

24 January 2017

**ASX Code:**  
SFX

**Directors:**

Mr Will Burbury  
Non-Executive Chairman

Mr Bruce McFadzean  
Managing Director

Mr Bruce McQuitty  
Non-Executive Director

Mr David Archer  
Technical Director

**Registered Office:**

Level 2, 41-47 Colin Street  
West Perth WA 6005

**Share Registry:**

Link Market Services  
Level 4, Central Park  
152 St Georges Terrace  
Perth WA 6000

**Capital Structure:**

Ordinary Shares: 181.0M  
Unlisted Options: 16.1M

**Market Capitalisation:**

A\$109 million

**Cash Reserves:**

A\$14.0 million

**Investor Relations:**

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## QUARTERLY ACTIVITIES REPORT FOR THE PERIOD ENDED 31 DECEMBER 2016

### HIGHLIGHTS

#### *Thunderbird Mineral Sands Project*

- Completion of BFS metallurgical test work, confirming pre-feasibility processing flowsheet using full-scale equipment
- High grade ilmenite produced by low temperature roasting - 56.1% TiO<sub>2</sub>
- Zircon is premium grade suited to the ceramics sector - 66.3% ZrO<sub>2</sub>
- Test work delivers improved recoveries across all key products
- Positive feedback from several potential offtake partners on product quality
- Delivery of BFS scheduled for end of March 2017
- Public Environmental Review process currently open for public comment
- Native Title process continues on schedule

#### *Corporate Activities*

- Cash position of A\$14.0 million as at 31 December 2016
- Offtake and financing discussions progressing during Q1 2017

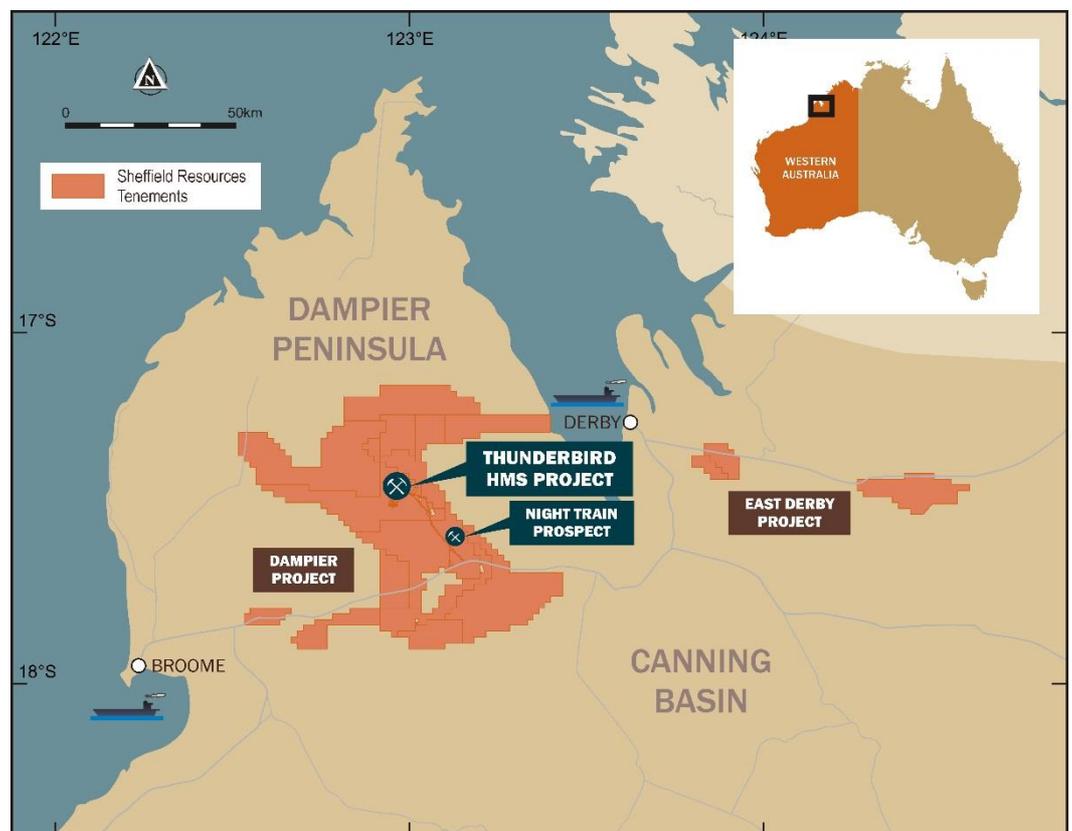


Figure 1: Location of Thunderbird Mineral Sands Project

## OPERATIONAL SUMMARY

During the December quarter Sheffield Resources Limited (“Sheffield” or “the Company”) continued its operational focus on its world class Thunderbird Heavy Mineral Sands Project (Thunderbird), located in the Canning Basin in northern Western Australia (Figure 1).

The Thunderbird deposit is one of the largest and highest grade zircon rich mineral sands discoveries in the past 30 years. Sheffield is currently undertaking a Bankable Feasibility Study (BFS) on Thunderbird, which is being managed by leading engineering firm Hatch.

During the quarter, positive project economic drivers have provided Sheffield with an opportunity to expedite the project construction timeline by accelerating the construction tender process. To date, Sheffield had adopted a staged BFS approach utilising a standard engineering capital estimation process prior to tendering the project construction. Sheffield has identified an opportunity to accelerate the construction tender process, enabling the BFS to be populated by robust capital costs as opposed to a probabilistic estimate, thereby reducing pricing risk and expediting the tendering route by several months. The BFS is targeted for release to the market toward the end of March 2017 in line with funding and offtake discussions.

Environmental approval and native title processes continue to advance. The environmental approval process for Thunderbird is well progressed with the Public Environmental Review process open for public comment for a period of four weeks with effect from 16 January 2017. The environmental approval process is scheduled to conclude in mid-2017. The Native Title process is also well advanced with finalisation of an agreement anticipated before mid-2017.

In parallel with the BFS and permitting processes, Sheffield continues to advance funding and product off-take opportunities. Interest in both funding and offtake prospects has been strong and the timing for completion of these key drivers with both the BFS and permitting processes is ideal.

Exploration and evaluation expenditure including BFS activities totalled A\$3.4m for the quarter. Cash reserves of A\$14.0 million (unaudited) remain as at 31 December 2016.

## THUNDERBIRD MINERAL SANDS PROJECT

Located in the Canning Basin in northern Western Australia, the Thunderbird Mineral Sands Project, wholly owned by ASX-listed Sheffield Resources Limited, is situated midway between the port towns of Derby and Broome. Thunderbird, by virtue of its location, size<sup>1</sup> and quality of product<sup>2</sup> has the potential to become a globally significant mineral sands operation. The significance of the Project is supported by the “Lead Agency” project status afforded to Thunderbird by the Department of Mines and Petroleum in Western Australia.

Zircon is the key value driver of the Project making up almost 60% of forecast revenue, with the remainder generated from substantial amounts of high grade sulphate ilmenite and “HiTi” leucoxene. The high proportion of zircon sets Thunderbird apart from many of the world’s operating and undeveloped mineral sands projects which are dominated by lower value ilmenite.

Current Mineral Resources at Thunderbird comprise 1.05 billion tonnes @ 12.2% heavy minerals (HM) at a 7.5%HM cut-off (Measured, Indicated and Inferred) containing 9.7Mt of zircon, 3.0Mt of high-titanium leucoxene and 35Mt of ilmenite. This places Thunderbird in the top tier of mineral sands

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<sup>1</sup> The PFS was based on the Thunderbird Mineral Resource announced on 31 July 2015 comprising 3.240Bt @ 6.9% HM (at 3% HM cut off), including a coherent high grade zone of 1.09Bt @ 11.9% HM (at 7.5% cut off) (Measured, Indicated and Inferred). The high grade component contains 9.9Mt of zircon, 3.0Mt of high-titanium leucoxene, 2.8Mt of leucoxene and 36Mt of ilmenite. The Maiden Ore Reserve announced to the ASX 22 January 2016 supports 40 year mine life operation outlined in the PFS.

<sup>2</sup> Leading global mineral sands consulting group TZMI has confirmed that Sheffield’s primary zircon and LTR ilmenite are high quality products that are likely to receive strong market support. Collectively these products represent 81% of the total projected revenue. Significant interest has been registered in these products by leading marketing specialists and industry groups.

deposits globally, including those currently in production. Current Ore Reserves, based on the July 2015 Mineral Resource and calculated in conjunction with the October 2015 Pre-Feasibility Study (PFS), comprise 683Mt @ 11.3% HM (total Proved and Probable Reserves). The PFS supported a 40-year mine life for the Project with a very low life-of-mine strip ratio (waste:ore) of less than 0.7:1 (see ASX announcements dated 5 July 2016, 22 January 2016 and 14 October 2015; and refer to Appendix 2 & 3 for further details). An updated Ore Reserve based on the new Mineral Resource will follow from BFS work currently underway.

