Hemi Process Flowsheet Selections

Highlights

- Prefeasibility Study ("**PFS**") process engineer Wood Australia has completed a comprehensive nine month trade-off study into the preferred process flowsheet design for the Mallina Gold Project, including the Hemi Deposit.
- Process flowsheet selections based on economic and technical considerations have also resulted in favourable ESG outcomes. Selections are supported by extensive metallurgical testwork conducted at ALS Laboratories for the:
  - **Comminution Circuit** – Three stage crushing utilising high pressure grinding rollers (HPGR) followed by conventional ball milling based on a 10Mtpa process plant throughput.
  - **Oxidation Circuit** – Pressure oxidation (POx) at the rate of 0.8Mtpa throughput has been chosen to oxidise the gold bearing sulphides after flotation.
- The trade-off study has confirmed that Hemi mineralisation has excellent recovery and is amenable to HPGR and POx processing technologies. The process route chosen has demonstrated advantages relative to other processing technologies including**:**
  - Proven and accepted technology for the scale of operation and style of mineralisation
  - Lower capital and operating costs[1]
  - Higher gold recovery between 93% and 95% depending on average feed grades
  - 20% lower energy consumption
  - 25% lower reagent (lime) consumption
  - 25% lower CO_2 emissions
  - No heat addition required to sustain, or cooling to control, the POx process
  - Robust and proven equipment
- The flowsheet selections have the benefit of lower carbon emissions through lower energy requirements and lower greenhouse gas emissions as a result of improved neutralisation and consequent lower lime consumption. Further studies are in progress as part of the PFS on the carbon intensity and greenhouse gas emissions for the Mallina Gold Project development.
- **Bench and pilot scale** variability optimisation testwork continues across all Hemi and regional deposits.
- **PFS currently well advanced** and due for announcement in the September Quarter 2022.

De Grey Managing Director, Glenn Jardine, commented:

"The use of a HPGR in the comminution circuit and POx for the oxidation circuit represent the best technical, environmental and economic outcomes for a proposed plant of this scale. HPGR and POx are robust, well proven and accepted technologies that have been chosen after extensive testwork. Pressure oxidation demonstrated lower reagent usage and carbon intensity, lowest greenhouse gas emissions and the highest gold recovery of the processing options considered for Hemi mineralisation.

We will carry the selected process flowsheet through the Pre-Feasibility Study currently underway and due for completion in the September Quarter, 2022. The significant increase in the scale and confidence level of Mineral Resources along with the robust flowsheet selected for processing at Hemi enhance and de-risk the project."

