Greenvale MINING LIMITED

ASX ANNOUNCEMENT **22 September 2021**

"GREEN" POWER SOLUTION TO BE INCORPORATED AS PART OF COMMERCIALISATION PATHWAY FOR ALPHA TORBANITE PROJECT, QUEENSLAND

Encouraging preliminary results received from retort testing program as Greenvale outlines low-risk development strategy encompassing innovative solar and gas-fired power station feeding into the local grid

Highlights:

- **Sighter testing program nearing completion using the Greenvale Retort and a standard retort testing and asphaltene recovery procedure.**

- **An updated commercialisation strategy for the Project has been developed incorporating a "green" power generation model. The Project will be designed to meet best-practice in terms of emissions and energy efficiency including a solar and gas-fired hybrid power station feeding into the local power grid which will ensure the Project is carbon-neutral overall.**

- **Sighter testing broadly aligns with historic reports and confirms the Alpha material is high yielding, with the Torbanite yielding up to 65% synthetic hydrocarbons and the cannel coal yielding around 42% synthetic hydrocarbons.**

- **Evaluation confirms that the range of synthesised and refined products have excellent potential for commercialisation, including synthetic industrial carbon products, bitumen products, liquid fuels, electricity and sulphuric acid.**

- **Greenvale has worked hard to reduce the technical risk of the Project and has confirmed that the pyrolysis systems, refining and power generation equipment required can be sourced "off the rack" from established vendors.**

- **Maiden JORC Mineral Resource on track to be delivered by late 2021 that will in turn underpin the Feasibility Study and Ore Reserve estimate targeted for completion in Q1 2022.**

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Greenvale Mining Limited (ASX: **GRV**) (‘**GRV’** or ‘**the Company’**) is pleased to provide an update on the project commercialisation pathway being developed for its flagship **Alpha Torbanite Project** in Queensland.

The strategy is being developed in parallel with the geological modelling currently underway for the Alpha Torbanite Deposit as well as another ongoing retort and synthetic product testing program, which is progressing well. Sighter test work is nearing completion and systematic retorting of the core samples will commence soon.

An updated commercialisation strategy for the Project has been developed incorporating a “green” power generation model, with Alpha aiming to become a long-term provider of power into the local power grid from a 100MW solar and gas-fired hybrid power station.

The proposed hybrid power station is aimed to have a useful life of over 30-years and the power generated and fed into the grid will be an additional source of revenue for the Project. The station will help the Alpha Project to become carbon neutral and assist the Company in fulfilling its long-term goal of becoming a responsible and sustainable producer of synthetic industrial carbon and bitumen products.

The proposed hybrid power station for the Alpha Project also helps serve an important strategic purpose for the Queensland Government as it looks to fulfill its target of 50% renewable power generation by 2030. The Company’s proposed hybrid power solution has the reliability and base load of a gas-powered plant whilst enjoying the carbon abatement benefits of a solar farm. The Company believes hybrid solutions, such as the one proposed, are necessary in moving pragmatically to a clean energy future.

Sighter Retort Testing

A total of 25 sighter tests have been conducted between the 14th of April and the 19th of September 2021, during which approximately 1kg of raw shale per test has been retorted (heated in an oxygen-free environment) with the proportion of synthetic asphaltenes, oil and gas ranging between 42% and 65% of the raw material.

- Retort (internal) temperatures approaching 1,000 degrees Celsius are required to ensure maximum yield and minimum processing time. Figure 1 shows the appearance of the retort cannister at the end of the test run with the external casing becoming white hot.
- When retorted, the fine-grained Torbanite produced the highest proportion of synthetic oil and gas (55% to 65% of raw Torbanite mass), including a significant proportion of long-chain hydrocarbons which will include asphaltenes used to produce bitumen.
- The cannel coal material (above the torbanite in the outcrop location) produces almost no long-chain hydrocarbons but does produce similar proportions of short-chain hydrocarbons to the Torbanite material and is still relatively high yielding with 42% of the raw cannel coal mass producing synthesised oil and gas products when retorted.

Standardised Retort Testing

It has been observed that the yield of synthetic oil and gas products varies between horizons. As a result, Greenvale has developed a four cannister retort apparatus to enable all the core samples to be tested in an efficient and cost-effective manner.

