

## THUNDERBIRD 10% ORE RESERVE INCREASE

### HIGHLIGHTS

- Ore Reserve updated by 68 million tonnes to 748 million tonnes @ 11.2% heavy mineral (HM)
- Exceptionally high in-situ zircon grades of 1.02% in Proved Category
- 6.4 million tonnes of contained zircon (500,000 tonne increase)
- New Ore Reserve will underpin the Thunderbird BFS Update due for release in coming weeks
- Confirms Thunderbird as one of the largest undeveloped zircon-rich mineral sands deposits globally

Sheffield Resources Limited (“Sheffield” “the Company”) (ASX: SFX) is pleased to announce an updated Ore Reserve for its world-class Thunderbird Mineral Sands Project, in the north west of Western Australia. The Ore Reserve forms the basis of the Bankable Feasibility Study (BFS) Update, due for release early this quarter. The updated Ore Reserve includes a substantial increase in contained zircon of 500,000 tonnes to 6.4 million tonnes and underlines the significant scale of the Thunderbird deposit.

This Ore Reserve estimate was prepared by Entech Pty Ltd, an experienced and prominent mining engineering consultancy with appropriate mineral sands experience and industry knowledge. This Ore Reserve is based on the Thunderbird Mineral Resource estimate, announced to the ASX on 5 July 2016, where Measured and Indicated Mineral Resources were converted to Proved and Probable Ore Reserves respectively, subject to modifying factors, including mine designs and economic evaluation.

The Ore Reserve for Thunderbird, as at 30 June 2019, is outlined in the table below:

**Table 1:** Thunderbird Ore Reserve, June 30, 2019.

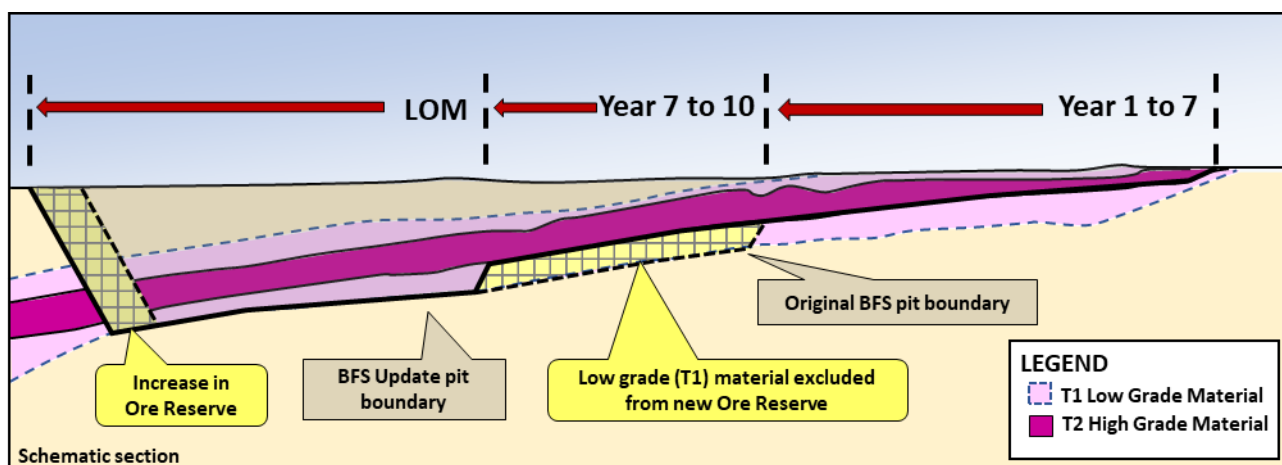
Ore Reserve			Valuable HM Grade (In-Situ)					
Reserve Category	Material (Mt)	HM (%)	Zircon (%)	HiTi Leuc (%)	Leucoxene (%)	Ilmenite (%)	Oversize (%)	Slimes (%)
Proved	219	13.7	1.02	0.30	0.28	3.68	14.0	16.1
Probable	529	10.1	0.79	0.26	0.27	2.87	10.5	14.5
<b>Total</b>	<b>748</b>	<b>11.2</b>	<b>0.86</b>	<b>0.27</b>	<b>0.27</b>	<b>3.11</b>	<b>11.6</b>	<b>15.0</b>

*The in-situ grade is determined by multiplying the percentage of HM by the percentage of each valuable heavy mineral within the heavy mineral assemblage at the resource block model scale. Tonnes and grades have been rounded to reflect the relative accuracy and confidence level of the estimate, thus the sum of columns may not equal. See Appendix A for additional details.*

The updated Ore Reserve of 748 million tonnes at 11.2% HM is an increase of 68 million tonnes or approximately 10% (based on ore tonnes) and approximately 9% (based on HM tonnes) compared to the previous Ore Reserve of 680.5 million tonnes at 11.3% HM. This reflects changes in market product pricing, reduced operating costs and the increased revenue certainty for Thunderbird. The majority of the cost estimates applied to determine the Ore Reserve have been informed by negotiated or executed agreements. In addition, binding offtake agreements account for more than 85% of projected Stage 1 revenues.

The BFS Update targets a 38% increase in the ore mining rate, the deferral of the Low Temperature Roast (LTR) ilmenite circuit and an increase in zircon production. This is expected to deliver lower capital and operating costs, lower construction risk and a financially stronger project. In support of this strategy, the updated Ore Reserve increases the period of mining the higher grade ore (T2) from seven years to ten years and removes lower grade ore (T1) from the process plant feed. This increases the in-situ zircon grade in the Proved Category to 1.02% zircon and reduces the tonnage of Proved Category from 236Mt to 219Mt as illustrated in the schematic section below.

**Figure 1:** Schematic of Thunderbird BFS Update pit boundary and increased period of mining higher grade ore (T2)



Sheffield's Managing Director Bruce McFadzean said that in the early stages of mine development we seek certainty.

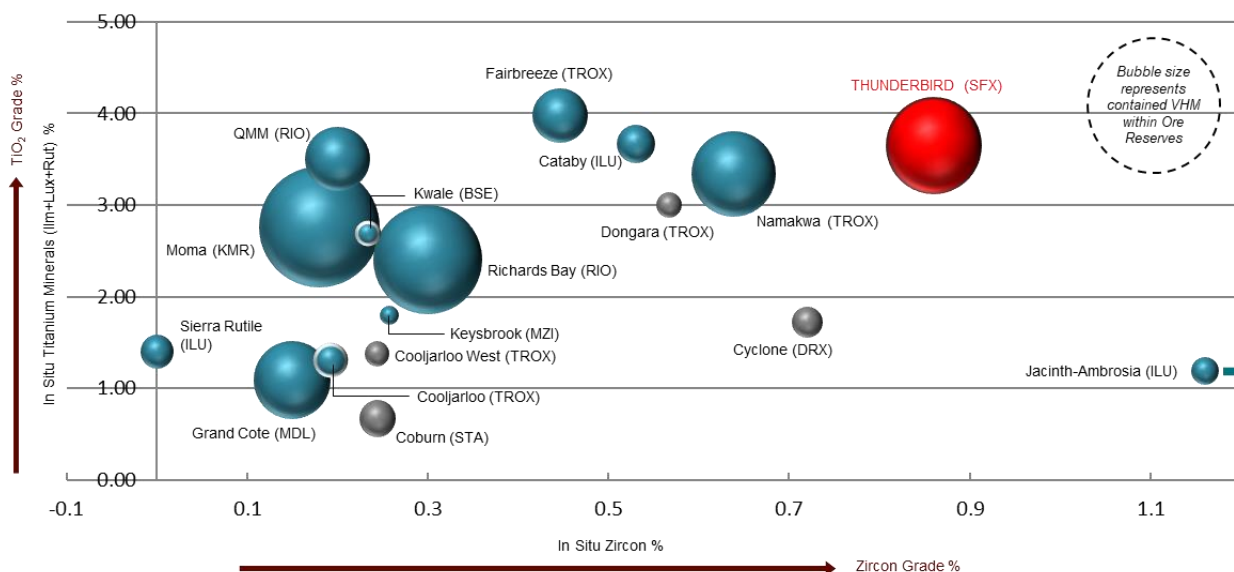
"With both 97 percent of the first 8 years of production and 30 percent of the updated Ore Reserve in the highest Proved category, the updated Thunderbird Ore Reserve delivers confidence."

