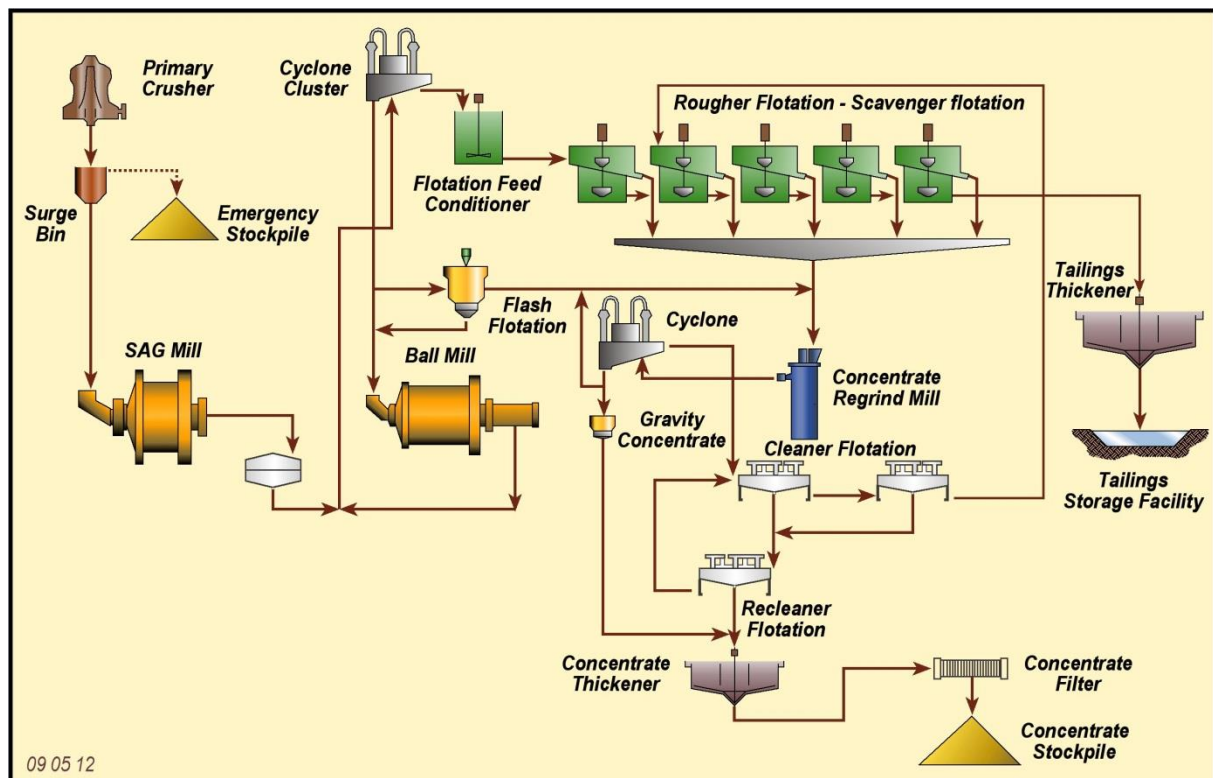
Extensive grinding and flotation/reagent testwork material consistently demonstrated that high copper and gold recoveries were achievable at a relatively low operating cost across all feed grades that are planned. SAG and ball milling delivers a grind size of 212µm and rougher concentrates are re-ground to 38µm.

Testwork indicates that the designed circuit will achieve a 96% copper recovery at a concentrate grade of 25% copper. Gold recovery is predicted to be 85% at a concentrate grade of 4g/t.

Standard milling and flotation technology will be used to generate approximately 150,000 tonnes of copper concentrate on an annual basis. The processing circuit is a simple one and consists of:

- Single stage gyratory crushing
- SAG and ball milling
- Flash flotation
- Flotation (rougher and scavenger)
- Concentrate regrind and flotation cleaning
- Gravity gold recovery
- Concentrate thickening and filtration
- Tailings thickening and disposal

A standard flotation circuit is proposed as illustrated in the chart below.



**Process flowsheet for the Little Eva plant**

Key metallurgical characteristics are:

#### Key Metallurgical Metrics

|                              |           |
|------------------------------|-----------|
| Tonnes of concentrate (dry)  | 150,000pa |
| Moisture content             | 9%        |
| Copper recovery              | 96%       |
| Gold recovery                | 85%       |
| Copper grade in concentrate  | 25%       |
| Gold grade in concentrate    | 4g/t      |
| Concentrate penalty elements | None      |

The concentrate will be filtered to 9% moisture and stored in a concentrate shed prior to transport to market.



Representative tailing and waste rock samples were found to be non-acid forming due to the low levels of contained sulphur and high carbonate content. The tailings and waste will not generate acid drainage during storage and can be disposed of safely using standard mining and processing practice.

