ASX Release

February 21, 2019

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Developing Australia's Largest Graphite Deposit

PFS Demonstrates Increased Returns for Siviour Through Integration of Spherical Graphite Production

- **Positive Prefeasibility Study (PFS) confirms opportunity to unlock further value from Siviour through Australia's first integrated graphite concentrate and spherical graphite operation**
- **Spherical graphite prices have experienced recent price increases, with strong potential for continued growth based on the increasing demand for lithium-ion batteries**
- **The spherical PFS projects that the inclusion of spherical graphite in a combined operation with graphite concentrates results in:**
  - **Post-tax unleveraged NPV_{10} of AU$889 million**
  - **Post-tax unleveraged IRR of 53%**
  - **Operating cost for spherical graphite of AU$1,883 per tonne (net of projected by-product credits), versus a projected spherical graphite selling price of AU$4,800 per tonne**
- **Relatively low capital cost for the spherical plant of AU$89.9m allows for potential to be funded from strategic project partner or from cashflows expected to be generated from production of high-grade graphite concentrates**
- **Spherical PFS results will now be used to advance off-take and project finance discussions and to assist Renascor in transitioning into development upon the completion of the Siviour graphite concentrate Definitive Feasibility Study (expected next quarter)**

Renascor Resources Limited (ASX: RNU) is pleased to announce the results of the Prefeasibility Study (the "Spherical PFS") for a spherical graphite production operation using graphite concentrates to be produced from Renascor's 100%-owned Siviour Graphite Project in South Australia's Eyre Peninsula.

The project economics are compelling and highlight Siviour's potential to achieve significant economic returns through the vertically integrated development of a mine and flake graphite concentrate operation, plus downstream production of spherical graphite.

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Financial Highlights

Estimated values of key parameters of the Spherical PFS are shown below, in addition to key economics of an integrated large-scale operation producing both spherical graphite and graphite concentrates as contemplated in Renascor's graphite concentrate Prefeasibility Study (the "Concentrate PFS") (see Renascor ASX announcement dated 14 March 2018).

Annual production of spherical graphite	29,085t	
Life of mine/project	30 years	
Capital cost of spherical operation	AU$89.9m	US$67.4m
Total capital (concentrate and spherical)	AU$221.5m	US$166.0m
NPV_{10} (after tax) of spherical operation	AU$487m	US$365m
NPV_{10} (after tax) of integrated operation	AU$889m	US$667m
IRR (after tax) of integrated operation	53%	
Average spherical graphite cash operating cost (net of by-product credit)[1]	AU$1,883/t	US$1,412/t
Projected spherical graphite sales price	AU$4,800/t	US$3,600/t

Table 1. Financial highlights

Commenting on the results, Managing Director David Christensen stated:

> *"Siviour is uniquely advantaged in its potential to produce a high-quality spherical graphite product for the growing market for lithium-ion battery anodes.*
>
> *The low operating cost we expect to achieve at the graphite concentrate operation underpins a very high margin spherical graphite operation and offers more direct exposure to the lithium-ion battery market.*
>
> *Based on the expected sales price of spherical graphite, there's a robust profit margin against our projected cost of production, which leads to strong free cash generation and rapid payback of capital.*
>
> *With nearly all spherical graphite used in lithium-ion battery anodes currently sourced from China, these results demonstrate Siviour's potential to offer strategic diversification of supply of this globally important commodity by offering a high-quality spherical product mined and processed in Australia."*

Set out in table 2 (next page) is a summary of the estimated economic results from the Spherical PFS on a stand-alone basis and a consolidated summary of an integrated operation that produces 117,000t per annum of graphite concentrates as contemplated in the Concentrate PFS, of which approximately 61,500t per annum are processed into spherical graphite (as per the Spherical PFS) and the balance is sold as graphite concentrates.

[1] Assumes sale of approximately 30,000t per annum of recarburiser by-product at sales price of AU$733/US$550 per tonne. Siviour graphite concentrates are assumed to be procured at production costs contemplated in the Concentrate PFS.

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Parameter	Spherical PFS (stand-alone)		Consolidated findings (graphite concentrates and spherical graphite)	
	Estimated values			
Currency[2]	**AU$**	**US$**	**AU$**	**US$**
NPV_{10} (after tax) (life of mine)	487m	365m	889m	667m
IRR (after tax) (life of mine)	69%		53%	
Start-up capital	89.9m	67.4m	221.5m	166.0m
Payback of start-up capital	2.5 years		4.0 years	
Net revenue	3,904m	2,928m	7,692m	5,768m
EBITDA	2,373m	1,779m	4,414m	3,310m
Net profit after tax	1,598m	1,198m	2,920m	2,190m

Table 2. Comparison of stand-alone spherical operation and results of consolidated findings (graphite concentrates and spherical graphite operation)

Spherical Graphite Prices

Growing demand for lithium-ion batteries has resulted in recent increases in spherical graphite prices. As shown in Figure 1 below, spherical graphite prices have risen steadily over the past year.

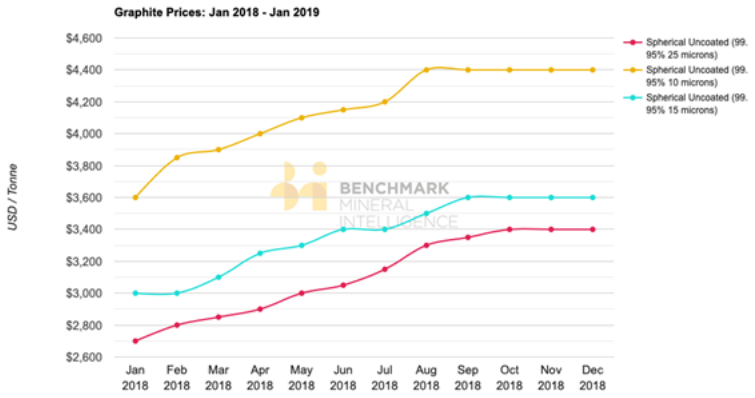

Figure 1. Price of uncoated spherical graphite (Source: Benchmark Mineral Intelligence)

Renascor considers the outlook for spherical graphite to offer strong prospects for continued growth as a result of projected increases in the use of lithium-ion batteries and limited sources of new spherical graphite capacity outside of China.

[2] The Spherical PFS and the consolidated findings adopt an exchange rate of AU$1.00 = US$0.75.

