

## ASX Release

July 1, 2020

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## Renascor Announces Battery Anode Material Manufacturing Operation

Renascor Resources Limited (ASX: RNU) is pleased to announce the results of a study assessing an integrated battery anode material operation (the “**Battery Anode Material Study**”) in South Australia to produce Purified Spherical Graphite (“**PSG**”) for lithium-ion battery anodes.

The Battery Anode Material Study confirms that the integration of a PSG processing operation with Renascor’s Siviour Graphite Project creates significant added value and aligns Renascor with end-users of PSG seeking supply chain security through the world’s first integrated, in-country mine and battery anode material operation outside of China.

### Highlights

- **World-class, low-OPEX project:** By leveraging off the comparatively low-cost of Siviour Graphite Concentrates as feedstock for PSG production, and co-locating the downstream operation in Australia, the Battery Anode Material Study shows a globally competitive gross operating cost of US\$1,989 per tonne of PSG.
- **Robust economics:** The results confirm the compelling economics of a combined mine and battery anode materials operation, including:
  - Post-tax unleveraged NPV<sub>10</sub> of A\$713 million;
  - Post-tax unleveraged IRR of 33%;
  - Total start-up capital cost of A\$213 million, consisting of A\$114 million<sup>1</sup> for the mine and concentrator and A\$90 million for the battery anode operation; and
  - Average annual EBITDA of A\$156 million.
- **Alignment with offtakers:** Planned PSG production averaging 28,000 tonnes per annum aligns with positive feedback from potential offtake and finance partners seeking to diversify supply chain from China, which currently controls 100% of downstream processing capacity for converting Graphite Concentrates to PSG.
- **High growth graphite market:** The PSG market provides direct exposure to the high growth lithium-ion battery sector, with PSG demand growth projected at 29% per year through 2030<sup>2</sup>.
- **Eco-friendly:** Renascor to produce PSG through more environmentally friendly chemical purification that avoids the use of hydrofluoric acid and satisfies sustainability requirements of end-users and prospective financiers.
- **Funding:** Renascor has received strong support for debt financing for the integrated mine and battery anode material operation, including in-principle finance support from Export Finance Australia<sup>3</sup> and the recent appointment of a leading European investment bank.<sup>4</sup> Renascor has also received in-principle support from Atradius, the official Dutch Export Credit Agency, for the mine and concentrate operation.<sup>5</sup>
- **Next steps:** Renascor intends to use the results of the Battery Anode Material Study to advance ongoing finance and offtake discussions. In parallel, Renascor continues optimisation, engineering and regulatory programs for the integrated mine and battery anode material operation.

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#### Cautionary Statements

*The Battery Anode Material Study has been undertaken to determine the economic viability of an operation consisting of a mine and Graphite Concentrate production plant and a battery anode material manufacturing facility designed to produce PSG. The Battery Anode Material Study is a technical and economic study and is based on updating a Prefeasibility Study completed in February 2019 that assesses the viability of producing PSG from Siviour (the Siviour PSG PFS) (see RNU ASX announcement dated 21 February 2019) and incorporating the results of a Definitive Feasibility Study completed in November 2019 that assesses the viability of the Siviour mine and Graphite Concentrate production plant (the Siviour Concentrate DFS) (see RNU ASX announcement dated 22 November 2019). The cost estimates for the Battery Anode Material Study have been prepared to an accuracy level of -10% to + 20% in accordance with the Australian Institute of Mining and Metallurgy (the AusIMM) guidelines<sup>6</sup>. The operating parameters of the Battery Anode Material Study differ materially from the plan and assessments described in the Siviour Concentrate DFS and the Siviour PSG PFS and are based on prefeasibility level technical and economic assessments.*

*The production target underpinning financial forecasts included in the Siviour Concentrate DFS includes 25% Measured Resources, 58% Indicated Resources and 17% Inferred Resources. There is a low level of geological confidence associated with Inferred Resources and there is no certainty that further exploration work will result in the determination of Indicated Resources or that the production target itself will be realised. There are no Inferred Resources included in the first ten years of the processing schedule. The Battery Anode Material Study is based on the material assumptions outlined elsewhere in this announcement. These include assumptions about the availability of funding. While Renascor considers all of the material assumptions to be based on reasonable grounds, there is no certainty that they will prove to be correct or that the range of outcomes indicated by the Battery Anode Material Study will be achieved.*

*To achieve the range of outcomes indicated in the Battery Anode Material Study, additional funding will likely be required. Investors should note that there is no certainty that Renascor will be able to raise that amount of funding when needed. It is also possible that such funding may only be available on terms that may be dilutive to or otherwise affect the value of Renascor's existing shares. It is also possible that Renascor could pursue other 'value realisation' strategies such as a sale, partial sale or joint venture of the project. If it does, this could materially reduce Renascor's proportionate ownership of the Project.*

*This announcement contains forward-looking statements. Renascor has concluded it has a reasonable basis for providing the forward-looking statements included in this announcement and believes it has reasonable basis to expect it will be able to fund development of the project. However, a number of factors could cause actual results, or expectations to differ materially from the results expressed or implied in the forward-looking statements. Given the uncertainties involved, investors should not make any investment decisions based solely on the results of the Battery Anode Material Study.*

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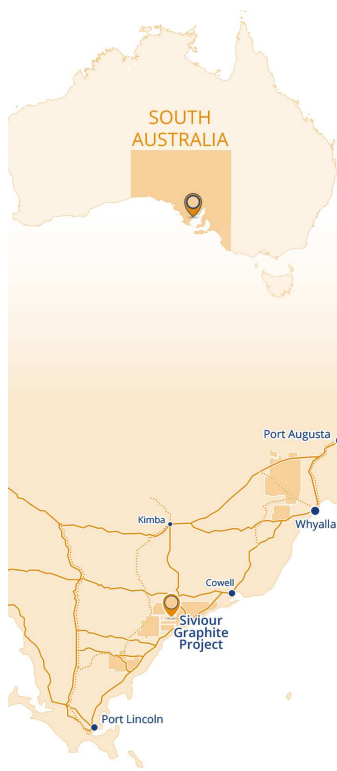
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## Financial Highlights

Estimated values of key parameters of the Battery Anode Material Study are shown below. Material assumptions are included elsewhere in this announcement.