### 1.7. Process Plant and Infrastructure

The Little Eva process plant is to be located approximately 70 kilometres north-west of Cloncurry and will be accessed via a sealed highway and a site access road of approximately 12 kilometres.

The process plant will be installed adjacent to the Little Eva and Turkey Creek open pits and will be designed to process 7 million tonnes per annum of ore for a minimum period of 14 years.

Infrastructure to be installed to support the operation includes:

- Access and haul roads
- Tailings storage facility
- Bunds and diversion channel to manage surface water
- Fuel storage and dispensing
- 33kV overland HV power line for a distance of 9 kilometres from the Dugald River minesite
- Plant site laboratory
- Accommodation village
- Administration facilities
- Workshop and warehousing facilities
- Borefield and water storage infrastructure
- Mining contractor infrastructure
- Explosives magazine

With 26MW of installed drives, the average power draw for the processing plant during operations will be approximately 22MW. Power for the concentrator is proposed to be supplied from grid power via a 220kV overhead power line stepped down to 33kV at a substation at MMG's Dugald River zinc-lead-silver project for supply to the Little Eva plant. Altona is negotiating with the Dugald River project to access its powerline. To allow for any access or maintenance costs Altona has included an infrastructure charge in its estimation of power costs. Dugald River is a major new underground zinc-lead-silver mine and processing plant nearing completion of construction. Communication infrastructure, an airstrip and sealed road access are in place.

Since the generation of the 2014 DFS update study the Tailings Storage Facility (TSF) has been relocated and redesigned following the discovery of the Turkey Creek deposit in the southern part of the original location of the TSF. The new TSF is a standalone embankment type incorporating a basin under-drainage system designed to reduce seepage, increase tailings density, and improve geotechnical stability. Solution recovered from the decant system will be pumped back to the plant for reuse in the process circuits.

Tailings will be discharged into the TSF by sub-aerial deposition methods, using a combination of banks of spigots at regularly spaced intervals from all embankments to direct the supernatant pond to the decant tower. Spigot location and discharge will be continually managed to ensure most the most effective tailings beach formation is achieved.

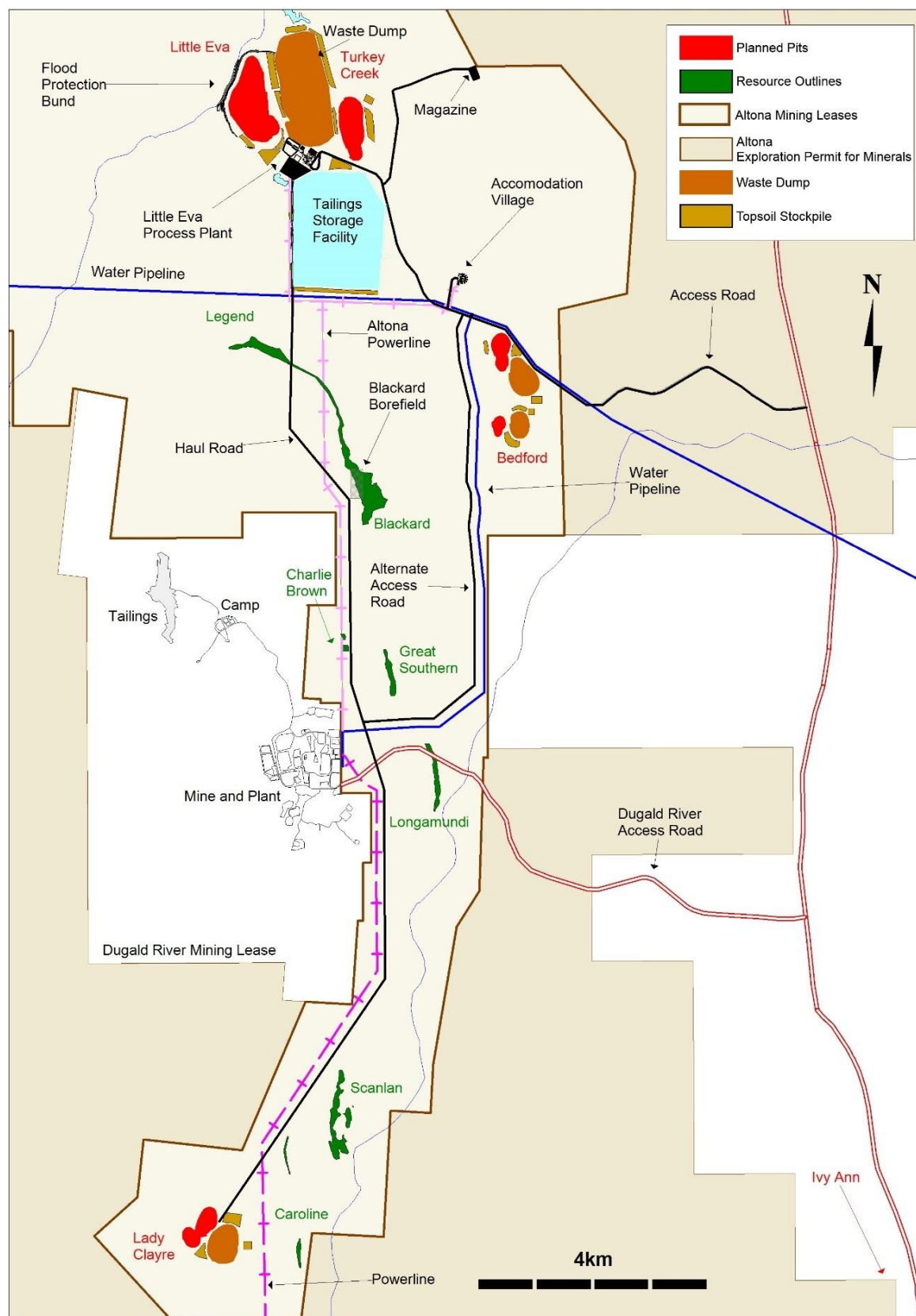
Most of the Project water supply will come from pit dewatering bores at Little Eva with the water to be stored in a raw water dam. The remainder will be sourced from a borefield to be developed at the Blackard deposit. Water balance for the project has assumed that 36% of the water discharged to the