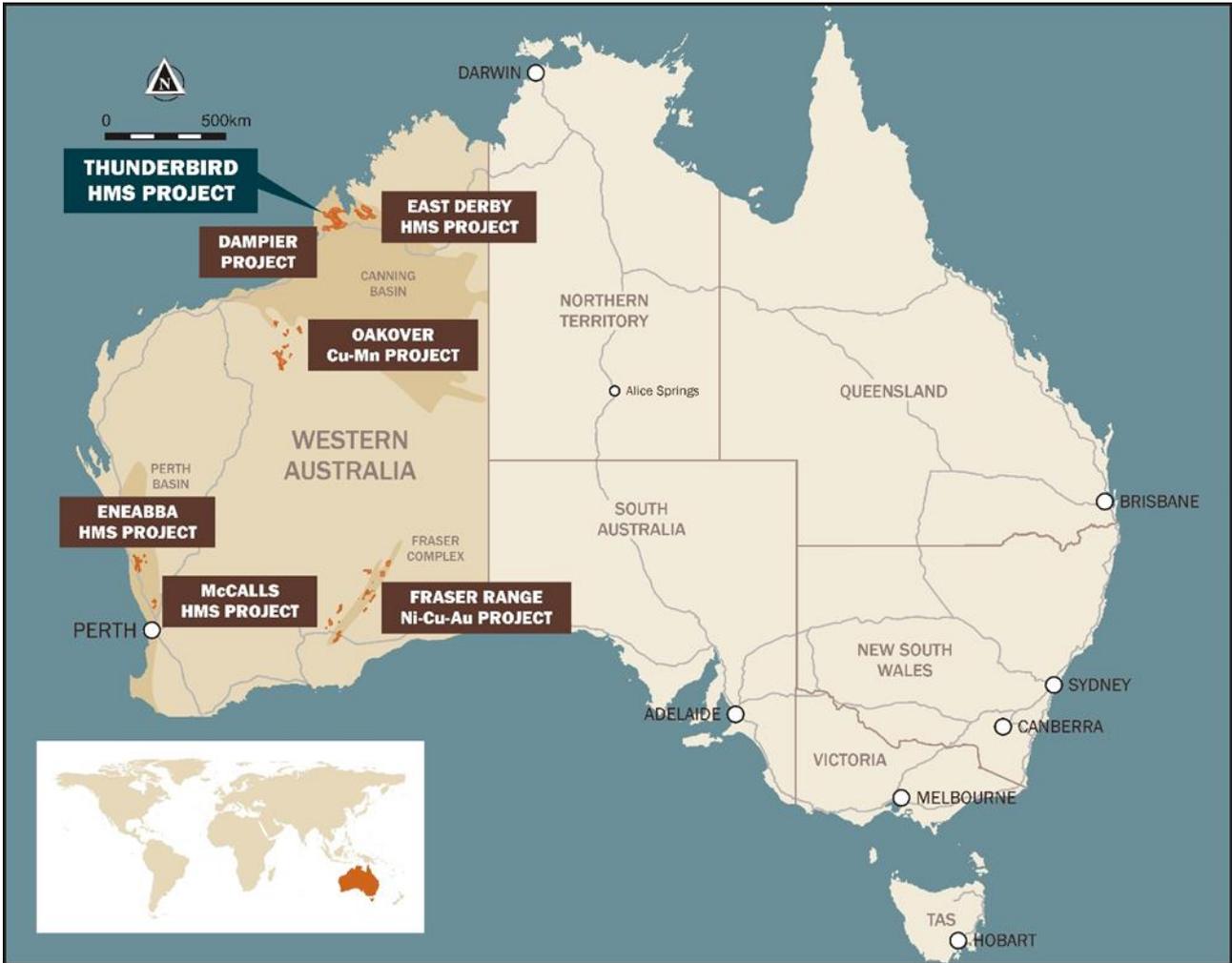


Figure 2: Location of Sheffield Resources Projects in Western Australia

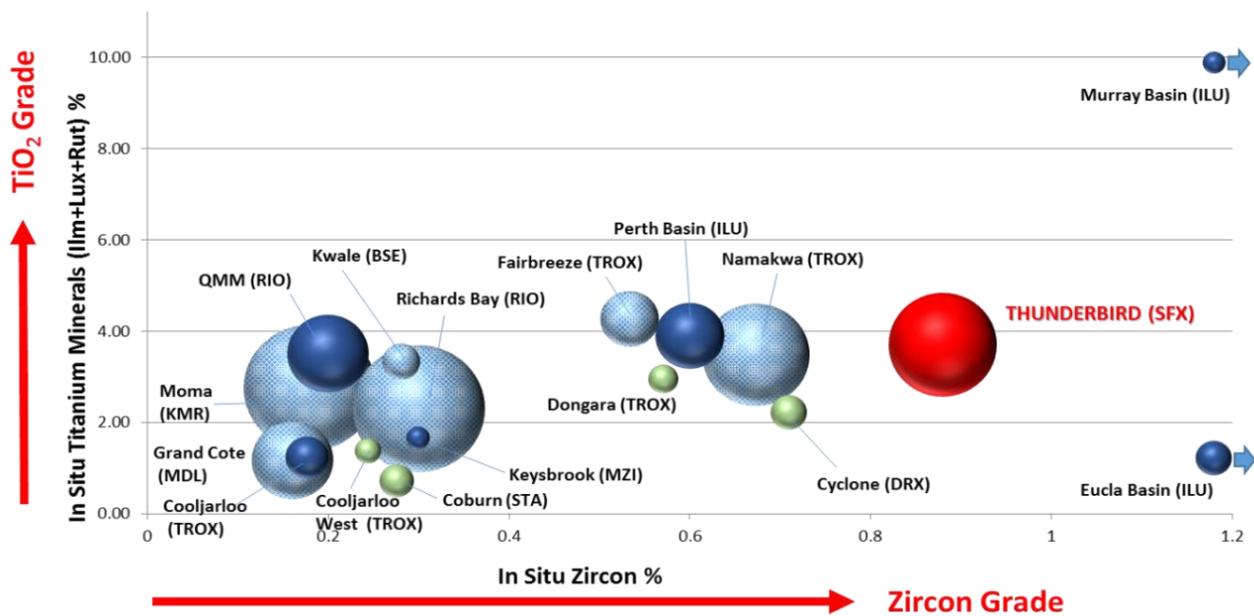


Figure 3: Thunderbird Ore Reserves ranked against Ore Reserves of current mineral sands operations and projects under investigation globally<sup>3</sup>

#### Thunderbird Bankable Feasibility Study (BFS)

The Thunderbird BFS activity is focused on confirmatory fieldwork and metallurgical test work, preliminary engineering, supply quotation and cost estimation. The BFS is designed to deliver reliable estimates of quantities and prices of plant, equipment, buildings and civil structures. The key deliverables of the BFS are detailed estimates of capital and operating costs accompanied by related risk and opportunities associated with the project. Other deliverables include a preliminary project construction plan, legal, commercial and other factors.

Metallurgical test work on a 40-tonne BFS bulk sample, representative of the initial 6-7 years of feed is now complete. This work has enabled the process flowsheet to be optimised and has resulted in high quality final products. Optimisation of the wet concentration and concentrate upgrade stages has resulted in further improved recoveries for the ilmenite and zircon products (refer to ASX announcement dated 12 October, 2016 for further detail).

The mineral separation test work utilising full-scale or scalable equipment was undertaken by IHC Robbins in Brisbane. The pilot scale test work on low temperature ilmenite roasting was completed under the supervision of Hatch and Sheffield at Hazen Laboratories in Colorado, USA.

During the quarter, key project economic drivers, namely, confirmation of the process design and flowsheet; continued improvement with the mineral sands market; growing consumer interest in Thunderbird product offtake and strong funding interest, have provided an opportunity to expedite the project construction timeline by accelerating the construction tender process. Upon commencement of the BFS, Sheffield had adopted a staged BFS approach utilising probabilistic engineering capital estimation prior to tendering the project construction. The opportunity to accelerate the construction

<sup>3</sup> Blue bubbles are operating mines, green bubbles are Ore Reserves reported but project is not operating. Blue hatched bubbles represent operating African mines' Ore Reserves. Bubble size proportional to tonnes of contained VHM. Only Ore Reserves > 4Mt contained VHM shown. Data compiled by Sheffield from public sources.

tender process will allow the BFS to be populated by robust capital costs as opposed to a probabilistic estimate, reducing pricing risk and expediting the tendering route by several months.

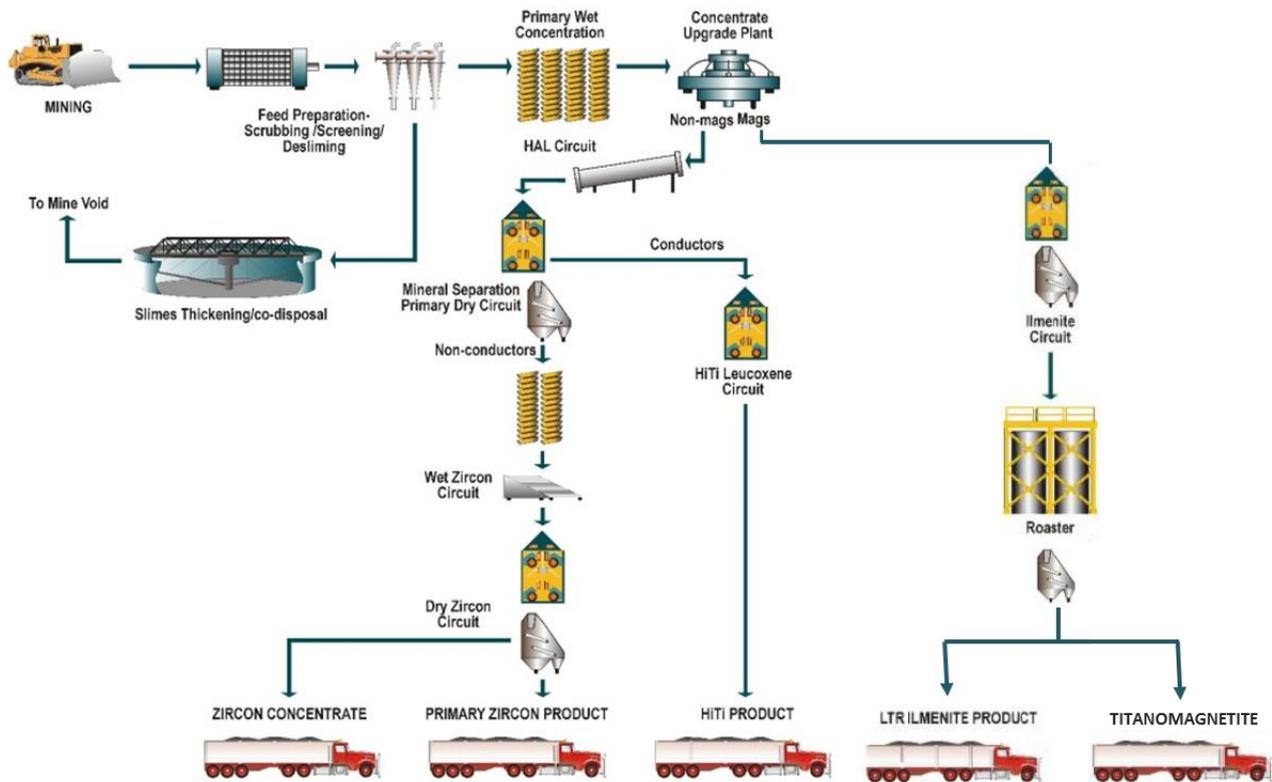


Figure 4: Schematic of Mineral separation Flowsheet - Thunderbird Project

### BFS Product Specifications

High quality final product specifications have been achieved from the BFS mineral separation process flowsheet and Low Temperature Roast (LTR) test work. Final BFS product summaries and specifications are provided below with further detail in Appendix 3;

- **Premium Zircon** – high quality ceramic grade zircon, >66% ZrO<sub>2</sub>;
- **LTR ilmenite** - high grade TiO<sub>2</sub> with low alkalis and chromium suitable for:
  - Feedstock for sulphate pigment plants - 56.1% TiO<sub>2</sub>;
  - Production of chloride grade and sulphate grade slag - 88% TiO<sub>2</sub>;
  - Potential blended feedstock for chloride processing. LTR ilmenite can be produced at higher grades (57-59% TiO<sub>2</sub>) for this potential market;
- **HITi 88** – suited to flux cored wire welding market, production of titanium sponge, or blended material for processing via the chloride process;
- **Zircon concentrate** – zircon rich (44% ZrO<sub>2</sub>, 20% TiO<sub>2</sub>) suited to zirconium chemicals industry;
- **Titanomagnetite** – co-product from the LTR process suited to furnace protection in the steel feed industry. Appraisal of this co-product will be undertaken to determine its marketability and value as a contributor to the revenue stream.

## Recoveries

Utilising full-scale and scalable equipment, and by optimising the primary concentration stages, improved recoveries for the ilmenite and zircon products (representing approximately 91% of projected revenue) over the PFS metallurgical test work have been achieved:

<i>Recoveries</i>	<i>PFS Test work</i>	<i>BFS Test work</i>
LTR Ilmenite	69.4%	71.0%
Zircon Premium	53.5%	56.1%
Zircon Concentrate	26.6%	33.0%
HiTi Leucoxene	38.6%	35.3%

**Table 1: Total recovery to products from BFS metallurgical test work.**

## Low Temperature Roast (LTR) Test Work Results

The BFS LTR continuous pilot-scale test work was completed on 1.5 tonnes of ilmenite at Hazen Laboratories in Colorado, USA and was managed and supervised by Hatch and Sheffield. Continuous-flow fluid bed test work was undertaken for the purposes of engineering design and validation of final product quality. Post-roast magnetic separation stages were completed by IHC Robbins in Brisbane, Australia.