Average annual LOM production of PSG	28,000t	
Life of mine/project	40 years	
Start-up capital cost of mine and concentrator	A\$114m	US\$79m
Start-up capital cost of battery anode material operation	A\$90m	US\$63m
Total start-up capital (integrated operation) <sup>7</sup>	A\$204m	US\$142m
Payback of total start-up capital	4.5 years	
NPV <sub>10</sub> (after tax) of integrated operation	A\$713m	US\$499m
IRR (after tax) of integrated operation	33%	
Average cost of Graphite Concentrate feedstock per tonne PSG	A\$1,107/t	US\$775/t
Average cost of converting Graphite Concentrates to PSG	A\$1,735/t	US\$1,214/t
Average gross PSG cash operating cost	A\$2,842/t	US\$1,989/t
Average net PSG cash operating cost (with by-product credit <sup>8</sup> )	A\$1,998/t	US\$1,398/t
Projected PSG sales price	A\$6,160/t	US\$4,312/t
Net revenue of integrated operation	A\$9,552m	US\$6,686m
EBITDA of integrated operation	A\$6,267m	US\$4,387m
Project cashflow of integrated operation	A\$4,112m	US\$2,878m

Table 1. Financial highlights

Commenting on the results of the study, Managing Director David Christensen stated:

*“Siviour has a key competitive advantage in being able to produce Graphite Concentrates at a cost that is amongst the lowest of any graphite development in the world.*

*By integrating an in-country Purified Spherical Graphite manufacturing facility, this study provides a clear path to leveraging off this comparative advantage to create shareholder value and compete in the high growth Purified Spherical Graphite market.*

*Renascor’s production of Purified Spherical Graphite benefits by procuring the key raw material, Graphite Concentrates, from the Siviour deposit, thereby passing on the cost advantage in Siviour Graphite Concentrates to the Purified Spherical Graphite operation.*

*The resultant advantage in producing Purified Spherical Graphite offers Renascor direct exposure to the high-growth lithium-ion battery market and high quality, bankable offtake partners attracted to the supply chain security offered by an integrated Australian mine and processing operation.*

*We look forward to using the results of this study to assist in securing offtake commitments to permit Siviour’s financing and development.”*



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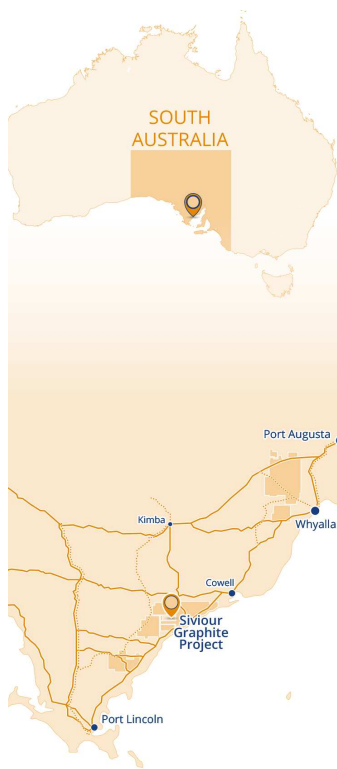
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## Siviour's Purified Spherical Graphite Advantage

The Battery Anode Material Study shows a PSG gross operating cost of of US\$1,989 per tonne. This compares favourably with operating costs from existing commercial PSG operations (all of which are in China), for which Renascor's market data suggests average operating costs of approximately US\$2,000 per tonne<sup>9</sup>.

This favourable cost position is particularly important as battery anode makers seek to diversify from China. Compared to other proposed PSG operations that are not vertically integrated, Renascor's integrated, in-country operation offers important advantages.

**Low-cost Graphite Concentrate feedstock**

Renascor achieves a relatively low PSG unit operating cost in large part because the battery anode materials operation obtains the key raw material, Graphite Concentrates, from Renascor's 100% owned Siviour Graphite Project at a projected life of mine unit operating cost of US\$355 per tonne.<sup>10</sup> The current market value for Graphite Concentrates,<sup>11</sup> is US\$540 per tonne,<sup>12</sup> and over the life of the battery anode material operation, the average market value of Graphite Concentrate is projected to be US\$898 per tonne.<sup>13</sup>

This price difference for Graphite Concentrate feedstock has an exaggerated impact on PSG operating costs primarily because only half of the Graphite Concentrates used as feedstock are spheronised to PSG during the milling process.<sup>14</sup> In other words, twice as much Graphite Concentrate feedstock is required compared to the resultant PSG production.<sup>15</sup>

As shown in Figure 1 below, the potential PSG unit operating cost savings attributable to using Siviour Graphite Concentrates is US\$385 per tonne based on current Graphite Concentrate prices. With Graphite Concentrate prices projected to grow over the life of the battery anode material operation,<sup>16</sup> the potential cost savings from sourcing Graphite Concentrate from Siviour grows to over US\$1,150 per tonne over the life of the operation.

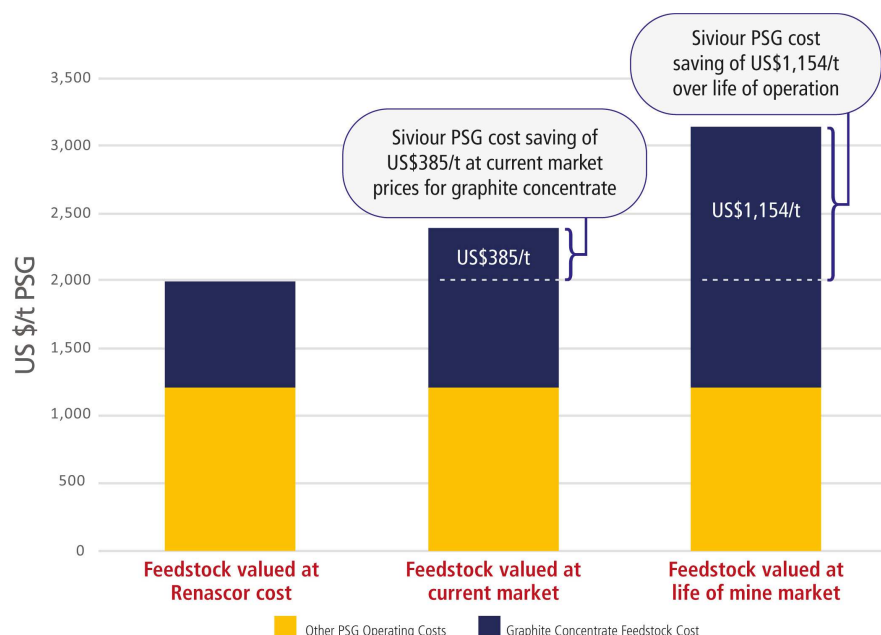


Figure 1. Impact of Graphite Concentrate feedstock cost on unit PSG operating costs

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#### *Advantage of in-country Australian processing*

Renascor's production of PSG also benefits from co-locating the Graphite Concentrate and PSG operations in South Australia. This eliminates supply dependence on overseas mines for Graphite Concentrates, and, for potential offtake and finance partners, offers the added benefit of limiting perceived supply chain risk to Australia, which is considered among the most attractive mining jurisdictions worldwide.<sup>17</sup>

Renascor's production of PSG with Siviour Graphite Concentrates also benefits by not introducing additional shipping costs, as the battery anode material operation is sited in Port Adelaide, which is within the planned transport corridor for Siviour Graphite Concentrates.

