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# **ASX Announcement**

**16 February 2017** 

#### **EVOLUTION APPROVES PROJECTS TO SECURE COWAL PRODUCTION TO 2032**

Evolution Mining (ASX:EVN) ("Evolution" or "the Company") is pleased to announce that the Board has approved investments in the E42 Stage H cutback and the Dual Leach Project at the Cowal gold mine. The life of Evolution's Cowal gold mine has now been secured for at least the next 15 years, allowing Evolution to continue its transformation of this cornerstone asset.

## **Highlights**

- Mine life extension projects approved:
  - E42 Stage H Cutback extends mine life by eight years and increases production by 1.2 million ounces
  - Dual Leach project targeting a 4 6% increase in gold recoveries
- December 2016 Ore Reserves increased from 2.85 million ounces to 3.2 million ounces
  - An increase of 679,000 gold ounces<sup>1</sup> or 24% prior to mining depletion of 326,000 ounces
  - Stage H Ore Reserve conversion cost of less than A\$15 per ounce
  - Since the July 2015 acquisition, Cowal Ore Reserves have increased by 2.28 million gold ounces<sup>1</sup>, or 145% (prior to mining depletion), and Mineral Resources have increased by 2.24 million gold ounces<sup>1</sup>
- Mine life of at least 15 years creates further asset enhancement opportunities including:
  - Co-treatment of high-grade oxide stockpiles
  - Potential to increase throughput to 9.0 9.5 million tonnes per annum
  - Continued drilling to convert significant mineral endowment outside of existing Ore Reserves including:
    - E46, E41, Galway and Regal deposits

Commenting on the Cowal operation, Evolution's Executive Chairman Jake Klein said:

Securing the mine life of this high-quality cornerstone asset for at least 15 years provides a strong platform to continue to grow our business.

Cowal has generated a net mine cash flow of A\$253.0 million representing 36% of the A\$703.0 million purchase price, in the six quarters since Evolution acquired it in July 2015. Over that period Ore Reserves have also increased by 2.28 million gold ounces or 145%. We were delighted with the results of the E42 Stage H drill program and are excited by the opportunities that are available to us to continue to optimise this long-life, low-cost asset.



On 8 February 2017 Cowal received NSW regulatory approval to extend operations to 2032. Following completion of the E42 Stage H resource definition drilling and associated feasibility studies, the Company has approved the Stage H cutback. The life of mine has increased by eight years with additional gold production of 1.2 million ounces planned. The remaining Life of Mine ("LOM") material movement is 103.1Mt of waste and 55.6Mt of ore for a strip ratio of 1.85:1. Capital investment in stripping is expected to be approximately A\$230.0 million over four years commencing in FY18.

The Dual Leach project consists of implementing an additional leaching circuit designed to recover gold from the flotation tailings stream. Detailed metallurgical test work has verified that overall plant gold recovery can be increased by 4-6%, which would increase gold production by an estimated 10,000-14,000 ounces per year. Capital in the range of A\$35.0 - A\$40.0 million will be spent over FY18 and FY19 with commissioning of the project expected in early FY19.

The implementation of the Dual Leach project will also enable the incremental co-treatment of existing stockpiles of high-grade oxide Ore Reserves. While studies are ongoing, this has the potential to bring forward an additional 10,000 –12,000 ounces per year in gold production from FY20. A further modification to the mining permit (Modification 14) would be required before implementation.

Throughput improvements from the current 7.5Mtpa to up to 9.5Mtpa are also being assessed as an opportunity to deliver economies of scale, bring forward treatment of low grade stockpiles, and reduce ore re-handling. This would involve the introduction of a secondary crusher to the plant. The project is currently in Scoping Study phase and would also require a modification to the current mining permit.

Importantly, the extension of Cowal's mine life out to at least 2032 enables the evaluation and development of additional Mineral Resources which sit outside the E42 open pit Ore Reserves. Resource definition drilling is planned to recommence on other long-term development opportunities including E41, E46, Galway and Regal deposits.

The December 2016 Cowal Ore Reserve estimated by Evolution is **116.71 million tonnes at 0.85g/t Au for 3.20 million ounces gold**, an increase of approximately 353,000 ounces (12%) compared with the December 2015 estimate.

The December 2016 Cowal Mineral Resource estimated by Evolution is **177.65 million tonnes at 0.88g/t Au for 5.04 million ounces gold** inclusive of Ore Reserves. This result is in-line with the December 2015 estimate after replacing mining depletion.

Since acquisition, Evolution has increased the Cowal Ore Reserve 2.28 million ounces, and increased the Cowal Mineral Resource by 2.24 million ounces prior to mining depletion. Value is being realised through the high rate of conversion of ounces added to the Mineral Resource being brought in to Ore Reserves.

The Cowal Mineral Resource and Ore Reserve statement has been prepared in accordance with JORC Code 2012. A Material Information Summary pursuant to ASX Listing Rules 5.8 and 5.9 is provided on pages 4 to 10 of this announcement. The Assessment and Reporting Criteria in accordance with JORC Code 2012 requirements is appended to this announcement.

## For further information please contact:

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## **About Evolution Mining**

Evolution Mining is a leading, growth-focussed Australian gold miner. Evolution operates six wholly-owned mines – Cowal in New South Wales; Mt Carlton, Mt Rawdon, and Cracow, in Queensland; and Mungari and Edna May in Western Australia. In addition Evolution holds an economic interest in the Ernest Henry copper-gold mine that will deliver 100% of future gold and 30% of future copper and silver produced from an agreed life of mine area. Outside of the life of mine area Evolution will have a 49% interest in future copper, gold and silver production.

In FY16 Evolution produced 803,476 ounces of gold at an AISC of A\$1,014 per ounce generating an operating cash flow of A\$628.4 million.

As a result of the acquisition of an economic interest in Ernest Henry in November 2016, Evolution revised its FY17 Group gold production guidance to 800,000 – 860,000 ounces at an AISC of A\$900 – A\$960 per ounce.

## **Competent Person Statements**

The information in this document that relates to Evolution's Cowal Mineral Resource is based on information compiled by Mr Joseph Booth a Competent Person who is a member of the Australasian Institute of Mining and Metallurgy, and is a full-time employee of Evolution Mining. Mr Booth has sufficient experience that is relevant to the style and type of deposit under consideration and to the activity which he has undertaken to qualify as a Competent Person as defined in the JORC Code 2012. Mr Booth consents to the inclusion in this report of the matters based on his information in the form and context in which it appears.

The information in this document that relates to Evolution's Cowal Ore Reserve is based on information compiled by Mr Jason Floyd a Competent Person who is a member of the Australasian Institute of Mining and Metallurgy, and is a full-time employee of Evolution Mining. Mr Floyd has sufficient experience that is relevant to the style and type of deposit under consideration and to the activity which he has undertaken to qualify as a Competent Person as defined in the JORC Code 2012. Mr Floyd consents to the inclusion in this report of the matters based on his information in the form and context in which it appears.



## **Material Information Summary**

A Material Information Summary pursuant to ASX Listing Rules 5.8 and 5.9 is provided below for Cowal together with commentary on changes between this estimate and the previous estimate. The Assessment and Reporting Criteria in accordance with JORC Code 2012 is presented in Appendix 1.

## 1.0 Cowal Mineral Resources and Ore Reserves

The December 2016 Cowal Ore Reserve estimate of 116.71Mt at 0.85g/t gold for 3,200koz represents an increase of 353koz compared to the December 2015 estimate of 99.4Mt at 0.89g/t gold for 2,848koz.

Changes are largely due to: stockpile increases (87koz); changes to the model (494koz); and a reduction due to mining depletion (326koz).