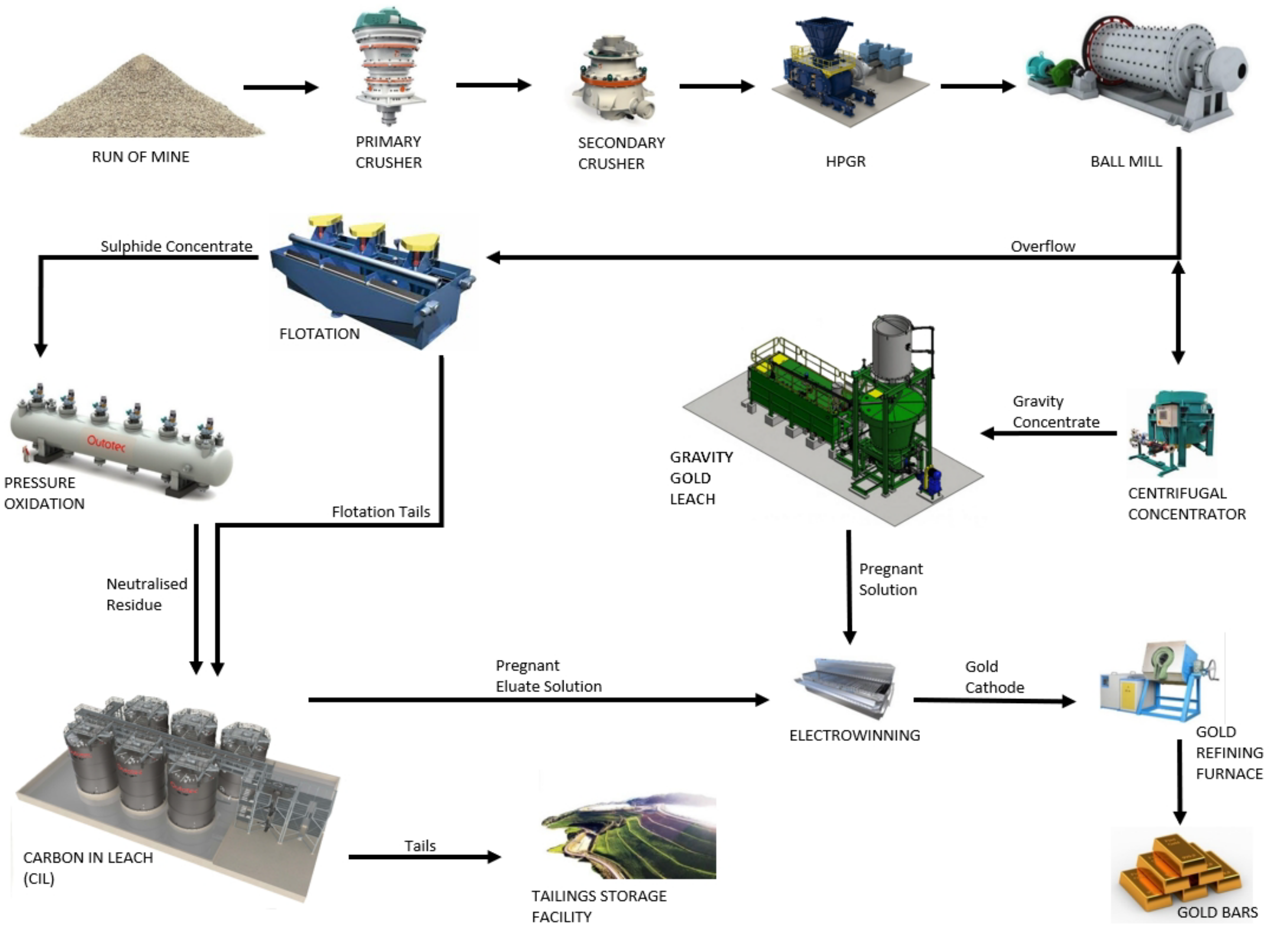
Note 1: Cost estimates in the trade off study were prepared to scoping study level and were sufficient for option assessment. Detailed capital and operating cost estimates for preferred options will be prepared in the PFS being conducted by Wood Engineering.

De Grey Mining Limited (ASX: DEG, "De Grey" or the "Company") is pleased to report the results of two important process flowsheet selections, the outcome of a comprehensive 9 month trade-off study completed by the **PFS** process engineer – Wood Australia. Each represent key inputs into the well advanced PFS for the Mallina Gold Project due in the September Quarter 2022.

Flowsheet Summary Description

A simplified flowsheet for Hemi is shown in Figure 1. Ore will be crushed and ground in the comminution circuit before being fed to the flotation circuit. Any gravity recoverable gold will be recovered prior to flotation with the use of, for example, a Knelson or Falcon concentrator. Testwork has shown gravity recoverable gold is present in the Hemi and regional mineralisation. The extent of gravity recoverable gold will continue to be assessed through testwork.