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Spherical Graphite Opportunity

In addition to offering the potential to achieve more robust project economics through the increased sales margin associated with the production of spherical graphite, potential upside benefits from spherical graphite production include:

- ***More direct exposure to lithium-ion battery market.*** Increased interest in renewable sources of energy is driving significant growth in the lithium-ion battery market. By offering a spherical graphite product for use in lithium-ion battery anodes, Renascor would gain more direct exposure to this high-growth market.
- ***Support graphite concentrate operation.*** A spherical graphite product is considered to be a highly sought-after product which could be the subject of a robust sales contract. This would in turn underpin the mining project by securing offtake for a significant portion of the flake production.
- ***Comparative advantage.*** The Concentrate PFS suggests that Siviour graphite concentrates might be produced at amongst the lowest cost of any new graphite development globally. As the cost of graphite concentrates is the primary cost in producing spherical graphite, Renascor would enjoy a potential comparative advantage in producing a low-cost spherical graphite product.
- ***Supply chain security from Australia.*** Presently, nearly all uncoated spherical graphite that is used in anodes for lithium-ion batteries is sourced from Chinese locations that procure graphite concentrates from within China. By offering a spherical product mined and processed into spherical graphite in Australia, Renascor believes it may have a further comparative advantage in offering potential buyers' access to Renascor's vertically integrated processing and diversity of supply from a low sovereign risk jurisdiction.

Overview of Spherical Graphite Prefeasibility Study

The Spherical PFS considers the opportunity to extract further value from the Siviour Project by taking our graphite concentrate product a step further in the value-adding chain and manufacturing spherical graphite for export to key players in the growing lithium-ion-battery market.

The Spherical PFS demonstrates strong financial returns can be expected from a large-scale development by adopting conventional techniques and procedures. Subsequent studies will focus on optimisation of project economics through alternative milling and purification technologies and providing multiple spherical graphite products at different size specifications. Further studies will also consider market entry strategies, including scaling up through pilot or small-scale development and partnering with downstream participants.

Wave International, an independent resource development consulting group with specific expertise in the downstream processing of industrial minerals, acted as the study manager and supervising engineer of this study. In its capacity as study manager, Wave International participated in processing test work, compiled the technical study

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work, preliminary assumptions and conceptual financial models using information and assumptions provided by Renascor and specialist consultants.

Next Steps

Renascor's upcoming work programs in respect of spherical graphite will focus on additional testing of Siviour spherical graphite in lithium-ion battery anodes, including by potential end-users as part of customer qualification. Renascor is also undertaking programs focusing on optimising the results of the Spherical PFS that will include testing alternative milling and purification technologies.

Concurrently, Renascor intends to continue the accelerated development of Siviour, with planned upcoming work programs expected to include:

- The completion of the graphite concentrates Definitive Feasibility Study (expected next quarter);
- Offtake and finance discussions with potential end-users of Siviour graphite products (including graphite concentrates and spherical graphite);
- Advanced feasibility planning regarding the production of both graphite concentrates and spherical graphite; and
- The completion of the permitting and approvals required to commence production at Siviour.

Bibliography

1. Renascor ASX announcement dated 28 November 2018, "Breakthrough to Drive Lower Spherical Graphite OPEX"
2. Renascor ASX announcement dated 31 August 2018, "Successful Locked-Cycle Tests and Bulk Sample Production"
3. Renascor ASX announcement dated 17 April 2018, "Battery Anode Material Successfully Produced from Siviour"
4. Renascor ASX announcement dated 14 March 2018, "Siviour Prefeasibility Study and Maiden Ore Reserve"
5. Renascor ASX announcement dated 15 February 2018, "99.99% Graphite Produced from Siviour"
6. Renascor ASX announcement dated 8 February 2018, "Spherical Scoping Study Further Improves Siviour Economics"
7. Renascor ASX announcement dated 25 January 2018, "Battery Grade Spherical Graphite Produced from Siviour"

Renascor confirms that it is not aware of any new information or data that materially affects the information included in the original market announcements and that all material assumptions and technical parameters underpinning the estimates in the relevant market announcement continue to apply and have not materially changed. Renascor confirms that the form and context in which the Competent Person's findings

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are presented have not been materially modified from the original market announcement.

Competent Person Statement

The information in this document that relates to metallurgical test work results is based on information compiled and reviewed by Mr Simon Hall, who is a Member of the Australasian Institute of Mining and Metallurgy. Mr Hall is a consultant to the Company. Mr Hall has sufficient experience relevant to the mineralogy and type of deposit under consideration and the typical beneficiation thereof to qualify as a Competent Person as defined by the 2012 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (the JORC Code, 2012 Edition). Mr Hall consents to the inclusion in the report of the matters based on the reviewed information in the form and context in which it appears.

This report may contain forward-looking statements. Any forward-looking statements reflect management's current beliefs based on information currently available to management and are based on what management believes to be reasonable assumptions. It should be noted that a number of factors could cause actual results, or expectations to differ materially from the results expressed or implied in the forward-looking statements.

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Appendix 1

Key Components of Spherical Graphite Prefeasibility Study

1. Background

Graphite concentrates production

In March 2018, Renascor announced the results of the Siviour Graphite Concentrate Prefeasibility Study (the "Concentrate PFS"), which considered the viability of producing natural flake graphite concentrates from Renascor's Siviour Graphite Deposit. See Renascor ASX announcement dated 14 March 2018.

The Concentrate PFS presented positive results and suggested Siviour had the potential to both:

- offer a long-term supply of high-quality graphite concentrates at globally competitive costs, and
- provide diversity of supply to the graphite supply chain by offering graphite concentrates from the low sovereign risk jurisdiction of South Australia.

Value-added opportunities

Concurrently with the preparation of the Concentrate PFS, Renascor considered opportunities to extract further value from Siviour by identifying high-growth markets for advanced graphite products that could be produced from Siviour graphite concentrates.

In considering these options, Renascor identified the potential to manufacture spherical graphite using Siviour graphite concentrates.

Spherical Graphite Prefeasibility Study

This study, the Siviour Spherical Graphite Prefeasibility (the "Spherical PFS"), assesses the potential viability of building a downstream processing facility in South Australia to produce spherical graphite from a portion of the graphite concentrates expected to be produced at Siviour.

The Spherical PFS builds upon an early scoping level study (the "Spherical Scoping Study") that concluded that there was potential for significant value uplift from a spherical graphite operation. See Renascor ASX announcement dated 8 February 2018.

The Spherical PFS investigated multiple approaches to establishing a spherical graphite operation, selecting as the most viable an operation that would produce approximately 30,000t per annum.

The cost estimates for the Spherical PFS have been prepared to an accuracy level of +/-25% in respect of capital cost estimates and -10%/+20% in respect of operating cost

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estimates in accordance with the Australian Institute of Mining and Metallurgy (the AusIMM) guidelines[3].