#### **Demand for Graphite Concentrates and Purified Spherical Graphite**

Renascor's focus on PSG is based on obtaining direct exposure to the highest growth sector of the graphite market, the lithium-ion battery sector.

#### **Graphite Concentrates**

Currently, the demand for Graphite Concentrates is about two-thirds industrial and one-third related to battery demand.<sup>18</sup> As electric vehicle take-up increases, the demand for Graphite Concentrates is expected to soon shift to the lithium-ion market, with the battery sector's share of Graphite Concentrate demand expected to exceed 50% by 2023 and 75% by 2029, and the overall market for Graphite Concentrates increasing from a projected 750,000 tonnes in 2019 to over 3 million tonnes by 2029.<sup>19</sup>

#### **Purified Spherical Graphite**

The impact of increased battery demand is expected to be even more pronounced in the demand for PSG, with annual growth rates of up to 29% predicted through to 2030, leading to an increase in the market from approximately 200,000 tonnes in 2019 to 2.4 million tonnes by 2029.<sup>20</sup> See Figure 2.

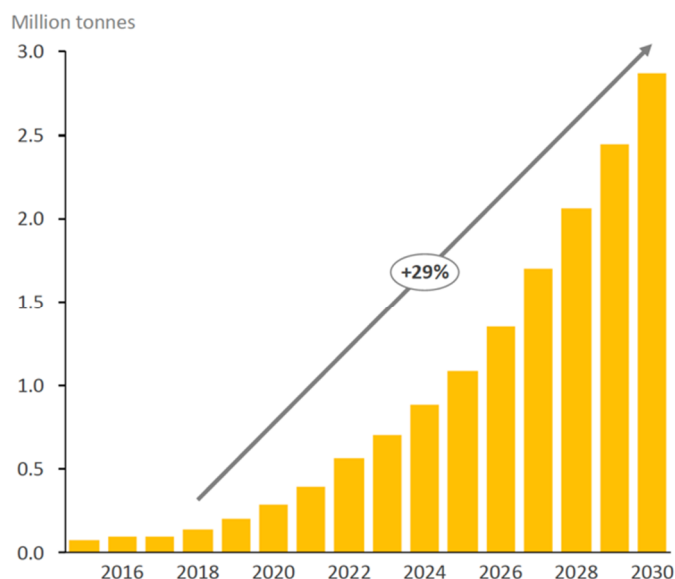


Figure 2. PSG demand forecast (source: Benchmark Mineral Intelligence)

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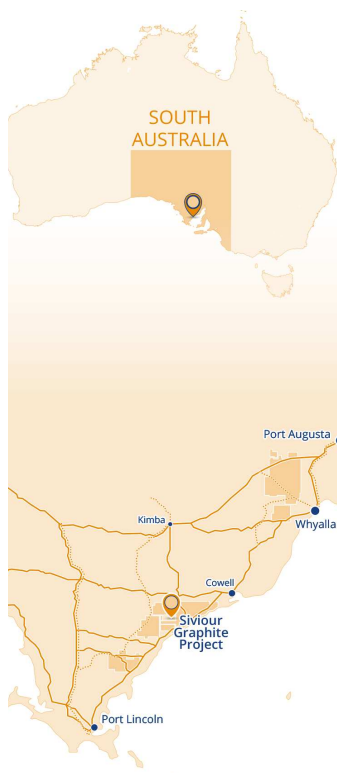
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#### Next Steps

Renascor intends to continue the development of Siviour, with a focus on the integrated mine and battery anode material operation. Planned upcoming work programs include:

- Offtake and finance discussions with potential end-users of Siviour graphite products (including both PSG and Graphite Concentrates);
- Preparation of additional customer samples of Siviour PSG;
- Advanced mineral processing tests, including optimisation of Renascor's purification circuit for producing PSG and production of other high value-added products;
- Advanced battery testing using Siviour PSG samples; and
- The completion of permitting and approvals required to commence production at Siviour.

#### Bibliography

Set out below is a list of announcements referenced in the main text of this announcement and the attached appendices:

1. Renascor ASX announcement dated 25 January 2018, "Battery Grade Spherical Graphite Produced from Siviour"
2. Renascor ASX announcement dated 15 February 2018, "99.99% Spherical Graphite Produced from Siviour"
3. Renascor ASX announcement dated 31 August 2018, "Successful Locked-Cycle Tests & Bulk Concentrate Production"
4. Renascor ASX announcement dated 31 October 2018, "Successful Pilot Plant Production"
5. Renascor ASX announcement dated 28 November 2018, "Breakthrough in Purification Expected to Drive Lower OPEX for Siviour Spherical Graphite Production"
6. Renascor ASX announcement dated 21 February 2019, "Spherical PFS Demonstrates Increased Returns for Siviour"
7. Renascor ASX announcement dated 4 March 2019, "BurnVoor Appointed as Financial Advisor for Siviour"
8. Renascor ASX announcement dated 10 April 2019, "In Principle Project Finance Support from Dutch ECA"
9. Renascor ASX announcement dated 30 April 2019, "High-Grade Measured Resource in Upgraded JORC Resource"
10. Renascor ASX announcement dated 12 August 2019, "Positive Results from Spherical Graphite Tests"
11. Renascor ASX announcement dated 11 November 2019, "Siviour Definitive Feasibility Study"
12. Renascor ASX announcement dated 18 November 2019, "Battery-Grade Graphite Produced via Low-Cost Purification"
13. Renascor ASX announcement dated 3 March 2020, "In Principle Finance Support from Australian ECA"
14. Renascor ASX announcement dated 24 June 2020, "Siviour Integrated Graphite Concentrate and Spherical Graphite Project -- Financing Update"



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

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.

This ASX announcement has been approved by Renascor's Board of Directors and authorised for release by Renascor's Managing Director David Christensen.

### For further information, please contact:

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<sup>1</sup> Start-capital cost of A\$114 million does not include mining pre-strip of A\$4 million.

<sup>2</sup> Source: Benchmark Mineral Intelligence.

<sup>3</sup> Renascor ASX announcement dated 3 March 2020.

<sup>4</sup> Renascor ASX announcement dated 23 June 2020.

<sup>5</sup> Atradius has provided in principle support for up to approximately 60% of upfront stage-one project capital expenditure for the mine and concentrate operation. Renascor ASX announcement dated 10 April 2019.

<sup>6</sup> AusIMM 2012. Cost Estimation Handbook. 2<sup>nd</sup> Edition, Monograph 27. The Australian Institute of Mining and Metallurgy.

<sup>7</sup> The Siviour Concentrate DFS contemplates a second stage expansion in year five to be paid with projected cashflows. The projected stage two capital requirement is A\$77 million or US\$ 54 million.

<sup>8</sup> Adjustment of A\$786/US\$550 per tonne made for sale by-product.

<sup>9</sup> Source: Benchmark Mineral Intelligence.