Figure 1 Simplified Process Flowsheet



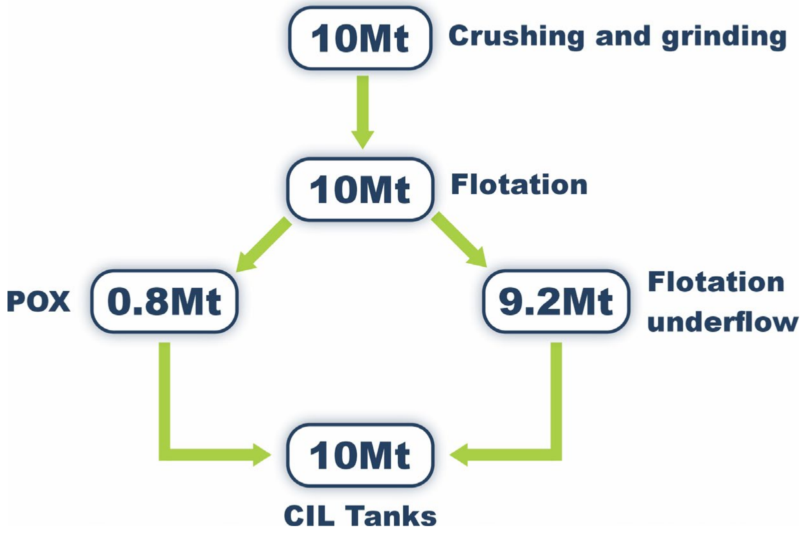
The flotation circuit will process gold bearing sulphides in Hemi ore producing a "low mass pull" gold rich sulphide concentrate. The POx circuit is designed to receive the gold rich sulphide concentrate from the flotation circuit. The Pox circuit will have a throughput of 8% (0.8Mtpa) of the throughput of the comminution circuit.

The POx circuit will convert the sulphide concentrate to a gold bearing residue amenable to standard carbon in leach (CIL) processing. The underflow from flotation is also amenable to standard CIL processing. Both streams will enter the CIL circuit followed by electrowinning to produce gold bars on site.

This has numerous benefits for the POx circuit including lower capital and operating costs compared with projects that require whole of ore treatment through POx.

Tailings from the CIL circuit will be pumped to a tailing storage facility.

Figure 2 Process Plant Circuit Throughput Rates



Hemi mineralisation has two significant and attractive mineralogical characteristics that lead to the overall expected metallurgical recovery of between 93% and 95% at expected mined grades:

1. The majority of gold at Hemi can be floated into a low mass pull concentrate that recovers very high levels of sulphides and gold ahead of oxidation.
2. The flotation tail contains gold that can be successfully recovered using standard CIL processing.

Comminution Circuit

The crushing circuit will include a primary gyratory crusher, a secondary cone crusher and HPGR as shown in Figure 1. The secondary cone crusher will operate in closed circuit with a sizing screen while the HPGR will operate in closed circuit with wet sizing screens to produce a nominal less than 7mm mill feed. The grinding circuit will consist of two ball mills with conventional pinion drives each with their own classification circuit.

Three different comminution circuit options were assessed:
- Three stage crushing including a high pressure grinding roll (HPGR);
- Primary crushing followed by a semi autogenous grinding (SAG) mill with ball milling and pebble crushing; and
- Two stage crushing followed by vertical roller mills (VRM).

The HPGR option has been chosen from the three alternatives as it:
- Provided the lowest capital and operating costs arrangement
- Provides a reliable robust circuit solution for the style of Hemi mineralisation
- Resulted in the lowest carbon emissions intensity
- Capacity is able to be increased by approximately 30% in future with the addition of a third ball mill
- Delivery times were within the Company's timetable planning, and
- Presents proven technology – the use and reliability of HPGRs in gold plants at the scale of Hemi has increased, along with design and operability improvements, over the past 20 years. HPGRs are currently used at large scale gold operations in Western Australia including the Boddington and Tropicana gold mines.

Oxidation Circuit

The oxidation circuit throughput for Hemi is proposed to be 0.8Mtpa, or 8% of the proposed comminution circuit throughput of 10Mtpa. The oxidation circuit will treat the gold bearing sulphide concentrate generated by the flotation circuit. The pressure oxidation circuit will consist of flotation concentrate thickening and storage, pressure oxidation utilising autoclave technology and neutralisation in association with the flotation tail prior to co-leaching in a carbon in leach (CIL) circuit.