The LTR stage facilitates the removal of ferric iron dominant minerals from the primary ilmenite process step. The roasting process is designed to enhance the magnetic susceptibility of the free iron minerals in the concentrate by exposing it to reducing gases (containing H<sub>2</sub> and CO) in a reaction vessel (fluid bed) at temperatures below 550°C. The magnetic fraction is then removed through a dry magnetic separation process and the remaining ilmenite is thus upgraded to a higher TiO<sub>2</sub>, lower ferric-iron bearing product, which is highly reactive and soluble in sulphate-route pigment production plants. This homogenising process is also designed to produce consistent and uniform product specifications.

Results from batch and continuous pilot plant test work utilising optimised roast conditions were successful in reducing the excess ferric iron in the primary ilmenite, and produced a high grade 56.1% TiO<sub>2</sub> LTR ilmenite, with outstanding improvements in the FeO:Fe<sub>2</sub>O<sub>3</sub> ratio to 1.2. This endorses Thunderbird LTR ilmenite as one of the highest-grade sulphate feedstocks available globally. Solubility test work completed independently by Roundhill Engineering and Hazen Laboratories confirmed very high acid solubility and the samples exhibited excellent reactivity in sulphuric acid. Testwork is currently underway to determine the LTR conditions required to reduce the Fe<sub>2</sub>O<sub>3</sub> content of the ilmenite to less than 13%. An ilmenite product with these specifications would attract a further pricing premium in the Chinese market.

The TiO<sub>2</sub> solubility of the Thunderbird LTR ilmenite has been benchmarked against several known commercial ilmenites that are suitable for existing sulphate plants (Figure 5).

Engineering design of the ilmenite roaster by Hatch is complete. The LTR plant process flow sheet is a simple, low operating temperature process with low risk.

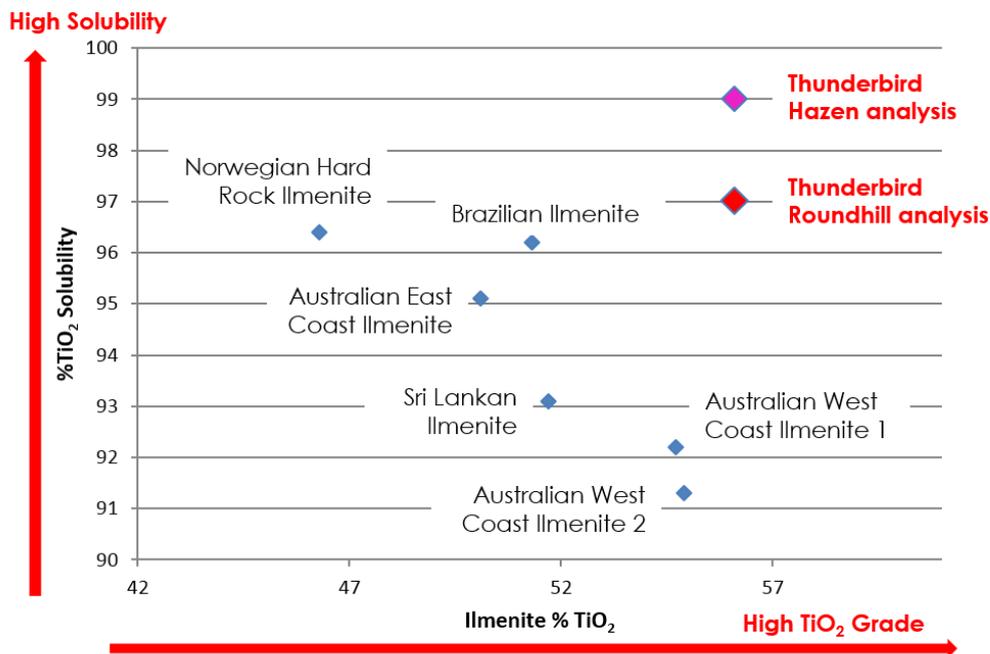


Figure 5: %TiO<sub>2</sub> Solubility vs Grade, Sheffield LTR Ilmenite benchmarked against known Sulphate Ilmenites (Blue), Roundhill (red) and Hazen (magenta) solubility results for Sheffield's LTR ilmenite from pilot test work.

### Marketing and Off-take Status

During the December quarter, in excess of 30 product samples were dispatched to leading global ilmenite and zircon consumers. Completion of analysis and preliminary test work performed by potential off-take partners resulting in both the ilmenite and zircon material being approved for use in the market place by consumers. Positive engagement with potential Asian and European offtake partners and subsequent site visits within China has confirmed the marketability of Thunderbird products, and consequently offtake discussions have progressed on several fronts. These discussions will continue through early 2017 with several customer visits organised through Europe, Asia and India in the coming months. The company continues to work towards completing offtake agreements in the first half of 2017 in line with planned funding discussions.

The company will also continue to discuss the potential of supply for higher grade TiO<sub>2</sub> material (57%-59% TiO<sub>2</sub>) into the chloride market subject to the completion of test work by the potential customers. Thunderbird product marketability reports were completed by TZMI and Ruidow in late 2016. Both reports show a stronger market emerging over the coming years for TiO<sub>2</sub> and zircon products.

### Mine Planning, Optimisation and Scheduling

Conclusion of an Enterprise Optimisation study utilising the recently completed Mineral Resource (refer ASX announcement 5 July 2016) is underway with mine planning and scheduling currently being finalised, supported by Whittle Consulting Pty Ltd and Entech Mining Consultants. For the BFS, phase 1 mining will commence at an initial throughput of between 7.5 and 10Mt per annum with throughput fixed at a constant feed rate of approximately ~750t per hour at the rougher spirals in the Wet Concentrator Plant. Phase 2 of the operation will involve a doubling of the throughput to approximately ~1,500t per hour at the rougher spirals, with the timing of the ramp-up to be determined during financial analysis within the BFS.

## Sustainability

Environmental approval and native title processes continue to advance. The Public Environmental Review (PER) opened for public comment for a period of four weeks with effect from 16 January 2017. The environmental approval process is scheduled to conclude in mid-2017. Native Title negotiations are also well advanced with finalisation of an agreement anticipated before mid-2017.

Substantial engagement with a range of stakeholders throughout the Kimberley local community continued during the quarter, with a series of BFS and PER information sessions and stakeholder briefings taking place. The Company has opened a small, local office in Broome and this follows the appointment of Mr Justin King as Senior Community Advisor within the region.

### **DAMPIER REGIONAL MINERAL SANDS**

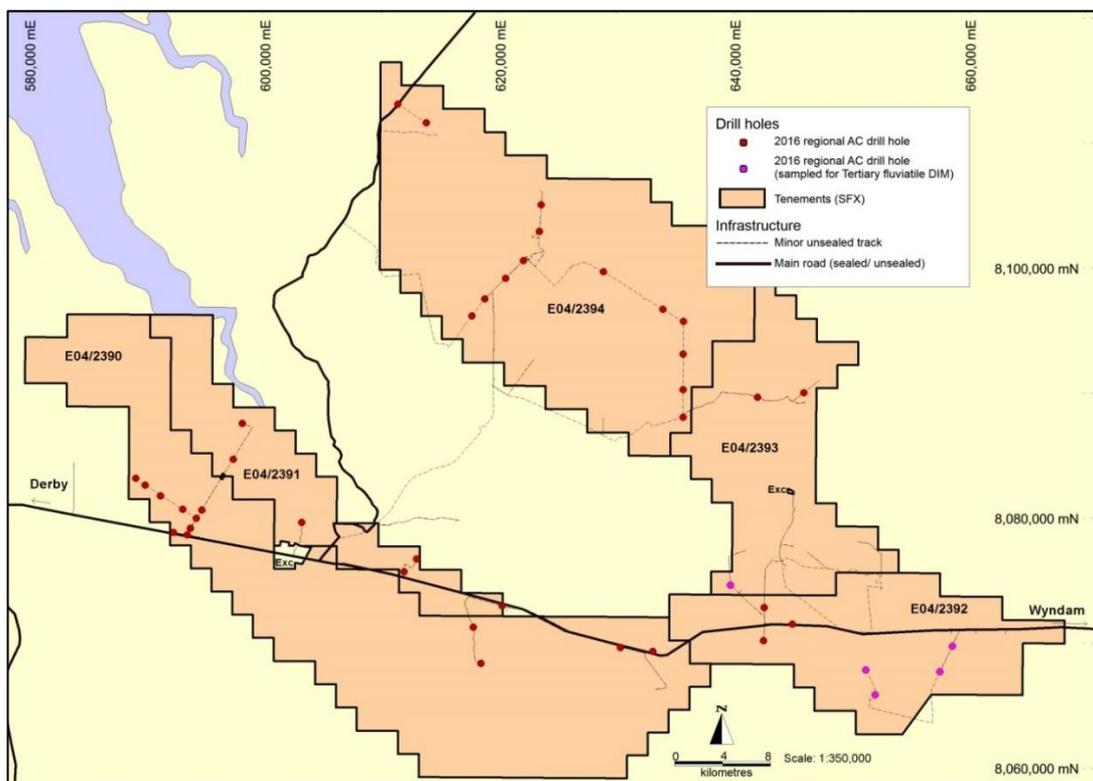
Planning and permitting for regional exploration on the Dampier project for 2017 continued during the quarter, with programs expected to commence during Q2 2017.

### **DERBY EAST MINERAL SANDS**

The Derby East Project comprises 5 exploration licences with a total area of 1,831km<sup>2</sup>. These tenements cover conceptual mineral sands targets to the east of Derby (Figure 1).

During the quarter results were returned from a first-pass reconnaissance drilling program of 43 holes for 2,202m, completed in October 2016. The holes were drilled to a maximum depth of 75m, and were broadly spaced (between 0.6km and 10.6km) (Table 2).

The program identified littoral sands and muds associated with a backfilled estuarine or low energy marine basin. The drilling did not intersect any significant concentrations of valuable heavy mineral (see Appendix 1 for additional details of this program).



**Figure 6: Derby East project tenements showing location of air core drilling**

The aircore drilling programme did outline a deposit of silica sand with properties potentially suitable for use in construction industries. This area is located in the western portion of E04/2390, approximately 30km by road to the port of Derby. Physical properties and geochemical analyses are being undertaken on drill samples from the program to determine the suitability of the sand for construction purposes, with results to be reported next quarter. Sheffield has applied for an additional exploration licence (E04/2478) to secure the remaining potential while the Company awaits the results.

Subsequent to the end of the quarter, Sheffield relinquished three East Derby project tenements: E04/2391, 2393 & 2394. Exploration licence E04/2392 has been retained for potential sale or joint venture due to the presence of diamondiferous palaeochannels outlined by previous explorers.

### FRASER RANGE NICKEL

During the quarter, Sheffield announced it had entered into a joint venture agreement with Independence Group NL (“IGO”) (ASX: IGO) in the Fraser Range region of Western Australia. The agreement encompasses four granted tenements E69/3052 & E69/3033 (Red Bull), E39/1733 (Big Bullocks), E28/2374-I (Bindii) and one tenement application, ELA69/2563 (Similkameen) as shown in Figure 7.