tailings facility in the tailings slurry will be decanted and returned to the plant for reuse. This is in accordance with recommendations made by Knight Piesold based upon the TSF design and water modelling for 'average climatic conditions'. There is further water supply capacity in the Lake Julius pipeline which is adjacent to the plant should the need arise.

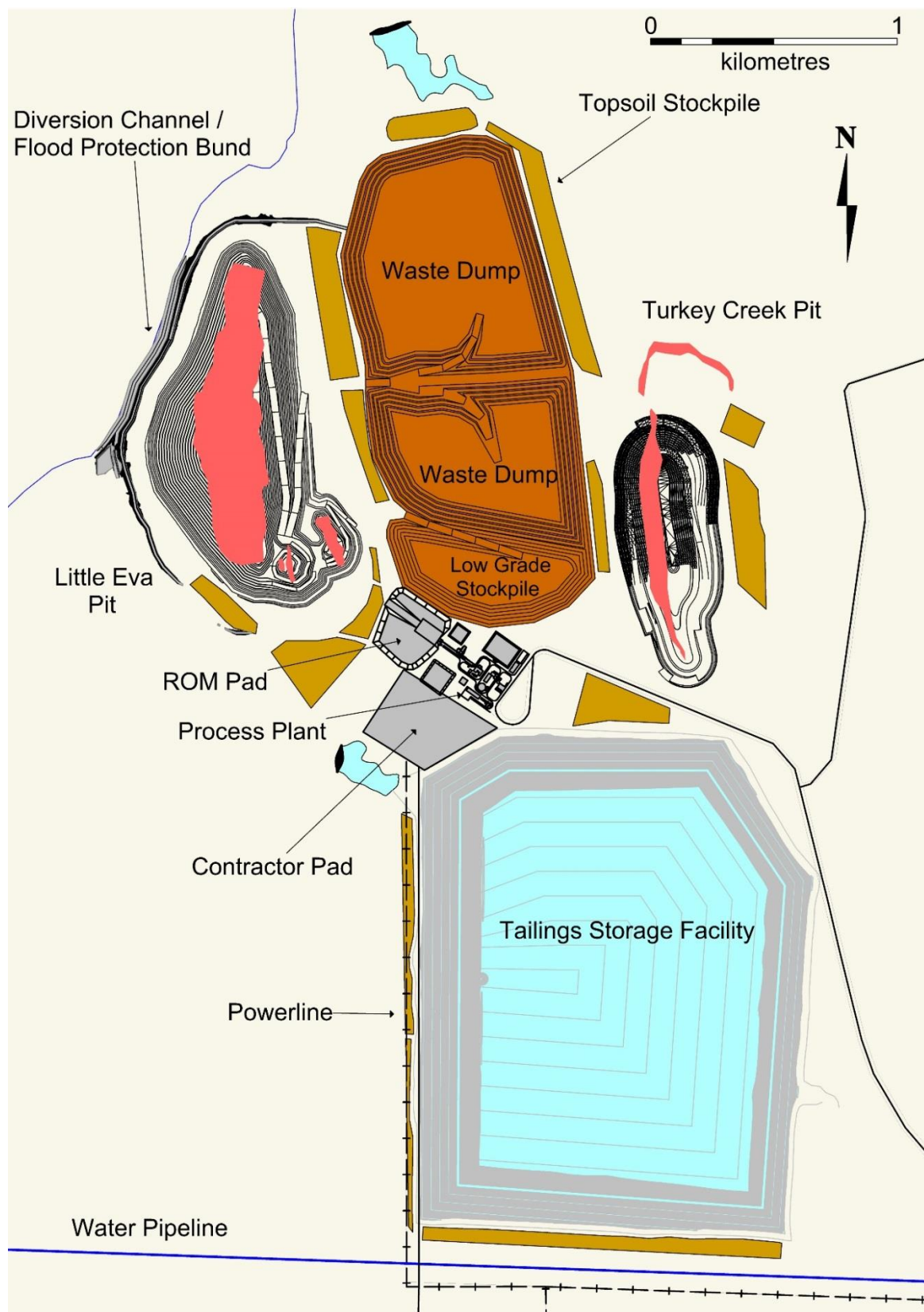
Communication is available via 4GX mobile phone coverage being provided by Telstra as part of its service delivery to the Dugald River Project.