"We will preferentially mine the high grade T2 ore thereby increasing the feed grade into the processing plant. This approach supports the recent decision to defer the LTR ilmenite circuit and focus on increased zircon output. The Thunderbird Ore Reserve is amongst the world's top tier zircon rich mineral sands ore reserves."

"In summary, the BFS Update targets an increase in zircon production by focusing on higher grade zircon ore and a 38 percent increase to the ore mining rate. The feed rate to the wet concentration plant has been lifted from 788 dry tonnes per hour (2017 BFS) to 1,085 dry tonnes per hour. This will apply to both Stage 1 from year one and Stage 2 from year five onward. Essentially, we are seeking to replace LTR ilmenite revenue with revenue from additional zircon production to target a significant reduction in the equity funding requirement. The recently announced sale of the Primary Ilmenite (refer ASX announcement dated 1 July 2019) further enhances this strategy and will materially improve the project economics."

"Final touches are being made to the BFS Update which will be released in the coming weeks," Mr McFadzean concluded.

Figure 2: Thunderbird Ore Reserve, June 30, 2019 comparison to global Ore Reserves published



1. Thunderbird Ore Reserves ranked against latest published Ore Reserves of current mineral sands operations and projects under investigation globally. Accordingly, for the operating projects, no account is made for any volumes of product already produced
2. Green bubbles are operating mines, grey bubbles are Ore Reserves reported but the project is not operating. Only Ore Reserves > 1.2Mt contained VHM shown
3. Data compiled by Sheffield from public sources. This analysis does not illustrate the variance in product value between rutile, leucocene and ilmenite

The studies and modifying factors applied to the estimation process have been completed to Bankable Feasibility Study level. The updated mine plan is technically achievable, economically viable and robust to variations in long term product pricing.

Updated and detailed mine design and schedules supported by pit optimisation and scheduling studies informed the updated Ore Reserve. A 98% mining recovery factor was applied to ore material, no additional dilution factor has been applied, given the bulk nature of the proposed mining operations and the removal of overburden and mineralised waste occurring well in advance of ore mining. Minimum mining width considerations are not applicable given the dimensions of the ore mining blocks guiding pit design.

The BFS Update has identified an interim pit with high value material, representing approximately 8 years of production with detailed design and scheduling completed within this zone. The interim pit contains 128 Mt of Proved Ore Reserve and 4Mt of Probable Ore Reserve confirming high confidence ore contained in the mining schedule. Beyond this area, a life of mine design has been completed and scheduled using larger scheduling blocks.

Minimal pre-strip is required to access the orebody with topsoil and overburden being excavated, hauled and stockpiled using conventional earthmoving equipment. Bulk mining techniques have been chosen for ore mining, incorporating dozer traps and in-pit feed preparation units (Mining Units Plant or “MUP”). The selected mining method is considered appropriate to the large, relatively thick and sheet-like characteristics of the orebody. Following mining and feed preparation, the ore will be slurried and pumped to a nearby wet concentration plant (WCP). Each MUP will target feed rates to the rougher spiral at the WCP of 1,085 dry tonnes per hour, with provision for conservative ramp up mining and processing factors, as guided by the debt provider’s independent technical experts. Initially one MUP is scheduled, with an additional MUP scheduled from year five. An 85% utilisation factor has been applied to the MUP operations and a 90% utilisation factor has been applied to the processing operations in determining

annual operating hours and throughput capacity respectively. The MUP operations and the processing operations can operate independently due to the installation of a heavy mineral concentrate (HMC) stockpile between the WCP and CUP. The HMC stockpile significantly increases operational flexibility.

Geotechnical analyses informs the basis of pit design criteria including excavatability, trafficability and pit slope wall angles with an estimated life-of-mine average strip ratio (waste: ore) of 0.85 : 1.00. Detailed designs have been completed for the surface tailings storage facility and in-pit tailing storage methodology for the first 4 years of operations, after which appropriate in-pit tails deposition assumptions have been applied.

Processing plant and associated infrastructure have been included in the capital estimates to support the updated Ore Reserve, including an initial Stage 1 zircon circuit and subsequent expansion of the zircon circuit after year 4 and installation of LTR Ilmenite circuit after year 7. The estimate includes the MUPs, Wet Concentration Plants, Mineral Separation Plants, LTR Ilmenite Circuit, site buildings, bore field, LNG gas supply and storage, power station and power distribution infrastructure, new and upgraded roads, accommodation village and upgraded materials handling facilities at the Port of Derby.

Mineral processing is based on well understood conventional unit processes and has been developed using the best in class full scale or scale-able equipment and extensive test work. The process flowsheet is effective in achieving the recoveries from the Ore Reserve for a suite of products produced over the life of mine, comprising premium zircon, zircon concentrate, primary ilmenite, LTR ilmenite and titanomagnetite. Sheffield has previously announced information relating to the recovery, quality and marketability of these products.

The BFS Update process and plant capital costs have been informed by an EPC agreement with GR Engineering Services (GRES) to engineer, procure and construct (EPC) the Stage 1 processing plant. The processing infrastructure is based on a process design and PFDs, mechanical equipment lists and plant and an overall mine site layout, which has been reviewed and agreed with Sheffield, GRES and the debt provider's independent technical experts. The EPC agreement with GRES also includes recovery and performance test guarantees. Capital costs for the Stage 2 and 3 upgrade expansions were estimated on a factored basis to replicate the current plant area and utilise common or expended elements within the Stage 1 plant area where appropriate to do so.

Non-processing plant infrastructure and owner's costs were estimated by Sheffield using executed or negotiated final agreements, industry sources or in-house estimation and expertise to determine the non-process plant infrastructure direct costs.

Project operating costs were estimated using equipment lists, pump and motor calculations (to assess power demand), manning schedules (to assess operating labour), mobile equipment and duty schedules (to assess fuel demand) and supporting calculations for all other consumables. The major operating cost estimates for power and LNG, ore mining and feed preparation services and accommodation services are informed by executed or negotiated final agreements and other operating costs were obtained from various independent sources, including expression of interest process issued and evaluated by Sheffield and third party consultants, on a 30 June 2019 cost basis.

The cost for land clearing, waste mining, tailings storage and other ancillary activities have been estimated on a first principle basis mining model by Entech, on a 30 June 2019 cost basis with

information and assumptions generated in consultation with industry experts, equipment suppliers and mining contractors. Equipment ownership costs were built into the hourly machinery costs.