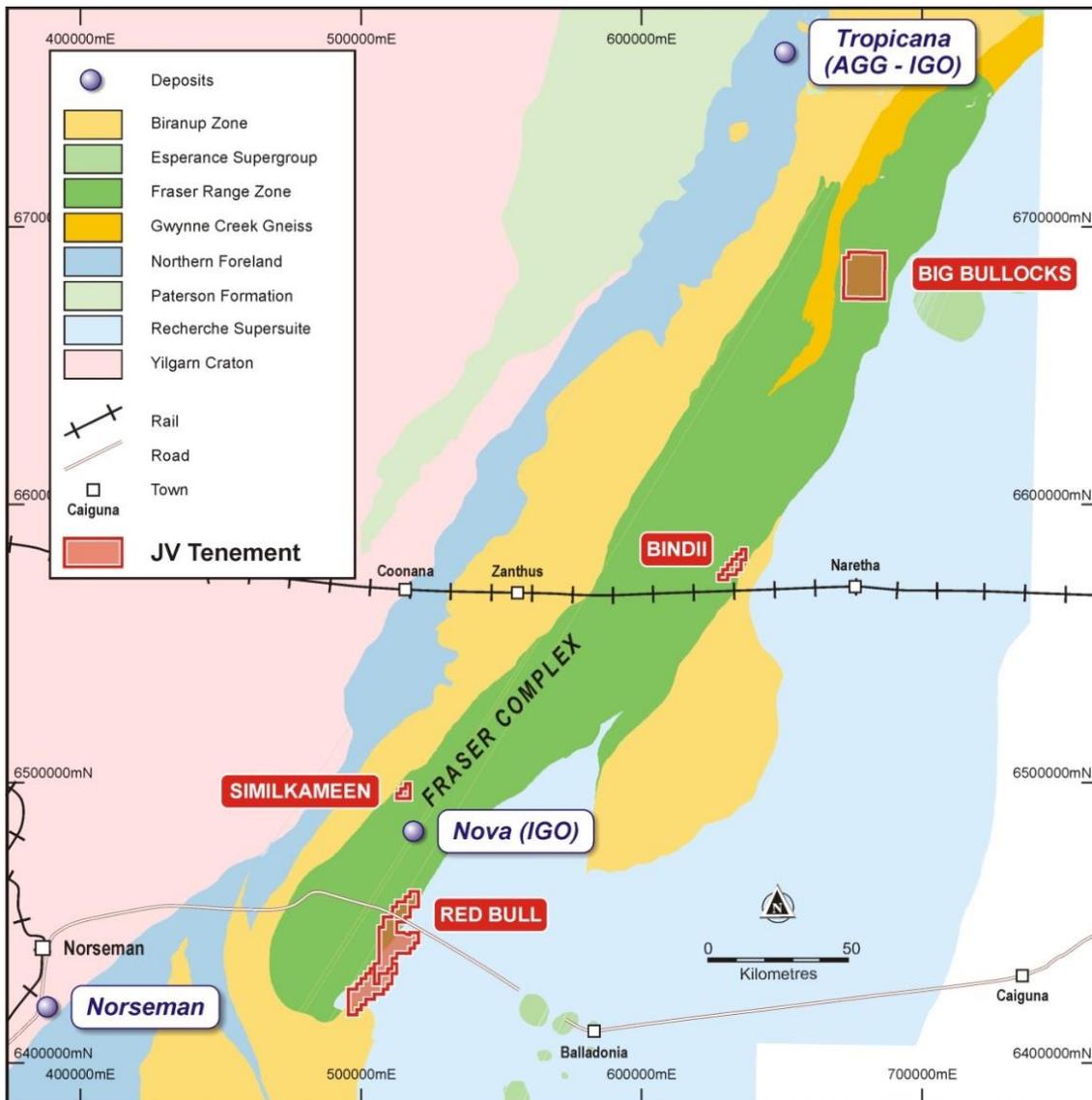


Figure 7: Location of Sheffield - IGO JV tenements in the Fraser Range

Key terms of the joint venture include:

- IGO will earn a 51% interest in the project by making an up-front cash payment of \$500,000
- IGO may earn an additional 19% interest by spending \$5 million within 5 years of commencement of the joint venture
- At any time after commencement of the joint venture and up until completion of the Pre-feasibility Study, IGO has an option to purchase an additional 5% interest for \$10 million or the equivalent in IGO shares
- Standard dilution clauses apply. Should Sheffield's interest dilute to 5% or less, it shall automatically convert to a 1% net smelter return royalty.

The joint venture allows Sheffield to retain significant exposure to exploration success in the Fraser Range, as it focuses on developing the Thunderbird project.

### OAKOVER COPPER-MANGANESE PROJECT

Sheffield's Oakover project, located in the highly prospective Eastern Hamersley Basin and Paterson Province, comprises 3 granted exploration licences and 12 exploration licence applications totalling over 3,580 km<sup>2</sup> (Figure 8).

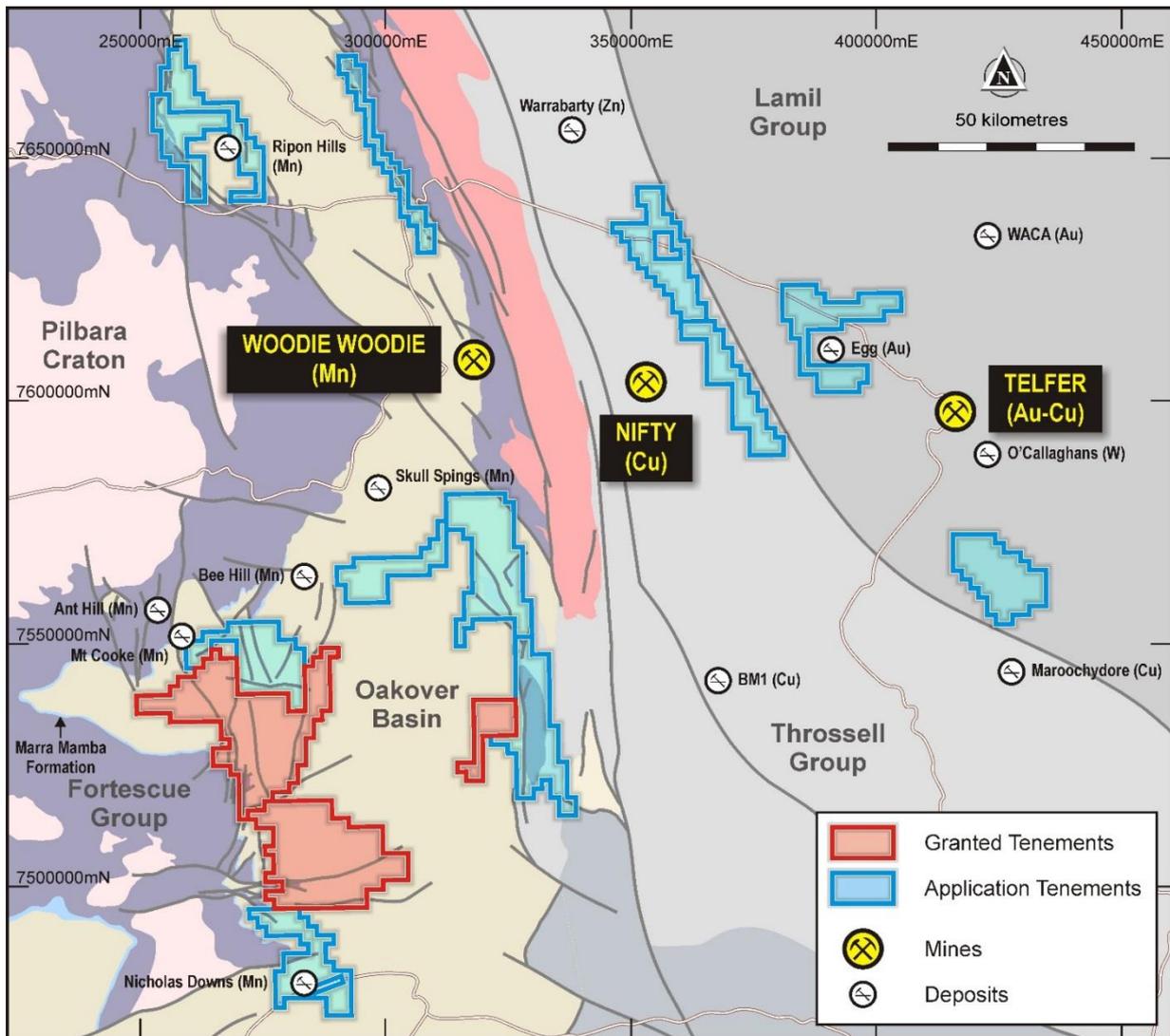


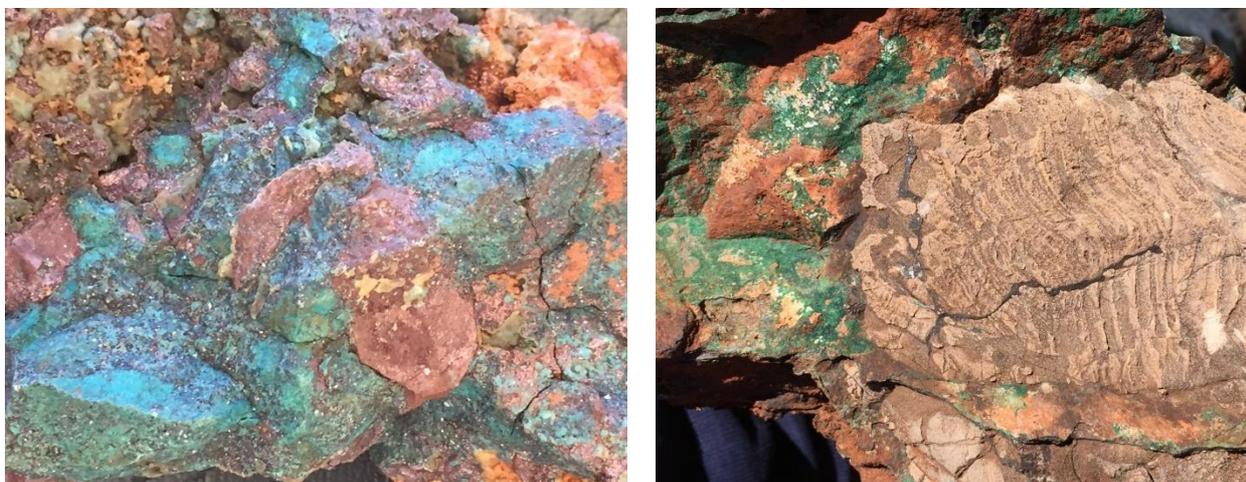
Figure 8: Oakover project tenements

Sheffield is targeting the Oakover projects for;

- Sediment hosted copper Cu-Co-(Zn-Pb) (i.e. Nifty, Warrabarty)
- Proterozoic gold-copper systems Au-Cu-(Ag-W) (i.e. Telfer, Calibre)
- Manganese Mn (i.e. Woodie Woodie, Ripon Hills)
- Iron Fe (i.e. Christmas Creek, Roy Hill)

Sheffield, through its wholly-owned subsidiary Carawine Resources, is building a significant landholding in the highly prospective Oakover and Paterson regions. As this work progresses, Sheffield shall seek opportunities to realise value from these assets, through potential new listing or divestment by sale or joint-venture.