This Spherical PFS adopts the technical parameters and assumptions included in the Concentrate PFS and assumes that approximately 61,500t per annum of fine flake (<150 µm) graphite concentrates will be procured from the Siviour Graphite Deposit. Later studies will consider the viability of producing spherical graphite at smaller scales.

The technical focus of this study involves the production of uncoated purified spherical graphite for sale to anode manufacturers. Future studies may consider further purification of by-products from the production of uncoated spherical graphite and further processing of uncoated spherical graphite into a coated spherical product.

2. Spherical Graphite Test Work

Spherical graphite test work has included micronisation, spheronisation and purification on Siviour graphite concentrates designed to assess the ability of Siviour concentrates to be processed into high purity spherical graphite meeting industry specifications for the lithium-ion battery anode market. Additional test work has included assessing the viability of Siviour spherical graphite to be incorporated into lithium-ion battery anodes.

Micronisation and spheronisation

Micronisation and spheronisation tests have included testing of Siviour graphite concentrates utilising a conventional cascading mill, the traditional technique used in the production of spherical graphite from natural flake graphite for use in lithium-ion battery anodes.

Test work was initially undertaken by a European graphite specialist[4] ("EuroLab One") with expertise in laboratory testing and analysis of natural graphite products on a 25kg composite core sample from Siviour, which was processed to produce graphite concentrates through standard milling and flotation techniques, before being micronised and spheronised with a laboratory-scale conventional cascading mill.

The results of this work are shown in Table A-1 (next page).

[3] AusIMM 2012. Cost Estimation Handbook. 2nd Edition, Monograph 27. The Australian Institute of Mining and Metallurgy.
[4] For confidentiality purposes, the identity of the European graphite specialist is not disclosed.

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Parameter	Test 1	Test 2
Feed size	-300 microns	-300 microns
D10 size fraction (-10% finer than this size)	9.8 microns	11.3 microns
D50 size fraction (-50% finer than this size)	16.3 microns	18.4 microns
D90 size fraction (-90% finer than this size)	27.5 microns	29.7 microns
Ratio D90 to D10 sizes	2.8	2.8
Tap density (measure of density of spherical graphite powder settled in test cylinder)	0.93 g/cm^3	0.95 g/cm^3

Table A-1. Laboratory-scale micronisation and spheronisation test results

In addition, first pass yields were achieved from 51% to 60%, which suggests a significant proportion of spherical graphite can be produced from Siviour concentrates.

Commercial pilot-scale tests were subsequently undertaken by a Chinese mining equipment supplier[5] using conventional cascading milling equipment on 60kg samples of Siviour graphite concentrates of 75 microns and 150 microns.

The results of this work are shown below in Table A-2.

Parameter	Test 1	Test 2
Feed size	-75 microns	-150 microns
D10 size fraction (-10% finer than this size)	9.1 microns	9.2 microns
D50 size fraction (-50% finer than this size)	15.4 microns	16.0 microns
D90 size fraction (-90% finer than this size)	23.5 microns	25.1 microns
Ratio D90 to D10 sizes	2.6	2.7
Tap density (measure of density of spherical graphite powder settled in test cylinder)	0.95 g/cm^3	0.96 g/cm^3

Table A-2. Commercial pilot-scale micronisation and spheronisation test results

[5] For confidentiality purposes, the identity of the Chinese supplier is not disclosed.

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Renascor has commenced additional micronisation and spheronisation tests on an alternative one-step milling technique that involves a single micronisation unit and a single spheronisation unit. This one-step technique, although not as widely used as the cascading approach, has potential benefits, including yielding a greater percentage of viable spherical graphite and lower operating costs than the cascading approach. Subsequent studies will consider the incorporation of a one-step milling technique.

Purification

Purification tests have assessed the suitability of Siviour graphite concentrates to be purified to +99.95% total carbon (TC), the purity specification generally required for lithium-ion battery anodes.

Caustic roast purification

Tests have included a caustic roasting process to purify samples of 95% TC Siviour graphite concentrates sourced from a bulk sample production program undertaken in 2018 by SGS Lakefield in Canada. See Renascor ASX Announcement dated 31 August 2018.

The caustic roast tests were undertaken by a European graphite specialist[6] ("EuroLab Two") with expertise in purification of natural flake graphite for use in lithium-ion battery anodes.

The program adopted a standard caustic roast process in which Siviour graphite concentrates were combined with a caustic solution and then roasted at low temperature before being leached with inorganic acids.

The process successfully produced samples of battery grade purity graphite, achieving purities of 99.95% TC and 99.96% TC.

Hydrofluoric acid purification

Additional tests have included hydrofluoric acid purification, the method generally adopted in China. Tests undertaken by EuroLab One on concentrate produced from a 25kg composite core sample achieved purities of up to 99.99% TC. See Renascor ASX Announcements dated 25 January 2018 and 15 February 2018.

For purposes of the Spherical PFS, Renascor has adopted the caustic roasting technique, as it is a more environmentally friendly process than the hydrofluoric acid purification technique and is expected to result in operational cost-savings, as reagents costs are expected to be lower and additional health and safety costs associated with hydrofluoric acid are avoided.

Battery testing

To test the suitability of Siviour graphite concentrates for use in lithium-ion battery anodes, Renascor has undertaken test programs using Siviour uncoated purified spherical graphite to produce lithium-ion battery anodes.

[6] For confidentiality purposes, the identity of the European graphite specialist is not disclosed.

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Test work has included initial sighter test work overseen by EuroLab One in which an anode slurry was produced using 94% Siviour spherical graphite (at 99.99% TC) and 6% binder. The anode was then tested in a lithium-ion battery coin cell filled with standard electrolyte. Rate capability tests were undertaken to analyse the behaviour of the lithium-ion battery anodes across a range of different charge and discharge rates.

It is important to note that the tests were undertaken to assess the performance of the Siviour spherical graphite under standard conditions that can be achieved in a cost-efficient manner at industrial scale. Battery making test parameters, such as coating or electrolyte composition, were not altered to increase the conductivity and capacity rates.