A village is to be constructed to accommodate the Project workforce. This will be a purpose built camp that will accommodate approximately 220 personnel at any one time and will be utilised for both construction and operations. It is assumed that a portion of the workforce will live locally and be accommodated off site.

The below diagrams illustrate the layout for regional infrastructure.



**Infrastructure in the Little Eva - Dugald River area showing Altona tenure, proposed pits and Mineral Resources**



**Process plant area infrastructure layout. Plan projection of Resource outlines in red.**



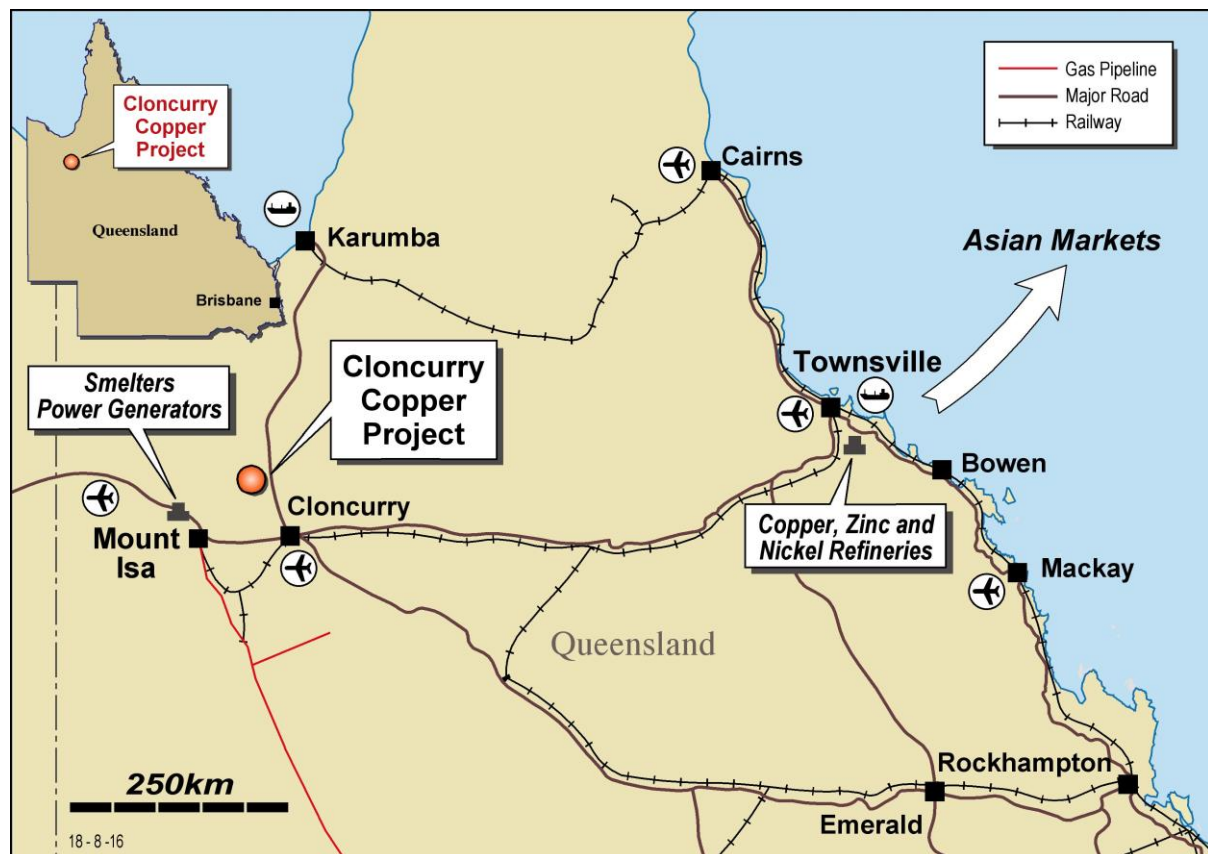
## Logistics

The highway from Cloncurry to Burketown and Normanton on the Gulf of Carpentaria is a full width sealed road that passes 12 kilometres to the east of the proposed plant site. At Cloncurry, approximately 70 kilometres to the south, it meets the Barkly Highway from Townsville to Mt Isa. Cloncurry has a regional airport, hospital, schools and other infrastructure

The concentrate will be containerised and transported from site by road train to the Cloncurry rail loading facility. The containers will then be loaded onto flatbed rail cars for dispatch to the Townsville port. The rail system between Cloncurry and Townsville is well serviced with multiple trains to Townsville each week. Once at the Townsville port, the containers will be unloaded directly into the ships' hold. An alternative, if commercially available, is to truck concentrate to the Glencore smelter at Mt Isa.