The standardised testing procedure will be based on:

- Loading the retort cannisters with approximately 1kg of minus 12.5mm crushed core material.
- Testing of each sample in duplicate to demonstrate yields of synthetic products are consistent and the Greenvale retort is a reliable apparatus.
- Heating of the retort cannisters above 900^{O}C to ensure the feed material is devolatilised and all the asphaltene content is released.
- Condensing a hot oil (172^{O}C) condensate, which is then re-heated (to approximately 430^{O}C) to separate the asphaltenes from the oil fraction (with the oil fraction being recovered at ambient temperature).
- All other oil condensate produced from the retort test is recovered in an ice bath at 0^{O}C.
- Synthetic gas samples are collected periodically (with excess gas burned off during the retort test).
- Synthetic oil and gas samples are then forwarded to other laboratories for further analysis.

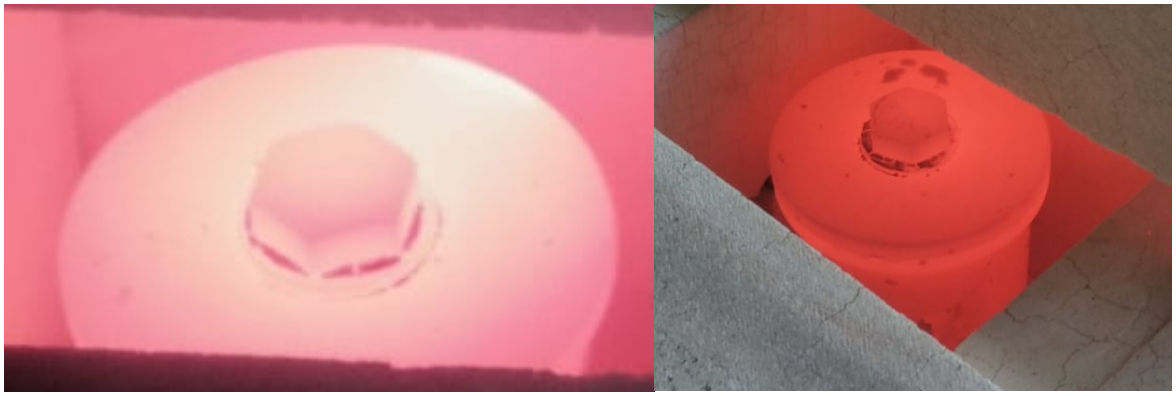

Figure 1. Retort casing at end of test run showing "white hot" cannister.

Process Plant Layout and Specifications

Over the past 30 years, pyrolysis technology (which is the heating of an organic material in solid form, in the absence of oxygen) has advanced significantly.

Off-the-shelf, small-scale pyrolysis systems have been developed to process a range of solid carbon-based materials including wood, plastics, tyres, and coal rejects.

Preliminary market research by Greenvale indicates that a system capable of processing between 250,000 and 500,000 tonnes per year can be sourced, installed, and commissioned using off-the-shelf components – with some modification, to

develop an integrated system that meets energy efficiency and emissions requirements.

Removal of the sulphur from the synthetic oil and gas will be required for the products to be saleable and the Company plans to establish desulphurisation technology to remove the sulphur and produce sulphuric acid.

Energy efficiency and reduction of emissions to acceptably low levels are a key consideration for the process system layout.

With this important consideration in mind, Greenvale plans to generate electricity from the gas and short chain hydrocarbons and use the resulting waste heat to power the pyrolysis process.

The base case evaluation for the Alpha Project includes the development of a solar farm to be included with the project. It is anticipated that, over the life of the project, the solar farm power generation will enable the project to be carbon neutral.

Figure 2 on the following page shows the conceptual process plant layout and marketable products to be produced from the Alpha shale.

Greenvale is confident that there will be a market for all of the products produced from Alpha, with the preference being that Greenvale partner with wholesale consumers of bitumen products, blending fuels and sulphuric acid under long-term supply agreements.

Industrial carbon products are intended to be sold into the export market and power is intended to be supplied into the Queensland Power Grid.

Project Logistics

A basic evaluation of the project logistics and market location confirms that off-site processing may be the best option for Alpha as:

- Approximately 85% of the raw material is likely to be converted into refined products with a market on the east coast of Australia (or export from Gladstone).
- Up to 15% of the raw material will be consumed for power generation and sulphuric acid production (with some mass loss as water vapour).
- As there is no power, water or rail infrastructure near the Alpha site, it will be necessary to transport the raw material using high-capacity road trains to access the east-west rail line from Alpha to Rockhampton.
- Project infrastructure cost will be significantly reduced by establishing a processing plant along the Alpha-to-Rockhampton rail corridor and there are multiple locations between Alpha and Rockhampton with suitable access to road, power, rail, and water infrastructure which may be ideal to establish a processing facility.