The oxidation circuit will be designed to have sufficient storage capacity prior to the autoclave to allow for maintenance shutdowns without the need for a mill shutdown. This decouples the comminution and oxidation circuits ensuring that each circuit does not impact on the availability of the other.

Three different oxidation process options were assessed:

- Pressure Oxidation (POx);
- Ultrafine grinding plus atmospheric oxidation (Albion); and
- Bacterial (or biological) oxidation.

All three options demonstrated a technical ability to oxidise the sulphide concentrate and achieve high gold recovery. POx provided the lowest capital and operating cost for Hemi mineralisation. This was primarily due to the short residence time required and relatively low reagent consumption compared to other options.

Additional advantages of the POx option are the robustness of the process, the long history of this methodology coupled with reliability improvements over the past two decades, both in materials of construction, operability, maintenance and delivery times.

Hemi mineralisation has been found, through extensive testwork and studies, to be amenable to POx.

- The gold bearing sulphide concentrate generated in the flotation circuit has a gold to sulphur ratio (Au g/t to % S^{2-}) of greater than 1.5 to 1. This ratio is above average (typically 1 to 1 or less for similar projects using this technology) and means that less sulphur needs to be oxidised in the POx circuit for the amount of gold produced.
- The level of sulphides present does not require the addition of heat to sustain or cooling to control the oxidation process.
- The mineralisation has neutralising properties from carbonates in the ore resulting in less reagents being required for neutralisation of acid generated in the POx circuit.

The POx circuit at 0.8Mtpa is significantly smaller than the remainder of the plant as it does not require a whole of ore feed. The autoclave circuit of this size has proven to be reliable, operable and maintainable.

The continuous metallurgical testwork undertaken on the pilot plant concentrate has validated earlier batch testwork and demonstrated that the neutralisation capacity of the non-sulphide minerals in the flotation concentrate and the flotation tailings can significantly reduce the need for lime in the neutralisation stage delivering operating cost and environmental benefits.

Pilot Plant Testwork

Extensive testwork has been completed on Hemi mineralisation both in batch testwork and more recently in pilot plant testwork. The testwork results have validated the decisions to select the HPGR comminution option and the POx oxidation option. Additional bench and pilot scale optimisation testwork will be conducted.

This announcement has been authorised for release by the De Grey Board.
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Competent Person's Statement

The information in this Announcement was compiled by Mr. Rod Smith, who has been a qualified metallurgist and a member of the Australasian Institute of Mining and Metallurgy for approximately 40 years. Mr. Smith is a full time employee of Sailsbury Enterprises Pty Ltd. Mr. Smith has sufficient experience in the development of gold projects from the studies phase through to the operational phase and consents to the inclusion in the report of the matters based on his information in the form and context in which it appears.

Previously released ASX Material References *that relates to Hemi Prospect includes:*

Studies:

- *De Grey Mining Mallina Gold Project Scoping Study, 5 October 2021*

Resources:

- *Mallina Gold Project Mineral Resource Statement, May 2022, 31 May 2022*
- *6.8Moz Hemi Maiden Mineral Resource drives Mallina Gold Project, 23 June 2021*
- *2020 Mallina Gold Project Resource update, 2 April 2020*

Metallurgical results announced for Hemi include:

- *Hemi pilot testwork confirms high recoveries at Brolga, 11 May 2022*
- *High gold recoveries achieved at Falcon and Crow, 21 September 2021*
- *High gold recoveries achieved at Aquila, 10 May 2021*
- *Further metallurgical testwork confirms high gold recoveries, 16 February 2021*
- *High gold recoveries achieved at Hemi, 09 July 2020*

JORC Code, 2012 Edition – Table 1

Section 1 Sampling Techniques and Data

(Criteria in this section apply to all succeeding sections.)