Townsville port is a well-established international port capable of handling bulk mineral materials with over 4 million tonnes of import/export trade mineral handled annually.

All infrastructure required to operate in this manner is already in place and available to the Project. Containers will be supplied as a part of a complete concentrate load and transport logistics arrangement with a major logistics operator.



*Infrastructure in North-West Queensland*

## Implementation Plan

### *Mining*

Contract mining is the preferred option for mining. This provides a degree of flexibility which will be highly beneficial during the ramp up phase of the Project. The current implementation plan proposes that Altona will be responsible for the lease of the majority of the mining fleet and for the supply of fuel and explosives. This approach will be reviewed upon commencement of the project as mining contractors currently hold a surplus of used mining equipment and it may prove more cost effective to access this equipment via the contractor rather than lease new equipment directly.

### *Plant*

It is proposed to deliver the process plant, associated services and site infrastructure on a turnkey project management, design and construction basis. The process plant and infrastructure would be undertaken on a guaranteed maximum price basis. Process plant performance guarantees would be sought from the Engineering, Procurement and Construction ("EPC") contractor.

Project management, design, procurement of process equipment, contracting commitments and project controls would be undertaken from Brisbane and/or Perth. All site subcontracts will be controlled from site. Site works would be performed mainly in horizontal packages by suitably qualified and capable Queensland organisations supplemented by construction expertise from the EPC contractor.

The intent for those components of infrastructure that have not already been covered within the plant or mining scopes is to tender based on a lump sum, turnkey project management, design and construction basis.

### **1.8. Community, Permitting and Tenure**

The Company has an agreement with the Kalkadoon People who hold a native title area over the Project area. A deed of the type required under the Native Title Act and an ancillary agreement were signed by the Company and appropriate representatives of the Kalkadoon People on 15 June 2006. The State of Queensland executed the Section 31 Deed on 29 June 2006.

An Environmental Impact Study and the Environmental Management Plan ("EMP") for the Project have been accepted by the Queensland Department of Environment and Heritage Protection ("DEHP") and an EA has been issued. The mine plan allows for closure and rehabilitation costs and the conditions of the EA include lodgement of a financial security with the authorities. The legislation around financial securities is subject to amendment by the Queensland Parliament. Financial security will be lodged prior to commencement of operations together with a Plan of Operations.

Mining Leases ("MLs") were granted on 19 November 2012 and total 143 square kilometres and are situated across two pastoral land holdings. Compensation agreements with pastoralists relating to the MLs have been agreed.

The Cloncurry Copper Project also has 4 granted Exploration Permits for Minerals ("EPMs") some 703 square kilometres in area that are, in part, contiguous with the MLs.

The Project is expected to directly employ some 300 people during the construction phase reducing to around 280 during operations, a portion of which will commute daily to site.

Most of the construction workforce will be provided by contractors from the north-west Queensland region.

During the operations phase, employment will be made up of a mixture of people living in Cloncurry commuting daily to site and fly in / fly out (“FIFO”) or drive in / drive out (“DIDO”) people from the regional centres which already provide personnel to the major mining centres such as Mt Isa and Townsville in north-west Queensland.

## 1.9. Capital Operating Costs

### Capital Costs

All capital costs relevant to the Project scope were reviewed. The process plant and infrastructure scope was unchanged. Capital cost estimates are based on December 2013 pricing from local and international equipment suppliers and local engineering and contracting firms. Major cost inputs associated with the capital estimate have been reviewed by GRES in February 2017 and adjusted for market movements. Capital costs are summarised below.

| Pre-production Capital Costs      | A\$ (million) |
|-----------------------------------|---------------|
| Mining mobilisation and pre-strip | 51            |
| Process plant and infrastructure  | 164           |
| Tailings storage facility         | 18            |
| Accommodation village             | 18            |
| First fill, spares etc            | 12            |
| Owner's costs                     | 8             |
| Contingency                       | 18            |
| <b>Total</b>                      | <b>288</b>    |

The pre-strip and pit cutback continues beyond the commencement of production at Little Eva and is considered to be a sustaining capital cost once production commences.