Cowal Ore Reserves - December 2016											
			Proved			Probable			Total Reserve		
Ore Reserve	Cut-off (g/t Au)	Tonnes (Mt)	Grade Au (g/t)	Cont. Metal Au (koz)	Tonnes (Mt)	Grade Au (g/t)	Cont. Metal Au (koz)	Tonnes (Mt)	Grade Au (g/t)	Cont. Metal Au (koz)	
E42 oxide	0.40				0.54	0.54	9	0.54	0.54	9	
E42 primary	0.40				72.48	0.94	2,197	72.48	0.94	2,197	
Stockpile	0.40	43.70	0.71	994				43.70	0.71	994	
Total		43.70	0.71	994	73.02	0.94	2,207	116.71	0.85	3,200	

		Proved			Probable			Total Reserve			
Estimate	Cut-off (g/t Au)	Tonnes (Mt)	Grade Au (g/t)	Cont. Metal Au (koz)	Tonnes (Mt)	Grade Au (g/t)	Cont. Metal Au (koz)	Tonnes (Mt)	Grade Au (g/t)	Cont. Metal Au (koz)	
Dec 2015	0.40	39.93	0.71	906.3	59.47	1.02	1,941	99.40	0.89	2,848	
Dec 2016	0.40	43.70	0.71	994	73.02	0.94	2,207	116.71	0.85	3,200	
Abs Change		3.77	-	87	13.55	(0.08)	265	17.31	(0.04)	353	
Rel Change		9%	0%	10%	23%	-8%	14%	17%	-4%	12%	

Data is reported to significant figures and differences may occur due to rounding



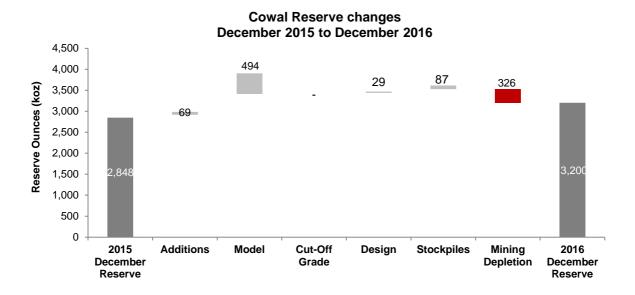


Figure: Waterfall chart illustrating the changes to the Ore Reserve when comparing the previous estimate with the new estimate

The December 2016 Cowal Mineral Resource estimate of 177.65Mt at 0.88g/t gold for 5,039koz is in-line with the December 2015 estimate of 164.1Mt at 0.96g/t gold for 5,046koz (inclusive of Ore Reserves). Mining depletion (326koz) has been replaced.



	Cowal Mineral Resources - December 2016											
		Measured	d		Indicated		Inferred			Total Resource		
Mineral Resource	Tonnes (Mt)	Grade Au (g/t)	Cont. Metal Au (koz)	Tonnes (Mt)	Grade Au (g/t)	Cont. Metal Au (koz)	Tonnes (Mt)	Grade Au (g/t)	Cont. Metal Au (koz)	Tonnes (Mt)	Grade Au (g/t)	Cont. Metal Au (koz)
E42 Oxide	-	-	-	0.58	0.54	10	-	-	-	0.58	0.54	10
E42 Primary	-	-	-	108.36	0.88	3,073	1.85	0.70	42	110.22	0.88	3,115
E42 Stockpile	43.70	0.71	994	-	-	-	-	-	-	43.70	0.71	994
E41 Oxide	-	-	-	4.15	1.20	160	0.73	1.85	43	4.87	1.29	203
E41 Primary	-	-	-	7.97	0.91	233	0.40	0.93	12	8.38	0.91	245
E46 Oxide	-	-	-	4.26	1.26	172	0.14	1.39	6	4.40	1.26	179
E46 Primary	-	-	-	1.82	1.42	83	0.09	3.44	10	1.91	1.51	93
GRE46 Oxide	-	-	-	0.66	1.56	33	0.52	1.98	33	1.17	1.74	66
GRE46 Primary	-	-	-	1.92	1.59	98	0.52	2.27	38	2.43	1.73	136
Total	43.70	0.71	994	129.71	0.93	3,861	4.24	1.35	184	177.65	0.88	5,039

		Measured			Indicated			Inferred			Total		
Estimate	Cut-off au (g/t)	Tonnes Mt	Grade Au (g/t)	Cont. Metal Au (koz)									
Dec 2015	0.40	39.93	0.71	906	95.68	1.05	3,226	28.51	1.00	913	164.12	0.96	5,046
Dec 2016	0.40	43.70	0.71	994	129.71	0.93	3,861	4.24	1.35	184	177.65	0.88	5,039
Abs Change		3.77	0.00	87	34.04	-0.12	635	-24.27	0.35	-729	13.54	-0.07	-7
Rel Change		9%	0%	10%	36%	-12%	20%	-85%	35%	-80%	8%	-8%	0%

Data is reported to significant figures and differences may occur due to rounding Mineral Resources are reported inclusive of Ore Reserves Mineral Resources have been reported above a cut-off grade of 0.40 g/t gold and constrained within an A\$1,800/oz pit optimisation shell



#### **Cowal Resource changes** December 2015 to December 2016 6,000 326 107 87 56 69 5,000 Resource Ounces (koz) 4,000 3,000 5.04 5.03 2,000 1,000 0 **Additions** 2015 Model **Cut-Off** Design **Stockpiles** Mining 2016 December Depletion December Grade Resource Resource

Figure: Waterfall chart illustrating the changes to the Mineral Resource when comparing the previous estimate with the new estimate

#### 1.1 Cowal Ore Reserves

## 1.1.1 Material Assumptions for Ore Reserves

The Ore Reserve estimate is based on the current Mineral Resource estimate as described in Section 1.2. The Mineral Resources reported are inclusive of those Mineral Resources modified to produce the Ore Reserve estimate. The methodology used to convert the Mineral Resource to Ore Reserve can be described as optimisation of existing open pit operations through standard mine planning process steps of pit optimisation, mine design, mine schedule and financial modelling. Factors and assumptions have been formed from existing operating technical assumptions and cost models. On this basis the analysis is considered at a higher than feasibility study.

## 1.1.2 Ore Reserve Classification

The Ore Reserves are predominantly derived from Indicated Resources. This classification is based on the density of drilling, the experience of ten years mining of E42 and the mining method employed. The only Probable Reserves derived from Measured Resources are those reported in known and quantified stockpiles. It is the Competent Person's view that the classifications used for the Ore Reserves are appropriate.

#### 1.1.3 Mining Method

Current open pit mining at Cowal is a conventional truck and excavator operation, with standard waste rock dumps, ore stockpiling and reclaim of lower grade ore. This excavator fleet is utilised to selectively mine ore material and waste from a total 9m design bench height in three 'flitches' each of 3m height. Ore dilution and recovery loss is accounted for in this process and no additional mining dilution or recovery factors are applied to the Cowal Open Pit Ore Reserve estimate. The current operations demonstrate the appropriateness of this mining method as the basis of the Ore Reserve estimate.

## 1.1.4 Processing method

The ore is to be processed through an existing traditional CIP/ CIL process plant. The current and estimated future average throughput and recovery for gold is ~7.5 Mt and 84% respectively. An operating history of over ten years supports the metallurgical parameters used in the Ore Reserve estimation.

## 1.1.5 Cut-off Grade

Two cut-off grades have been calculated based on the current and forecasted costs and modifying factors, forecast over a period greater than 3 years. These cut-off values are:



- Fully Costed cut-off includes all operating costs associated with the extraction and processing of ore material
- Incremental cut-off grade applies to material that will be mined in the process of gaining access to economic material

Ore Reserves are reported at 0.40g/t gold cut-off.

## 1.1.6 Estimation Methodology

See sections 1.2.6 and 1.2.7 below.

#### 1.1.7 Material Modifying Factors

With over ten years of continuous mining (April 2005) and processing operations (April 2006), Cowal is considered to be a mature operation with reliable historical data. Inputs for the Ore Reserve estimate are generally consistent with current and planned operating practices and experience. For this reason the analysis is considered to be at a higher level than a feasibility study.

Mining and ore processing operations at the Cowal open pit are conducted pursuant to a granted mining lease, exploration licences, general purpose leases and miscellaneous licences and associated environmental and other approvals. The granted tenements and permits cover all infrastructure in the immediate vicinity of the mine site, including the open pit, mill, waste rock dumps and tailings storage facilities.

To demonstrate the Ore Reserve as economic it has been evaluated through a high level financial model. This process has demonstrated that the Ore Reserves for the Cowal open pit has a positive cash flow.