<sup>10</sup> Source: Siviour Concentrate DFS. The estimated LOM average operating cost of US\$355 per tonne of Graphite Concentrates consists of the following breakdown: (1) an average LOM cost of US\$361 per tonne of Graphite Concentrates Feedstock, and (2) average LOM cost of US\$349 per tonne of Graphite Concentrates sold to the market.

<sup>11</sup> Financial Model assumes -80 mesh and -100 mesh Graphite Concentrate as feedstock to PSG operations. For the purpose of Figure 1, fair market value of -100 mesh is being adopted for illustration purposes.

<sup>12</sup> Source: Benchmark Mineral Intelligence.

<sup>13</sup> Source: Siviour Concentrate DFS. Fair market value of US\$898 per tonne is based on life of mine projected price forecast from Benchmark Mineral Intelligence for -100 mesh 94%-95% TC Graphite Concentrate. See note 9.

<sup>14</sup> The Battery Anode Material Study assumes that The Battery Anode Material Study assumes that Graphite Concentrates that do not pass to the purification circuit (see Figure A-2) for sale as PSG are sold as a bi-product for sale into the recarburiser market. Renascor is also assessing opportunities for further processing for sale into the market for high purity fines and ultra-high purity fines.

<sup>15</sup> During the purification process, additional "losses" occur, as spheronised Graphite Concentrates are upgraded from purity levels of typically 94%-95% to +99.95% TC.

<sup>16</sup> See Siviour Concentrate DFS, p. 28.

<sup>17</sup> South Australia was rated the sixth most attractive jurisdiction in the world for mining investment, according to the Fraser Institute Survey of Mining Companies 2019.

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<sup>18</sup> Source: Benchmark Mineral Intelligence.

<sup>19</sup> Source: Benchmark Mineral Intelligence.

<sup>20</sup> Source: Benchmark Mineral Intelligence.





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## Appendix 1

### Key Components of the Battery Anode Material Study

#### 1. Overview

The Battery Anode Material Study assesses the potential viability of integrating a downstream PSG processing operation with a mine and Graphite Concentrate operation at Renascor's Siviour Graphite Project in South Australia.

The results presented here update a prefeasibility level study completed in February 2019 (the "PSG PFS") (see RNU ASX announcement dated 21 February 2019) by incorporating the results of the Siviour Graphite Concentrate Definitive Feasibility Study (the "Siviour Concentrate DFS") (see RNU ASX announcement dated 11 November 2019) and adjusting and validating material inputs to the downstream PSG processing operation, including PSG and by-product production levels, Graphite Concentrate feedstock specifications, operating and capital costs and revenue projections.

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 the Battery Anode Material Study, as well as the original PSG PFS.

In its capacity as study manager of the PSG PFS and the Battery Anode Material Study, Wave International participated in processing test work, compiled the technical study work, preliminary assumptions and conceptual financial models using information and assumptions provided by Renascor and specialist consultants.

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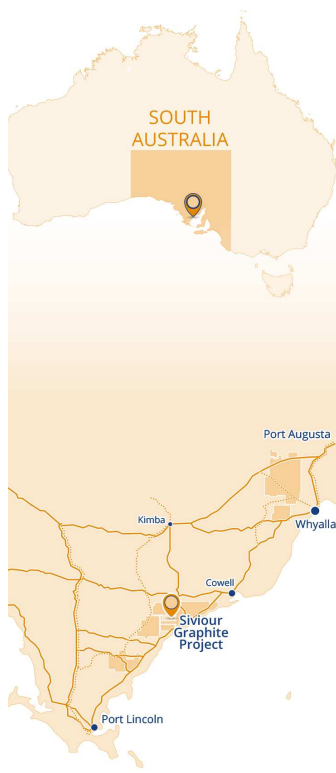
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## 2. Plant location and Infrastructure

The battery anode material operation incorporates a downstream processing operation to manufacture PSG from Graphite Concentrates to be produced at the Siviour mine site in South Australia's Eyre Peninsula, with the PSG manufacturing plant to be located at an industrial site near Port Adelaide. See Figure A-1.

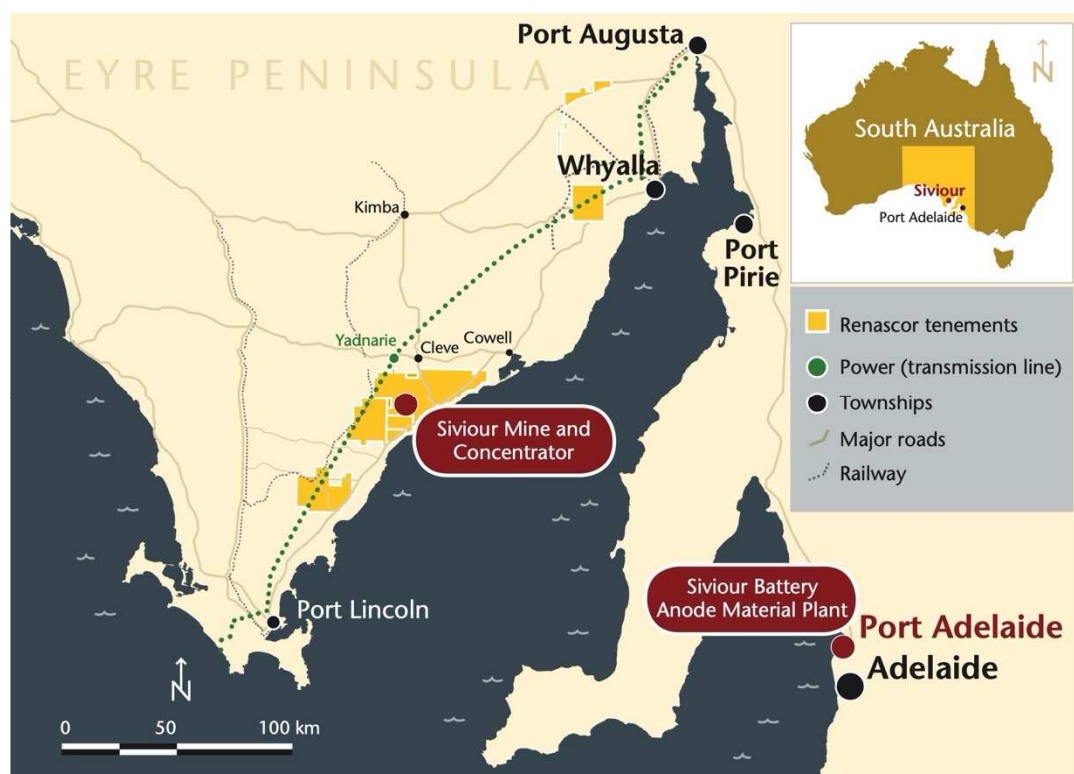


Figure A-1. Locations for Siviour Mine and Concentrate operation and battery anode material production facility

By siting the plant in an industrial precinct between the mine site and the shipping port (Port Adelaide), several advantages are realised, including:

- *Infrastructure availability to reduce capital requirements.* The industrial precinct provides ready availability to necessary supplies of electricity and water, as well as easy road access for receipt of raw materials and transport of products for shipment to customers.
- *Regulatory and environmental.* The industrial precinct is zoned for heavy industrial use in a manner that would permit the commissioning and operation of the proposed battery anode material plant. The site also offers more limited risk of issues associated with heritage protection, water contamination and other community standards.
- *Operational cost savings.* Transport costs are minimised by limiting movement along the planned mine-to-port transport route for Siviour Graphite Concentrates. Relative to other potential PSG operations that propose exporting Graphite Concentrates to third-countries for processing, Renascor expects a comparative cost savings by avoiding additional transport and logistic costs.