Proximity to power infrastructure is likely to be a key consideration when selecting a process plant location as power will need to be connected to the surrounding power grid (which will be a high voltage connection with confirmation of network capacity for up to 100 MW of power feed). An ideal site location would be adjacent to high-voltage network power lines and, if there is a switching station with sufficient capacity available, this will reduce project capital requirements.

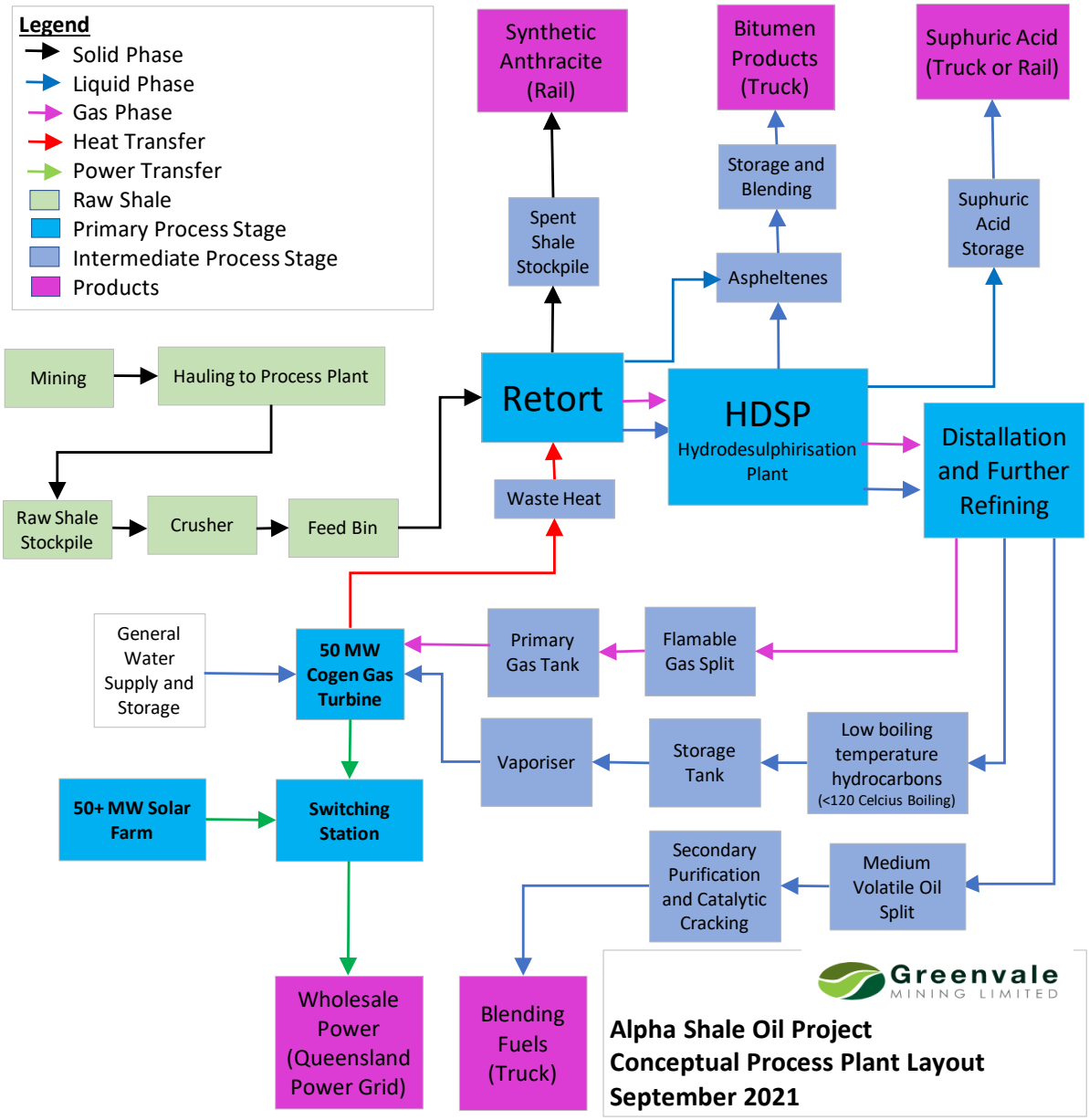

Figure 2. Conceptual Process Plant Layout for Alpha and Product Logistics.