## 1.2.1 Cowal Mineral Resources

## 1.2.1 Material Assumptions for Mineral Resources

The Cowal open pit Mineral Resource estimate is defined within an optimised pit shell assuming an A\$1,800/oz gold price assumption and the same based on detailed geotechnical design parameters, practical mining considerations and mining depletion at 31 December 2016 as the Cowal Ore Reserve. The Mineral Resource estimate also draws on the experience gained since mining commenced in April 2005 at Cowal.

## 1.2.2 Geology and Geological Interpretation

The mineralisation at the Cowal Mine comprises three deposits: E41, E42, and E46.

The E41 West mineralisation strikes north-northeast and dips -70° east, and measures 750m along strike and 250 m across strike. Individual mineralised zones are 35 m to 50m wide and extend down dip for 125m. The E41 East mineralisation strikes east-west and dips -35° to -80° south, and measures 475m along strike and 500 m across strike. Individual mineralised zones are 35m to 50m wide and extend down dip for 225m.

The E42 deposit comprises the Regal/Galway corridor and the E42 Main Zone. The Regal/Galway corridor trends north-south, dips vertical to -70° west, and is composed of small and discontinuous lenses. The corridor is approximately 900m along strike and 200m wide. The E42 Main Zone trends north-south and dips -35° to -45° west. The two principal domains in the E42 Zone are separated by the Cowal Fault. Overall, the E42 Main Zone mineralisation is approximately 850m by 850m and extends 500m down dip.

The E46 deposit is subdivided into the East and West zones. The East zone is a continuation of the Regal/Galway corridor, trends north-south, dips vertical to -70° west, and extends approximately 750m along strike and 175m across strike. Individual lenses in the E46 East mineralised zone are 1.0m to 15m wide, 25m to 250m long, and extend 50m to 200m down dip. The E46 West mineralisation trends north-northeast, dips -40° west to flat-lying, and measures approximately 650m along strike and 17m across strike. Individual zones are approximately 50m wide and extend 200m down dip.

Confidence in the geological interpretation is considered to be good. The interpretation is based on drilling that ranges from a 25m by 25m spacing to 50m by 50m spacing. The interpretation also incorporates data gathered from the mapping of exposures created by open cut mining which has been in operation continuously since 2005. The mapping has assisted in understanding the controls on mineralisation to improve the confidence in the geological interpretation. All available data from drilling and mapping is used in the geological interpretation.



Petrological, litho-geochemical and structural studies have also been undertaken and have been used to develop the geological interpretation.

The use of pit mapping and other production data such as grade control drill data has helped resolve the controls on mineralisation as such the current interpretation is considered to be relatively robust. An iterative process has been adopted with respect to the geological interpretation to insure that it reflects the current understanding of the geology and controls on mineralisation.

The factors that affect the continuity of grade and geology at Cowal are structure, lithology and alteration, in order of magnitude. Areas of higher grade are those where there is a greater frequency of structures intersecting the host lithology, such as the core of the E42 resource. These factors have been addressed in the interpretation and domaining of the resource and the estimation process.

## 1.2.3 Sampling and Sub-Sampling

Diamond core is cut with a diamond saw or chisel. Core is cut to preserve the bottom of hole orientation mark and the top half of core is always sent for analysis to ensure no bias is introduced. During the Stage H drilling program a majority of the NQ daughter holes were whole core sampled to expedite sample processing and assay turnaround.

RC/AC Samples have been split using either a riffle splitter from a bulk sample collected at the rig or a rotary cone splitter attached to the cyclone. For a majority of holes, chip samples were collected dry but several areas have been affected by groundwater.

## 1.2.4 Sample Analysis Methods

Early in the North Ltd program, samples were crushed to 95% minus 6mm and a sub-sample then pulverised to 95% minus 75µm. Mid-way in the North Ltd program, specifications were modified to crushing to 95% minus 10mm to 15mm followed by pulverising to 85% minus 75µm. Analysis of all the North Ltd samples was done at Australian Laboratory Services and Australian Assay Labs, Orange, NSW. Both independent facilities used fire assay of a 50g sample with an atomic absorption (AA) finish.

More recent sample preparation was conducted by SGS West Wyalong and consisted of:

Drying in the oven at  $105^{\circ}$ C; crushing in a jaw crusher; fine crushing in a Boyd crusher to 2-3mm; rotary splitting a 3kg assay sub-sample if the sample is too large for the LM5 mill; pulverising in the LM5 mill to nominal; 90% passing 75 $\mu$ m; and a 50g fire assay charge was taken with an atomic absorption (AA) finish. The detection limit was 0.01g/t Au.

## 1.2.5 Drilling Techniques

The majority of the drilling used to generate the Mineral Resource at Cowal is diamond core for the primary portion of the deposit. RC and AC drilling was predominantly utilised to delineate the oxide areas.

Drill holes were drilled on a nominal even spaced grid pattern to avoid clustering and collar and down hole surveys were utilised to accurately record final locations. Industry standard sampling, assaying and Quality Assurance/Quality Control (QA/QC) practices were applied to all forms of drilling.

A majority of the resource definition holes are drilled with an HQ3 collar through the oxide and completed through the primary zone to target using NQ2 core. During 2016 a dedicated program of directional diamond holes was completed to test the south-west extension of the E42 deposit known as Stage H. Stage H drilling consisted of a fence of HQ sized parent holes each with a number or NQ sized daughter holes steered via navigational drilling methods.

Reverse Circulation and Air Core drilling was also used to delineate oxide areas of the resource utilising 4.5 - 5.5 inch face drill hammer. RC drilling was completed to base of oxide with some holes hosting diamond tails. Air Core drilling was conducted to refusal. Additional RC drilling was completed from within the existing Stage G pit during 2016.

Core has been oriented using a variety of techniques in line with standard industry practice.

## 1.2.6 Estimation Methodology



Historic modelling of E42 has consistently over-estimated grades across the deposit with an under-estimation of tonnes for an overall under-estimation of ounces. To address this issue an analysis of the top cutting, composite lengths, block size, domaining and estimation techniques was conducted. As a result, the 2016 model update used new top cuts, adjusted estimation domains and increased composite length from 3m to 9m for all the E42 domains. No material changes were made to the E41, E46 or Galway Regal estimates.

A review was undertaken to define domains with similar features such as style of mineralisation, structure, lithology or grade characteristics. The resource estimation process has underlying assumptions that each domain shares similar characteristics.

Top cutting of assay data is considered appropriate where outliers exist outside the lognormal distribution. These values have the potential to unduly bias grade estimates.

Individual domains were reviewed in terms of grade distribution using frequency histograms.

Nine metre composites were formed for use in grade estimation. The decision to use 9m composites was based on a combination of mine reconciliation data, previous modelling reconciliation and a mining bench height of 9m. Datamine mining software was used to composite the data, using an option that adjusts the composite length as close to the possible interval. This approach means that there are no residual samples that need to be excluded from the estimation process.

A review was completed to establish the optimum search parameters for the kriging process. Search distances and kriging weights were examined for the effect on kriging variance, slope of regression and negative kriging weights.

The estimation process used relatively large search distances and sample numbers due to the high nugget values. This resulted in a relatively smoothed grade estimate due to less predictable grade distributions. A discretisation of 6 x 6 x 3 in the plane x,y,z was used with a minimum sample number of 6 and maximum of 42 for the first pass of the estimate. A second pass was run where the search distances were maintained, but the minimum sample number was reduced to 2. The smoothing effect is constrained through the creation of appropriate waste domains based on other factors and known trends in conjunction with grade to ensure the smoothing effect is limited to only those zones that have a high confidence of being ore. Search ellipsoids are based on the modelled semi-variogram ranges for each domain.

Parent block size was selected at 15m x 15m x 9m. Ordinary kriging was completed on all domains and block grades were compared with 9m composite of cut data to ensure kriging grades were represented in block grades. Swath plots were used to determine the modelled gold distributions in relation to composites with all showing expected trends as well as visual validation on 25m sections.

No assumption of mining selectivity has been incorporated in the estimate.