Life of Mine (“LOM”) sustaining capital requirements have changed since that reported in the 2014 DFS Update with a decrease in mined material classified as sustaining development, increased provisions for capital item replacement within the plant and an increased provision for TSF uplift costs. In addition to this the extension to the life of the mine resulting from the inclusion of Turkey Creek in the mine schedule contributes to the higher sustaining costs reported below.

| Sustaining Capital Costs            | A\$ (million) |
|-------------------------------------|---------------|
| Mine development                    | 50            |
| Processing plant and infrastructure | 29            |
| Tailings                            | 46            |
| Rehabilitation                      | 12            |
| <b>Total</b>                        | <b>137</b>    |

## Operating Costs

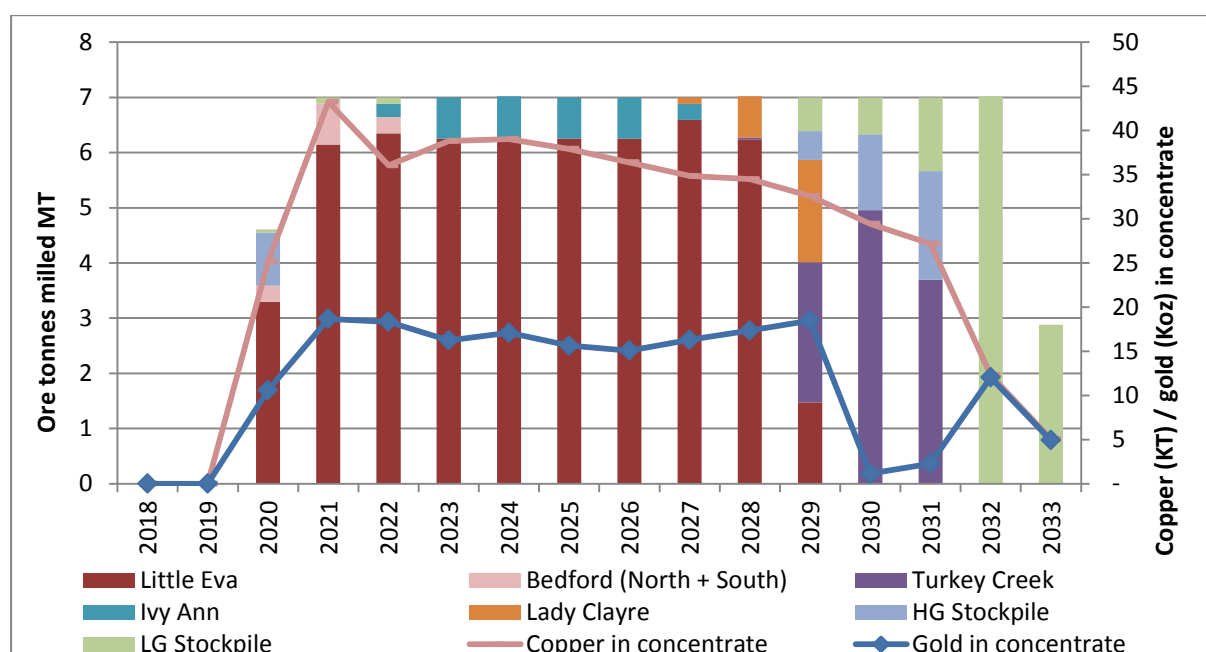
Operating cost estimates are based on December 2013 labour rates and quotations from utilities, contractors and reagent suppliers and are detailed in the table below. Contract mining rates have been refreshed based on budget submissions provided by suitably qualified mining contractors.

Power cost estimates have not been formally updated by providers. The current volatility in the east coast gas and energy market makes it difficult to get accurate long term pricing from enquiry. To make provision for movement in power costs since the previous report the supplied rate to the project reflected in the operating costs and financial modelling has been increased from \$0.16/kWhr to \$0.192/kWhr

| Average Operating Costs per Tonne | A\$ (per tonne milled) |
|-----------------------------------|------------------------|
| Mining                            | 10.05                  |
| Processing                        | 8.12                   |
| General and administration        | 2.12                   |
| Concentrate transport and sales   | 2.78                   |
| <b>Total operating costs</b>      | <b>23.07</b>           |
| Royalties                         | 2.24                   |
| Sustaining capital costs          | 1.48                   |
| <b>Total cash costs</b>           | <b>26.79</b>           |

### 1.10. Financial Analysis

The production profile over the project life is illustrated below.



Metal prices and exchange rates used in this study are benchmarked against broker consensus forecasts and various research house estimates.