During the quarter, an initial field reconnaissance trip to granted tenements E46/1041 and E46/1069 was undertaken. Reconnaissance mapping at the Western Star prospect confirmed the occurrence of primary high grade copper mineralisation hosted by breccias and vein stockworks within Proterozoic dolomites (Figure 9).



**Figure 9: Western Star prospect - copper breccia (left), copper vein stockwork (right): prospect location GDA94 MGA zone 51, 274,777mE, 7,530,481mN.**

The field trip also confirmed the presence of manganese mineralisation within the Brown Dog Graben in dolomites of the Carawine Formation (Figure 10). In addition, strong iron enrichment was observed within the Marra Mamba Formation near Holden Bore and a new style of high grade hydrothermal iron enrichment was identified within Proterozoic cherts and chert breccias (Figure 10).



**Figure 10: Manganese mineralisation (left): location GDA94 MGA zone 51, 282,112mE, 7,530,044mN., hydrothermal iron enrichment (right); location GDA94 MGA zone 51, 280,923mE, 7,535,128mN.**

A comprehensive review of historical exploration data is due for completion in Q1 2017. This will be followed by field reconnaissance, geological mapping and sampling to validate exploration targets identified at the Oakover project.

#### **ENEABBA & McCALLS HEAVY MINERAL SANDS**

No work was completed on the Eneabba and McCalls projects during the quarter. A short exploration drilling program to test dunal HM targets is scheduled for H1 2017, subject to obtaining landholder consents.

#### **CASH POSITION AND CORPORATE ACTIVITIES**

As at 31 December 2016, Sheffield had cash reserves of approximately \$14.0 million (unaudited). This amount includes the receipt of \$1.2 million attributable to the 2016 Research and Development tax return.

In conjunction with the significant and positive results arising from the Thunderbird BFS process, Sheffield's corporate activities continue to focus on securing a pathway through to project development, which may include potential partnering and product off-take arrangements. Marketing activities and engagement with potential customers continued during the December quarter, including a comprehensive marketing visit by Sheffield management to several potential customers' manufacturing sites.



**Mr Bruce McFadzean**

Managing Director

24 January 2017

## Schedule 1: Interests in Mining Tenements at the end of the quarter as required under ASX Listing Rule 5.3.3

Project	Tenement	Holder	Interest	Location <sup>3</sup>	Status
Mineral Sands	E04/2081	Sheffield Resources Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2083	Sheffield Resources Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2084	Sheffield Resources Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2159	Sheffield Resources Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2171	Sheffield Resources Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2192	Sheffield Resources Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2193	Sheffield Resources Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2194	Sheffield Resources Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2348	Sheffield Resources Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2349	Sheffield Resources Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2350	Sheffield Resources Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2386	Sheffield Resources Ltd	100%	Canning Basin	Pending
Mineral Sands	E04/2390	Sheffield Resources Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2391	Sheffield Resources Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2392	Sheffield Resources Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2393	Sheffield Resources Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2394	Sheffield Resources Ltd	100%	Canning Basin	Granted
Mineral Sands	E04/2399	Sheffield Resources Ltd	100%	Canning Basin	Pending
Mineral Sands	E04/2400	Sheffield Resources Ltd	100%	Canning Basin	Pending
Mineral Sands	E04/2455	Sheffield Resources Ltd	100%	Canning Basin	Pending
Mineral Sands	E04/2456	Sheffield Resources Ltd	100%	Canning Basin	Pending
Mineral Sands	M04/459	Sheffield Resources Ltd	100%	Canning Basin	Pending
Mineral Sands	L04/82	Sheffield Resources Ltd	100%	Canning Basin	Pending
Mineral Sands	L04/83	Sheffield Resources Ltd	100%	Canning Basin	Pending
Mineral Sands	L04/84	Sheffield Resources Ltd	100%	Canning Basin	Granted
Mineral Sands	L04/85	Sheffield Resources Ltd	100%	Canning Basin	Granted
Mineral Sands	L04/86	Sheffield Resources Ltd	100%	Canning Basin	Granted
Mineral Sands	L04/92	Sheffield Resources Ltd	100%	Canning Basin	Granted
Mineral Sands	L04/93	Sheffield Resources Ltd	100%	Canning Basin	Granted
Mineral Sands	E70/3762	Sheffield Resources Ltd	100%	Perth Basin	Granted
Mineral Sands	E70/3813	Sheffield Resources Ltd	100%	Perth Basin	Granted
Mineral Sands	E70/3814	Sheffield Resources Ltd	100%	Perth Basin	Granted
Mineral Sands	E70/3929	Sheffield Resources Ltd	100%	Perth Basin	Granted
Mineral Sands	E70/3967	Sheffield Resources Ltd	100%	Perth Basin	Granted
Mineral Sands	E70/4190	Sheffield Resources Ltd	100%	Perth Basin	Granted
Mineral Sands	E70/4292	Sheffield Resources Ltd	100%	Perth Basin	Granted
Mineral Sands	E70/4313	Sheffield Resources Ltd	100%	Perth Basin	Granted
Mineral Sands	E70/4584	Sheffield Resources Ltd	100%	Perth Basin	Granted
Mineral Sands	M70/872 <sup>1</sup>	Sheffield Resources Ltd	100%	Perth Basin	Granted
Mineral Sands	M70/965 <sup>1</sup>	Sheffield Resources Ltd	100%	Perth Basin	Granted
Mineral Sands	M70/1153 <sup>1</sup>	Sheffield Resources Ltd	100%	Perth Basin	Granted

Project	Tenement	Holder	Interest	Location	Status
Mineral Sands	R70/35 <sup>1</sup>	Sheffield Resources Ltd	100%	Perth Basin	Granted
Mineral Sands	E70/3859	Sheffield Resources Ltd	100%	Perth Basin	Pending
Mineral Sands	L70/150	Sheffield Resources Ltd	100%	Perth Basin	Granted
Mineral Sands	E70/4719	Sheffield Resources Ltd	100%	Perth Basin	Granted
Mineral Sands	E70/4747	Sheffield Resources Ltd	100%	Perth Basin	Granted
Mineral Sands	E70/4922	Sheffield Resources Ltd	100%	Perth Basin	Pending
Nickel	E69/3033 <sup>2</sup>	Sheffield Resources Ltd	49%	Fraser Range	Granted
Nickel	E69/3052 <sup>2</sup>	Sheffield Resources Ltd	49%	Fraser Range	Granted
Nickel	E39/1733 <sup>2</sup>	Sheffield Resources Ltd	49%	Fraser Range	Granted
Nickel	E28/2374-I <sup>2</sup>	Sheffield Resources Ltd	49%	Fraser Range	Granted
Nickel	E28/2563 <sup>2</sup>	Sheffield Resources Ltd	49%	Fraser Range	Pending
Gold	E63/1696	Sheffield Resources Ltd	100%	Tropicana Belt	Granted
Nickel/Gold	E28/2481	Sheffield Resources Ltd	100%	Tropicana Belt	Granted
Copper/Manganese	E46/1041	Sheffield Resources Ltd	100%	Pilbara	Granted
Copper/Manganese	E46/1042	Sheffield Resources Ltd	100%	Pilbara	Pending
Copper/Manganese	E46/1044	Sheffield Resources Ltd	100%	Pilbara	Granted
Copper/Manganese	E45/4574	Sheffield Resources Ltd	100%	Pilbara	Pending
Copper/Manganese	E46/1069-I	Sheffield Resources Ltd	100%	Pilbara	Granted
Copper/Manganese	E46/1070	Sheffield Resources Ltd	100%	Pilbara	Pending
Copper/Manganese	E46/1099	Sheffield Resources Ltd	100%	Pilbara	Pending
Copper/Manganese	E46/1116	Sheffield Resources Ltd	100%	Pilbara	Pending
Copper/Manganese	E46/1119	Sheffield Resources Ltd	100%	Pilbara	Pending
Copper/Manganese	E45/4717	Sheffield Resources Ltd	100%	Pilbara	Pending
Copper/Manganese	E45/4719	Sheffield Resources Ltd	100%	Pilbara	Pending
Copper/Zinc	E45/4600	Sheffield Resources Ltd	100%	Patterson	Pending
Copper/Gold	E45/4844	Carawine Resources Pty Ltd <sup>4</sup>	100%	Patterson	Pending
Copper/Zinc	E45/4845	Carawine Resources Pty Ltd <sup>4</sup>	100%	Patterson	Pending
Copper/Zinc	E45/4847	Carawine Resources Pty Ltd <sup>4</sup>	100%	Patterson	Pending

Notes:

<sup>1</sup>Iluka Resources Ltd (ASX: ILU) retains a gross sales royalty of 1.5% in respect to tenements R70/35, M70/872, M70/965 & M70/1153.

<sup>2</sup>Sheffield retains a 49% interest, having sold a 51% interest to Independence Group NL (IGO) during the quarter.

<sup>3</sup>All tenements are located in the state of Western Australia.

<sup>4</sup>Carawine Resources Pty Ltd is a 100% owned subsidiary of Sheffield Resources Ltd.

Details of tenements and/or beneficial interests acquired/disposed of during the quarter are provided in Section 10 of the Company's Appendix 5B notice for the December 2016 quarter.

**Table 2. Derby East Air Core drill hole collar information**

Tenement ID	Hole ID	Easting (m)	Northing (m)	Azimuth / Dip	Hole Depth	Comment
E04/2391	EDAC001	598188	8087576	000/-90	45	
E04/2391	EDAC002	597409	8084717	000/-90	36.5	
E04/2391	EDAC003	603256	8079665	000/-90	45	
E04/2394	EDAC004	613832	8111625	000/-90	24	
E04/2394	EDAC005	611405	8113132	000/-90	42	
E04/2394	EDAC006	617730	8096182	000/-90	45	
E04/2394	EDAC007	618816	8097551	000/-90	45	
E04/2394	EDAC008	620587	8099191	000/-90	45	
E04/2394	EDAC009	622114	8100606	000/-90	54	
E04/2394	EDAC010	623458	8102950	000/-90	52.5	
E04/2394	EDAC011	623624	8105058	000/-90	45	
E04/2394	EDAC012	628907	8099728	000/-90	60	
E04/2394	EDAC013	633979	8096710	000/-90	60	
E04/2394	EDAC014	635706	8095740	000/-90	60	
E04/2394	EDAC015	635678	8093131	000/-90	51	
E04/2394	EDAC016	635681	8090298	000/-90	51	
E04/2394	EDAC017	635701	8088078	000/-90	60	
E04/2393	EDAC018	642019	8089679	000/-90	69	
E04/2393	EDAC019	645962	8090042	000/-90	69	
E04/2391	EDAC020	613018	8076744	000/-90	75	
E04/2391	EDAC021	611938	8075723	000/-90	60	
E04/2390	EDAC022	618495	8068378	000/-90	69	
E04/2390	EDAC023	617849	8071274	000/-90	57	
E04/2391	EDAC024	620310	8072986	000/-90	60	
E04/2393	EDAC025	633105	8069344	000/-90	36	
E04/2390	EDAC026	630366	8069661	000/-90	54	
E04/2392	EDAC027	642538	8070191	000/-90	60	
E04/2392	EDAC028	642580	8072864	000/-90	60	
E04/2393	EDAC029	639726	8074652	000/-90	60	Tertiary channel analysed for DIM 0-12m
E04/2392	EDAC030	644997	8071537	000/-90	60	
E04/2392	EDAC031	658606	8069768	000/-90	51	Tertiary channel analysed for DIM 0-16.5m
E04/2392	EDAC032	657531	8067732	000/-90	51	Tertiary channel analysed for DIM 0-16.5m
E04/2392	EDAC033	651218	8067863	000/-90	21	Tertiary channel analysed for DIM 0-9m
E04/2392	EDAC034	652039	8065880	000/-90	22.5	Tertiary channel analysed for DIM 0-6m
E04/2390	EDAC035	592327	8078870	000/-90	57	
E04/2390	EDAC036	594752	8080667	000/-90	27	
E04/2390	EDAC037	589127	8083198	000/-90	63	
E04/2390	EDAC038	589930	8082637	000/-90	60	
E04/2390	EDAC039	591233	8081795	000/-90	54	
E04/2390	EDAC040	593121	8080718	000/-90	48	
E04/2390	EDAC041	594289	8079999	000/-90	36	
E04/2390	EDAC042	593770	8079197	000/-90	51	
E04/2390	EDAC043	593499	8078662	000/-90	51	