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### 3. Spherical Graphite Test Work

PSG test work has included micronisation, spheronisation and purification tests designed to assess the ability of Siviour Graphite Concentrates to be processed into high purity PSG meeting industry specifications for the lithium-ion battery anode market. Additional test work has included assessing the viability of Siviour PSG 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 to convert Graphite Concentrates into PSG for use in lithium-ion battery anodes.

Test work was initially undertaken by ProGraphite GmbH ("**ProGraphite**"), an independent specialist graphite company with expertise in laboratory testing and analysis of natural graphite products, on a 25kg composite core sample from the 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.

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

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

In addition, first pass yields were achieved from 51% to 60%. For purposes of the Battery Anode Material Study, an assumed yield of 50% has been adopted.

Commercial pilot-scale tests were subsequently undertaken using conventional cascading milling equipment on 60kg samples of Siviour Graphite Concentrates of 75 µm and 150 µm.

The results of this work are shown below in Table A-2 (next page).



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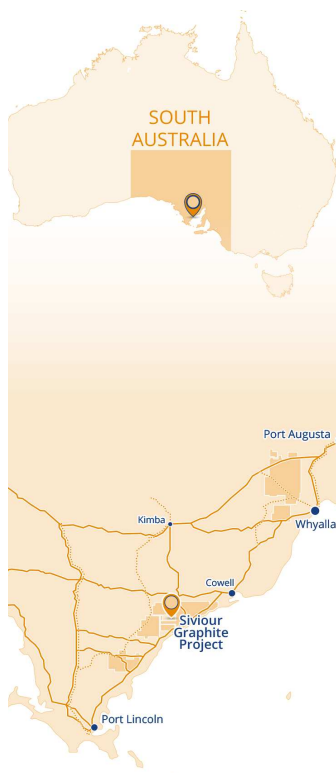
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Parameter	Test 1	Test 2
Feed size	75 µm	150 µm
D10 size fraction (-10% finer than this size)	9.1 µm	9.2 µm
D50 size fraction (-50% finer than this size)	15.4 µm	16.0 µm
D90 size fraction (-90% finer than this size)	23.5 µm	25.1 µm
Ratio D10 to D90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

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

Renascor has also undertaken additional micronisation and spheronisation tests on alternative one-step milling machinery using a single micronisation unit and a single spheronisation unit. Renascor's testing to date suggests that these alternative milling machines offer potential benefits, including yielding a greater percentage of viable spherical graphite than the cascading approach. At present, however, one-step milling technology is still in the development phase. For purposes of the Battery Anode Material Study, Renascor has adopted the conventional cascading mill.

### 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. For purposes of the Battery Anode Material Study, three techniques were tested: caustic roast purification, chemical treatment with hydrofluoric acid and a low-temperature, non-oxidative purification technique<sup>1</sup>. In each case, Siviour graphite was successfully upgraded to battery-anode purity levels.

For purposes of the Battery Anode Material Study, caustic roast purification has been selected as the most viable method due primarily due the environmental benefits associated with avoiding the use of hydrofluoric acid.

Details of purification tests programs are provided below.

### Caustic roast purification

Caustic roast purification involves Siviour Graphite Concentrates being combined with a caustic solution and then roasted at low temperature before being leached with hydrochloric acid.

<sup>1</sup> Thermal purification is also generally considered a viable method for upgrading Graphite Concentrates to battery-grade purify, however, it has been excluded from this study due to the relatively high energy consumption rates.

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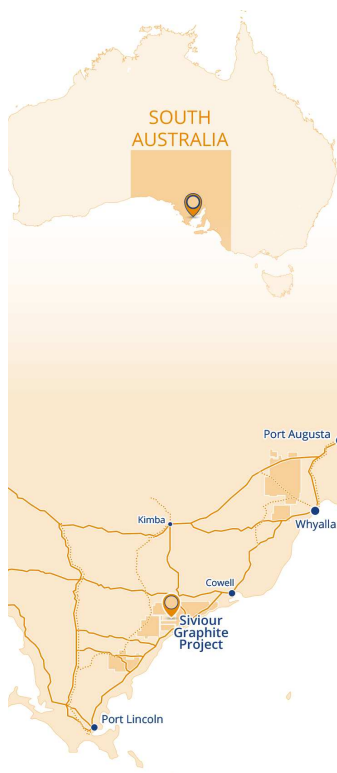
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One advantage of the caustic process is that it does not use hydrofluoric acid, the method generally adopted in China, which currently controls 100% of the market for converting Graphite Concentrates to PSG. Due to its high toxicity, the use and disposal of hydrofluoric acid presents environmental management challenges.

A further advantage of caustic roasting involves potential cost savings, with lower reagent and health and safety costs.

Caustic roast purification tests have included tests undertaken by a Tungsten Consulting UG (“**Tungsten**”), a German graphite specialist with expertise in purification of natural flake graphite for use in lithium-ion battery anodes.

Initial caustic roast purification tests were undertaken on samples of 95% total TGC 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 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. See Renascor ASX announcement dated 28 November 2018.

Additional testing was performed on Siviour Graphite Concentrates that were subsequently micronised and spheronised using a conventional cascading mill. Samples of the spheronised graphite from this process were then combined with a caustic solution for the caustic roasting process, before undergoing leaching and drying. See Renascor ASX announcement dated 12 August 2019.

The tests successfully produced +99.95% TC, battery-grade anode material, with an average grade of 99.965% TC. A summary table is presented in Table A-3 below.

Sample ID	Total Carbon (TC)
TC-3534	99.959%
TC-3535	99.958%
TC-3536	99.966%
TC-3537	99.980%
TC-3538	99.978%
TC-3539	99.957%
TC-3540	99.943%
TC-3541	99.980%
<b>Average</b>	<b>99.965%</b>

Table A-3. Commercial pilot-scale micronisation and spheronisation test results

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Additional purification tests were also performed on Graphite Concentrates produced from a bulk sample production program undertaken at SGS Lakefield in Canada. See Renascor ASX Announcement dated 31 August 2018.