General and administration operating costs were built up on a first principles basis from manning schedules, labour work rosters, operation of on-site village accommodation, light vehicle and mobile equipment costs and other administration related fixed costs such as communications, IT, consultants, recruitment, and annual tenement costs on a 30 June 2019 cost basis.

Prices for products are based on a combination of industry sources and market evaluations of quality by external consultants TZMI. Sheffield has applied TZMI's long term pricing assumptions for Thunderbird premium zircon, zircon concentrate, LTR Chloride ilmenite and primary ilmenite products.

Financial modelling has been prepared and tested by varying revenue, cost and macro-economic factors. These factors include commodity price, operating and capital costs, production volume and ratios, along with economic discount factors. Material positive outcomes for NPV, IRR and cash flow were generated in all cases from the financial modelling. An A\$/US\$ exchange rate of 0.75 was assumed for the life of mine, based on consensus forecasts.

This Ore Reserve is based on information compiled by Mr. Per Scrimshaw, an employee of Entech Pty Ltd. Other experts, including Optiro Pty Ltd, IHC Robbins, GR Engineering Services, MBS Environmental, ATC Williams, S.A.M. and Sheffield have been relied on for information regarding Mineral Resources, engineering, geotechnical, metallurgy and process design, environmental, operating and capital costs and financial modelling. Further details regarding the Ore Reserve estimate are included as Appendix A.

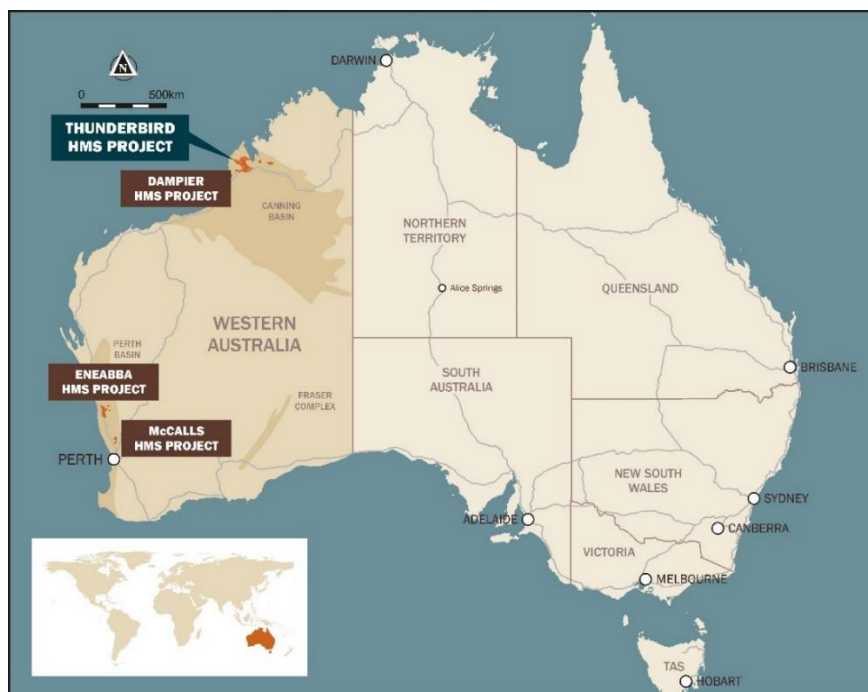


Figure 3: Location of Thunderbird Mineral Sands Project

ENDS

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## COMPLIANCE STATEMENTS

The information in this report that relates to Ore Reserve is based on information compiled by Mr Per Scrimshaw, a Competent Person who is a Member of The Australasian Institute of Mining and Metallurgy. Mr Scrimshaw is employed by Entech Pty Ltd and has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity being undertaken to qualify as a Competent Person as defined in the 2012 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves'. Mr Scrimshaw consents to the inclusion in the report of the matters based on his information in the form and context in which it appears.

## PREVIOUSLY REPORTED INFORMATION

### **The Mineral Resources and Ore Reserves of Sheffield have been extracted from Sheffield's ASX releases;**

"HIGH GRADE MAIDEN MINERAL RESOURCE AT NIGHT TRAIN" 31 January 2019

"MINERAL RESOURCE AND ORE RESERVE STATEMENT" 3 October 2018

"THUNDERBIRD ORE RESERVE UPDATE" 16 March 2017

"SHEFFIELD DOUBLES MEASURED MINERAL RESOURCE AT THUNDERBIRD" 5 July 2016

### **The exploration results have been extracted from Sheffield's ASX releases;**

"NEW LARGE HIGH GRADE DISCOVERY SOUTH OF THUNDERBIRD" 13 November 2018

"EXCEPTIONAL RESULTS CONFIRM MAJOR DISCOVERY AT NIGHT TRAIN" 9 October 2018

A copy of these announcements is available at <http://www.sheffieldresources.com.au/>

### **Bankable Feasibility Study ("BFS")**

This Information Memorandum contains information that relates to a Bankable Feasibility Study. This information was extracted from the following ASX releases by Sheffield:

THUNDERBIRD BFS DELIVERS OUTSTANDING RESULTS" 24 March, 2017

### **Other Extracted Information**

In addition to those ASX releases referred to above, this Information Memorandum contains information extracted from the following ASX releases:

"SHEFFIELD SIGNS BINDING PRIMARY ILMENITE OFFTAKE AGREEMENT" 1 July 2019

"QUARTERLY ACTIVITIES REPORT" and "QUARTERLY CASHFLOW REPORT" 30 April 2019

"QUARTERLY ACTIVITIES REPORT" and "QUARTERLY CASHFLOW REPORT" 30 January 2019

"SHEFFIELD SECURES THUNDERBIRD LNG SUPPLY AGREEMENT" 22 January 2019

"SHEFFIELD SIGNS TAURUS DEBT FACILITY AND EPC CONTRACT" 12 November 2018

"NATIVE TITLE AGREEMENT SIGNED BY TRADITIONAL OWNERS" 1 November 2018

"FEDERAL ENVIRONMENTAL APPROVAL GRANTED FOR THUNDERBIRD" 28 September 2018

"MINING LEASE GRANTED OVER THUNDERBIRD MINERAL SANDS PROJECT" 26 September 2018

"NAIF APPROVES LOAN FACILITIES TOTALLING A\$95M" 19 September 2018

"NATIVE TITLE UPDATE: SHEFFIELD SIGNS CO-EXISTENCE AGREEMENT" 10 September 2018

"FAVOURABLE NATIONAL NATIVE TITLE TRIBUNAL OUTCOME" 28 August 2018

"STATE MINISTER FOR ENVIRONMENT APPROVES THUNDERBIRD MINERAL SANDS PROJECT" 13 August 2018

"GRANT OF MISCELLANEOUS LICENCES" 27 June 2018

"MAIDEN BINDING ILMENITE OFFTAKE AGREEMENT" 21 June 2018

"ADDITIONAL BINDING OFFTAKE SIGNED" 1 February 2018

"BINDING OFFTAKE AGREEMENTS EXCEED 50% OF STG 1 REVENUE" 22 December 2017

"BINDING ZIRCON CONCENTRATE OFFTAKE AGREEMENT SIGNED" 12 December 2017

"COMMENCEMENT OF EARLY WORKS AND TRAINING PROGRAM" 4 December 2017

"SHEFFIELD ANNOUNCES EPC PREFERRED CONTRACTOR" 19 October 2017

"SHEFFIELD MANDATES TAURUS FOR US\$200M DEBT FACILITY" 18 October 2017

"EPA RECOMMENDS APPROVAL OF THUNDERBIRD" 9 October 2017

"SHEFFIELD SECURES SECOND BINDING OFFTAKE AGREEMENT" 25 September 2017

"SHEFFIELD SIGNS MAIDEN BINDING OFFTAKE AGREEMENT" 12 September 2017

"SHEFFIELD LAUNCHES ABORIGINAL EMPLOYMENT PROGRAM" 17 August 2017

"SHEFFIELD SIGNS CORNERSTONE ILMENITE MOU" 29 May 2017

"SHEFFIELD SECURES FURTHER ZIRCON OFFTAKE MOUs" 26 April 2017

"ADDITIONAL ZIRCON OFFTAKE MOU SIGNED" 10 April, 2017

"THUNDERBIRD ILMENITE EXCEEDS PREMIUM SPECIFICATION" 13 March 2017

The Company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcements and, in the case of estimates of Mineral Resources, Ore Reserves, Pre-feasibility Study and Technical Study results, that all material assumptions and technical parameters underpinning the estimates in the relevant market announcement continue to apply and have not materially changed. The Company 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.

## **FORWARD LOOKING AND CAUTIONARY STATEMENTS**

Some statements in this report regarding estimates or future events are forward-looking statements. They involve risk and uncertainties that could cause actual results to differ from estimated results. Forward-looking statements include, but are not limited to, statements concerning the Company's exploration programme, outlook, target sizes and mineralised material estimates. They include statements preceded by words such as "anticipated", "expected", "targeting", "likely", "scheduled", "intends", "potential", "prospective" and similar expressions.



## Appendix A - JORC 2012 Checklist of Assessment and Reporting Criteria

### Thunderbird Ore Reserve 30 June 2019

#### Section 1 Sampling Techniques and Data

Criteria	JORC Code explanation	Commentary
		<ul style="list-style-type: none"><li>This Ore Reserve is based entirely on previously released Mineral Resources (previously released details are available at <a href="http://www.sheffieldresources.com.au">www.sheffieldresources.com.au</a>). No new Mineral Resources or exploration results are being released.</li></ul>

#### Section 2 Reporting of Exploration Results

Criteria	JORC Code explanation	Commentary
		<ul style="list-style-type: none"><li>This Ore Reserve is based entirely on previously released Mineral Resources (previously released details are available at <a href="http://www.sheffieldresources.com.au">www.sheffieldresources.com.au</a>). No new exploration results are being released.</li></ul>

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

Criteria	JORC Code explanation	Commentary
		<ul style="list-style-type: none"><li>This Ore Reserve is based entirely on previously released Mineral Resources (previously released details are available at <a href="http://www.sheffieldresources.com.au">www.sheffieldresources.com.au</a>). No new Mineral Resources are being released.</li></ul>

## Section 4 Estimation and Reporting of Ore Reserve

Criteria	JORC Code explanation	Commentary
<b>Mineral Resource estimate for conversion to Ore Reserves</b>	<ul style="list-style-type: none"> <li>• Description of the Mineral Resource estimate used as a basis for the conversion to an Ore Reserve.</li> <li>• Clear statement as to whether the Mineral Resources are reported additional to, or inclusive of, the Ore Reserve.</li> </ul>	<ul style="list-style-type: none"> <li>• This Ore Reserve is based entirely on the Measured and Indicated portion of the current reported Mineral Resources at Thunderbird (previously released details are available at <a href="http://www.sheffieldresources.com.au">www.sheffieldresources.com.au</a>).</li> <li>• Mineral Resources are reported inclusive of the Ore Reserve.</li> </ul>
<b>Site visits</b>	<ul style="list-style-type: none"> <li>• Comment on any site visits undertaken by the Competent Person and the outcome of those visits.</li> <li>• If no site visits have been undertaken indicate why this is the case.</li> </ul>	<ul style="list-style-type: none"> <li>• The competent person has not visited the site.</li> <li>• The competent person is comfortable relying on reports from other independent consultants who have visited site and other operations in the area respectively.</li> </ul>
<b>Study status</b>	<ul style="list-style-type: none"> <li>• The type and level of study undertaken to enable Mineral Resources to be converted to Ore Reserves.</li> <li>• The Code requires that a study to at least Pre-Feasibility Study level has been undertaken to convert Mineral Resources to Ore Reserves. Such studies will have been carried out and will have determined a mine plan that is technically achievable and economically viable, and that material Modifying Factors have been considered.</li> </ul>	<ul style="list-style-type: none"> <li>• The study supporting the Ore Reserve has been completed to a bankable feasibility level.</li> <li>• Modifying factors accurate to the study level have been applied. The resulting mine plan is technically achievable and economically viable.</li> </ul>
<b>Cut-off parameters</b>	<ul style="list-style-type: none"> <li>• The basis of the cut-off grade(s) or quality parameters applied.</li> </ul>	<ul style="list-style-type: none"> <li>• A cost/value model was formulated by Whittle Consulting for Enterprise optimisation studies on the Thunderbird project.</li> <li>• This value modelling procedure follows the entire process chain and applies cost, recovery, and revenue multipliers at appropriate stages throughout the process to derive block values. The value model used for preliminary pit optimisation studies was not updated to reflect the most recent cost, recovery and revenue assumptions, however comparison of revenue and cost per ore tonne with the final financial model demonstrate similar revenue / cost ratios between models.</li> <li>• This model was used, together with the Whittle Consulting recommended mine sequence and discard strategy as a basis for guiding ore and waste</li> </ul>



	<p>discrimination in the design process. In general, lower grade T1 material is discarded to waste early in the project and increasing amounts are incorporated as process feed as mining progresses into regions of higher strip ratio.</p>
<p><b>Mining factors or assumptions</b></p> <ul style="list-style-type: none"> <li>• <i>The method and assumptions used as reported in the Pre-Feasibility or Feasibility Study to convert the Mineral Resource to an Ore Reserve (i.e. either by application of appropriate factors by optimisation or by preliminary or detailed design).</i></li> <li>• <i>The choice, nature and appropriateness of the selected mining method(s) and other mining parameters including associated design issues such as pre-strip, access, etc.</i></li> <li>• <i>The assumptions made regarding geotechnical parameters (e.g. pit slopes, stope sizes, etc.), grade control and pre-production drilling.</i></li> <li>• <i>The major assumptions made and Mineral Resource model used for pit and stope optimisation (if appropriate).</i></li> <li>• <i>The mining dilution factors used.</i></li> <li>• <i>The mining recovery factors used.</i></li> <li>• <i>Any minimum mining widths used.</i></li> <li>• <i>The manner in which Inferred Mineral Resources are utilised in mining studies and the sensitivity of the outcome to their inclusion.</i></li> <li>• <i>The infrastructure requirements of the selected mining methods.</i></li> </ul>	<ul style="list-style-type: none"> <li>• Open pit optimisation studies were conducted using CAE NPV Scheduler software to generate Lerch-Grossman shells. An initial high margin area was selected that provided an approximate 8 year production inventory. Detailed design and scheduling was undertaken in this area including individual mining block definition and sequencing. Beyond this area, a life of mine design has been completed. Scheduling beyond the initial pit area is undertaken on coarser 600 m dimension zones, consistent with the strategic schedule zones as defined by Whittle Consulting.</li> <li>• Bulk mining techniques have been chosen for ore mining, incorporating dozer traps and in-pit feed preparation units. Topsoil and overburden will be excavated, hauled and stockpiled using conventional earthmoving equipment. Following excavation and classification ore will be slurried and pumped to a nearby wet concentration plant. Oversize reject from feed preparation units will be rehandled using front end loader within the mine void.</li> <li>• The selected mining method is considered appropriate to the large, relatively thick, and sheet-like characteristics of the host sand unit. Minimal pre-strip is required to access the orebody. The Life-of-Mine average strip ratio (waste: ore) is 0.85: 1.00.</li> <li>• Independent consultants prepared the geotechnical analysis that forms the basis of pit design criteria including excavatability, trafficability and pit slope wall angles.</li> <li>• A series large diameter Bauer holes and test pits were excavated to further assess geotechnical aspects.</li> </ul>