*Air core hole locations surveyed at surface by handheld GPS system with expected accuracy of +/- 5m horizontal, RL not recorded. Easting and Northing coordinate system is MGA Zone 51 (GDA94). Tertiary channel intersects underwent preliminary analysis for diamond indicator minerals (DIM), none were identified.*

## COMPLIANCE STATEMENTS

### EXPLORATION RESULTS

The information in this report that relates to Exploration Results is based on information compiled by Mr David Boyd, a Competent Person who is a Member of Australian Institute of Geoscientists (AIG). Mr Boyd is a full-time employee of Sheffield Resources 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 Boyd 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

This report includes information that relates to Exploration Results, Exploration Targets, Mineral Resources, Ore Reserves, a Pre-feasibility Study and Technical Studies which were prepared and first disclosed under the JORC Code 2012. The information was extracted from the Company's previous ASX announcements as follows:

- Thunderbird BFS Update: *"OUTSTANDING IMPROVEMENTS IN RECOVERIES AND PRODUCT SPECIFICATIONS FROM THUNDERBIRD BFS"* 12 October, 2016
- McCalls Mineral Resource Update: *"QUARTERLY ACTIVITIES REPORT FOR THE PERIOD ENDED 30 JUNE 2016"* 25 July 2016.
- Thunderbird Mineral Resource Update: *"SHEFFIELD DOUBLES MEASURED MINERAL RESOURCE AT THUNDERBIRD"* 5 July, 2016
- Thunderbird Ore Reserve: *"MAIDEN ORE RESERVE - THUNDERBIRD PROJECT"*, 22 January, 2016
- Thunderbird Pre-feasibility Study Update: *"PRE-FEASIBILITY STUDY UPDATE CONFIRMS THUNDERBIRD AS THE WORLD'S BEST UNDEVELOPED MINERAL SANDS PROJECT,"* 14 October 2015

This report also includes information that relates to Exploration Results and Mineral Resources which were prepared and first disclosed under the JORC Code 2004. The information has not been updated since to comply with the JORC Code 2012 on the basis that the information has not materially changed since it was last reported. The information was extracted from the Company's previous ASX announcements as follows:

- Drummond Crossing Mineral Resource and Sampling Results from Dunal-Style HM Targets, Eneabba Project: *"1Mt HEAVY MINERAL RESOURCE ADDED TO ENEABBA PROJECT"*, 30 October 2013.
- Yandanooka Mineral Resource: *"YANDANOOKA RESOURCE UPGRADE AND METALLURGICAL RESULTS"*, 30 January 2013.
- Durack Mineral Resource: *"ENEABBA PROJECT RESOURCE INVENTORY EXCEEDS 5MT HEAVY MINERAL"*, 28 August 2012.
- West Mine North Mineral Resource: *"WEST MINE NORTH MINERAL RESOURCE ESTIMATE EXCEEDS EXPECTATIONS"*, 7 November 2011.
- Ellengail Mineral Resource: *"1MT CONTAINED HM INFERRED RESOURCE AT ELLENGAIL"*, 25 October 2011.

These announcements are available to view on Sheffield Resources Ltd's web site [www.sheffieldresources.com.au](http://www.sheffieldresources.com.au)

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", "target", "scheduled", "intends", "potential", "prospective" and similar expressions.

## Appendix 1: JORC (2012) Table 1 Report Derby East Aircore Drilling

### Section 1 Sampling Techniques and Data

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

Criteria	JORC Code explanation	Commentary
Sampling techniques	<ul style="list-style-type: none"> <li>Nature and quality of sampling (eg cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc). These examples should not be taken as limiting the broad meaning of sampling.</li> <li>Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.</li> <li>Aspects of the determination of mineralisation that are Material to the Public Report.</li> <li>In cases where 'industry standard' work has been done this would be relatively simple (eg 'reverse circulation drilling was used to obtain 1 m samples from which 3 kg was pulverised to produce a 30 g charge for fire assay'). In other cases more explanation may be required, such as where there is coarse gold that has inherent sampling problems. Unusual commodities or mineralisation types (eg submarine nodules) may warrant disclosure of detailed information.</li> </ul>	<ul style="list-style-type: none"> <li>NQ diameter aircore drilling used to collect 2-3kg samples at 1.5m intervals down-hole.</li> <li>Mineral Sands Industry-standard drilling technique.</li> </ul>
Drilling techniques	<ul style="list-style-type: none"> <li>Drill type (eg core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc) and details (eg core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc).</li> </ul>	<ul style="list-style-type: none"> <li>Aircore system NQ diameter holes.</li> <li>Blade drill bit used for majority of drilling, where hard rock layers intersected and unable to drill with blade bit, a Wallis diamond tipped air core blade was used to penetrate layers.</li> <li>Aircore system used as an industry standard for HMS deposits.</li> </ul>
Drill sample recovery	<ul style="list-style-type: none"> <li>Method of recording and assessing core and chip sample recoveries and results assessed.</li> <li>Measures taken to maximise sample recovery and ensure representative nature of the samples.</li> <li>Whether a relationship exists between sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.</li> </ul>	<ul style="list-style-type: none"> <li>Sample quality (including wet vs. dry and qualitative recovery) is logged at the drill site.</li> <li>Orientation process undertaken at the beginning of program to set up sampling system to collect 2-3kg sub-sample from 1.5m intervals. Remainder of sample was disposed of down the drill hole.</li> <li>Sample weight recorded at laboratory</li> <li>Drill system is optimised for HMS.</li> <li>Duplicate samples are collected at the drill site (see below) to enable analysis of data precision</li> </ul>
Logging	<ul style="list-style-type: none"> <li>Whether core and chip samples have been geologically and geotechnically logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and metallurgical studies.</li> <li>Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc) photography.</li> <li>The total length and percentage of the relevant intersections logged.</li> </ul>	<ul style="list-style-type: none"> <li>Every drill sample is washed and panned, then geologically logged on-site in 1.5m intervals, recording primary, secondary and oversize lithology, qualitative hardness, grainsize, rounding, sorting, and washability, visual estimates of HM%, SL% and OS%, and depth to water table.</li> <li>The entire length of the drill hole is logged; minimum (nominal) interval length is 1.5m.</li> <li>Logging is suitable such that interpretations of grade and deposit geology can be used, for example, to establish context of exploration results and support Mineral Resource</li> </ul>

Criteria	JORC Code explanation	Commentary
<p><i>Sub-sampling techniques and sample preparation</i></p>	<ul style="list-style-type: none"> <li>• <i>If core, whether cut or sawn and whether quarter, half or all core taken.</i></li> <li>• <i>If non-core, whether riffled, tube sampled, rotary split, etc and whether sampled wet or dry.</i></li> <li>• <i>For all sample types, the nature, quality and appropriateness of the sample preparation technique.</i></li> <li>• <i>Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.</i></li> <li>• <i>Measures taken to ensure that the sampling is representative of the in situ material collected, including for instance results for field duplicate/second-half sampling.</i></li> <li>• <i>Whether sample sizes are appropriate to the grain size of the material being sampled.</i></li> </ul>	<p>estimation.</p> <p>Drill Site</p> <ul style="list-style-type: none"> <li>• 2-3kg sample collected at 1.5m intervals in numbered bags at the drill site via rotary splitter at cyclone discharge point.</li> <li>• Duplicate samples (field duplicates) collected at drill site 1 in every 40 samples.</li> <li>• Reference standard and blank material samples inserted 1 each in every 40 samples.</li> <li>• Sample submitted to external laboratory for heavy liquid separation (HLS) determination of weight per cent heavy mineral (HM), Slimes (SL) and Oversize (OS).</li> </ul> <p>Laboratory</p> <ul style="list-style-type: none"> <li>• 2-3kg drill sample sub-split via rotary splitter to approx. 200g for analysis.</li> <li>• HM, SL and OS calculated as percentage of total sample weight.</li> <li>• Laboratory repeats are conducted 1 in every 20 samples, and laboratory reference standard inserted 1 in every 40 samples.</li> </ul> <p>All</p> <ul style="list-style-type: none"> <li>• Spacing of duplicate, standard, blank and lab repeat samples are designed to identify sample misplacement or misallocation during sample collection and laboratory analysis.</li> <li>• Sample representivity and data precision has been determined as acceptable through analysis of results from field duplicate samples and laboratory repeats.</li> <li>• Visual estimates of HM, Slimes and OS logged at the drill site are compared against laboratory results to identify any major errors.</li> <li>• Analysis of duplicates show the data has acceptable precision, indicating sampling techniques are appropriate for the deposit style.</li> </ul> <p>Techniques are considered appropriate for use in public reporting of exploration results and Mineral Resource estimation.</p>