Criteria	JORC Code explanation	Commentary
Sampling techniques	• *Nature and quality of sampling (e.g. cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc.). These examples should not be taken as limiting the broad meaning of sampling.* • *Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.* • *Aspects of the determination of mineralisation that are Material to the Public Report.* • *In cases where 'industry standard' work has been done this would be relatively simple (e.g. 'reverse circulation drilling was used to obtain 1 m samples from which 3 kg was pulverised to produce a 30 g charge for fire assay'). In other cases, more explanation may be required, such as where there is coarse gold that has inherent sampling problems. Unusual commodities or mineralisation types (e.g. submarine nodules) may warrant disclosure of detailed information.*	• All drilling and sampling was undertaken in an industry standard manner • Core samples were collected with a diamond rig drilling mainly NQ2 diameter core. • After logging and photographing, NQ2 drill core was cut in half, with one half sent to the laboratory for assay and the other half retained. HQ and PQ core was quartered, with one quarter sent for assay. Holes were sampled over mineralised intervals to geological boundaries on a nominal 1m basis. • Sample weights ranged from 2-4kg • RC holes were sampled on a 1m basis with samples collected from a cone splitter mounted on the drill rig cyclone. 1m sample ranges from a typical 2.5-3.5kg • Aircore samples were collected by spear from 1m sample piles and composited over 4m intervals. Samples for selected holes were collected on a 1m basis by spear from 1m sample piles. Sample weights ranges from around 1-3kg. • The independent laboratory pulverises the entire sample for analysis as described below. • Industry prepared independent standards are inserted approximately 1 in 20 samples. • The independent laboratory then takes the samples which are dried, split, crushed and pulverized prior to analysis as described below. • Sample sizes are considered appropriate for the material sampled. • The samples are considered representative and appropriate for this type of drilling. Diamond core and RC samples are appropriate for use in a resource estimate.
Drilling techniques	• *Drill type (e.g. core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc.) and details (e.g. core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc.).*	• Diamond core diameters are - NQ2 (51mm), HQ3 (61mm), PQ (85mm). • Reverse Circulation (RC) holes were drilled with a 5 1/2-inch bit and face sampling hammer. • Aircore holes were drilled with an 83mm diameter blade bit.

Criteria	JORC Code explanation	Commentary
Drill sample recovery	• *Method of recording and assessing core and chip sample recoveries and results assessed.* • *Measures taken to maximise sample recovery and ensure representative nature of the samples.* • *Whether a relationship exists between sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.*	• Core recovery is measured for each drilling run by the driller and then checked by the Company geological team during the mark up and logging process. • RC and aircore samples were visually assessed for recovery. • Samples are considered representative with generally good recovery. Deeper RC and aircore holes encountered water, with some intervals having less than optimal recovery and possible contamination. • No sample bias is observed.
Logging	• *Whether core and chip samples have been geologically and geotechnically logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and metallurgical studies.* • *Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc.) photography.* • *The total length and percentage of the relevant intersections logged.*	• The entire hole has been geologically logged and core was photographed by Company geologists, with systematic sampling undertaken based on rock type and alteration observed • RC and diamond sample results are appropriate for use in a resource estimation, except where sample recovery is poor. • The aircore results provide a good indication of mineralisation but are not used in resource estimation.
Sub-sampling techniques and sample preparation	• *If core, whether cut or sawn and whether quarter, half or all core taken.* • *If non-core, whether riffled, tube sampled, rotary split, etc. and whether sampled wet or dry.* • *For all sample types, the nature, quality and appropriateness of the sample preparation technique.* • *Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.* • *Measures taken to ensure that the sampling is representative of the in-situ material collected, including for instance results for field duplicate/second-half sampling.* • *Whether sample sizes are appropriate to the grain size of the material being sampled.*	• Core samples were collected with a diamond drill rig drilling NQ2, HQ3 or PQ diameter core. After logging and photographing, NQ2 drill core was cut in half, with one half sent to the laboratory for assay and the other half retained. HQ and PQ core was quartered, with one quarter sent for assay. Holes were sampled over mineralised intervals to geological boundaries on a nominal 1m basis. • RC sampling was carried out by a cone splitter on the rig cyclone and drill cuttings were sampled on a 1m basis in bedrock and 4m composite basis in cover. • Aircore samples were collected by spear from 1m sample piles and composited over 4m intervals. Samples for selected holes were collected on a 1m basis by spear from 1m sample piles. • Industry prepared independent standards are inserted approximately 1 in 20 samples. • Each sample was dried, split, crushed and pulverised. • Sample sizes are considered appropriate for the material sampled. • The samples are considered representative and appropriate for this type of drilling • Core and RC samples are appropriate for use in a resource estimate. • Aircore samples are generally of good quality and appropriate for delineation of geochemical trends but are not generally used in resource estimates.