	<ul style="list-style-type: none"> <li>• 40 degree overall slope angles have been used in pit design.</li> <li>• A mining recovery factor of 98% was applied. No mining dilution factor is applied due to the bulk, non-selective nature of the deposit and proposed mining method. Overburden mining takes place prior to exposing the underlying ore and is therefore a spatially discrete mining activity. Minimum mining width considerations are not applicable given the dimensions of the mining blocks guiding pit design. A 0.2 m topsoil depth has been allowed for and recovered material excludes material designated as topsoil.</li> <li>• Only minor amounts of Inferred Mineral Resource occur within the mine design (0.2Mt) at the periphery of the final life-of-mine pit design. Inferred material is excluded from Ore Reserve reporting and the reporting of this material in the mine plan has no material impact on the economics supporting the Ore Reserve.</li> <li>• The following infrastructure will be required to support the mining method and is included in the capital and operating cost estimate: Mining Units Plant “MUP”, Wet Concentration Plant “WCP”, Concentrate Upgrade Plant “CUP”, Mineral Separation Plant “MSP”, Low Temperature Roast Plant “LTR”, site buildings, bore field, Power Station and power distribution infrastructure, new and upgraded roads, accommodation camp, upgraded materials handling at Port of Derby.</li> </ul>
<p><b>Metallurgical factors or assumptions</b></p> <ul style="list-style-type: none"> <li>• <i>The metallurgical process proposed and the appropriateness of that process to the style of mineralisation.</i></li> <li>• <i>Whether the metallurgical process is well-tested technology or novel in nature.</i></li> <li>• <i>The nature, amount and representativeness of metallurgical test work undertaken, the nature of the metallurgical domaining applied and the corresponding metallurgical recovery factors applied.</i></li> <li>• <i>Any assumptions or allowances made for deleterious elements.</i></li> </ul>	<ul style="list-style-type: none"> <li>• The metallurgical process was developed to a bankable feasibility study level including the development of a flowsheet and capital and operating costs. The flowsheet consists of the following: <ul style="list-style-type: none"> <li>* Feed Preparation Process “FPP”</li> <li>* Wet Concentration Process “WCP”</li> <li>* Concentrate Upgrade Process “CUP”</li> <li>* Mineral Separation Process “MSP”</li> </ul> </li> </ul>

- *The existence of any bulk sample or pilot scale test work and the degree to which such samples are considered representative of the orebody as a whole.*
  - *For minerals that are defined by a specification, has the ore reserve estimation been based on the appropriate mineralogy to meet the specifications?*
- The developed process flow sheet is deemed appropriate for the style of mineralisation.
- The process stages are based on well understood conventional unit processes and has been developed using best in class full scale or scale-able equipment. There are no un-tested novel processes or equipment used within the flowsheet. Extensive test work has confirmed the process flowsheet is effective in achieving high recoveries from the ore.
  - Extensive metallurgical processing test work has been completed on four bulk samples (comprising samples of 6.0 t, 5.0 t 12.5 t and 40 t).
  - Process mineral recoveries have been increased in three phases to reflect a commissioning ramp up to target operating recoveries. Discounted recoveries have been applied in production years 1, 2 and 3. Overall financial model recovery factors are derived from the metallurgical test work and the modelled LOM recoveries are:
    - \* Zircon 86.9%
    - \* Ilmenite 83.9%
    - \* Titanomagnetite 85% (Iron oxide recoveries not tracked separately through the processing circuit; Based on a recovery of 85% to calculated trash reporting to the Ilmenite Circuit, and a titanomagnetite purity of 90%)
    - \* Products produced from metallurgical test work, all meet typical market requirements and no assumptions regarding product quality or deleterious elements have been made.
  - Characterisation of head samples, intermediate samples and final products to determine mineralogy has been based on the same process as applied for the drill sample analyses. This method includes oversize determination, slimes determination, heavy mineral

	<p>determination, magnetic fractionation of heavy mineral and XRF/QEMSCAN analyses on resultant fractions.</p> <ul style="list-style-type: none"> <li>• Mineral characterization data derived from bulk sample data is aligned with mineral characterization data derived from drill sample data. As such bulk samples tested are aligned with domain data associated with bulk sample origin and are representative of the orebody.</li> <li>• Final product analyses are based on XRF analyses and detailed QEMSCAN analyses which is the same as for the Ore Reserve</li> </ul>
<p><b>Environmental</b></p> <ul style="list-style-type: none"> <li>• <i>The status of studies of potential environmental impacts of the mining and processing operation. Details of waste rock characterisation and the consideration of potential sites, status of design options considered and, where applicable, the status of approvals for process residue storage and waste dumps should be reported.</i></li> </ul>	<ul style="list-style-type: none"> <li>• All environmental approvals from State and Federal Government have been received. This includes: <ul style="list-style-type: none"> <li>○ Ministerial Statement 1080,</li> <li>○ Department of Water and Environmental Works Approval</li> <li>○ Licence to take Water GWL201977(1)</li> <li>○ Australian Government Department of Environment and Energy EPBC approval 2018-7648</li> </ul> </li> <li>• Mining and transportation methods are not new and are commonly used throughout Australia.</li> <li>• Sheffield has undertaken significant investigation and consultation to confirm environmental issues and stakeholder concerns.</li> <li>• Secondary approvals are well understood and a strategy has been defined and implemented to ensure these are obtained in time for construction and operation.</li> <li>• Sheffield has systems in place to make sure community concerns and environmental issues are managed</li> <li>• Mine waste characterisation demonstrates that overburden material arising from the Project is extremely benign and represents no risk to the surrounding environment. In addition, mine waste arising from depths up to 48.5 m below the water table do not present an acid-forming risk. Some potentially</li> </ul>