## 1.2.7 Resource Classification

The Mineral Resource classification is based on good confidence of the geological and grade continuity, 25m by 25m spaced drill hole density in the bulk of the resource and up to 50m by 50m spaced data in the peripheral parts of the resource. Ten years of continuous mining operations and the iterative use of 10 m by 10 m spaced grade control and production data have been used to refine the Mineral Resource estimate. Reconciliation of the Mineral Resource against production data supports the classification that has been applied to the Mineral Resource.

The Mineral Resource estimate appropriately reflects the view of the Competent Person and is assigned in accordance with the JORC 2012 guideline.

## 1.2.8 Cut-off Grade

Mineral Resources are reported using a cut-off grade of 0.4g/t Au this reflects the cost and price assumptions derived from operational performance.

1.2.9 Mining and Metallurgical methods, parameters and other modifying factors considered to date

See sections 1.1.3 and 1.1.4 above.



## **Appendix 1**

## JORC Code 2012 Edition - Table 1 Cowal Gold Deposit

## **Section 1 Sampling Techniques and Data**

Criteria

Commentary

Sampling techniques

The majority of the drilling used to generate the Mineral Resource at Cowal is diamond core for the primary portion of the deposit. Reverse Circulation and Air Core drilling was predominantly utilised to delineate the oxide areas.

Drill holes were drilled on a nominal even spaced grid pattern to avoid clustering and collar and down hole surveys were utilised to accurately record final locations. Industry standard sampling, assaying and QA/QC practices were applied to all forms of drilling.

Drill core was halved with a diamond saw in 1m intervals, irrespective of geological contacts. Oxide material that was too soft and friable to be cut with a diamond saw was split with a chisel. Core was cut to preserve the bottom of hole orientation mark and the top half of core sent for analysis to ensure no bias is introduced. Early RC/AC samples were collected as a bulk sample in 1m intervals from the drill rig and riffle-split to generate a sub-sample for the analytical lab. More recently RC/AC samples are taken using a rotary cone splitter at 1m intervals.

Early in the North program, samples were crushed to 95% minus 6mm and a sub-sample then pulverised to 95% minus 75µm. Mid-way in the North program, specifications were modified to crushing to 95% minus 10mm to 15mm followed by pulverising to 85% minus 75µm. Analysis of all the North samples was done at Australian Laboratory Services and Australian Assay Labs, Orange, NSW. Both independent facilities used fire assay of a 50g sample with an atomic absorption (AA) finish. More recent sample preparation was conducted by SGS West Wyalong and consisted of:

Drying in the oven at 105°C; crushing in a jaw crusher; fine crushing in a Boyd crusher to 2-3mm; rotary splitting a 3kg assay sub-sample if the sample is too large for the LM5 mill; pulverising in the LM5 mill to nominal; 90% passing 75µm; and a 50g fire assay charge was taken with an atomic absorption (AA) finish. The detection limit was 0.01 g/t Au.

Drilling techniques

A majority of the resource definition holes are drilled with an HQ3 collar through the oxide and completed through the primary zone to target using NQ2. During 2016 a dedicated program of directional diamond core drill holes was completed to test the south-west extension of the E42 deposit known as Stage H. Stage H drilling consisted of a fence of HQ sized parent holes each with a number or NQ core sized daughter holes steered via navigational drilling methods.

Reverse Circulation and Air Core drilling was also used to delineate oxide areas of the resource utilising 4.5 - 5.5 inch bits. RC drilling was completed to base of oxide with some holes hosting diamond tails. Air Core drilling was conducted to refusal. Additional RC drilling was completed from within the existing Stage G pit during 2016.

Core has been oriented using a variety of techniques in line with standard industry practice.

Drill sample recovery

Provisions are made in the drilling contract to ensure that hole deviation is minimised and core/chip sample recovery is maximised. This is monitored by a geologist on a hole by hole basis. Core recovery is recorded in the database. There are no significant core loss or sample recovery issues. Core is reoriented and marked up at 1m intervals. Measurements of recovered core are made and reconciled to the driller's depth blocks, and if necessary, to the driller's rod counts.

There is no apparent relationship between core-loss and grade.

Logging

All core intervals and RC/AC chips are logged.

Historically RC chips were logged in the field onto a printed template and uploaded to the database in the office. Current practice is for RC chips to be inspected at the rig while drilling, with detailed logging taking place in the office via LogChief software which is validated and uploaded directly into the Datashed database. Chips are logged for rock-type, alteration, mineralisation and veining as well as point data for base of transported and base of oxide/top of primary rock.

Geologists log core for lithology, alteration, structure, and veining. Logging was done directly onto laptop computers using a site specific Excel spreadsheet.

The Cowal logging system allows recording of both a primary and a secondary lithology and alteration. Geologists also record the colour, texture, grain size, sorting, rounding, fabric, and fabric intensity characterising each lithological interval.

The logged structures include faults, shears, breccias, major veins, lithological contacts, and intrusive contacts. Structures are also recorded as point data to accommodate orientation measurements.

Structural measurements are obtained using a core orientation device. Core is rotated into its original orientation, using the Gyro survey data as a guide. Freiberg compasses are used for structural



## Criteria Commentary

measurements.

Geologists log vein data including vein frequency, vein percentage of interval, vein type, composition, sulphide percentage per metre, visible gold, sulphide type, and comments relative to each metre logged.

Geotechnical logging is done by field technicians and geologists. Logging is on a per metre basis and includes percentage core recovery, percentage RQD, fracture count, and an estimate of hardness. The geotechnical data is entered into the database.

All drill core, once logged, is digitally photographed on a core tray-by-tray basis. The digital image captures all metre marks, the orientation line (BOH) and geologist's lithology, alteration, mineralogy, and other pertinent demarcations. The geologists highlight geologically significant features such that they can be clearly referenced in the digital images.

Sub-sampling techniques and sample preparation

Diamond Core is cut with a diamond saw or chisel. Core is cut to preserve the bottom of hole orientation mark and the top half of core is always sent for analysis to ensure no bias is introduced. During the Stage H drilling program a majority of the NQ daughter holes were whole core sampled to expedite sample processing and assay turnaround.

RC/AC Samples have been split using either a riffle splitter from a bulk sample collected at the rig or a rotary cone splitter attached to the cyclone. For a majority of holes, chip samples were collected dry but several areas have been affected by groundwater.

In 2003 Analytical Solutions Ltd conducted a Review of Sample Preparation, Assay and Quality Control Procedures for Cowal Gold Project. This study, combined with respective operating company policy and standards (North Ltd, Homestake, Barrick and Evolution) formed the framework for the sampling, assaying and QAQC protocols used at Cowal to ensure appropriate and representative sampling.

Field duplicates are taken at regular intervals on RC/AC holes.

Results per interval are reviewed for half core samples and if unexpected or anomalous assays are returned an additional quarter core may be submitted for assay.

Quality of assay data and laboratory tests

SGS West Wyalong acts as the Primary Laboratory and ALS Orange conducts independent Umpire checks. Both labs operate to international standards and procedures and take part in the Geostatistical Round Robin inter-laboratory test survey. The Cowal QA/QC program comprises blanks, Certified Reference Material (CRM), inter-laboratory duplicate checks, and grind checks.

Typical protocols for QAQC checks are summarised below, however depending on sample submission batch sizes overall rates may vary slightly:

1 in 30 fine crush residue samples has an assay duplicate. 1 in 20 pulp residue samples has an assay duplicate.

Wet screen grind checks are performed on 1 in 20 pulp residue samples. A blank is submitted 1 in every 38 samples, CRM's are submitted 1 in every 20 samples. The frequency of repeat assays is set at 1 in 30 samples.

All sample numbers, including standards and duplicates, are pre-assigned by a QA/QC Administrator and given to the sampler on a sample sheet. The QA/QC Administrator monitors the assay results for non-compliance and requests action when necessary. Batches with CRM's that are outside the ±2SD acceptance criteria are re-assayed until acceptable results are returned.