The values adopted are:

| Assumption                              | Value |
|---|-------|
| Copper (US\$ per pound)                 | 2.95  |
| Gold (US\$ per ounce)                   | 1,250 |
| US\$:A\$                                | 0.75  |
| Treatment charge (US\$ per tonne)       | 80.00 |
| Copper refining charge (US\$ per pound) | 0.08  |
| Gold refining charge (US\$ per ounce)   | 5.00  |
| Copper payability                       | 96.5% |
| Gold payability                         | 94%   |

Cashflow is robust and is broken down below:

| Item                    | Totals           | Financial Year Ending |            |           |            |            |            |            |            |            |           |           |           |           |          |    |
|-------------------------|------------------|-----------------------|------------|-----------|------------|------------|------------|------------|------------|------------|-----------|-----------|-----------|-----------|----------|----|
|                         |                  | 19                    | 20         | 21        | 22         | 23         | 24         | 25         | 26         | 27         | 28        | 29        | 30        | 31        | 32       | 33 |
| Revenues                | <b>3,629</b>     | -                     | 211        | 363       | 307        | 325        | 328        | 317        | 305        | 295        | 293       | 281       | 229       | 214       | 114      | 47 |
| <b>Less expenditure</b> |                  |                       |            |           |            |            |            |            |            |            |           |           |           |           |          |    |
| Capital                 | <b>289</b>       | 228                   | 61         | -         | -          | -          | -          | -          | -          | -          | -         | -         | -         | -         | -        | -  |
| Operating               | <b>2,112</b>     | -                     | 122        | 185       | 177        | 189        | 183        | 172        | 163        | 150        | 161       | 198       | 179       | 125       | 75       | 34 |
| Sustaining              | <b>137</b>       | -                     | 15         | 4         | 23         | 3          | 10         | 10         | 11         | 29         | 14        | 6         | 5         | 4         | 2        | 2  |
| Royalties               | <b>205</b>       | -                     | 12         | 20        | 17         | 18         | 18         | 17         | 17         | 16         | 16        | 18        | 15        | 14        | 6        | 2  |
| <b>Total</b>            | <b>887 (228)</b> | <b>2</b>              | <b>155</b> | <b>90</b> | <b>116</b> | <b>118</b> | <b>118</b> | <b>114</b> | <b>100</b> | <b>102</b> | <b>60</b> | <b>31</b> | <b>71</b> | <b>31</b> | <b>9</b> |    |

All values in A\$ millions.

The Project will generate an average annual operating surplus of A\$141 million in the first 5 years of full production. The average operating cost is A\$23.07 per tonne compared with average revenue of A\$39.64 per tonne.

A discount rate of 7.5% was estimated using a Weighted Average Cost of Capital ("WACC") methodology for Altona as owner. The rate selected compared well to WACC calculations for other similar and recent project developments.

| Key Financial Metrics                                  | A\$ (million) |
|--|---------------|
| Capital costs  | 288           |
| Sustaining capital                                     | 137           |
| Revenue (net smelter return) pa *                      | 328           |
| Pre-tax and sustaining capital operating cashflow pa * | 141           |
| Pre-tax NPV (7.5% real discount rate)                  | 462           |
| IRR%   | 36%           |
| Cash cost per pound copper in concentrate              | US\$1.65      |
| All in cash cost per pound copper in concentrate       | US\$1.92      |

\* Average, years 1 to 5.

## **Taxation and Royalties**

It is assumed that the Project will be developed by Altona Mining Limited.

Altona has tax losses carried forward to later income years providing they are available to it under the current taxation provisions. As at 30 June 2016, the tax losses are approximately A\$60.4 million.

Royalties of approximately A\$205 million are payable over the life of the mine to the Queensland government and a number of private entities.

## **Sales and Marketing**

The payability of metal in concentrates, smelter treatment charges, refining charges, shipping and insurance costs for the concentrates have been estimated from Altona's market experience, industry norms and by benchmarking against recent transactions. For copper-gold concentrates it assumed that LOM treatment charges and refining charges ("TC/RC") will average US\$80 per tonne, US8.0¢ per pound respectively and that no penalties will be payable. Copper payability is assumed to be 96.5% and gold approximately 94%.

It has been assumed that the concentrate will be shipped to Asian markets.

### **1.11. Exploration**

#### **Existing Deposits**

A combination of infill and extension drilling and new geological modelling could deliver material upgrades to existing Resources in the mine plan, in particular; Lady Clayre, Bedford, Ivy Ann and Turkey Creek.

There is also significant potential to improve Resources at the copper-only deposits that are not included in the mine plan.

#### **Exploration Targets**

Altona has consolidated all prior exploration data and adopted a new approach to exploration utilising that data in combination with high resolution (close-spaced) mapping of copper in soils analyses via a handheld XRF.

There are 16 major targets close to, or at the stage of drill testing. The 30 years of exploration and resource delineation has led to an excellent understanding of geological and exploration models.

In addition to copper mineralisation, there is potential for extension or repeats of Dugald River style zinc-lead-silver mineralisation within the Project.