These tests first replicated the PSG PFS design criteria using a caustic solution, before performing a low temperature roast and hydrochloric acid leach. The tests successfully achieved high graphite purities in excess of 99.98% TC.

#### **Hydrofluoric acid purification**

Purification tests were also undertaken using hydrofluoric acid purification, the method generally adopted in China. Tests undertaken by ProGraphite on Siviour Graphite 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.

#### **Low-temperature, non-oxidative purification**

Additional purification tests have included a proprietary purification process, which has not previously been commercially used in the graphite sector, that uses a low-temperature (80°C), non-oxidative purification technique to produce battery-grade graphite from Graphite Concentrates.

The tests were undertaken by Urbix Resources (“**Urbix**”), a US-based graphite processing specialist active in the development of technologies to improve the graphite value chain. See Renascor ASX announcement dated 18 November 2019.

To assess the suitability of the Urbix purification technique for Siviour, Renascor provided Urbix with Siviour Graphite Concentrates for testing at Urbix’s laboratory in Mesa, Arizona (USA). Testing was performed on sample PO976, a sample of Siviour Graphite Concentrate with a purity of approximately 96% TC.

A summary of key results is provided in table A-4 below:

Sample	Trial	Sample status	%TC
PO976	Purified, trial 1, batch 1	Composite sample	99.97%
PO976	Purified, trial 1, batch 2	Composite sample	99.98%

Table A-4. Urbix purification test results

The results of the Urbix purification tests suggest the potential to achieve further cost-savings through the adoption of Urbix’s purification technique. As Urbix’s purification technology is still in the development phase, it has not been adopted for the Battery Anode Material Study.



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### 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 PSG to produce lithium-ion battery anodes.

Test work has included initial sighter test work overseen by ProGraphite in which an anode slurry was produced using Siviour PSG 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 Siviour PSG 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 PSG 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 PSG 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, met specification with Siviour PSG, with an efficiency of 99.9% after 153 cycles. This result suggests Siviour PSG would perform at a high level over a long battery life, with excellent durability.

### 4. Environment and Permitting

The primary approval required for the battery anode material 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 it has secured a project site.

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## 5. Plant Design and Process

The battery anode material plant has been designed to produce battery-grade PSG through an eco-friendly process that avoids the use of hydrofluoric acid and thereby satisfies increasingly strict sustainability requirements of end-users and prospective financiers.

Graphite Concentrates obtained from Siviour will be micronised, spheronised and purified before being bagged for shipment. The designed process results in the manufacture of two products: PSG and a fine by-product from the spheronisation process, which is typically sold into the recarburiser market. Renascor is also assessing smaller high value-add markets for by-product production, including high purity and ultra-high purity fine flake graphite<sup>2</sup>.

The results presented are based on an annual battery anode material plant treatment of approximately 60,000t of flake Graphite Concentrate obtained from Siviour with a nominal purity of 94% total graphitic carbon ("TGC") and flake size of <180 µm or 80 mesh.

The proposed battery anode material plant incorporates facilities for the following unit process operations:

- Graphite Concentrate offloading and dry storage;
- Micronisation and spheronisation;
- Caustic roast thermal purification; and
- PSG drying and bagging.

A simplified flow sheet is shown below in Figure A-2.

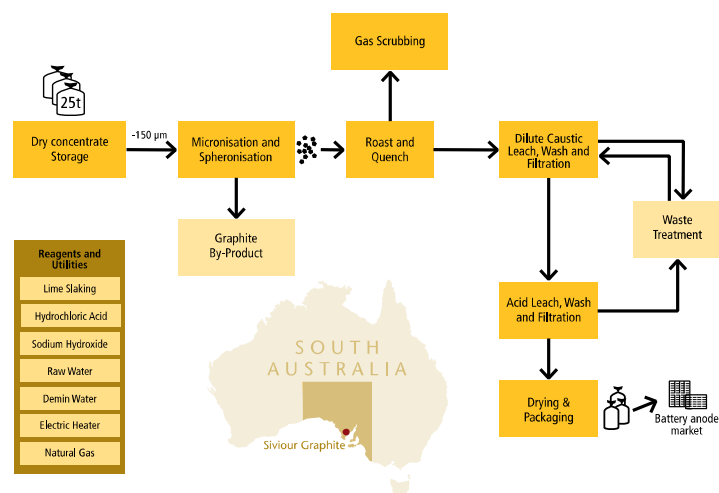


Figure A-2. Process flow sheet

<sup>2</sup> The market for high purity (+99% TC) fine flake graphite is small relative to PSG, with Renascor's market data suggesting an overall market size of approximately 50,000 tonnes per year, which includes a smaller market for ultra-high purity (+99.9% TC) fine flake graphite.

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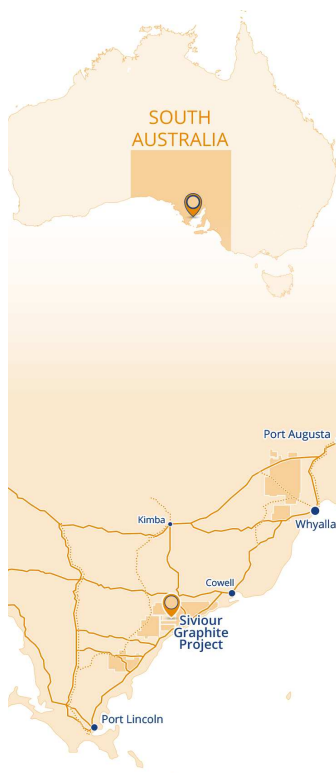
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## 6. Market

### Product specifications

Uncoated PSG must meet purity, size and other product quality specifications for use in lithium-ion battery anodes. For the purposes of this study, Renascor has adopted a minimum purity requirement of 99.95% TC. PSG product size is dependent on end-user requirements, with common sizes ranging between 10 and 25  $\mu\text{m}$ . For purposes of the Battery Anode Material Study, Renascor has assumed a mid-point size requirement of 15  $\mu\text{m}$ .

### Forecast pricing

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

For the purposes of project valuation and product pricing, Renascor commissioned Benchmark Minerals Intelligence, an independent marketing consultant with expertise in PSG pricing, to prepare a market report, including a ten-year forecast for PSG pricing, which has been adopted for the Battery Anode Material Study as shown in Table A-5.

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Price (US\$ per tonne)	3,306	3,333	3,032	3,335	3,668	4,035	4,237	4,364	4,495	4,444

Table A-5. PSG Price Forecast (Source: Benchmark Mineral Intelligence)

By-product pricing is based on extensive engagement with end-users, intermediaries, specialty price reporting consultants and other graphite market participants regarding the potential sale of PSG by-products. Based on this engagement, Renascor has adopted a price a by-product price of US\$550/t of by-product.



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**7. Capital Costs**

Estimated pre-production capital costs of the battery anode material plant are provided below in Table A-6.