Material used for blanks is uncertified, sourced locally, comprising fine river gravel which has been determined to be below detection limit. A single blank is submitted every 38 samples. Results are reviewed by the QA/QC Administrator upon receipt for non-compliances. Any assay value greater than 0.1g/t Au will result in a notice to the laboratory. Blank assays above 0.20g/t Au result in reassay of the entire batch. The duplicate assays (Au2) are taken by the laboratory during the subsampling at the crushing and pulverisation stages. The results were analysed using scatter plots and relative percentage difference (RPD) plots. Repeat assays represent approx. 10% of total samples assayed. Typically there is a large variance at the lower grades which is common for low grade gold deposits, however, the variance decreases to less than 10% for grades above 0.40g/t Au, which is the cut-off grade used at Cowal.

Approximately 5% of the pulps, representing a range of expected grades, are submitted to an umpire assay laboratory (ALS Orange) to check for repeatability and precision. Analysis of the data shows that the Principal Laboratory is performing to an acceptable level.

Due to the high volume of samples generated during the 2016 Stage H drilling program, additional SGS and ALS labs in Townsville, Kalgoorlie and Orange were utilised to ensure turnaround of samples was met. All these labs meet industry accepted QAQC standards which were verified by both internal and external validation as per the above. Overall analysis of the QAQC from the



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laboratories used for the Stage H samples has not shown any significant issues between the laboratories; no biases or increased variability was noticed.

## Verification of sampling and assaying

No dedicated twinning drilling has been conducted however verification of significant intercepts has been conducted by Grade Control drilling and mining production and reconciliation has occurred at the E42 deposit since 2005.

Cowal uses DataShed software system to maintain the database. Digital assay results are loaded directly into the database. The software performs verification checks including checking for missing sample numbers, matching sample numbers, changes in sampling codes, inconsistent "from-to" entries, and missing fields. Results are not entered into the database until the QA/QC Administrator approves of the results. A QA/QC report is completed for each drill hole and filed with the log, assay sheet, and other appropriate data. Only the Senior Project Geologist and Database Manager have administrator rights to the database. Others can use and sort the database but not save or delete data.

# Location of data points

All recent drill hole collars are surveyed using high definition DGPS. All drill holes were surveyed using a downhole survey camera. For all hole types, the first survey reading was approximately 18 m from surface, then at 30 m intervals and, finally, at the end of each hole.

On completion of each angled drill hole, a down hole gyroscopic (Gyro) survey is conducted. The Gyro tool was referenced to the accurate surface surveyed position of each hole collar and readings were taken at intervals to the base of each hole ("in run") and at intervals back to surface ("out run"). The results of these two surveys were then compared and a final survey produced if there was "closure" between surveys. The Gyro results were entered into the drill hole database without conversion or smoothing.

An aerial survey was flown during 2003 by AAM Hatch. This digital data has been combined with surveyed drill hole collar positions and other features (tracks, lake shoreline) to create a digital terrain model (DTM). The survey was last updated in late 2014.

In 2004, Cowal implemented a new mine grid system with the assistance of AAM Hatch. The current mine grid system covers all areas within the ML and ELs at Cowal with six digits.

# Data spacing and distribution

Drilling at Cowal covers all mining and exploration licences, an approximate area of 20km (north-south) by 20km (east-west), with the majority of the drilling focused on E41, E42, E46, and Galway/Regal. Drilling at the E41, E46, and Regal/Galway deposits has an average spacing of 50 m by 50 m both along and across strike, while E42 has a nominal drill hole spacing of 25 m by 25 m, extending to 50 m by 50 m on the periphery of the deposit.

This drill spacing is generally sufficient to generate reliable Mineral Resource and Ore Reserve estimates utilising definitions and classifications consistent with the 2012 JORC Code. All drilling is sampled at 1 m intervals irrespective of drill type; samples are then composited to 9 m for estimation.

# Orientation of data in relation to geological structure

Predominant drill direction at Cowal is east-west; this is considered the best orientation to intersect the main controls on mineralisation in a normal manner. There is no apparent bias in terms of the drill orientation that has been noted to date. A number of south-north holes have been strategically drilled to confirm the existence of oblique mineralised structures to assist with geological interpretation and modelling.

Additional holes that were drilled for the Stage H update were orientated at 030 or North-North-East for optimal mineralisation interception in the specific target area. Diamond holes were drilled from surface in an attempt to gain more geological understanding within the weathered top 100m of this area that had previously not been drilled. The majority of historical diamond holes were drilled at 60° inclination however parent holes of the FS were collared at 55° and following wedging and navigational cuts, some daughter holes finished as low as 20° inclination at EOH due to the target depth and pit wall angles limiting access. Infill drilling was done in some areas using in-pit RC to better define mineralisation directly below the existing Stage G pit floor.

## Sample security

Drill contractors are issued with drill instructions by an Evolution geologist. The sheet provides drill hole names, details, sample requirements, and depths for each drill hole. Drill hole sample bags are pre-numbered. The drill holes are sampled by Evolution personnel who prepare sample submission sheets. The submission sheet is then emailed to the laboratory with a unique submission number



#### Criteria Commentary

assigned. This then allows individual drill holes to be tracked.

An SGS West Wyalong (SGS) representative collects the samples from site twice daily, however, if samples are being sent to other laboratories a local freight company is used to collect the samples from site and deliver them to the laboratory. Upon arrival, the laboratory sorts each crate and compares the received samples with the supplied submission sheet. The laboratory assigns a unique batch number and dispatches a reconciliation sheet for each submission via email. The reconciliation sheet is checked and any issues addressed. The new batch name and dispatch information is entered into the tracking sheet. The laboratory processes each batch separately and tracks all samples through the laboratory utilising the LIMS system. Upon completion, the laboratory emails Standard Industry Format (SIF) files with the results for each batch to Evolution personnel.

The assay batch files are checked against the tracking spreadsheet and processed. The drill plan is marked off showing completed drill holes. Any sample or QA/QC issues with the results are tracked and resolved with the laboratory.

#### Audits or reviews

QA/QC Audits of the Primary SGS West Wyalong Laboratory are carried out on an approximately quarterly basis and for the Umpire ASL Orange Laboratory approximately on a six monthly basis. Any issues are noted and agreed remedial actions assigned and dated for completion.

Numerous internal audits of the database and systems have been undertaken by site geologists and company technical groups from North Ltd, Homestake, Barrick and Evolution. External audits were conducted in 2003 by RMI and QCS Ltd. and in 2011 and 2014 review and validation was conducted by RPA. Recent audits have found no significant issues with data management systems or data quality.

## **Section 2 Reporting of Exploration Results**

#### Criteria

#### Commentary

Mineral tenement and land tenure status

The Cowal Mine is located on the western side of Lake Cowal in central New South Wales, approximately 38km north of West Wyalong and 350km west of Sydney. It is situated within the Bland Creek Valley, which is a region that supports mainly dry land agriculture with irrigation farming in the Jemalong/Wyldes Plains Irrigation Districts located to the northeast of the mining lease.

#### Land and tenure

Evolution has a total property holding of approximately 11,300ha at Cowal, which has been acquired to act as a physical buffer to reduce the effects of mining and processing activities on local landowners and the general public.

Land within Mining Lease 1535 (ML) is a mixture of freehold owned by Evolution. A travelling stock reserve (TSR), a game reserve, and three unformed Crown roads were adjusted as part of the ML grant. The TSR has been relocated around the ML and the game reserve has been relocated to the south of the ML to maintain public access to Lake Cowal. The unformed Crown roads have been closed

Agricultural activities on Evolution landholdings are currently undertaken by a number of the previous owners and neighbours under licence agreements.

#### **Mineral Tenure**

The Cowal Mine tenement incorporates five contiguous exploration licences (EL) and one ML covering 1073 km², as summarised in Table 4-1. All leases are 100% held by Evolution.

The Cowal ML 1535 encompasses approximately 2,630 ha as allowed under the New South Wales Mining Act 1992.