Products and Marketing

Based on sighter testing results and the base case process system layout, it is expected that Alpha will produce a range of value-added products which will be in high demand locally and internationally. These products will include:

- **Wholesale Electricity** as produced by a co-generation turbine (gas plus steam) and solar farm. Current planning is based on having a 50MW turbine which will produce enough waste heat for the retorting process coupled with a 50MW solar farm (or alternative renewable energy system), which will offset all carbon emissions over the life of the project. It is planned to use the gas and high volatile oil material to power the turbine and preliminary modelling indicates this will account for 10% to 15% of the raw mass.

- **High-quality bitumen products** can be refined on site or sold in pelletized form to domestic and export customers. Greenvale has been in discussion with local asphalt producers and is confident that long-term supply agreements can be secured for all of the asphalt produced from Alpha. Sighter testing confirms historic reports which indicate that up to 15% of the raw shale will be refined into bitumen products although this proportion may eventually be lower when cannel coal is being processed (as this material contains almost no asphaltenes or long chain hydrocarbons).

- **Refined liquid petroleum products** can be produced and sold domestically and Greenvale is in the process of working with established petroleum distributors to confirm logistics and marketing options which take advantage of the Project's proximity to the Bowen Basin to supply mining operations with diesel and other fuels. This will account for most of the synthetic oil produced.

- **Industrial carbon products** are produced from the spent Torbanite, which will have market applications including blending with metallurgical PCI coal, sale as a synthetic anthracite or industrial active carbon. It is currently estimated that between 60% (cannel coal) and 35% (high quality torbanite) of the raw material will be recovered as spent shale and the material will need to be railed to domestic users or exported (from RG Tanna Port at Gladstone most likely).

- **Sulphuric Acid** will be produced as a product of the desulphurisation process, with up to 2.5% of the synthetic oil and gas mass being sulphur.

Preliminary Capital Estimates

Order-of-magnitude capital estimates for the Alpha Torbanite Project range between **AU$125 million and AU$200 million**, with the retort and processing system aimed to have an operational life of more than 10 years and the power infrastructure (solar farm and switching station) aimed to have an operational life of more than 30 years.

Most of the capital for the project will be required for power infrastructure (co-generation gas turbine, solar farm and switching station), which is anticipated to account for around 70% of the capital estimate. It is estimated that between 40% and 60% of the project revenue could be derived from the sale of electricity into the grid.

On the basis that the project is carbon-neutral with renewable energy production to offset carbon emissions, it is envisaged that several financing options to fund the power infrastructure will be available.

Key capital items will include:

- Continual feed retort system (nominally a double layered rotary kiln style machine with associated crusher and conveyor feed system) to operate at a feed rate of up 100 tonnes per hour.
- Hydrodesulfurization plant to reduce sulphur to extremely low levels so that all hydrocarbon fuels can be sold or consumed in Australia and elsewhere which will operate at a feed rate of approximately 60 tonnes per hour.
- Distillation tower and oil and gas refining plant to separate the various oil and gas products and refine them into finished, marketable products.
- Associated intermediate and final product storage tanks and stockpile areas.
- 50 MW Cogeneration Gas Turbine to produce baseload electricity and heat for the retort system.
- 50 MW solar farm (or alternative renewable energy system).
- Switching station including step-up transformer system to enable the project to be connected to the power grid.

Figure 3 on the following page shows an overview of the capital requirements based on preliminary analysis.