The results for the initial tests confirm that the Siviour spherical graphite meets several key performance criteria for lithium-ion battery anodes:

- *Formation behaviour.* The formation cycles observed using Siviour spherical graphite were reported as normal for uncoated graphite, suggesting positive performance in terms of cycle life limitations, capacity reversibility and safety.
- *Charge/discharge.* Rate capability tests were undertaken to analyse the charge and discharge capacity across a range of standard times and intensities. The test work showed that the Siviour spherical graphite could be charged to very high capacities exceeding 367mAh/g, with minimal irreversible capacity loss.
- *Durability.* To assess the stability of anode performance over time, tests were performed to measure the amount of energy that can be released from the battery after it is charged over multiple cycles. In total, the test material was charged and discharged over 153 cycles, and measurements were undertaken to assess the ability to release (or discharge) the charge from each cycle. The tests demonstrated that this durability standard, referred to as coulombic efficiency, was very high with Siviour spherical graphite, with an efficiency of 99.9% after 153 cycles. This result suggests Siviour spherical graphite would perform at a high level over a long battery life, with excellent durability.

Renascor has commenced additional work programs to test the suitability of Siviour spherical graphite to be used in lithium-ion battery anodes. Upcoming work programs are expected to include further testing, including the production of additional spherical graphite samples for the purpose of end-user qualification.

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3. Spherical Graphite Plant Design

The spherical graphite plant is designed to process graphite concentrates into an uncoated purified spherical graphite for sale into the market for anode material used in the manufacture of lithium-ion batteries. Graphite concentrates obtained from Siviour will be micronised, spheronised and purified before being bagged for shipment. The design process results in the manufacture of two products: an uncoated spherical graphite product and a fine by-product from the spheronisation process, which is typically sold into the recarburiser market.

The results presented are based on an annual spherical graphite plant treatment of approximately 61,500t of flake graphite concentrate obtained from Siviour with a nominal purity of 95% total graphitic carbon (TGC) and flake size of <150 µm (microns) or 100 mesh.

The proposed spherical graphite plant incorporates facilities for the following unit process operations:

- Graphite concentrate offloading and dry storage,
- Micronisation,
- Spheronisation,
- Caustic roast thermal purification and
- Purified spherical graphite drying and bagging

A simplified flow sheet is shown below in Figure A-1.

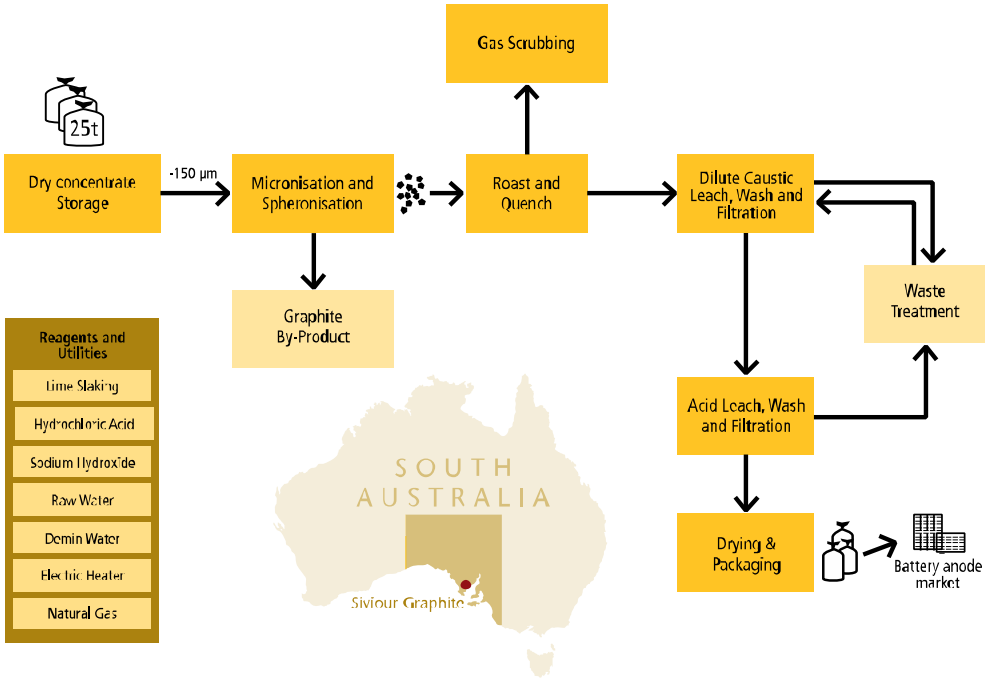

Figure A-1. Process flow sheet

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As noted above in Figure A-1, the production of spherical graphite involves micronisation followed by spheronisation. This process step is common to all flowsheet options.

Micronisation utilises rotary mills to reduce the overall size distribution of the graphite in preparation for spheronisation. Spheronisation utilises similar, smaller rotary mills to shape the individual particles. The particles are classified by size with the required size fraction progressing to the purification stage. Undersize and oversize material is recirculated for further processing, with material meeting spherical graphite size specifications passing to purification and the remaining material becoming a by-product which is packaged and sold separately.

For purposes of this study, the micronisation and spheronisation equipment have been selected from established vendors with units currently in operating facilities. The equipment is available as a standard design and has been assessed against a number of potential other experienced vendors.

Following spheronisation, Siviour graphite will be purified in a caustic roast process. Renascor considered two process options that are generally used for the purification of spherical graphite to meet nominal impurity specifications for battery anode material manufacture: chemical purification and thermal purification.

Chemical purification is typically utilised in China for the purification of spherical graphite. Whilst various options for chemicals exist, typically hydrofluoric acid is utilised in conjunction with other acids to complete the purification process. Thermal purification is aimed at removing the need for potentially harmful and toxic acids (such as hydrofluoric acid) and has been proposed by a number of potential spherical graphite producers.

As part of this study, operating and capital cost estimates were calculated for both chemical and thermal processes. The caustic roast thermal process was selected as both the most cost effective and most environmentally practical process (primarily due to the avoidance of handling hydrofluoric acid), as well as being based on mature technologies that are not subject to any existing intellectual property barriers.

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4. Spherical Graphite Plant Location and Infrastructure

Location

This study assumes that the spherical plant will be located in an existing or new industrial precinct situated proximate to the planned transport corridor for Siviour graphite concentrates.