Table 4-1	Cowal Gold Mine Land Tenure			
Tenement	Area	Expiry		
renement	(km²)	Date		
EL 7750	596	May 27, 2016*		
ELA5297	270	App May 30 2016**		
EL5524	110	Sep 16 2018***		
EL6593	10	Jul 06 2019***		
EL 1590	61	May 12, 2019		



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ML 1535	26	June 12, 2024
Total	1,073	

Note: \*Renewal pending \*\*Application in progress \*\*\*Tenements recently acquired from Newcrest (Marsden acquisition) pending transfer approval

The ML is granted by the Minister for Mineral Resources of the State of New South Wales (the Minister.) Obligations to retain the ML are detailed in the Conditions of Authority for the Mining Lease and outline all requirements for operating within the lease:

#### Royalties

A New South Wales government royalty is applicable to Cowal, payable on the value of the processed gold. The royalty is calculated as follows:

Royalty = 4% of {Total Revenue – Processing Costs – (33% of site Administration costs) – Depreciation}

For financial evaluations, the 4% gross royalty has been equated to approximately 3% of the gold produced.

#### **Cultural Heritage**

A survey of aboriginal sites and artefacts on the mining lease was conducted under the Cowal Gold Mine Environmental Impact Statement submitted by North Ltd. (North) in 1998. The survey results and the registered Aboriginal sites identified in each management zone are outlined in the Cowal Gold Project Indigenous Archaeology and Cultural Heritage Management Plan (IACHMP) (Barrick, 2003).

Aboriginal heritage sites which occur within ML 1535 and have been registered with the New South Wales Department of Environment, Climate and Water (DECCW). These sites range from open scatters to base camps to a sacred tree. Summaries of the survey results and the registered Aboriginal sites identified in each management zone are outlined in the IACHMP.

All relevant permits and consents have been obtained under Section 87 and Section 90, respectively, pursuant to the National Parks and Wildlife (NPW) Act for the management of Aboriginal Heritage Artefacts at Cowal Gold Operation (CGO). All activities at CGO have been conducted in accordance with relevant permit and consent conditions and the IACHMP.

All earthworks have been monitored and no non-compliances have been reported. Collection works have been undertaken at CGO by archaeologists with observation/participation of members of the Aboriginal community, in accordance with the permits and consents. All collected Aboriginal objects are currently retained in a Keeping Place within ML 1535.

No items considered to be of important European heritage which cannot be disturbed have been found in the vicinity of the Project.

## **Environmental status**

CGO has numerous documented operational phase environmental management strategies, management plans, and programs to meet the requirements of the February 1999 Development Consent and various Environmental Licences, Permits, and the Mining Operations Plan

The E42 deposit has been developed generally in accordance with the Environmental Impact Statement (EIS) issued by North Ltd on March 13, 1998. This document details all environmental requirements that must be met prior to and during construction, during operations, and following the cessation of operations leading to the relinquishment of the tenements.

Over the course of the mine life, CGO has submitted a number of applications to modify the development consent in line with various pit expansions, operating adjustments and mine life extensions. To Dec 2016 12 Modifications had been approved with Modification 13 permitted in February 2017 which gives regulatory approval to extend the mine life to 2032.

There are no current environmental liabilities on the property. CGO has all required permits to conduct the proposed work on the property. There are not any other known significant factors and risks that may affect access, title, or the right or ability to perform the proposed work program on the property.

Exploration done by other parties

Before 1980 limited exploration and shallow gold mining activities were mainly constrained to the west of Lake Cowal in areas of better outcrop. No investigation of the lake was made due to virtually nil



#### Criteria

#### Commentary

outcrop and up to 80m of Recent lacustrine sediments and the cyclical flooding.

Following upon the success in the Goonumbla area, (now the Northparkes group of mines), the exploration company, Geopeko, identified the Cowal area as having some potential for porphyry copper development and subsequently conducted reconnaissance RAB drilling. By 1988 the company had broadly delineated the geology of the Cowal Igneous Complex (CIC) and a number of low grade porphyry copper deposits in the south of the CIC and had outlined an anomalous 0.1 ppm Au "gold corridor", (approximately 2km by 7.5km), along the western margin of the lake which now includes the E41, E42, Galway/Regal and E46 deposits.

Exploration continued into the early 1990s and a feasibility study of the E42 deposit, was completed in 1995. Provisional mining consent was obtained in 1999. In 2000, Rio Tinto acquired North Ltd who subsequently sold to Homestake Mining in May 2001 by December 2001 Homestake had merged into Barrick Gold Corporation. Native title agreements were completed in 2003, culminating in the granting of ML1535 to Barrick Gold of Australia Limited. During this time extensive mineral resource/ore reserve definition drilling was undertaken. Construction began in 2004, with the first gold produced in 2006. The mine and exploration ground was purchased by Evolution Mining Ltd in 2015 and further drilling has continued to expand upon the resource of E42 and extend the gold corridor.

#### Geology

## **Regional Geology**

Middle Ordovician arc volcanism associated with westward subduction resulted in the deposition of widespread mafic to intermediate volcaniclastic and turbiditic rocks and intrusive activity with associated porphyry copper and gold mineralisation throughout the central west of New South Wales. Remnants of the arc complex extend from Junee to Nyngan and include lithologies comprising the Northparkes Volcanic Group and the Lake Cowal Volcanic Complex. Arc volcanism and sedimentation ceased during the Late Ordovician to Early Silurian Benambran Orogeny. Deformation associated with the Benambran Orogeny initiated the Gilmore, Parkes and Coolac-Narromine Fault Zones. Intermittent igneous and volcanic activity continued in the region through to the Late Silurian.

At the end of the Silurian, extension and marine incursion, (likely resulting from the retreat of the subduction zone), initiated the deposition of the sedimentary and volcanic rocks of the Ootha and Deriwong Groups. Rifting within the Ordovician volcanic arc separated the Lake Cowal and Northparkes Volcanic Complexes and produced the Jemalong Trough which underwent deposition through to the Early Devonian. A change in tectonic regime from extension to compression resulted in reverse movement along reactivated structures within the Gilmore, Parkes and Coolac-Narromine Fault Zones and the formation of the Booberoi fault.

The last orogeny to affect the region was the Late Devonian to Early Carboniferous Kanimblan Orogeny which produced the Tullamore Syncline and the Forbes Anticline and reactivated the earlier major fault zones. Limbs of synclines in the Jemalong Trough were steepened and overturned during reverse faulting and parts of the Lake Cowal Volcanic Complex were thrust eastwards along the Marsden Thrust.

The Cowal gold deposits (E41, E42, E46, Galway, and Regal) occur within the 40 km long by 15 km wide Ordovician Lake Cowal Volcanic Complex, east of the Gilmore Fault Zone within the eastern portion of the Lachlan Fold Belt. There is sparse outcrop across the Lake Cowal Volcanic Complex and, as a consequence, the regional geology has largely been defined by interpretation of regional aeromagnetic and exploration drilling programs.

The Lake Cowal Volcanic Complex contains potassium rich calc-alkaline to shoshonitic high level intrusive complexes, thick trachyandesitic volcanics, and volcaniclastic sediment piles. The Cowal Complex is a strong regional magnetic high anomaly with a sharp linear western margin, represented by the Gilmore Fault Zone, separating the Lake Cowal Volcanics from the relatively low magnetic response of sediments to the west.

Similar Ordovician magmatic rocks are found over a large area of the eastern Lachlan Fold Belt and are commonly associated with copper-gold mineralisation (e.g., Northparkes, Cadia, Peak Hill, and Gidginbung). The main diorite intrusion at E42 has a K-Ar dating of 456 ± 5 Ma (Early to Mid-Ordovician). The gold deposits at Cowal are structurally hosted, epithermal to mesothermal gold deposits occurring within and marginal to a 230 m thick dioritic to gabbroic sill intruding trachy-andesitic volcaniclastic rocks and lavas.