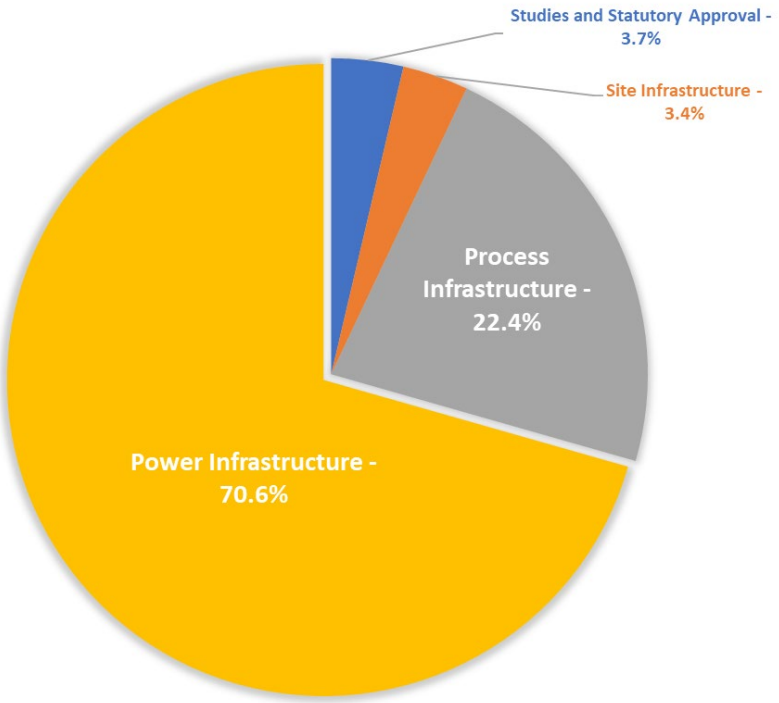

Figure 3. Proportion of Capital Assignment based on Preliminary Capital Evaluation.

Key capital items will include (cont.):

- Process infrastructure to produce and then refine synthetic oil and gas products only accounts for 22.4% of project capital if a strategy of using established technology is applied.

- The cost of site infrastructure is relatively low (3.4% of project capital), as the deposit is shallow and there are suitable roads established to the concession boundary. Mining costs are assumed to be based on appointment of a mining services contractor although there will not be a significant increase in capital if Greenvale consider an owner-managed strategy to be more appropriate.

- The cost of studies and statutory approval (3.4%) is relatively low (typically capital provisions for design and engineering are 5% to 10% of project capital costs) and align to a strategy of using established technology which does not require significant re-engineering.

Management Comment

Greenvale Managing Director Neil Biddle said: *"Our commercialisation strategy for the unique Alpha Torbanite Deposit is rapidly taking shape, supported by the successful Retort Testing Program – now in its final stages.*

"Importantly, sighter testing has confirmed historical data which indicates that the Alpha material is high yielding and shows that the deposit can produce a range of high-value products with excellent commercialisation potential. These include industrial carbon products, bitumen products, liquid fuels, electricity and sulphuric acid.

"One of the most important conclusions from our work so far is that it has confirmed that Alpha can produce a range of synthesised and refined products for sale using proven, off-the-shelf technology including pyrolysis systems, refining and power generation equipment that can be sourced relatively easily.

"One of the key changes to our development strategy is a proposal to include a 100MW power station as part of the Project, powered 50% by gas and 50% by solar. This introduces an important renewable energy aspect to the Project, with the power station aimed to have a total life of some 30 years.

"This power system will feed into the local grid, helping to make the Project carbon-neutral over its life and contributing a significant proportion of revenue during the initial years of mine life.

"We look forward to providing further details about these exciting new developments as part of the Definitive Feasibility Study targeted for completion in Q1 next year. In the meantime, work is continuing towards the delivery of JORC Mineral Resource by the end of the year, engaging with potential off-take partners for our key products and advancing other key aspects of the Project's commercialisation strategy."

DISCLAIMERS AND FORWARD-LOOKING STATEMENTS

This announcement contains forward looking statements. Forward looking statements are often, but not always, identified by the use of words such as "seek", "target", "anticipate", "forecast", "believe", "plan", "estimate", "expect" and "intend" and statements that an event or result "may", "will", "should", "could" or "might" occur or be achieved and other similar expressions.

The forward-looking statements in this announcement are based on current expectations, estimates, forecasts and projections about Greenvale and the industry in which they operate. They do, however, relate to future matters and are subject to various inherent risks and uncertainties. Actual events or results may differ materially from the events or results expressed or implied by any forward-looking statements. The past performance of Greenvale is no guarantee of future performance.

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of fulfilment of any forward-looking statement, or any events or results expressed or implied in any forward-looking statement, except to the extent required by law. You are cautioned not to place undue reliance on any forward-looking statement. The forward-looking statements in this announcement reflect views held only as at the date of this announcement.

Authorised for Release

This announcement has been approved by the Board for release to the ASX.

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Company Secretary

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Competent Person's Statement

The information in this report that relates the sighter testing and mineral sampling is based on information compiled by Mr Ashley Ginn, a mining engineer with over 20 years of experience in mining operations, project development and project management.