Criteria	JORC Code explanation	Commentary
Quality of assay data and laboratory tests	• *The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.* • *For geophysical tools, spectrometers, handheld XRF instruments, etc., the parameters used in determining the analysis including instrument make and model, reading times, calibrations factors applied and their derivation, etc.* • *Nature of quality control procedures adopted (e.g. standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (i.e. lack of bias) and precision have been established.*	• The samples were submitted to a commercial independent laboratory in Perth, Australia. • For diamond core and RC samples Au was analysed by a 50g charge Fire assay fusion technique with an AAS finish and multi-elements by ICPAES and ICPMS • Aircore samples were analysed for Au using 25g aqua regia extraction with ICPMS finish and multi-elements by ICPAES and ICPMS using aqua regia digestion • The techniques are considered quantitative in nature. • As discussed previously certified reference standards were inserted by the Company and the laboratory also carries out internal standards in individual batches • The standards and duplicates were considered satisfactory
Verification of sampling and assaying	• *The verification of significant intersections by either independent or alternative company personnel.* • *The use of twinned holes.* • *Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.* • *Discuss any adjustment to assay data.*	• Sample results have been merged by the company's database consultants. • Results have been uploaded into the company database, checked and verified. • No adjustments have been made to the assay data. • Results are reported on a length weighted basis.
Location of data points	• *Accuracy and quality of surveys used to locate drill holes (collar and down-hole surveys), trenches, mine workings and other locations used in Mineral Resource estimation.* • *Specification of the grid system used.* • *Quality and adequacy of topographic control.*	• Diamond and RC drill hole collar locations are located by DGPS to an accuracy of +/-10cm. • Aircore hole collar locations are located by DGPS to an accuracy of +/-10cm., or by handheld GPS to an accuracy of 3m. • Locations are given in GDA94 zone 50 projection • Diagrams and location table are provided in the report • Topographic control is by detailed airphoto and Differential GPS data.
Data spacing and distribution	• *Data spacing for reporting of Exploration Results.* • *Whether the data spacing, and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied.* • *Whether sample compositing has been applied.*	• Drill spacing varies from 80m x 40m to 320m x 80m. • All holes have been geologically logged and provide a strong basis for geological control and continuity of mineralisation. • It has not yet been determined if data spacing and distribution of RC and diamond drilling is sufficient to provide support for the results to be used in a resource estimate. • Sample compositing has not been applied except in reporting of drill intercepts, as described in this Table.
Orientation of data in relation to	• *Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.*	• The drilling is believed to be approximately perpendicular to the strike of mineralisation where known and therefore the sampling is considered representative

Criteria	JORC Code explanation	Commentary
geological structure	• *If the relationship between the drilling orientation and the orientation of key mineralised structures is considered to have introduced a sampling bias, this should be assessed and reported if material.*	of the mineralised zone. • In some cases, drilling is not at right angles to the dip of mineralised structures and as such true widths are less than downhole widths. This is allowed for when geological interpretations are completed.
Sample security	• *The measures taken to ensure sample security.*	• Samples were collected by company personnel and delivered direct to the laboratory via a transport contractor.
Audits or reviews	• *The results of any audits or reviews of sampling techniques and data.*	• No audits have been completed. Review of QAQC data has been carried out by database consultants and company geologists.