Criteria	JORC Code explanation	Commentary
Quality of assay data and laboratory tests	<ul style="list-style-type: none"> <li>The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.</li> <li>For geophysical tools, spectrometers, handheld XRF instruments, etc, the parameters used in determining the analysis including instrument make and model, reading times, calibrations factors applied and their derivation, etc.</li> <li>Nature of quality control procedures adopted (eg standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (ie lack of bias) and precision have been established.</li> </ul>	<ul style="list-style-type: none"> <li>Assay and laboratory procedures are industry standard for HMS, although laboratories' methods and heavy liquid composition vary slightly. TBE (2.96g/ml) is used for this program.</li> <li>Method produces a total grade as weight per cent of the initial sample.</li> <li>Method does not determine the relative amounts of valuable (saleable or marketable) and non-valuable heavy mineral species.</li> <li>QAQC sample frequency is described above. The HM reference sample used is a field-homogenised bulk sample with expected values and ranges determined internally from assay results. Blank material used is commercially available builder's sand.</li> <li>Reference standards and blanks are examined for performance over time and within laboratory batches. Batches or sub-batches are re-analysed if unacceptable QAQC data are returned.</li> <li>Analysis of reference standards, blanks and laboratory repeats show the data to be of acceptable accuracy and precision for use in public reporting of exploration results and Mineral Resource estimation.</li> <li>Selected intervals as indicated in Table 2 (above) underwent preliminary "sighter" testwork for diamond indicator minerals (DIM). This was not a complete nor comprehensive DIM analysis program as only the HM component of relatively small (3kg) samples were analysed. No DIM were identified.</li> </ul>
Verification of sampling and assaying	<ul style="list-style-type: none"> <li>The verification of significant intersections by either independent or alternative company personnel.</li> <li>The use of twinned holes.</li> <li>Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.</li> <li>Discuss any adjustment to assay data.</li> </ul>	<ul style="list-style-type: none"> <li>Significant intervals are reviewed by senior Sheffield personnel prior to release. No assays contained significant intersections of valuable heavy mineral.</li> <li>Data is logged electronically using "validation at point of entry" systems prior to storage in the Company's drill hole database, which is managed by Company personnel and an external consultancy.</li> <li>Documentation related to data custody and validation are maintained on the Company's server.</li> <li>No assay data have been adjusted.</li> </ul>
Location of data points	<ul style="list-style-type: none"> <li>Accuracy and quality of surveys used to locate drill holes (collar and down-hole surveys), trenches, mine workings and other locations used in Mineral Resource estimation.</li> <li>Specification of the grid system used.</li> <li>Quality and adequacy of topographic control.</li> </ul>	<ul style="list-style-type: none"> <li>Hole locations were surveyed by handheld GPS system with expected accuracy of +/- 15m horizontal.</li> <li>RL determined by projection to a SRTM DEM model.</li> <li>Easting and Northing coordinate system is MGA Zone 51 (GDA94)</li> <li>RL is at 0mRL as vertical accuracy of the hand held GPS is poor and a DTM surface has not been purchased.</li> </ul>
Data spacing and distribution	<ul style="list-style-type: none"> <li>Data spacing for reporting of Exploration Results.</li> <li>Whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied.</li> </ul>	<ul style="list-style-type: none"> <li>See body of announcement for drill hole detail of spacing.</li> <li>This is a first-pass exploration drill program and holes are widely spaced to test potential heavy mineral occurrences around the basin.</li> <li>Samples have not been composited. No</li> </ul>

Criteria	JORC Code explanation	Commentary
	<ul style="list-style-type: none"> <li>Whether sample compositing has been applied.</li> </ul>	significant intervals are reported.
Orientation of data in relation to geological structure	<ul style="list-style-type: none"> <li>Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.</li> <li>If the relationship between the drilling orientation and the orientation of key mineralised structures is considered to have introduced a sampling bias, this should be assessed and reported if material.</li> </ul>	<ul style="list-style-type: none"> <li>Strata surrounds a palaeo-embayment where littoral to sub-littoral sands were deposited along the edge. Drilling intersected these peripheral sub-horizontal sands testing for tidal cyclonic deposition of heavy mineral.</li> </ul>
Sample security	<ul style="list-style-type: none"> <li>The measures taken to ensure sample security.</li> </ul>	<ul style="list-style-type: none"> <li>Sample security is not considered a significant risk given the location of the Project.</li> <li>Nevertheless, the use of recognised transport providers, and sample dispatch procedures directly from the field to the laboratory are considered sufficient to ensure appropriate sample security.</li> </ul>
Audits or reviews	<ul style="list-style-type: none"> <li>The results of any audits or reviews of sampling techniques and data.</li> </ul>	<ul style="list-style-type: none"> <li>No formal external audits or review have been conducted.</li> <li>Audits are not considered necessary at this stage of the Project's development. Industry-standard methods are being employed.</li> </ul>

## Section 2 Reporting of Exploration Results

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

Criteria	Statement	Commentary
Mineral tenement and land tenure status	<ul style="list-style-type: none"> <li>Type, reference name/number, location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environmental settings.</li> <li>The security of the tenure held at the time of reporting along with any known impediments to obtaining a licence to operate in the area.</li> </ul>	<ul style="list-style-type: none"> <li>Exploration results are entirely within 100% Sheffield Resources held Exploration Licences: <ul style="list-style-type: none"> <li>E04/2390 which was granted on 14/07/2015 and is due to expire on 13/07/2021.</li> <li>E04/2391 which was granted on 05/01/2015 and is due to expire on 27/07/2020.</li> <li>E04/2392 which was granted on 22/03/2016 and is due to expire on 21/03/2021.</li> <li>E04/2393 which was granted on 28/07/2015 and is due to expire on 28/07/2020.</li> <li>E04/2394 which was granted on 28/07/2015 and is due to expire on 27/07/2020.</li> </ul> </li> <li>Note the text in the body of this announcement stating most of these tenements were surrendered after the drilling program was completed.</li> <li>There are no known or experienced impediments to obtaining a licence to operate in the area.</li> <li>Sheffield has been operating successfully in the region for more than a year.</li> <li>Tenure is 25km to 100km east of Derby on either side of the Gibb River Road.</li> </ul>
Exploration done by other parties	<ul style="list-style-type: none"> <li>Acknowledgment and appraisal of exploration by other parties.</li> </ul>	<ul style="list-style-type: none"> <li>Diamond exploration has been carried out by Kimberley Diamond Company NL from (1993-2000) exploring for diamonds associated with</li> </ul>

Criteria	Statement	Commentary
		<p>Tertiary fluvial deposits flowing off the Ellendale field. This project was brought by Blina in (2004 – 2009).</p> <ul style="list-style-type: none"> <li>• Areva Resources drilled for roll-type uranium reduced facies uranium (2011-2014)</li> <li>• No work has been carried out exploring for heavy mineral sands within the tenements.</li> </ul>
Geology	<ul style="list-style-type: none"> <li>• <i>Deposit type, geological setting and style of mineralisation.</i></li> </ul>	<ul style="list-style-type: none"> <li>• Sheffield is exploring for Cainozoic heavy mineral sands associated with cyclonic events or tidal accumulations along strand and littoral/sub-littoral zones along palaeo-basin margins.</li> </ul>
Drill hole Information	<ul style="list-style-type: none"> <li>• <i>A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all Material drill holes:</i> <ul style="list-style-type: none"> <li>○ <i>easting and northing of the drill hole collar</i></li> <li>○ <i>elevation or RL (Reduced Level – elevation above sea level in metres) of the drill hole collar</i></li> <li>○ <i>dip and azimuth of the hole</i></li> <li>○ <i>down hole length and interception depth</i></li> <li>○ <i>hole length.</i></li> </ul> </li> <li>• <i>If the exclusion of this information is justified on the basis that the information is not Material and this exclusion does not detract from the understanding of the report, the Competent Person should clearly explain why this is the case.</i></li> </ul>	<ul style="list-style-type: none"> <li>• See body of announcement.</li> </ul>
Data aggregation methods	<ul style="list-style-type: none"> <li>• <i>In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (eg cutting of high grades) and cut-off grades are usually Material and should be stated.</i></li> <li>• <i>Where aggregate intercepts incorporate short lengths of high grade results and longer lengths of low grade results, the procedure used for such aggregation should be stated and some typical examples of such aggregations should be shown in detail.</i></li> <li>• <i>The assumptions used for any reporting of metal equivalent values should be clearly stated.</i></li> </ul>	<ul style="list-style-type: none"> <li>• None applied.</li> </ul>
Relationship between mineralisation widths and intercept lengths	<ul style="list-style-type: none"> <li>• <i>These relationships are particularly important in the reporting of Exploration Results.</i></li> <li>• <i>If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported.</i></li> <li>• <i>If it is not known and only the down hole lengths are reported, there should be a clear statement to this effect (eg 'down hole length, true width not known').</i></li> </ul>	<ul style="list-style-type: none"> <li>• Heavy mineral intersects were viewed under a microspore to assess the valuable heavy mineral component. As a result iron contaminants were identified as constituting the majority of the fractionated sample with trace valuable heavy mineral.</li> <li>• Mineralisation and stratigraphy is assumed to be sub-horizontal.</li> <li>• No significant intervals were reported.</li> </ul>
Diagrams	<ul style="list-style-type: none"> <li>• <i>Appropriate maps and sections (with scales) and tabulations of intercepts should be included for any significant discovery being reported These should include, but not be limited to a plan view of drill hole collar locations and appropriate sectional views.</i></li> </ul>	<ul style="list-style-type: none"> <li>• See body of announcement.</li> </ul>
Balanced reporting	<ul style="list-style-type: none"> <li>• <i>Where comprehensive reporting of all Exploration Results is not practicable, representative reporting of both low and high grades and/or widths should be practiced to avoid misleading reporting of Exploration Results.</i></li> </ul>	<ul style="list-style-type: none"> <li>• All current drill hole results are reported in this announcement. No results met the criterion of significant intercept.</li> <li>• All information considered material to the reader's understanding of the exploration results have been reported.</li> </ul>

Criteria	Statement	Commentary
Other substantive exploration data	<ul style="list-style-type: none"> <li>Other exploration data, if meaningful and material, should be reported including (but not limited to): geological observations; geophysical survey results; geochemical survey results; bulk samples – size and method of treatment; metallurgical test results; bulk density, groundwater, geotechnical and rock characteristics; potential deleterious or contaminating substances.</li> </ul>	<ul style="list-style-type: none"> <li>Where relevant this information has been included in the body of this announcement.</li> </ul>
Further work	<ul style="list-style-type: none"> <li>The nature and scale of planned further work (eg tests for lateral extensions or depth extensions or large-scale step-out drilling).</li> <li>Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.</li> </ul>	<ul style="list-style-type: none"> <li>Sheffield does not plan to carry out further drilling for Heavy Mineral Sands upon tenements E04/2390, E04/2391, E04/2392, E04/2393 and E04/2394</li> </ul>

## APPENDIX 2: Ore Reserves and Mineral Resources

Sheffield announced a maiden Ore Reserve totalling 682.7 million tonnes @ 11.3% HM for the Thunderbird heavy mineral sands deposit, in the Kimberley Region of Western Australia, on 22 January 2016, and is currently completing a Bankable Feasibility Study for development of the deposit (the Thunderbird Mineral Sands Project). The Proved and Probable Ore Reserve estimate is based on that portion of the (previous) July, 2015 Thunderbird deposit Measured and Indicated Mineral Resources within mine designs and optimisation shells that may be economically extracted, considering all “Modifying Factors” in accordance with the JORC Code 2012.

Sheffield also has a number of Mineral Resource estimates for heavy mineral sands deposits within its Eneabba and McCalls Projects located in the Mid-West Region of Western Australia.