Mr Ginn has sufficient experience that is relevant to the tabular style of mineralisation and type of deposit under evaluation. Other mining professionals in fields of metallurgy, mechanical engineering and process process engineering have contributed to the retort testing and development of the conceptual process layout in this report. The Alpha Torbanite deposit is moderately complicated as there will be a range of products synthesised from the pyrolysis project and specialist mining professionals will continue to be engaged to evaluate the project and support the development of a feasibility study.

Mr Ginn is employed by PT. Multi Solusi Sejahtera (MSS Consulting). MSS Consulting provide technical, project management and specialist consulting services to Greenvale Mining Ltd in support of the development of the Alpha Torbanite Project, located in central Queensland.

MSS Consulting provide EPMCM (Engineer Procurement Management Contract Management) professional services with MSS team members working in Australia and other locations in Asia and are engaged on a fee for service basis only.

Preliminary capital estimates for imported processing elements have been determined by MSS Associates confirming budgetary price estimates with vendors (on an ex works basis) and provisions are added for shipping, taxes, duties, commissioning and contingency. Additional for project studies and planning, land acquisition, statutory approvals, access and infrastructure has also been provisioned. The capital estimate is to be considered preliminary as the system design and specification needs to be confirmed with additional work.

Mr Ginn and MSS Consulting consents to the inclusion in the report of the matters based on his information in the form and context presented. The test work and evaluation undertaken to date has been focused on the development of a commercialisation pathway for the project which is important to provide a basis for confirming a reasonable prospect (Resource) and will also provide a framework for detailed techno-commercial modelling as required to develop a JORC2012 compliant Reserve estimate.

JORC Code, 2012 Edition – Table 1 Report

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.*	• An outcrop sample has been collected using basic channel sample protocols. • An electric jackhammer was required to cut a vertical section (approximately 30cm x 30cm) with samples typically being taken in 30cm to 60cm intervals and interval boundaries being defined by a visual change in material type or the presence of bedding. • All reasonable attempts were made to sample a uniform vertical cross section. • The purpose of the outcrop sampling has been to provide sufficient material for sighter testing only.
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).*	• Not applicable to the outcrop sampling.
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.*	• Not applicable to the outcrop sampling.

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.*	• Detailed logging was not undertaken at the outcrop sample location as it was not possible to expose the full horizon. • The outcrop sampling of material has only been used for sighter testing with all Mineral Resource estimation, mining, and metallurgical studies to be developed based evaluation of the core sample material. • Photographic records have been taken which shows each horizon sampled and the weight of samples taken from each sample location has been recorded.
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.*	• Samples were taken from the top of the outcrop section down with all material from the channel being carefully collected to ensure no external contamination from adjacent material. • Samples have been prepared by crushing the outcrop sample material to varying sizes from minus 50mm down to 6.5mm in a NATA accredited laboratory. • Samples were stored in sample bags and frozen as quickly as possible after collection and after secondary sizing. • Sample preparation and sizing ensures that raw material is blended, and representative of each of the horizons being tested.
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 sighter testing program has been focused on developing a reliable and repeatable pyrolysis or retorting method that can be used for future test work of core samples. • Raw and retorted (or spent) samples have been sent for proximate, sulphur (including forms of sulphur) and calorific value. • Synthetic oil and gas samples are being sent to various bitumen and Oil and Gas laboratories for more detailed assaying. • It is not intended to do comprehensive assaying on samples and synthetic products produced by the pyrolysis of the outcrop samples as it is not intended to use this data in the Resource model. • Basic gas chromatography fingerprint assaying will be undertaken to determine the composition of hydrocarbons (C1 to C40) in the synthetic oil and gas produced by pyrolysis (but other assay work will

		only be undertaken on synthetic oil and gas produced from core samples - which will be used as points of observation in the Resource model).
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.*	• Outcrop sample has been observed by multiple personnel including Engineers, Geologists and Greenvale employees have been involved in the sample acquisition.
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.*	• The sample location has been surveyed.
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.*	• Not relevant to the outcrop sample and retort test work.
Orientation of data in relation to geological structure	• *Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.* • *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.*	• Not relevant to the outcrop sample and retort test work.
Sample security	• *The measures taken to ensure sample security.*	• Samples have been stored in dedicated freezers from the time the sample was acquired.
Audits or reviews	• *The results of any audits or reviews of sampling techniques and data.*	• No audits have been undertaken.