Potential locations considered in this study include the Siviour mine site, as well as existing industrial precincts along the planned transport route for Siviour graphite concentrates from the mine site to Port Adelaide. See Figure A-2

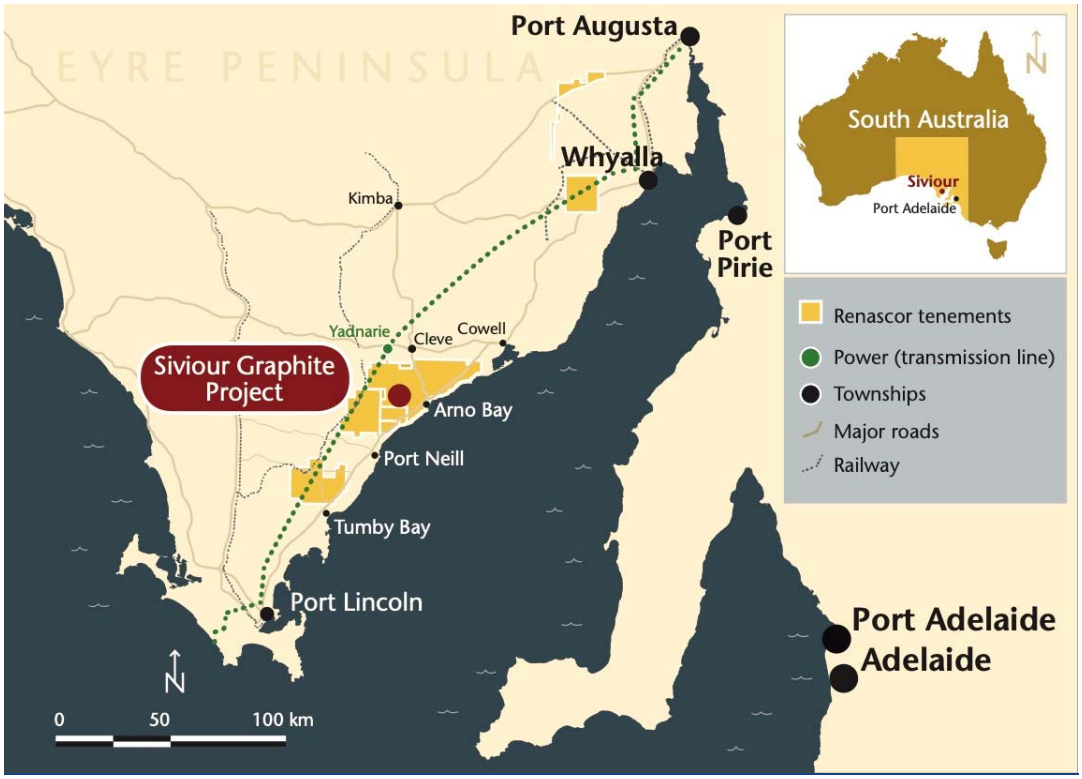

Figure A-2. Location of Siviour Graphite Deposit and potential locations for spherical graphite plant

Siting the plant in an industrial precinct between (or at) the mine site and the shipping port (Port Adelaide) has several advantages, including:

- *Infrastructure availability to reduce capital requirements.* Each of the existing potential industrial precincts provides readily available access to necessary supplies of electricity and water, as well as easy road access for receipt of raw materials and transport of spherical graphite and recarburiser products to port for shipment to customers. Accordingly, limited capital is required.
- *Regulatory and environmental.* Each of the potential sites are zoned for heavy industrial use in a manner that would permit the commissioning and operation of the proposed spherical graphite plant.

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- *Operational cost savings.* Transport costs are minimised by limiting movement along the planned transport route for Siviour graphite concentrates.
- *Comparative advantage.* Relative to other potential operations that propose exporting graphite concentrates to third-countries for processing, Renascor expects a comparative cost savings by avoiding export duties that may apply on graphite concentrates. Renascor also expects logistic cost savings by siting the spherical graphite plant close to required reagent supplies.

For purposes of this study, Port Adelaide (see Figure A-2) was selected on a preliminary basis as the location for the spherical plant based on its existing established industrial precinct, as well as its port facilities, from which Renascor expects to export both Siviour graphite concentrates and spherical graphite. A final decision on plant location will be made after more detailed studies and negotiations with owners over potential plant sites.

Spherical plant infrastructure

Spherical plant infrastructure includes the following supporting infrastructure:

- Site access road to the plant,
- Earthworks, laydowns, hardstands and roadways,
- Administration, office facilities and laboratory including first aid room, change house and amenities facilities,
- Light vehicle carparking,
- Workshop and warehouse facility,
- Container storage compounds,
- Lighting,
- Site communications,
- Site wide water and sewage services,
- Site water capture and
- Site water containment dam

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A preliminary project site plan is shown below in Figure A-3.

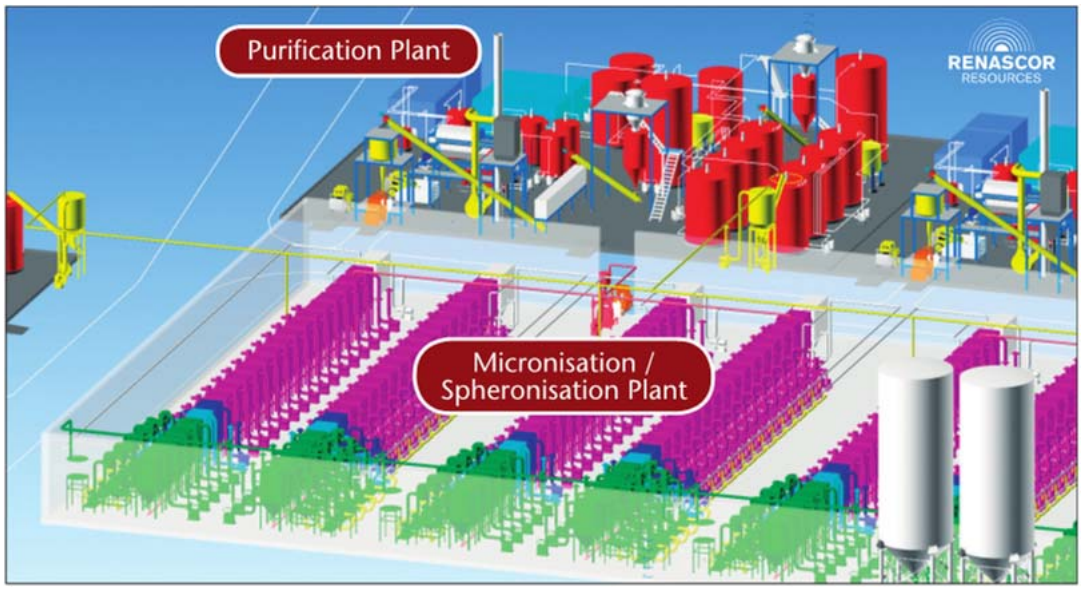

Figure A-3. Project site plan

Transport

Siviour graphite concentrates will be shipped from the mine site near Arno Bay to the proposed spherical graphite plant by road transport.

Spherical graphite and recarburiser products will be bagged and containerised for transport at Port Adelaide.

Workforce

It is expected that Renascor will employ the majority of personnel from the local community within the vicinity of the spherical graphite plant site.