	<p>acid forming material is present &gt;48.5 m below the water table; however, these materials will not be encountered until approximately 35 years from commencement of mining and are not considered to be extensive and not expected to require complex management measures to be implemented. Analysis of process residue demonstrates it is non-acid forming and is completely benign.</p>
<p><b>Infrastructure</b></p> <ul style="list-style-type: none"> <li>• <i>The existence of appropriate infrastructure: availability of land for plant development, power, water, transportation (particularly for bulk commodities), labour, accommodation; or the ease with which the infrastructure can be provided, or accessed.</i></li> </ul>	<ul style="list-style-type: none"> <li>• The site is located 98 km northeast of Broome and 72 km west of Derby in Western Australia. There is currently no substantial on-site infrastructure, and the study estimates the costs for the development of all necessary infrastructure items.</li> </ul>
<p><b>Costs</b></p> <ul style="list-style-type: none"> <li>• <i>The derivation of, or assumptions made, regarding projected capital costs in the study.</i></li> <li>• <i>The methodology used to estimate operating costs.</i></li> <li>• <i>Allowances made for the content of deleterious elements.</i></li> <li>• <i>The source of exchange rates used in the study.</i></li> <li>• <i>Derivation of transportation charges.</i></li> <li>• <i>The basis for forecasting or source of treatment and refining charges, penalties for failure to meet specification, etc.</i></li> <li>• <i>The allowances made for royalties payable, both Government and private.</i></li> </ul>	<ul style="list-style-type: none"> <li>• The process plant capital costs have been informed by an EPC agreement with GR Engineering Services (GRES) to engineer, procure and construct (EPC) the Stage 1 processing plant and processing infrastructure based on a process design and PFDs, mechanical equipment lists and plant and an overall mine site layout, which has been reviewed and agreed with Sheffield, GRES and the debt provider's independent technical experts. The EPC agreement with GRES also includes recovery and performance test guarantees. Non-processing plant infrastructure and owners costs were estimated by Sheffield using executed or negotiated final agreements, industry sources or in-house estimation and expertise to determine the non-process plant infrastructure direct costs. Engineering estimates has been developed for the future expansion of the zircon circuit and LTR Ilmenite circuit.</li> <li>• Capital costs for the Stage 2 and 3 upgrade expansions were estimated on a factored basis to replicate the current plant area and utilise common or expended elements within the Stage 1 plant area where appropriate to do so.</li> <li>• Ore mining and feed preparation costs are informed by tendered fixed and variable schedule of rates with an</li> </ul>

experienced mineral sand mining contractors. Ore mining and feed preparation costs include all ore mining, feed preparation and pumping of ore to the processing plant.

- The cost for land clearing, waste mining, tailings storage and other ancillary activities were estimated by Entech on a 30 June 2019 cost basis on the following information and assumptions:
  - Local base salary labour rates that are representative of typical labour costs within the region.
  - Labour on-costs include allowances for superannuation, payroll tax, workers compensation insurance premiums and recruitment and relocation costs and are representative of similar operations in the same region of Western Australia;
  - Net diesel fuel cost of \$0.90 per litre after allowing for rebate;
  - Equipment productivities calculated by Entech in consultation with industry experts and mining contractors;
  - Mining costs estimated by Entech in consultation with industry experts, equipment suppliers and mining contractors; and
  - Equipment ownership and operating costs as provided by equipment suppliers in consultation with Entech.
- Central to the development of the Processing Plant Operating Costs are Mechanical Equipment lists (to assess power demand), manning schedules (to assess operating labour), mobile equipment and duty schedules (to assess fuel demand) and supporting calculations for all other consumables (such as reagents, flocculants etc.).





	<ul style="list-style-type: none"> <li>• Power and LNG prices are informed on executed or tendered and negotiated final agreements and evaluated by Sheffield and third party consultants.</li> <li>• General and administration operating costs were built up on a first principles basis from manning schedules, labour work rosters (DIDO), quotations for the supply and operation of on-site village facilities, light vehicle and mobile equipment requirements and associated leasing and running costs and other administration-related fixed costs such as communications, IT, consultants, recruitment, annual tenement costs and the like.</li> <li>• All cost estimates have been prepared on Australian Dollar basis</li> <li>• All infrastructure components and consumables are assumed delivered to site at estimated road haulage rates.</li> <li>• There are no additional treatment or refining charges applied, and minerals are sold as finished products.</li> <li>• Premium Zircon is sold as bagged product. All other products are bulk. Suitable provision has been made for bagging, transportation and port charges.</li> <li>• An appropriate allowance has been made for Western Australian State and Native Title royalties. All royalties are applied as a % of gross revenue.</li> <li>• The mine planning underpinning the Ore Reserve was conducted using preliminary cost assumptions that was considered suitable for block model coding, strategic planning and mine design.</li> </ul>
<p><b>Revenue factors</b></p> <ul style="list-style-type: none"> <li>• <i>The derivation of, or assumptions made regarding revenue factors including head grade, metal or commodity price(s) exchange rates, transportation and treatment charges, penalties, net smelter returns, etc.</i></li> <li>• <i>The derivation of assumptions made of metal or commodity price(s), for the principal metals, minerals and co-products.</i></li> </ul>	<ul style="list-style-type: none"> <li>• The revenue is a function of block modelled grade and mineral assemblage, modelled comprehensively through the mining, mineral processing, and transportation chain where it is expected to be delivered to an off taker at a forecast price.</li> <li>• The mine planning underpinning the Ore Reserve was conducted using preliminary product pricing that was suitable for block model coding, strategic planning and</li> </ul>

mine design. In the final financial analysis, revenue from ore deliveries were then recalculated using an updated pricing and sales product mix model. The Ore Reserve are feasible and economic under both pricing schedules

- An A\$/US\$ exchange rate of 0.75 is assumed for the life of mine, based on Consensus forecasts.
- Sheffield has applied TZMI's long term pricing assumptions for Thunderbird premium zircon, zircon concentrate, LTR Chloride ilmenite and Primary Ilmenite products.
- Sheffield has applied Ruidow's long term pricing assumption for the Thunderbird titano-magnetite product.
- Prices for the zircon concentrate and titano-magnetite have been converted from CIF to FOB. Conversion from CIF to FOB for zircon concentrate has assumed current ocean going rates of US\$23 per tonne for 10,000t shipments of zircon concentrate to China. Rates of US\$17 per tonne have been assumed for 20,000t shipments of titano-magnetite to the main ports in China.
- Prices for products on a FOB basis are as follows:
  - LTR Sulfate Ilmenite \$US 213 per tonne
  - Primary Ilmenite \$US 91 per tonne
  - Premium Zircon \$US 1,596 per tonne (CY2021)
  - Premium Zircon \$US 1,597 per tonne (CY2022)
  - Premium Zircon \$US 1,559 per tonne (CY2023)
  - Premium Zircon \$US 1,469 per tonne (FY2024 and beyond)
  - Zircon Concentrate \$US 714 per tonne (CY2021)
  - Zircon Concentrate \$US 714 per tonne (CY2022).
  - Zircon Concentrate \$US 699 per tonne (CY2023).
  - Zircon Concentrate \$US 670 per tonne (CY2024 to CY2027).
  - Zircon Concentrate \$US 728 per tonne (CY2028 and beyond).



○ Titano-magnetite \$US 48 per tonne.