Parameter	Estimated value	
	A\$	US\$
Battery anode material plant	52.4m	36.7m
Engineering and project management	7.7m	5.4m
Pre-production and Site infrastructure	2.0m	1.4m
Indirect costs	14.6m	10.2m
Contingency	13.1m	9.2m
<b>Total</b>	<b>89.9m</b>	<b>62.9m</b>

Table A-6. Pre-production capital cost estimate summary

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## 8. Operating Costs

Estimated operating costs of PSG are provided below in Table A-7.

Parameter	Estimated value			
	A\$/year	A\$/tonne of spherical graphite	US\$/year	US\$/tonne of spherical graphite
Energy	A\$15.5m	A\$555	US\$10.9m	US\$389
Reagents and consumables	A\$23.1m	A\$825	US\$16.1m	US\$578
Maintenance	A\$3.7m	A\$133	US\$2.6m	US\$93
Labour	A\$2.5m	A\$88	US\$1.7m	US\$62
General and administration <sup>3</sup>	A\$1.5m	A\$54	US\$1.1m	US\$38
Product logistics FOB	A\$2.2m	A\$79	US\$1.5m	US\$55
<b>Sub-total (cost of converting Graphite Concentrates to PSG)</b>	<b>A\$48.5m</b>	<b>A\$1,735</b>	<b>US\$33.9m</b>	<b>US\$1,214</b>
Graphite Concentrate feedstock	A\$30.6m	A\$1,107	US\$21.4m	US\$775
<b>Sub-total (gross cost of producing PSG)</b>	<b>A\$79.0m</b>	<b>A\$2,842</b>	<b>US\$55.3m</b>	<b>US\$1,989</b>
By-product credit	(A\$23.6m)	(A\$844)	(US\$16.5m)	(US\$591)
<b>Total</b>	<b>A\$55.5m</b>	<b>A\$1,998</b>	<b>US\$38.8m</b>	<b>US\$1,398</b>

Table A-7. Operating cost estimate summary

<sup>3</sup> Assumes general and administration costs are shared with the Graphite Concentrate operation.

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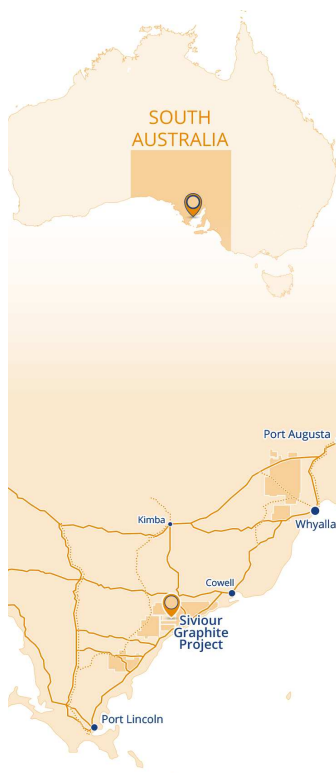
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## 9. Financial Sensitivities

A sensitivity analysis was completed to assess the impact of a range of key parameters to the project net present value ("NPV") using a 10% discount rate, after-tax, and expressed in Australian Dollars.

Variable	-10% unfavourable		+10% favourable	
	A\$m	US\$m	A\$m	US\$m
Capital expenditure	A\$719m	US\$503m	A\$707m	US\$495m
Operating expenditure	A\$675m	US\$472m	A\$751m	US\$526m
PSG price	A\$611m	US\$427m	A\$815m	US\$571m
By-product price	A\$698m	US\$489m	A\$728m	US\$510m
Exchange rate	A\$895m	US\$627m	A\$564m	US\$395m
Graphite Concentrate price	A\$665m	US\$466m	A\$761m	US\$532m

Table A-8. Net present value sensitivity of integrated Graphite Concentrate and battery anode operation

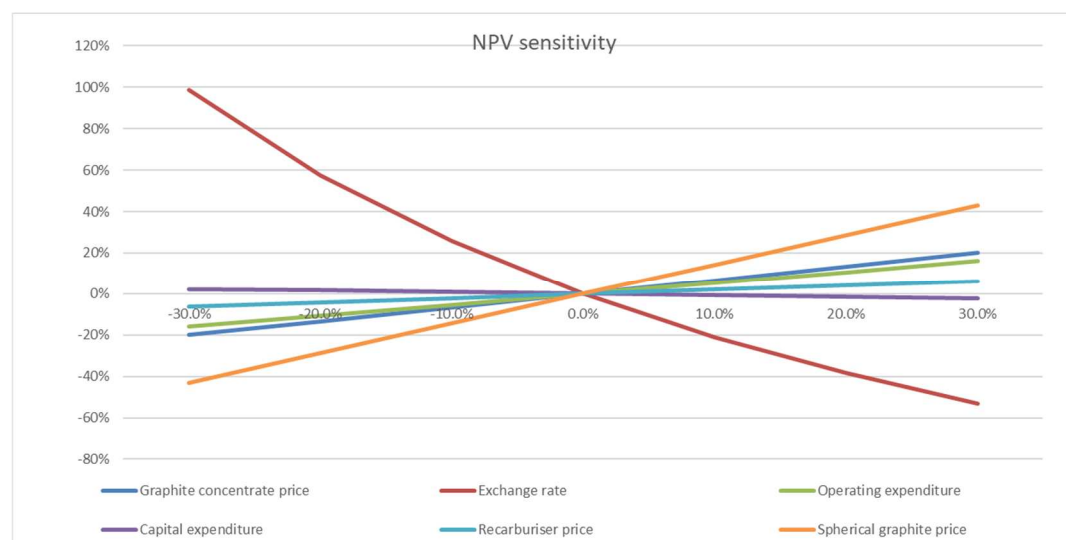


Figure A-3. Net present value sensitivity of integrated Graphite Concentrate and battery anode operation



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## 10. Funding

The Battery Anode Material Study is based on the production of PSG for sale into the high-growth lithium-ion battery market. Siviour PSG is expected to be sought-after by high-quality partners seeking long-term offtake agreements that are considered likely to attract project debt financing.

Renascor has received strong support for debt financing for the integrated mine and battery anode material operation. This includes in-principle finance support for the integrated operation from Export Finance Australia. See Renascor ASX announcement dated 3 March 2020. Renascor has also received in-principle support from Atradius, the official Dutch Export Credit Agency, for up to approximately 60% of upfront stage-one project capital expenditure for the mine and concentrate operation. See Renascor ASX announcement dated 10 April 2019. Recently, Renascor appointed a leading European investment bank to assist with securing debt financing. See Renascor ASX announcement dated 24 June 2020.