5. Environment and Permitting

The primary approval required for the spherical graphite plant under South Australian legislation is development approval under the *Development Act 1993* and the *Planning, Development and Infrastructure Act 2016*, which is progressively replacing the Development Act. Additional approval will likely be required under the *Environmental Protection Act 1993*.

Renascor has commenced environmental approval planning and preliminary stakeholder engagement, and no material impediments to approval have been identified. It is expected that development consent will be sought through the local council process after Renascor has secured a project site.

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6. Marketing

Product specifications

Uncoated purified spherical graphite must meet purity, size and other product quality specifications for use in lithium-ion battery anodes. For purposes of this study, Renascor has adopted a minimum purity requirement of 99.95% TC. Spherical graphite product size is dependent on end-user requirements, with common sizes ranging between 10 and 25 microns. For purposes of this study, Renascor has assumed a mid-point size requirement of 15 microns. It is expected that subsequent studies will consider operating parameters designed to produce both finer and coarser spherical graphite products, as well as higher purity by-products for sale into specialty markets.

Pricing

The study contemplates the sale of a spherical graphite product for sale into the market for lithium-ion battery anodes and a by-product for sale into the recarburiser market. Both spherical graphite and spherical graphite by-products are generally sold on a directly negotiated basis between suppliers, end-users and intermediaries without regard to a recognised reference price.

Renascor has had extensive engagement with end-users, intermediaries, specialty price reporting consultants and other graphite market participants regarding the potential sale of spherical graphite and spherical graphite by-products. Based on this engagement, Renascor has adopted a price for spherical graphite of US$3,600/t and a price for the recarburiser product of US$550/t.

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7. Capital Costs

Estimated pre-production capital costs are provided below in Table A-3.

Parameter	Estimated value	
	AU$	US$
Spherical graphite plant	52.4m	39.3m
Engineering and project management	7.7m	5.8m
Pre-production and site infrastructure	2.0m	1.5m
Indirect costs	14.6m	11.0m
Contingency	13.1m	9.8m
Total	**89.9m**	**67.4m**

Table A-3 . Pre-production capital cost estimate summary[7]

Spherical graphite plant. The capital cost estimate for the spherical graphite plant includes all capital costs for the establishment of a functioning process plant plus plant specific infrastructure. The battery limits for the processing plant for the Spherical PFS are:

- The receival point for flake concentrate feed delivery from the mine and
- The connection point to power and water supplies (approximately at the plant site boundary).

Engineering and project management. Engineering and project management costs for the capital cost estimates were developed by Wave International on the basis of the process plant being delivered by a single engineering, procurement and construction (EPC) contractor.

Pre-production and site infrastructure. Pre-production and site infrastructure include:

- Spares and first fills,
- Mobile plant and equipment,
- Vendor representatives and support,
- Administration, laboratory and support facilities,
- Fire and water services and
- Stores.

[7] Columns may not total exactly due to rounding errors.

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Indirect costs. Indirect costs include:

- Construction major plant and equipment including site facilities,
- Mobilisation and demobilisation,
- Insurances,
- Contract management,
- Owners team and
- Commissioning and testing.

Contingency. Contingencies were applied to the capital cost estimates through an estimate risk review process considering the likelihood of the final cost of each item based on scope definition, accuracy of supplier quotations and data from recent similar projects, resulting in a contingency equal to approximately 17% of the total capital cost estimate.

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8. Operating Costs

Operating costs have been estimated based on the following sources:

- Estimates built from first principles referencing data bases and information from similar projects,
- Budget quotations and supplier recommendations,
- Reagent consumption based on test work and supplier recommendations,
- Power demand developed by Wave from equipment list and installed power,
- Power costs from South Australia energy market supplier quotes (inclusive of transmission charges),
- Product logistics costs derived from logistic and port service providers and
- Water costs are estimated from SA Water.

Estimated annual cash operating costs are provided below in Table A-4.

Parameter	Estimated value			
	AU$/year	AU$/tpa of spherical graphite	US$/year	US$/tpa of spherical graphite
Graphite concentrate feedstock[8]	29.0m	1,068	21.7m	801
Energy	14.8m	546	11.1m	409
Reagents and consumables	19.3m	712	14.4m	534
Maintenance	3.7m	135	2.8m	101
Labour	2.2m	81	1.7m	61
General and administration[9]	1.5m	56	1.1m	42
Product logistics FOB	1.6m	59	1.2m	44
Sub-total	72.1m	2,658	54.0m	1,994
By-product credit	21.0m	776	15.8m	582
Total	**AU$51.0m**	**AU$1,883**	**US$38.3m**	**US$1,412**

Table A-4. Operating cost estimate summary[10]

[8] Assumes approximately 61,500t of graphite concentrates obtained from Siviour at cost of AU$436 or US$335 (operating cost per tonne of concentrate, as contemplated in Concentrate PFS and losses in upgrading nominal 95% TGC graphite concentrate to 99.95% TC spherical graphite.
[9] Assumes general and administration costs will be shared with graphite concentrate operation.
[10] Columns may not total exactly due to rounding errors.

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9. Financial Sensitivities

Sensitivities on the net present value (10% discount rate, after-tax) in respect of the spherical graphite operation on a stand-alone basis are shown below in Figures A-4 and A-5. Sensitivities based on an integrated graphite concentrate and spherical graphite production operation are shown in Figures A-6 and A-7 (next page).

Variable	-10% unfavourable		+10% favourable	
	AU$	US$	AU$	US$
Capital expenditure	398	272	593	404
Operating expenditure	450	307	524	357
Spherical graphite price	396	394	578	270
Recarburiser price	473	322	501	342
Exchange rate	393	369	602	295
Graphite concentrate price	384	262	590	402