**Market  
assessment**

- *The demand, supply and stock situation for the particular commodity, consumption trends and factors likely to affect supply and demand into the future.*
  - *A customer and competitor analysis along with the identification of likely market windows for the product.*
  - *Price and volume forecasts and the basis for these forecasts.*
  - *For industrial minerals the customer specification, testing and acceptance requirements prior to a supply contract.*
- In relation to Ilmenite supply and demand, TZMI report that global pigment production is expected to increase by 10% between 2018 and 2023, with supply deficit expected in the sector in the near to medium term.
  - In relation to Zircon supply and demand, TZMI predict that global demand is forecast to return to moderate growth of 2.4% CAGR to 2023, following a period of solid demand in 2018 through to 2019.
  - Market analysis by consumer groups supports comments that zircon is of premium quality suitable for the ceramic market. TZMI have reported that Thunderbird LTR Ilmenite is expected to command a 10% premium in the sulfate ilmenite market. LTR Ilmenite is ideal for supply into the sulfate pigment and chloride slag feedstock markets. Primary Ilmenite is also suitable to be sold into the chloride slag feedstock market which is evidenced by the recent signing of a binding offtake agreement for this application. Titanomagnetite product can be used in the steel industry as a lower cost feedstock and is desired due to the ability to protect against erosion of the blast furnace hearth.
  - Key regional markets for supply of premium grade zircon include China, India, and Europe as primary target markets, with The America's, Southeast Asia and the Middle East also having potential for consuming volumes of material and becoming secondary target markets. Sheffield plans on supplying an average of 67,000 t (metric tonnes) per annum of premium zircon in years 2 to 4, with an increase to an average of 120,000 t per annum from years 5 to 10 and an average of 90,000 t per year from year 11 onwards.
  - The key target market for Sheffield's zircon concentrate is the Chinese concentrate processing market. Sheffield plans on supplying an average of 85,000 t (metric

tonnes) per annum of zircon concentrate in years 2 to 4, with an increase to an average of 140,000 t per annum from years 5 to 10 and an average of 110,000 t per year from year 11 onwards.

- Key major primary markets for supply of LTR ilmenite and primary ilmenite include China, Southeast Asia and Europe with the Middle East and Americas as secondary target markets. Sheffield plans on supplying an average of 650,000 t (metric tonnes) per annum of primary ilmenite in years 2 to 4, with an increase to an average of 1,000,000 t per annum from years 5 to 10 and an average of 825,000 t per year from year 11 onwards. From year 10 Sheffield plans to supply LTR Ilmenite at an average of 275,000 t per annum from year 10 to 15 and an average of 125,000 t per year from year 16 onwards
- The major target market for titanomagnetite will be Chinese steel manufacturers, primarily on the east coast of China due to their favourable location for shipping. From year 10 Sheffield plans to supply titanomagnetite at an average of 165,000 t per annum for year's 10 to 15 and an average of 75,000 t per year from year 16 onwards.
- TZMI have reviewed the proposed product specifications of the Thunderbird ilmenites and zircon products and have verified that they will meet various market uses and typical specifications required for those markets.
- Sheffield has binding off take agreements in place for premium zircon, zircon concentrate and primary ilmenite which is approximately 85% of the revenue for Thunderbird Stage 1 operation.

**Economic**

- *The inputs to the economic analysis to produce the net present value (NPV) in the study, the source and confidence of these economic inputs including estimated inflation, discount rate, etc.*
- *NPV ranges and sensitivity to variations in the significant assumptions and inputs.*

- For the purpose of estimating an Ore Reserve, a NPV was estimated at a discount rate of 8.5%. The confidence in the inputs is consistent with a Bankable Feasibility level of study. The project demonstrated a positive NPV.



	<ul style="list-style-type: none"> <li>Financial outcomes of the Bankable Feasibility Study Update were tested by varying revenue, cost and macro-economic factors. These factors include commodity price, costs (both operating and capital), production volume and ratios, along with economic discount factors. Positive outcomes for NPV, IRR and cash flow were generated in all cases to support the Ore Reserve estimate</li> </ul>
<p><b>Social</b></p> <ul style="list-style-type: none"> <li><i>The status of agreements with key stakeholders and matters leading to social licence to operate.</i></li> </ul>	<ul style="list-style-type: none"> <li>Engagement with key stakeholders, including Traditional Owners, pastoralists and government agencies, has been ongoing and will continue in parallel with funding processes, construction activities and project operations.</li> <li>A comprehensive Heritage Survey with Traditional Owners was completed in 2016 over the proposed area of mining operations and associated infrastructure.</li> <li>The Company has agreed with Traditional Owners to observe a number of Aboriginal heritage exclusion zones around the edges of the deposit, one of which overlaps the Ore Reserve. This is not considered to have a material effect on the Ore Reserve as it does not occur until late in the life of mine schedule, and the mine plan is technically and economically viable without the inclusion of this area.</li> <li>The Company executed a Co-existence agreement with the Traditional Owners in October 2018. The Co-existence Agreement establishes the framework by which the Company can work with the Traditional Owners to protect Aboriginal heritage and the environment while delivering sustainable employment and business outcomes for Traditional Owners and the wider Aboriginal community</li> </ul>
<p><b>Other</b></p> <ul style="list-style-type: none"> <li><i>To the extent relevant, the impact of the following on the project and/or on the estimation and classification of the Ore Reserves:</i></li> <li><i>Any identified material naturally occurring risks.</i></li> <li><i>The status of material legal agreements and marketing arrangements.</i></li> </ul>	<ul style="list-style-type: none"> <li>All naturally occurring risks are assumed to have adequate prospects for control and mitigation.</li> <li>The sale of greater than 80% of the revenue in Stage 1 of the Project as covered by binding off take agreements</li> </ul>



	<ul style="list-style-type: none"> <li>• <i>The status of governmental agreements and approvals critical to the viability of the project, such as mineral tenement status, and government and statutory approvals. There must be reasonable grounds to expect that all necessary Government approvals will be received within the timeframes anticipated in the Pre-Feasibility or Feasibility study. Highlight and discuss the materiality of any unresolved matter that is dependent on a third party on which extraction of the reserve is contingent.</i></li> </ul>	<ul style="list-style-type: none"> <li>• The Thunderbird deposit is within Exploration Licence E04/2083, held 100% by Sheffield Resources Ltd, and due to expire on 04/09/2021.</li> <li>• Sheffield has received the Mining Lease 04/459 for mining and processing operations, and Miscellaneous Licences 04/82, 04/83, 04/84, 04/85 and 04/86 for ancillary infrastructure.</li> </ul>
<b>Classification</b>	<ul style="list-style-type: none"> <li>• <i>The basis for the classification of the Ore Reserves into varying confidence categories.</i></li> <li>• <i>Whether the result appropriately reflects the Competent Person's view of the deposit.</i></li> <li>• <i>The proportion of Probable Ore Reserves that have been derived from Measured Mineral Resources (if any).</i></li> </ul>	<ul style="list-style-type: none"> <li>• The Proved and Probable Ore Reserve is based on that portion of the Measured and Indicated Mineral Resources respectively within the mine designs that may be economically extracted.</li> <li>• The result appropriately reflects the Competent Persons view of the deposit.</li> </ul>
<b>Audits or reviews</b>	<ul style="list-style-type: none"> <li>• <i>The results of any audits or reviews of Ore Reserve estimates.</i></li> </ul>	<ul style="list-style-type: none"> <li>• No external audit of the Ore Reserve estimate has been undertaken.</li> </ul>
<b>Discussion of relative accuracy/confidence</b>	<ul style="list-style-type: none"> <li>• <i>Where appropriate a statement of the relative accuracy and confidence level in the Ore Reserve estimate using an approach or procedure deemed appropriate by the Competent Person. For example, the application of statistical or geostatistical procedures to quantify the relative accuracy of the reserve within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors which could affect the relative accuracy and confidence of the estimate.</i></li> <li>• <i>The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnages, which should be relevant to technical and economic evaluation. Documentation should include assumptions made and the procedures used.</i></li> <li>• <i>Accuracy and confidence discussions should extend to specific discussions of any applied Modifying Factors that may have a material impact on Ore Reserve viability, or for which there are remaining areas of uncertainty at the current study stage.</i></li> <li>• <i>It is recognised that this may not be possible or appropriate in all circumstances. These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.</i></li> </ul>	<ul style="list-style-type: none"> <li>• This Ore Reserve is attributed a confidence classification of "Proved" and "Probable" Ore Reserve. There is a degree of uncertainty associated with the Mineral Resource estimate and the modifying factors.</li> <li>• Overall accuracy of the operating and Stage 1 capital cost estimate is considered to be -10% to +10%. Accuracy of the Stage 2 and Stage 3 capital cost estimate is considered to be +/- 20%</li> <li>• Stress testing of operating cashflow shows this remains positive well beyond the stated accuracy of the cost estimates.</li> <li>• No production data is available against which the Ore Reserve estimates may be reconciled.</li> </ul>