The overall structure of the gold deposits is complex but in general consists of a faulted antiform that plunges shallowly to the north-northeast. The deposits are aligned along a north-south orientated corridor with bounding faults, the Booberoi Fault on the western side and the Reflector Fault on the



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Criteria	Commentary
	eastern side (the Gold Corridor).
	Mineralisation
	The mineralisation at the Cowal Mine comprises three deposits: E41, E42, and E46.
	The E41 West mineralisation strikes north-northeast and dips -70° east, and measures 750m along strike and 250m across strike. Individual mineralised zones are 35 m to 50 m wide and extend down dip for 125m. The E41 East mineralisation strikes east-west and dips -35° to -80° south, and measures 475 m along strike and 500 m across strike. Individual mineralised zones are 35m to 50m wide and extend down dip for 225 m.
	The E42 deposit comprises the Regal/Galway corridor and the E42 Main Zone. The Regal/Galway corridor trends north-south, dips vertical to -70° west, and is composed of small and discontinuous lenses. The corridor is approximately 900m along strike and 200m wide. The E42 Main Zone trends north-south and dips -35° to -45° west. The two principal domains in the E42 Zone are separated by the Cowal Fault. Overall, the E42 Main Zone mineralisation is approximately 850m by 850m and extends 500m down dip.
	The E46 deposit is subdivided into the East and West zones. The East zone is a continuation of the Regal/Galway corridor, trends north-south, dips vertical to -70° west, and extends approximately 750 m along strike and 175 m across strike. Individual lenses in the E46 East mineralised zone are 1.0 m to 15m wide, 25m to 250m long, and extend 50m to 200m down dip. The E46 West mineralisation trends north-northeast, dips -40° west to flat-lying, and measures approximately 650m along strike and 17m across strike. Individual zones are approximately 50m wide and extend 200m down dip.
Drill hole Information	No exploration has been reported in this release, therefore no drill hole information to report. This section is not relevant to this report on Mineral Resources and Ore Reserves.
	Comments relating to drill hole information relevant to the Mineral Resource estimate can be found in Section 1 – "Sampling techniques" and "Drill sample recovery."
Data aggregation methods	No exploration has been reported in this release, therefore there are no drill hole intercepts to report. This section is not relevant to this report on Mineral Resources and Ore Reserves.  Comments relating to data aggregation methods relevant to the Mineral Resource estimate can be found in Section 1 – "Sampling techniques" and "Drill sample recovery."
Relationship between mineralisation widths and intercept lengths	No exploration has been reported in this release, therefore there are no relationships between mineralisation widths and intercept lengths to report. This is not relevant to this report on Mineral Resources and Ore Reserves.
Diagrams	No exploration has been reported in this release; therefore no exploration diagrams have been produced. This section is not relevant to this report on Mineral Resources and Ore Reserves.
Balanced reporting	No exploration has been reported in this release, therefore there are no results to report. This section is not relevant to this report on Mineral Resources and Ore Reserves.
Other substantive exploration data	No exploration results have been reported in this release. This section is not relevant to this report on Mineral Resources and Ore Reserves.
Further work	No exploration results have been reported in this release. This section is not relevant to this report on Mineral Resources and Ore Reserves.

# **Section 3 Estimation and Reporting of Mineral Resources**

Criteria	Commentary
Database integrity	Cowal uses DataShed software system to maintain the database. Assay results, returned from the laboratory as digital files, are loaded directly into the database. The software performs verification checks including checking for missing sample numbers, matching sample numbers, changes in sampling codes, inconsistent "from-to" entries, and missing fields. Results are not entered into the database until the QA/QC Administrator approves of the results. A QA/QC report is completed for each drill hole and filed with the log, assay sheet, and other appropriate data. Only the Senior Project Geologist and Database Manager have administrator rights to the database. Others can use and sort the database but not save or delete data.
Site visits	The Competent Person is an employee of Evolution Mining and has been a staff member on-site at



Criteria

Commentary

Cowal gold mine.

Geological interpretation

Confidence in the geological interpretation is considered to be good. The interpretation is based on drilling that ranges from a 25m by 25m spacing to 50m by 50m spacing. The interpretation also incorporates data gathered from the mapping of exposures created by open cut mining which has been in operation continuously since 2005. The mapping has assisted in understanding the controls on mineralisation to improve the confidence in the geological interpretation. All available data from drilling and mapping is used in the geological interpretation. Petrological, litho-geochemical and structural studies have also been undertaken and have been used to develop the geological interpretation.

The use of pit mapping and other production data such as grade control drill data has helped resolve the controls on mineralisation as such the current interpretation is considered to be relatively robust. An iterative process has been adopted with respect to the geological interpretation to insure that it reflects the current understanding of the geology and controls on mineralisation.

The factors that affect the continuity of grade and geology at Cowal are structure, lithology and alteration, in order of magnitude. Areas of higher grade are those where there is a greater frequency of structures intersecting the host lithology, such as the core of the E42 resource. These factors have been addressed in the interpretation and domaining of the resource and the estimation process.

Dimensions

The Mineral Resource area which incorporates the E41, E42, E46 and the Galway/Regal Trend has the following dimensions, 4,200 m (north), 2,500 m (east) and 1,000 m (elevation).

Estimation and modelling techniques

Historic modelling of E42 has consistently over-estimated grades across the deposit with an under-estimation of tonnes for an overall under-estimation of ounces. To address this issue an analysis of the top cutting, composite lengths, block size, domaining and estimation techniques was conducted. As a result, the 2016 model update used new top cuts, adjusted estimation domains and increased composite length from 3m to 9m for all the E42 domains. No material changes were made to the E41, E46 or Galway Regal estimates.

A review was undertaken to define domains with similar features such as style of mineralisation, structure, lithology or grade characteristics. The resource estimation process has underlying assumptions that each domain shares similar characteristics.

Top cutting of assay data is considered appropriate where outliers exist outside the lognormal distribution. These values have the potential to unduly bias grade estimates

Individual domains were reviewed in terms of grade distribution via frequency histograms

9m composites were formed for use in grade estimation. The decision to use 9m composites was based on a combination of mine reconciliation data, previous modelling reconciliation and a mining bench height of 9m. Datamine mining software was used to composite the data, using an option that adjusts the composite length as close to the possible interval. This approach means that there are no residual samples that need to be excluded from the estimation process.

A review was completed to establish the optimum search parameters for the kriging process. Search distances and kriging weights were examined for the effect on kriging variance, slope of regression and negative kriging weights.

The estimation process used relatively large search distances and sample numbers due to the high nugget values. This resulted in a relatively smoothed grade estimate due to less predictable grade distributions. A discretisation of 6 x 6 x 3 in the plane x,y,z was used with a minimum sample number of 6 and maximum of 42 for the first pass of the estimate. A second pass was run where the search distances were maintained, but the minimum sample number was dropped to 2. The smoothing effect is constrained through the creation of appropriate waste domains based on other factors and known trends in conjunction with grade to ensure the smoothing effect is limited to only those zones that have a high confidence of being ore. Search ellipsoids are based on the modelled semi-variogram ranges for each domain.

Parent block size was selected at 15m x 15m x 9m. Ordinary kriging was completed on all domains and block grades were compared with 9m composite of cut data to ensure kriging grades were represented in block grades. Swath plots were used to determine the modelled gold distributions in relation to composites with all showing expected trends as well as visual validation on 25m sections.

No assumption of mining selectivity has been incorporated in the estimate.

Only Au was estimated in the Mineral Resource, Ag which is a by-product of the processing has an assumed ratio of 1:1 with Au. Ag has not been accounted for in the estimation of Mineral Resources or Ore Reserves.