Figure A-4. Net present value sensitivity of spherical graphite plant

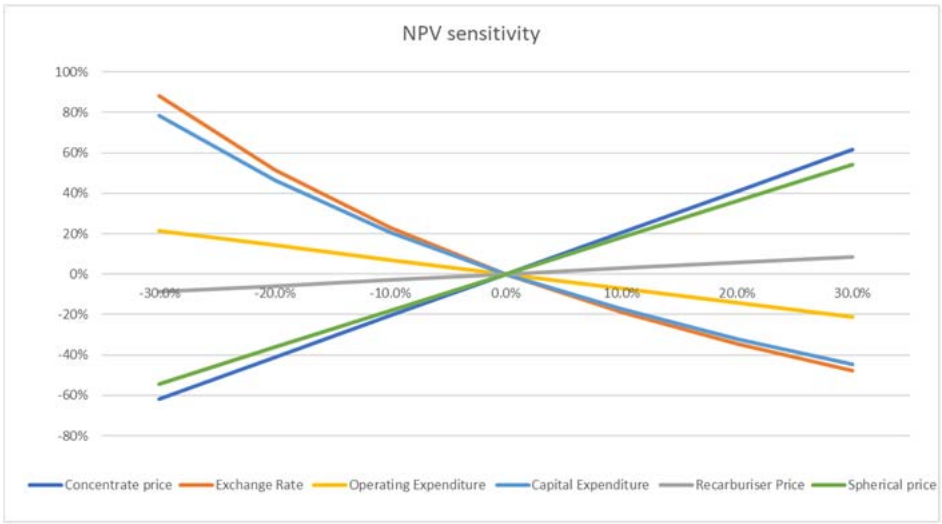

Figure A-5. Net present value sensitivity of spherical graphite plant

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Variable	-10% unfavourable		+10% favourable	
	AU$	US$	AU$	US$
Capital expenditure	801	600	995	746
Operating expenditure	852	639	926	695
Spherical graphite price	798	599	980	735
Recarburiser price	875	656	904	678
Exchange rate	729	602	1,084	732
Graphite concentrate price	714	536	1,064	798

Figure A-6. Net present value sensitivity of integrated operation

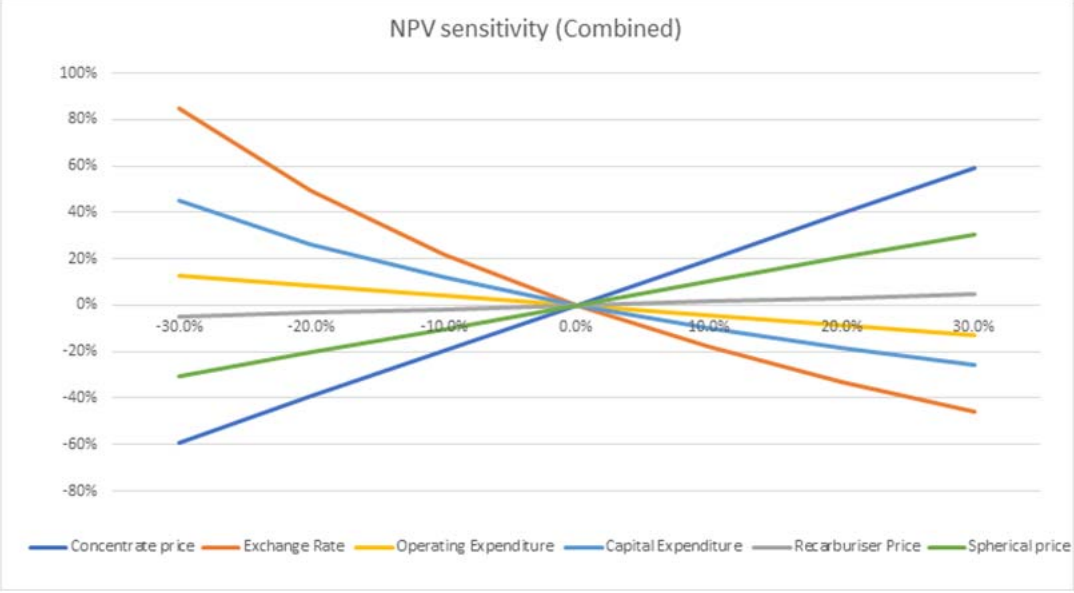

Figure A-7. Net present value sensitivity of integrated operation

Material Assumptions

Material assumptions used in the estimation of the production targets and associated financial information relating to the study discussed in this announcement are set out in the following table.

Criteria	Commentary
Study status	The production targets and financial information in this study are based on a Prefeasibility Study (PFS) level assessment, with cost estimates prepared to an an accuracy level of +/- 25% in respect of capital cost estimates and -10%/+20% in respect of operating cost estimates in accordance with the Australian Institute of Mining and Metallurgy (the AusIMM) guidelines (AusIMM 2012. Cost Estimation Handbook. 2nd Edition, Monograph 27. The Australian Institute of Mining and Metallurgy). For all matters relating to the production of graphite concentrates, this study adopts the assumptions of the large-scale case from Renascor's prefeasibility study on the viability of producing graphite concentrates (the Concentrate PFS). See Renascor ASX announcement dated 14 March 2018.
Mineral resource estimate underpinning the production target	The Mineral Resource estimate for Siviour declared in March 2018 (see Renascor ASX announcement dated 14 March 2018) underpins the production target related to the graphite concentrates that are processed into spherical graphite as contemplated by this study. This Mineral Resource estimate was prepared by a Competent Person in accordance with JORC Code 2012 (the JORC Code). The JORC Code (Clause 49) requires that industrial minerals must be reported "in terms of the mineral or minerals on which the project is to be based and must include the specification of those minerals" and that "it may be necessary, prior to the reporting of a Mineral Resource or Ore Reserve, to take particular account of certain key characteristics or qualities such as likely product specifications, proximity to markets and general product marketability." The likelihood of eventual economic extraction was considered in terms of possible open pit mining, likely product specifications, possible product marketability and potentially favourable logistics to port.
Mining factors or assumptions	This study is based on processing graphite concentrates that are obtained from the Siviour Graphite Deposit, as contemplated in the large-scale case from the Concentrate PFS. The Concentrate PFS contemplates mining based on an open-cut operation utilising conventional drill and blast, load and haul and crusher feed, with mining to be undertaken by Renascor.

Metallurgical factors or assumptions	The parameters for the processing of graphite concentrates into spherical graphite are based on test work completed in December 2018 by a Chinese supplier of spherical graphite equipment. The graphite concentrates used in this test work were produced during a pilot plant campaign conducted in October 2018. See Renascor ASX announcement dated 31 October 2018. For the production of the graphite concentrates, this study adopts mineral processing parameters of the larger-scale case from the Concentrate PFS.
Infrastructure and logistics	The infrastructure required to support the spherical graphite plant includes a site access road; earth works, laydowns, hardstands and roadways; administration including first aid Room, change house and amenities facilities; light vehicle car parking; workshop and warehouse facility; container storage compounds (as required); power supply and motor control centre; lighting; site communications; site wide water and sewage services; site water capture; security facility and security fencing; and other miscellaneous items. The spherical graphite study is based on siting the plant in an industrial location with existing access to high voltage power and water. This study assumes that spherical graphite product will be bagged into 1t bulk bags and then packed into 40-foot sea containers. Based on previous logistics studies, the 40-foot sea containers can be loaded with approximately 25t of cargo. The sea containers will be transported to the nearby Port of Adelaide (as per the Concentrate PFS for the mine) for export. This study adopts the assumptions of the large-scale case from the Concentrate PFS for all matters relating to the production of graphite concentrates, including infrastructure and logistics assumptions.
Capital costs	The capital cost estimate for the spherical graphite has been compiled by Wave International based on a preliminary process design, for the design, supply, fabrication, construction and commissioning of the spherical graphite facility. The process flowsheet prepared by Wave International underlies the basis of this estimate. The estimate has been prepared based upon equipment quotations, current in-house data from recent projects, industry standard estimating factors and benchmarking against other projects, and excludes duties and taxes, working capital, financing costs, relocation and resettlement costs, rehabilitation and closure costs. An itemised contingency allowance of between 10% and 25% has been applied to the estimate for direct and indirect costs, based on a risk-based analysis of each estimate line item. The plant cost estimate was compiled in AU$ with a base date of Q4 2018 with no allowance for escalation to an accuracy of +/- 25%. Engineering and project management refers to engineering, procurement and construction management costs and is applied at