## Appendix B: Thunderbird Deposit Mineral Resource 5 July 2016

### Thunderbird Deposit Mineral Resource Summary

Resource Category	Cut-off HM%	Mineral Resources		Valuable HM Grade (In-situ)				
		Material Million Tonnes	HM %	Zircon %	HiTi Leucoxene %	Leucoxene %	Ilmenite %	Total VHM %
Measured	3.0	510	8.9	0.71	0.20	0.19	2.4	3.5
Indicated	3.0	2,120	6.6	0.55	0.18	0.20	1.8	2.8
Inferred	3.0	600	6.3	0.53	0.17	0.20	1.7	2.6
<b>Total</b>	<b>3.0</b>	<b>3,230</b>	<b>6.9</b>	<b>0.57</b>	<b>0.18</b>	<b>0.20</b>	<b>1.9</b>	<b>2.9</b>
Measured	7.5	220	14.5	1.07	0.31	0.27	3.9	5.5
Indicated	7.5	640	11.8	0.90	0.28	0.25	3.3	4.7
Inferred	7.5	180	10.8	0.87	0.27	0.26	3.0	4.4
<b>Total</b>	<b>7.5</b>	<b>1,050</b>	<b>12.2</b>	<b>0.93</b>	<b>0.28</b>	<b>0.26</b>	<b>3.3</b>	<b>4.8</b>

### Thunderbird Deposit Mineral Resource

Resource Category	Cut off (HM%)	Mineral Resources					In-situ THM (Mt)	Mineral Assemblage			
		Material (Mt)	Bulk Density	HM %	Slimes %	Osize %		Zircon %	HiTi Leuc %	Leuc %	Ilmenite %
Measured	3.0	510	2.1	8.9	18	12	45	8.0	2.3	2.2	27
Indicated	3.0	2,120	2.0	6.6	16	9	140	8.4	2.7	3.1	28
Inferred	3.0	600	2.0	6.3	15	8	38	8.4	2.6	3.2	28
<b>Total</b>	<b>3.0</b>	<b>3,230</b>	<b>2.0</b>	<b>6.9</b>	<b>16</b>	<b>9</b>	<b>223</b>	<b>8.3</b>	<b>2.6</b>	<b>2.9</b>	<b>28</b>
Measured	7.5	220	2.1	14.5	16	15	32	7.4	2.1	1.9	27
Indicated	7.5	640	2.1	11.8	14	11	76	7.6	2.4	2.1	28
Inferred	7.5	180	2.0	10.8	13	9	20	8.0	2.5	2.4	28
<b>Total</b>	<b>7.5</b>	<b>1,050</b>	<b>2.1</b>	<b>12.2</b>	<b>15</b>	<b>11</b>	<b>127</b>	<b>7.6</b>	<b>2.3</b>	<b>2.1</b>	<b>27</b>

### Thunderbird Deposit contained Valuable HM (VHM) Resource Inventory

Resource Category	Cut off (HM%)	Zircon (kt)	HiTi Leucoxene (kt)	Leucoxene (kt)	Ilmenite (kt)	Total VHM (kt)
Measured	3.0	3,600	1,000	1,000	12,000	17,700
Indicated	3.0	11,800	3,800	4,300	39,100	59,000
Inferred	3.0	3,200	1,000	1,200	10,500	15,900
<b>Total</b>	<b>3.0</b>	<b>18,600</b>	<b>5,900</b>	<b>6,500</b>	<b>61,700</b>	<b>92,600</b>
Measured	7.5	2,300	700	600	8,400	12,000
Indicated	7.5	5,800	1,800	1,600	21,000	30,200
Inferred	7.5	1,600	500	500	5,600	8,200
<b>Total</b>	<b>7.5</b>	<b>9,700</b>	<b>3,000</b>	<b>2,700</b>	<b>35,000</b>	<b>50,400</b>

Notes: Mineral Resources are reported inclusive of (not additional to) Ore Reserves. Mineral Resources reported above 3% HM cut-off are inclusive of (not additional to) the Mineral Resource reported above 7.5% HM cut-off.

All tonnages and grades have been rounded to reflect the relative accuracy and confidence level of the estimate, thus sum of columns may not equal.

The in-situ grade is determined by multiplying the percentage of total HM by the percentage of each valuable heavy mineral within the heavy mineral assemblage at the resource block model scale.

Estimates of Mineral Assemblage are presented as percentages of the total heavy mineral (THM) component of the deposit, as determined by magnetic separation, QEMSCAN and XRF. Magnetic fractions were analysed by QEMSCAN for mineral determination as follows: Ilmenite: 40-70% TiO<sub>2</sub> >90% Liberation; Leucoxene: 70-94% TiO<sub>2</sub> >90% Liberation; High Titanium Leucoxene (HiTi Leucoxene): >94% TiO<sub>2</sub> >90% Liberation; and Zircon: 66.7% ZrO<sub>2</sub>+HfO<sub>2</sub> >90% Liberation. The non-magnetic fraction was submitted for XRF analysis and minerals determined as follows: Zircon: ZrO<sub>2</sub>+HfO<sub>2</sub>/0.667 and High Titanium Leucoxene (HiTi Leucoxene): TiO<sub>2</sub>/0.94.

## ABOUT SHEFFIELD RESOURCES

Sheffield Resources Limited is focused on developing its 100% owned, world class Thunderbird Mineral Sands Project, located in north-west Western Australia. Sheffield continues to also assess other regional exploration opportunities.

## THUNDERBIRD MINERAL SANDS

Thunderbird is one of the largest and highest grade mineral sands discoveries in the last 30 years.

Sheffield's Bankable Feasibility Study shows Thunderbird is a technically low risk, modest capex project that generates strong cash margins from globally significant levels of production over an exceptionally long mine life of 37 years.

Thunderbird will generate a high-quality suite of mineral sands products with specifications suited to market requirements. These products include Premium Zircon suitable for the ceramic sector and LTR Ilmenite which will be one of the highest-grade sulfate feedstocks available globally.

Thunderbird is located in one of the world's most attractive mining investment jurisdictions and is well placed to deliver long term, secure supply of high quality products to a range of potential customers.

The Company is targeting initial production in 2021. The initial planned production profile is aligned with consensus emerging supply deficit in global zircon markets.

ASX Code:	SFX	Market Capitalisation:	A\$120m
Issued shares:	260.6m	Cash (unaudited, 31 Mar 2019):	A\$5.8m