### **1.12. Opportunities and Upside**

#### **Project Review, Optimisation and Value Engineering**

Pit designs (other than Turkey Creek) are based on 2011 resource models costs and optimisations. There have been significant improvements in geological/geotechnical models, costs and macro-economics since 2011. To determine the potential maximum footprints of pits and waste dumps,

Orelogy undertook pit optimisations using current costs, macro-economics and geological models. Optimum pits at Little Eva contained significantly more ore tonnes, with more contained copper and gold than the current Reserve. Whilst such a significant improvement is unlikely to be replicated in a full design, the exercise highlights the upside to Reserve Estimates.

At the time of designing the Little Eva pit, the nature of the zone of poor ground conditions on the western edge of the deposit was poorly understood. Conservative geotechnical modelling resulted in a conservative pit design. A new geotechnical model highlights the potential to improve the pit design. The new resource model also suggests the 'starter pit' location is not optimal.

A new Resource in 2016 at Bedford provided materially higher copper and gold Resources within the pit design and also highlighted the opportunity to expand Resources. Bedford pits are scheduled for year 1 of production and require revised pit designs and better definition of metallurgical and geotechnical data.

At Little Eva there may be opportunity to refine grade control costs, mining selectivity, ore loss and dilution factors based upon outcomes of a program of closer spaced drilling to be done prior to production.

Rainfall in the Cloncurry area is highly variable and the area is subject to drought. Water budgets are adequate but may be stretched in extended low rainfall periods.

#### *Recommendations to Improve Reserves*

- Drill Inferred Resources below current pit design but within 2015 Orelogy pit to convert to Indicated Resources to increase Reserves.
- At Little Eva conduct grade control drilling ahead of mining to optimise mining selectivity and grade control costs/strategy. No work is required at satellite pits to be mined after year 5.
- Re-optimize the Little Eva pit using an updated resource model and current costs and then generate new pit designs.
- Drill the Bedford deposits to maximise the Resource and obtain definitive geotechnical and metallurgical data.
- At Bedford generate a new geological and resource model and re-optimize and design pits.
- Re schedule years 1 to 5 of production based upon the new Bedford and Little Eva Ore Reserves and pits.

#### *Recommendations to Improve Infrastructure, Process and Plant*

- Power supply optimisation assessment.
- Consider alternative access routes to site.
- Confirmatory geotechnical investigation of new TSF and Cabbage Tree Creek bund.
- Re-evaluate gravity gold recovery to maximise payable gold.
- Investigate low capita increase to processing to 8 million tonnes per annum given likely increase in Reserves.
- Re-evaluate bringing Turkey Creek forward in mine schedule due to operational simplicity.
- Re-evaluate the hydrology/de-watering of the Little Eva pit in the context of the new geotechnical model.
- Undertake exploration for additional water resources to maintain supply in year 4 onwards and to support up to 8 million tonnes per annum throughput.

#### **Expansion of Production or Mine Life**

There is significant potential to expand existing Resources, particularly at Bedford and Lady Clayre. There is upside at Turkey Creek, Little Eva and Ivy Ann, though not as material as Bedford and Lady Clayre. The greatest potential for expansion of Reserves in the medium term is through already defined resources at the copper-only deposits.

There are some 840,000 tonnes of contained copper in copper-only deposits. These deposits comprise deeply weathered rocks containing native copper overlaying conventional sulphide mineralisation. Metallurgical recovery of native copper from weathered rocks is 55% to 65%. The lower recovery led to the decision to omit these deposits from the initial mine plan.

Pit optimisations and designs in the 2005 and 2009 studies only considered native copper mineralisation, subsequent drilling has highlighted that these are significant tonnages of sulphide mineralisation in fresh rock beneath the native copper mineralisation. This mineralisation is almost identical to the 93% recovery copper sulphide ore from Turkey Creek that is included in the mine plan.

The native copper deposits have not been optimised using current geological models. A pre-feasibility level study should be undertaken to consider expanding production based upon mining the copper-only deposits in 2023.

Given the clear potential for additional Resources and Reserves there may be potential to increase plant throughput. Additional water resources will be required to increase production.

*Recommendations for Satellite Deposits (Lady Clayre, Ivy Ann and Turkey Creek) Scheduled for Late in Mine Life*

- Drill out new geological and resource models
- Complete definitive geotechnical and metallurgical studies
- Optimise pits, design pits and re-schedule production over LOM

*Recommendations for Copper-only Deposits*

- Metallurgical testwork on sulphide ore from these deposits
- Optimise copper-only pits based on current resource models and financial inputs, design new pits
- Re-visit options for co-processing native copper and sulphide ores included in 2005 and 2009 studies
- Conduct water exploration to ensure sufficient water for higher throughputs
- Engineering studies on expanding the Little Eva plant to either co-process or batch process native copper ore to determine optimum production rate
- Consolidate studies into a pre-feasibility study on production expansion

**Exploration Targets**

Mineralisation models and exploration signatures are well understood given the long history at the Project. There are 16 high priority targets identified with a high probability of discovery of additional Resources.

*Recommendation*

Drill and explore targets with a particular focus on higher grade, higher recovery mineralisation.