	a rate of 0% to 35% to specific direct costs. The estimated owners' costs were prepared by Renascor based on allocations for land acquisition and other requirements. All capital costs relating to the production of graphite concentrates are based on estimates included in the large-scale case from the Concentrate PFS.
Operating costs	The operating cost estimate for this study includes all costs associated with processing, infrastructure, and site-based general and administration costs. The operating cost estimate is presented on an annualised basis and there has been no allowance for initial ramp-up periods or contingencies applied. The operating costs have been developed in AU$ by Wave International with input from Renascor. The cost of Siviour graphite concentrates is set at the production costs contemplated by Concentrate PFS. Renascor provided labour force estimates based on industry standards from similar operations. The estimate for product logistics was taken from the Concentrate PFS. All operating costs relating to the production of graphite concentrates are based on estimates included in the large-scale case from the Concentrate PFS. In all cases, the operating cost estimates exclude exchange rate variations, price escalation and interest charges.
Revenue factors	Revenue from the project is derived from the sale of spherical graphite concentrates and recarburiser product. Renascor has established the characteristics of expected final products of spherical graphite through test programs undertaken on composite samples from Siviour core and a bulk sample processed from sample ore. Renascor has received market feedback that graphite concentrates produced to a minimum purity of approximately 99.95% TC will be attractive to potential customers. The characteristics of recarburiser products is based on typical specifications for various graphite and other carbonaceous material used in recarburisers. Product prices are based on discussions with end-users and market professionals and examination of other studies. Risks associated with the assumptions used in product pricing include that the product split is not achieved and that the price assumptions are not met by the prevailing markets. Revenue factors relating to the production of graphite concentrates are based on estimates included in the Concentrate PFS.
Schedule and timeframe	The project development schedule is based on the completion of a definitive feasibility study without material modification and having funding readily in place to commence construction of in 2021. The schedule assumes a likely EPC implementation strategy. The project implementation schedule estimates a timeline of up to 18 months from funding approval to operation. The schedule assumes

	that permitting progresses concurrently with the schedule. The project development schedule in this study is based on the spherical graphite plant becoming operational at the same time as the graphite concentrate mine and processing plant, as contemplated in the large-scale case from the Concentrate PFS.
Market assessment	Spherical graphite is considered a key growth market, as this product is utilised in the manufacture of anode material of the lithium-ion battery. There is perceived to be a potential market shortfall in spherical graphite supply, and as such prices have risen in recent months. This is understood from various market analyst reports to come from the closing of a number of operations due to environmental concerns. Recarburising (also known as carburising or carburisation) is the process used to increase the carbon content of some irons and steels in solid form. It involves heating in the presence of a carbon bearing material so that carbon is absorbed by the metal. Graphite is highly suitable for use as a recarburiser because it comprises pure carbon and is soluble in the molten metal. The quantity of graphite used depends on the carbon content of the original metal and the recarburiser itself, as well as the type of product required and the type of furnace being used. Based on discussions with end-users and market professionals and examination of other studies, Renascor considers it reasonable to assume that there will be an adequate market for the recarburiser product it contemplated producing in this study. Market factors relating to the production of graphite concentrates are based on estimates included in the Siviour Scoping Study.
Funding	To achieve the range of outcomes indicated in the spherical graphite study, funding of in the range of AU$99m or US$74 will likely be required for capital works, pre-production working capital and contingency required to construct the spherical graphite plant and funding in the range of AU$145m or US$109m will likely be required for capital works, pre-production working capital and contingency required to construct the mine and graphite concentrate processing plant. It is anticipated that the finance will be sourced through a combination of equity and debt instruments from existing shareholders, new equity investment and debt providers from Australia and overseas. The Company has sufficient cash on hand at the date of this announcement to undertake the next stage of planned work programs, including the completion of a definitive feasibility study for the production of graphite concentrates, continued metallurgical and battery testing and completion of a mining approvals.

	Renascor's Board believes that there is a reasonable basis to assume that funding will be available to complete all feasibility studies and finance the pre-production activities necessary to commence production on the following basis: • Renascor's Board and executive team have a strong financing track record in developing resources projects; • Renascor has a proven ability to attract new capital; • Renascor's Board believes this study demonstrates the project's strong potential to deliver favourable economic return; and • Other companies at a similar stage in development have been able to raise similar amounts of capital in recent capital raisings.
Economic	A discount rate of 10% has been used for financial modeling. This number was selected as a generic cost of capital and considered a prudent and suitable discount rate for project funding and economic forecasts. The model has been run as a life of mine model and includes sustaining capital and closure costs. The study outcome was tested for key financial inputs including: basket price, capital and operating costs and US/AU exchange rate. All of these inputs were tested for variations of+/- 10%.
Exchange rate	The exchange rate for the reporting of the results from this study is AU$1.00 = US$0.75.
Social	This study contemplates siting the spherical plant in Port Adelaide, an existing industrial precinct situated in near proximity to a shipping port. Potential locations have been identified in Whyalla (located approximately 120km from Siviour), Port August (300km) and Port Adelaide (320km). Renascor has commenced meetings with potential stakeholders within these areas, with further meetings expected to occur in the near term. There are no known community issues that Renascor has identified as being a likely material impediment to developing the project. Social factors relating to the production of graphite concentrates are based on information derived from the Concentrate PFS.
Other	There are several other material risks to this project including product price, competition, regulatory approval, social licence, scheduling and other risks typical of projects of similar scale.
Audits or reviews	This study was internally reviewed by Renascor. No material issues were identified by the reviewers. All study inputs related to metallurgical testing were prepared by the Competent Person identified in this announcement.

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