The ultimate funding mix for construction and operational start-up, together with other costs associated with the project (such as environmental bond) will be determined prior to final investment decision and will be dependent on final estimates for capital cost, construction and ramp-up period, market outlook, debt availability and cost, and funding scope of any strategic offtake partner or strategic investor at the time. Renascor believes it is well placed to secure necessary funding for the integrated mine and battery anode material operation, with options being actively pursued including:

- equity and debt instruments from existing and potential shareholders;
- project finance;
- offtake-related finance;
- bond;
- strategic investment;
- equipment and contractor finance; and
- access to government grants.

To aid the securing of funding for the project, Renascor has appointed BurnVoor Corporate Finance, a leading independent advisory firm with a strong record of arranging debt and equity finance for small to mid-tier single mine mining companies. See ASX announcement dated 4 March 2019.

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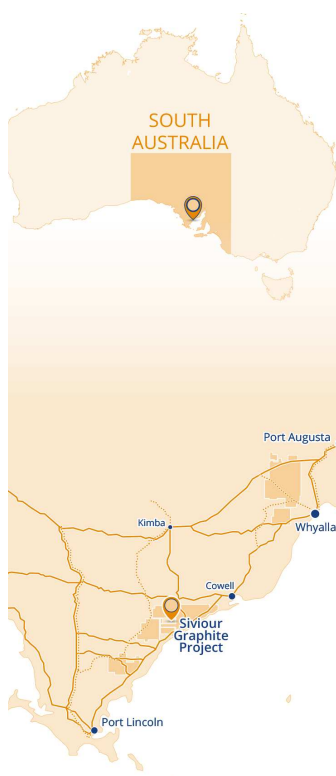
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## 11. Implementation Schedule

The schedule for the Battery Anode Material Study incorporates the execution plan for the mine and concentrate operation, with activities required for the battery anode material plant.

The implementation schedule for integrated battery anode material operation is subject to project and board approvals, funding and securing offtake agreements. Pending completion of the foregoing, the final investment decision is planned for the first quarter of 2021, to be immediately followed by detailed engineering and procurement. Construction is scheduled to commence in the second quarter of 2021, with commission and ramp-up scheduled for second half of 2022.

A summary schedule for is shown below in Figure A-4.

	Q2'20	Q3'20	Q4'20	Q1'21	Q2'21	Q3'21	Q4'21	Q1'22	Q2'22	Q3'22	Q4'22
Marketing and Offtake											
PSG Optimisation Tests and Product Testing											
PSG Engineering											
Early Works											
Long Lead time Procurement											
Project Financing and Due Diligence											
Final Regulatory Approvals											
Final Investment Decision											
Detailed Design and Procurement											
Construction											
Commissioning											
Production Ramp Up											
Full Production											

Figure A-4. Summary implementation schedule

## 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 accuracy level of -10% to + 20% in accordance with the Australian Institute of Mining and Metallurgy (the AusIMM) guidelines (AusIMM 2012. Cost Estimation Handbook. 2 <sup>nd</sup> 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 from Renascor’s Definitive Feasibility Study on the viability of producing Graphite Concentrates (the “Siviour Concentrate DFS”). See Renascor ASX announcement dated 22 November 2019.
Mineral resource estimate underpinning the production target	The Mineral Resource estimate for Siviour declared in April 2019 (see Renascor ASX announcement dated 30 April 2019) underpins the production target related to the Graphite Concentrates that are processed into Purified 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 Siviour Concentrate DFS. The Siviour Concentrate DFS 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 experienced mining contractors.
Metallurgical factors or assumptions	The parameters for the processing of Graphite Concentrates into Purified 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 successful 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 Siviour Concentrate DFS.



Infrastructure and logistics	<p>The infrastructure required to support the battery anode material 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 Battery Anode Material Study is based on siting the plant in an industrial location with existing access to high voltage power and water. This study assumes that Purified 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 Siviour Concentrate DFS for the mine) for export. This study adopts the assumptions of the Siviour Concentrate DFS for all matters relating to the production of Graphite Concentrates, including infrastructure and logistics assumptions.</p>
Capital costs	<p>The capital cost estimate for the Purified 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 underlie 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. A contingency allowance of 15% 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 A\$ with a base date of Q4 2018 with no allowance for escalation to an accuracy of +/-25%. EPCM refers to engineering, procurement and construction management costs and is applied at a rate of 0% to 35% of 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 Siviour Concentrate DFS.</p>
Operating costs	<p>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 A\$ by Wave International with input from Renascor. The cost of Siviour Graphite Concentrates is set at the production costs contemplated by the Graphite Siviour Concentrate DFS. Renascor provided labour force estimates based on industry standards from similar operations. The estimate for product logistics was taken from the Siviour Concentrate DFS. All operating costs relating to the production of Graphite Concentrates are based on estimates included in the Siviour Concentrate DFS. In all cases, the operating cost estimates exclude exchange rate variations, price escalation and interest charges.</p>

Revenue factors	<p>Revenue from the project is derived from the sale of Purified Spherical Graphite, Graphite Concentrates and recarburiser product. Renascor has established the characteristics of expected final products of Purified 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 these 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 Siviour Concentrate DFS.</p>
Schedule and timeframe	<p>The project development schedule is based on having 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 24 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 battery anode material becoming operational at the same time as the Graphite Concentrate mine and processing plant, as contemplated in the large-scale case from the Siviour Concentrate DFS.</p>
Market assessment	<p>Purified 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 Purified Spherical Graphite supply. This is understood from various market analyst reports. 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 Concentrate DFS.</p>
Funding	<p>To achieve the range of outcomes indicated in the Battery Anode Material Study, total approximate funding of (1) A\$99m or US\$44m will likely be required for capital works, pre-production working capital and contingency required to construct the battery anode material and (2) A\$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</p>

	<p>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.</p> <p>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:</p> <ul style="list-style-type: none"> <li>• Renascor's Board and executive team have a strong financing track record in developing resources projects;</li> <li>• Renascor has a proven ability to attract new capital;</li> <li>• Renascor's Board believes this study demonstrates the project's strong potential to deliver favourable economic return; and</li> <li>• Other companies at a similar stage in development have been able to raise similar amounts of capital in recent capital raisings.</li> </ul>
Economic	<p>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: price, capital and operating costs and US/AU exchange rate. All of these inputs were tested for variations of +/- 10%.</p>
Exchange rate	<p>The exchange rate for the reporting of the results from this study is A\$1.00 = US\$0.70, except in the case of references to the Siviour Concentrate DFS, which used an exchange rate of A\$1.00 = US\$0.70.</p>
Social	<p>This study contemplates siting the battery anode material plant in Port Adelaide, an existing industrial precinct situated in near proximity to 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 estimates included in the Siviour Concentrate DFS.</p>
Other	<p>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.</p>
Audits or reviews	<p>This study was internally reviewed by Renascor. No material issues were identified by the reviewers.</p>





## Appendix 3 – Financial Model

A summary of the financial model is shown below:

[illegible]



## Appendix 3 – Financial Model

A summary of the financial model is shown below:

[illegible]