Criteria	Commentary
	Validation of the Mineral Resource comprised comparing block grades against the data used to inform the estimate on a domain by domain basis, visual comparison of the informing data against the estimate and the use of swath plots showing grade trends by easting northing and elevation of the input data against the estimate. For the E42 deposit the Mineral Resource was reconciled against production. To date reconciliation of the Mineral Resource against production is in line with resource classification applied and the expected confidence limits of the classification on a global basis.
Moisture	Mineral Resource tonnage estimates are on a dry basis.
Cut-off parameters	Mineral Resources are reported using a cut-off grade of 0.4g/t Au this reflects the cost and price assumptions derived from operational performance. Further explanations of the cut-off grade are detailed in Section 4 of this Table.
Mining factors or assumptions	Mining factors are based on the current operation at Cowal, which has been operating continuously for the past ten years. The mining factors applied reflect the current open cut operation.
Motollyraical	Further explanations of Mining factors are detailed in Section 4 of this Table.
Metallurgical factors or assumptions	Metallurgical recovery assumptions are based on the performance of the processing plant which has been in continuous operation since 2006, further explanations of Metallurgical factors are detailed in Section 4 of this Table.
Environmental factors or assumptions	The Cowal Mine has two Tailings Storage Facilities – the North Tailings Storage Facility (NTSF) and the South Tailings Storage Facility (STSF). The current TSFs are estimated to be sufficient to store the ore that will be processed according to the LOM plan.
	Cowal Mine has a Water Management System in place. The overall objective of the water management system is to contain potentially contaminated water generated within the Project area while diverting all other water around the perimeter of the site.
	The water management system has the following major components: Up-catchment diversion system; Lake isolation system (comprising the temporary isolation bund, lake protection bund and perimeter waste rock emplacement); and Internal catchment drainage system (comprising the permanent catchment divide and contained water storages)
	Further explanation of Environmental factors are detailed in Section 4 of this Table.
Bulk density	North Ltd. conducted density testing during the early stages of project development. These data were supplemented in 2002 by five dedicated holes across E42 to provide support for previous density estimates. Since production and mining began in 2005 systematic SG sampling has been conducted to continually validate resource model density.
Classification	The Mineral Resource classification is based on good confidence of the geological and grade continuity, 25m by 25m spaced drill hole density in the bulk of the resource and up to 50m by 50m spaced data in the peripheral parts of the resource. Ten years of continuous mining operations and the iterative use of 10m by 10m spaced grade control and production data have been used to refine the Mineral Resource estimate. Reconciliation of the Mineral Resource against production data supports the classification that has been applied to the Mineral Resource.  The Mineral Resource estimate appropriately reflects the view of the Competent Person and is
	assigned in accordance with the JORC 2012 guideline.
Audits or reviews	Roscoe Postle and Associates (RPA) audited the Resource Model in 2011 and 2014. No material issues were identified in the audits.
Discussion of relative	The relative accuracy of the Mineral Resource estimate is reflected in the reporting of the Mineral Resource in accordance with the guidelines of the 2012 JORC Code.
accuracy/ confidence	The relative accuracy relates to a global mineral resource estimate of grade and tonnes.
	Reconciliation of the mineral resource estimate against the last 2 years production supports the classification with reconciliation of tonnes and grade to be within 5% of what the mine has produced For the calendar year 2016 the resource estimate reconciled 2% over on tonnes and 5% under on grade compared to the declared ore mined, with metal being approximately 3% higher than predicted by the model. Historically at Cowal there has been a consistent under-call of the Mineral Resource against production ranging 10% to 20% annually over the life of the mine. This undercall has been addressed through adjustments to block size, composite length and domaining analysis. No factoring has been applied to the tonnes, grade or metal in the resource model.

# **Section 4 Estimation and Reporting of Ore Reserves**



Criteria	Commentary
Mineral Resource estimate for conversion to Ore Reserves	The Ore Reserve estimate is based on the current Mineral Resource estimate as described in Section 3.  The Mineral Resources reported are inclusive of those Mineral Resources modified to produce the Ore Reserve estimate.
Site Visits	The Competent Person is an employee of Evolution Mining and has been a staff member on-site at Cowal gold mine.
Study Status	Cowal is considered to be a mature operation with over ten years of historical data. Ore Reserve estimates are generally consistent with current operating practices and experience. On this basis the analysis is considered at a higher level than a Feasibility Study.
Cut-off parameters	Two cut-off grades have been calculated based on the current and forecasted costs and modifying factors, forecast over a period greater than 3 years. These cut-off values are:
	<ul> <li>Fully Costed – cut-off includes all operating costs associated with the extraction and processing of ore material</li> </ul>
	<ul> <li>Incremental – cut-off grade applies to material that will be mined in the process of gaining access to economic material</li> <li>Ore Reserves are reported at 0.40g/t gold cut-off.</li> </ul>
Mining factors or assumptions	The methodology used to convert the Mineral Resource to Ore Reserve can be described as optimisation of existing open pit operations through standard mine planning process steps of pit optimisation, mine design, mine schedule and financial modelling. Factors and assumptions have been formed from existing operating technical assumptions and cost models. On this basis the analysis is considered at a higher than feasibility study.
	Current mining at Cowal open pit is undertaken via conventional truck and excavator fleet to extract ore material to the ROM, waste material to the waste rock dumps and stockpiling and reclaim of lower grade material. The current mining activities show the appropriateness of this mining method as the basis of the Ore Reserve.
	Ore dilution and recovery loss is specifically accounted for in the Mineral Resource modelling method and no additional mining dilution or recovery factors are applied to the Cowal Pit Ore Reserve estimate. This assumption is supported by the actual reconciliation between resource model and mill performance at Cowal to date being within acceptable uncertainty range for the style of mineralisation under consideration.
	External and internal Geotechnical studies are carried out to evaluate the operational designs. Ore Reserves are based on the most recent recommendations of pit slope berm, batter configuration.
	Inferred material is excluded from the Ore Reserves and treated as waste material, which incurs a mining cost but is not processed and hence does not generate any revenue.
	The selected mining method does not require additional infrastructure.
Metallurgical factors or assumptions	The ore is to be processed through an existing traditional CIP/ CIL process plant. The current and estimated future average recovery for gold is 84%. Optimisation calculation used a mill recovery formula, calculated as follows:
	Oxide Recovery = IF(Au_Grade>10,99/100,((5.176*LOG(Au_Grade+0.00001)+86.446)/100)) Sulphide Recovery = IF(Au_Grade>1.45,0.833,IF(Au_Grade<0.2,0,(Au_Grade-
	(0.05083*(Au_Grade**2.13856)+0.12456))/Au_Grade))  An operating history of over ten years supports the metallurgical parameters used in the Ore Reserve estimation.
Environmental factors or assumptions	Cowal E42 open pit is current with all environmental approvals and compliant to those conditions set out in such approvals. Current approvals are sufficient for the E42 Ore Reserves pit design to
Infrastructure	be completed.  The mine is currently in operation, thus current infrastructure is adequate to support future operation.
Costs	Capital and operating costs have been determined based on the current operating cost base modified for changing activity levels and reasonable cost base reductions over the life of the mine. On this basis the analysis is considered at a higher level than a Feasibility Study.
	Site unit costs are applied both as break even site cost used to determine ultimate pit shell and marginal site cost used to define ore/waste cut-off boundary within the ultimate pit shell. The break-even cost base is predicated on similar levels of site activity to recent history with planned cost



	improvements built in. The marginal cut-off cost base is based on the period of low grade stockpile reclaim at the end of mine life. During this reclaim only period mining activity would have ceased and activity level across site would be dramatically reduced relative to current level.  No cost impact is expected from deleterious elements and no costs have been included in the Ore Reserve estimate for these.  State Royalties are 4%, payable on the value of the processed gold. The royalty is calculated as follows:  Royalty = 4% of {Total Revenue - Processing Costs - (33% of site Administration costs) - Depreciation}
Revenue factors	Revenue is calculated using a gold price A\$1,350/oz. A typical 3 year trailing average has not been used to set the commodity pricing. Instead a position has been set based on mean broker estimates and the company's longer term view of these commodities.
Market assessment	Gold sold at spot price. Silver credits equate to approximately 1.5% of total revenue. All silver is sold at spot price. Silver estimates were not included during the optimisation process.
Economic	To demonstrate the Ore Reserve as economic it has been evaluated through a high level financial model. This process has demonstrated that the Ore Reserves for the Cowal open pit has a positive cash flow.
Social	Currently Evolution Mining has agreements with Traditional Owners and is on good terms with neighbouring pastoralists.
Other	
Classification	The Ore Reserves are predominantly derived from Indicated Resources. This classification is based on the density of drilling, the experience of ten years mining of E42 and the mining method employed. The only Probable Reserves derived from Measured Resources are those reported in known and quantified stockpiles. It is the Competent Person's view that the classifications used for the Ore Reserves are appropriate.
Audits or reviews	This Ore Reserve has been verified internally by Evolution's Technical Services Group.
Discussion of relative accuracy/ confidence	The accuracy of the estimates within this Ore Reserve are mostly determined by the order of accuracy associated with the Mineral Resource model, the metallurgical input and the long term cost adjustment factors used. In the opinion of the Competent Person, the modifying factors and long term cost assumptions used in the Ore Reserve estimate are reasonable.