Section 2 Reporting of Exploration Results

(Criteria listed in the preceding section also apply to this section.)

Criteria	JORC Code explanation	Commentary
Mineral tenement and land tenure status	• *Type, reference name/number, location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environmental settings.* • *The security of the tenure held at the time of reporting along with any known impediments to obtaining a license to operate in the area.*	• Drilling occurs on various tenements held by De Grey Mining Ltd or its 100% owned subsidiaries. • The Hemi Prospect is approximately 60km SSW of Port Hedland.
Exploration done by other parties	• *Acknowledgment and appraisal of exploration by other parties.*	• The tenements have had various levels of previous surface geochemical sampling and wide spaced aircore and RAB drilling by De Grey Mining. Limited previous RC drilling was carried out at the Scooby Prospect. Airborne aeromagnetics/radiometrics has been flown previously.
Geology	• *Deposit type, geological setting and style of mineralisation.*	• The mineralisation style is new to the Pilbara region and is interpreted to be hydrothermally emplaced gold mineralisation within intermediate intrusions that have intruded into the older Archaean Mallina basin sediments. •
Drill hole Information	• *A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all Material drill holes:* • *easting and northing of the drill hole collar* • *elevation or RL (Reduced Level – elevation above sea level in metres) of the drill hole collar* • *dip and azimuth of the hole* • *down hole length and interception depth* • *hole length.* • *If the exclusion of this information is justified on the basis that the information is not Material and this exclusion does not detract from the understanding of the report, the Competent Person should clearly*	• No new drill hole information is provided in this report.

Criteria	JORC Code explanation	Commentary
	explain why this is the case.	
Data aggregation methods	• *In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (e.g. cutting of high grades) and cut-off grades are usually Material and should be stated.* • *Where aggregate intercepts incorporate short lengths of high grade results and longer lengths of low grade results, the procedure used for such aggregation should be stated and some typical examples of such aggregations should be shown in detail.* • *The assumptions used for any reporting of metal equivalent values should be clearly stated.*	• No new exploration results are reported. • Intercepts are length weighted averaged. • No maximum cuts have been made. • Metallurgical samples have been provided as whole core for this testwork.
Relationship between mineralisation widths and intercept lengths	• *These relationships are particularly important in the reporting of Exploration Results.* • *If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported.* • *If it is not known and only the down hole lengths are reported, there should be a clear statement to this effect (e.g. 'down hole length, true width not known').*	• The drill holes are interpreted to be approximately perpendicular to the strike of mineralisation. • Drilling is not always perpendicular to the dip of mineralisation and true widths are less than downhole widths. Estimates of true widths will only be possible when all results are received, and final geological interpretations have been completed.
Diagrams	• *Appropriate maps and sections (with scales) and tabulations of intercepts should be included for any significant discovery being reported These should include, but not be limited to a plan view of drill hole collar locations and appropriate sectional views.*	• No new exploration results are being reported. •
Balanced reporting	• *Where comprehensive reporting of all Exploration Results is not practicable, representative reporting of both low and high grades and/or widths should be practiced to avoid misleading reporting of Exploration Results.*	• No new exploration results are being reported. • The report is considered balanced and provided in context.
Other substantive exploration data	• *Other exploration data, if meaningful and material, should be reported including (but not limited to): geological observations; geophysical survey results; geochemical survey results; bulk samples – size and method of treatment; metallurgical test results; bulk density, groundwater, geotechnical and rock characteristics; potential deleterious or contaminating substances.*	• No other new substantive exploration data is provided in this report.
Further work	• *The nature and scale of planned further work (e.g. tests for lateral extensions or depth extensions or large-scale step-out drilling).* • *Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.*	• Follow up aircore drilling will be undertaken to test for strike extensions to mineralisation. • Programs of follow up RC and diamond drilling aimed at extending resources at depth and laterally are underway. • Metallurgical testwork is continuing across Mallina Gold Project zones including the Brolga, Diucon, Eagle and Falcon deposits