Ore Reserves										
<i>Dampier Project Ore Reserves</i> <sup>1,4</sup>										
Deposit	Ore Reserve Category	Ore Tonnes (millions)	In-situ HM Tonnes (millions)	HM Grade (%)	Valuable HM Grade (In-situ) <sup>2</sup>				Slimes (%)	Osize (%)
					Zircon %	HiTi Leuc %	Leuc %	Ilmenite %		
Thunderbird	Proved	115.1	15.8	13.7	1.01	0.29	0.28	3.67	17.3	12.7
	Probable	567.6	61.9	10.9	0.85	0.27	0.29	3.03	16.1	10.2
	<b>Total</b>	<b>682.7</b>	<b>77.1</b>	<b>11.3</b>	<b>0.88</b>	<b>0.27</b>	<b>0.29</b>	<b>3.14</b>	<b>16.3</b>	<b>10.6</b>
Deposit	Ore Reserve Category	Ore Tonnes (millions)	In-situ HM Tonnes (millions)	HM Grade (%)	Mineral Assemblage <sup>3</sup>				Slimes (%)	Osize (%)
					Zircon (%)	HiTi Leuc (%)	Leuc (%)	Ilmenite (%)		
Thunderbird	Proved	115.1	15.8	13.7	7.4	2.1	2.1	26.8	17.3	12.7
	Probable	567.6	61.9	10.9	7.8	2.5	2.6	27.9	16.1	10.2
	<b>Total</b>	<b>682.7</b>	<b>77.1</b>	<b>11.3</b>	<b>7.7</b>	<b>2.4</b>	<b>2.5</b>	<b>27.7</b>	<b>16.3</b>	<b>10.6</b>

1) Ore Reserves are presented both in terms of in-situ VHM grade, and HM assemblage. Calculations have been rounded to the nearest 100,000 t, 0.1 % grade. Differences may occur due to rounding. Ore Reserve is reported by economic cut-off with appropriate consideration of modifying factors, costs, mineral assemblage, process recoveries and product pricing.

2) The in-situ grade is determined by multiplying the HM Grade by the percentage of each valuable heavy mineral within the heavy mineral assemblage.

3) Mineral Assemblage is reported as a percentage of HM Grade, it is derived by dividing the in-situ grade by the HM grade.

4) Ore Reserves reported for the Dampier Project were prepared and first disclosed under the JORC Code 2012

## Mineral Resources

### Dampier Project Mineral Resources <sup>1,2,5</sup>

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

### Eneabba Project Mineral Resources <sup>2,4,6</sup>

Deposit (cut-off)	Mineral Resource Category	Material Tonnes (millions)	In-situ HM Tonnes (millions)	HM Grade (%)	Mineral Assemblage <sup>3</sup>				Slimes (%)	Osize (%)
					Zircon (%)	Rutile (%)	Leuc (%)	Ilmenite (%)		
Yandanooka (> 0.9% HM)	Measured	3	0.1	4.1	10	1.9	2.2	72	15	14
	Indicated	90	2.1	2.3	12	3.7	3.7	69	16	15
	Inferred	3	0.03	1.2	11	3.9	4.6	68	18	21
	<b>Total</b>	<b>96</b>	<b>2.2</b>	<b>2.3</b>	<b>12</b>	<b>3.6</b>	<b>3.7</b>	<b>69</b>	<b>16</b>	<b>15</b>
Durack (>0.9% HM)	Indicated	50	1.0	2.0	14	2.8	4.6	70	15	21
	Inferred	15	0.2	1.2	14	2.4	6.7	67	14	17
	<b>Total</b>	<b>65</b>	<b>1.2</b>	<b>1.8</b>	<b>14</b>	<b>2.8</b>	<b>4.9</b>	<b>70</b>	<b>15</b>	<b>20</b>
Drummond Crossing (>1.1% HM)	Indicated	49	1.0	2.1	14	10	3.6	53	16	9
	Inferred	3	0.05	1.5	13	9.9	2.8	55	16	8
	<b>Total</b>	<b>52</b>	<b>1.1</b>	<b>2.1</b>	<b>14</b>	<b>10</b>	<b>3.6</b>	<b>53</b>	<b>16</b>	<b>9</b>
Ellengail (>0.9% HM)	Inferred	46	1.0	2.2	9	8.7	1.9	64	16	2
	<b>Total</b>	<b>46</b>	<b>1.0</b>	<b>2.2</b>	<b>9</b>	<b>8.7</b>	<b>1.9</b>	<b>64</b>	<b>16</b>	<b>2</b>
West Mine North (>0.9% HM)	Measured	6	0.4	5.6	4	9.6	9.5	54	15	1
	Indicated	36	0.8	2.3	7	9.6	5.4	60	13	3
	<b>Total</b>	<b>43</b>	<b>1.2</b>	<b>2.8</b>	<b>6</b>	<b>9.6</b>	<b>6.6</b>	<b>58</b>	<b>13</b>	<b>3</b>
All Eneabba (various)	Measured	9	0.5	5.2	6	7.7	7.7	59	15	5
	Indicated	225	5.0	2.2	12	5.8	4.2	64	15	13
	Inferred	68	1.3	1.9	10	7.7	2.7	64	15	6
<b>Total</b>	<b>302</b>	<b>6.8</b>	<b>2.2</b>	<b>11</b>	<b>6.3</b>	<b>4.1</b>	<b>64</b>	<b>15</b>	<b>11</b>	

### McCalls Project Mineral Resources <sup>2,4,6</sup>

Deposit (cut-off)	Mineral Resource Category	Material Tonnes (millions)	In-situ HM Tonnes (millions)	HM Grade (%)	Mineral Assemblage <sup>3</sup>				Slimes (%)	Osize (%)
					Zircon (%)	Rutile (%)	Leuc (%)	Ilmenite (%)		
McCalls (>1.1% HM)	Indicated	2,214	31.7	1.4	5.1	3.2	2.7	76.8	21.7	1.3
	Inferred	1,436	18.7	1.3	5.0	3.2	3.1	80.3	25.5	1.1
	<b>Total</b>	<b>3,650</b>	<b>50.4</b>	<b>1.4</b>	<b>5.1</b>	<b>3.2</b>	<b>2.9</b>	<b>78.5</b>	<b>23.2</b>	<b>1.2</b>

1) The Dampier Project Mineral Resources are reported inclusive of (not additional to) Ore Reserves. The Mineral Resource reported above 3% HM cut-off is inclusive of (not additional to) the Mineral Resource reported above 7.5% HM cut-off.

2) All tonnages and grades have been rounded to reflect the relative accuracy and confidence level of each estimate and to maintain consistency throughout the table, therefore the sum of columns may not equal.

3) The Mineral Assemblage is represented as the percentage of HM grade. For Dampier the mineral assemblage was determined by screening and magnetic separation. Magnetic fractions were analysed by QEMSCAN for mineral determination as follows: >90% liberation and; Ilmenite 40-70% TiO<sub>2</sub>; Leucoxene 70-94% TiO<sub>2</sub>; High Titanium Leucoxene (HiTi Leucoxene) >94% TiO<sub>2</sub> and Zircon 66.7% ZrO<sub>2</sub>+HfO<sub>2</sub>. The non-magnetic fraction was analysed by XRF and minerals determined as follows: Zircon ZrO<sub>2</sub>+HfO<sub>2</sub>/0.667 and HiTi Leucoxene TiO<sub>2</sub>/0.94. For Eneabba & McCalls determination was by QEMSCAN, with TiO<sub>2</sub> minerals defined according to the following ranges: Rutile >95% TiO<sub>2</sub>; Leucoxene 85-95% TiO<sub>2</sub>; Ilmenite <55-85% TiO<sub>2</sub>

4) West Mine North, Durack, Drummond Crossing and McCalls are reported below a 35% Slimes upper cutoff.

5) Mineral Resources for the Dampier Project were prepared and first disclosed under the JORC Code 2012.

6) Mineral Resources reported for the Eneabba Project were prepared and first disclosed under the JORC Code 2004. These have not been updated since to comply with the JORC Code 2012 on the basis that the information on which the Resource estimates are based has not materially changed since it was last reported.

The Company's Ore Reserves and Mineral Resources Statement is based on information first reported in previous ASX announcements by the Company. These announcements are listed below and are available to view on Sheffield Resources Limited's web site [www.sheffieldresources.com.au](http://www.sheffieldresources.com.au) . Mineral Resources and Ore Reserves reported for the Dampier Project and Mineral Resources reported for the McCalls Projects were prepared and first disclosed under the JORC Code 2012. Mineral Resources reported for the Eneabba Project were prepared and first disclosed under the JORC Code 2004, these have not been updated since to comply with the JORC Code 2012 on the basis that the information on which the Resource estimates are based has not materially changed since it was last reported.

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 that all material assumptions and technical parameters underpinning the estimates in the relevant market announcement continue to apply and have not materially changed.

The Competent Persons for reporting of Mineral Resources and Ore Reserves in the original market announcements are listed below. 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.

Item	Name	Company	Professional Affiliation
Mineral Resources Reporting	Mr Mark Teakle Mr David Boyd	Sheffield Resources Sheffield Resources	MAIG, MAusIMM MAIG
Mineral Resources Estimation	Mrs Christine Standing Mr Tim Journeaux Mr Trent Strickland	Optiro QG QG	MAusIMM MAusIMM MAusIMM
Ore Reserves	Mr Per Scrimshaw	Entech	MAusIMM

Ore Reserves and Mineral Resources prepared and first disclosed under the JORC Code 2012:

Item	Report Title	Report Date	Competent Person(s)
Thunderbird Ore Reserve	Maiden Ore Reserve – Thunderbird Project	22 January 2016	P. Scrimshaw
Thunderbird Mineral Resources	Sheffield Doubles Measured Mineral Resource At Thunderbird	5 July 2016	M. Teakle C. Standing
McCalls Mineral Resources	Quarterly Activities Report For The Period Ended 30 June 2016	20 July 2016	D. Boyd T. Journeaux

Mineral Resources prepared and first disclosed under the JORC Code 2004:

Item	Report Title	Report Date	Competent Person(s)
Ellengail Mineral Resource	1Mt Contained HM Inferred Resource at Ellengail	25 October 2011	M. Teakle T. Strickland
West Mine North Mineral Resource	West Mine North Mineral Resource Estimate Exceeds Expectations	7 November 2011	M. Teakle T. Strickland
Durack Mineral Resource	Eneabba Project Resource Inventory Exceeds 5Mt Heavy Mineral	28 August 2012	M. Teakle T. Strickland
Yandanooka Mineral Resource	Yandanooka Resource Upgrade and Metallurgical Results	30 January 2013	M. Teakle T. Strickland
Drummond Crossing Mineral Resource	1Mt Heavy Mineral Resource Added to Eneabba Project	30 October 2013	M. Teakle T. Strickland

**Appendix 3: BFS Final Product Specifications**  
(refer to ASX announcement dated 12 October 2016 for further details)

**Premium zircon**

ZrO <sub>2</sub> +HfO <sub>2</sub>	TiO <sub>2</sub>	Fe <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	D <sub>50</sub>
66.3%	0.14%	0.08%	32.5%	0.1%	59µm

- High grade 66.3% ZrO<sub>2</sub>+HfO<sub>2</sub>
- Low in key impurities iron and titanium
- Very low in aluminium impurities
- Good opacity, similar to other competing products

**LTR Ilmenite**

TiO <sub>2</sub>	FeO	Fe <sub>2</sub> O <sub>3</sub>	FeO:Fe <sub>2</sub> O <sub>3</sub>	Cr <sub>2</sub> O <sub>3</sub>	CaO	MgO	D <sub>50</sub>
56.1%	22.0%	18.5%	1.2	0.03%	0.01%	0.21%	67µm

- High titanium grade (56.1% TiO<sub>2</sub>)
- Low in key contaminant Cr<sub>2</sub>O<sub>3</sub>
- Very low in alkalis CaO and MgO
- Consistent homogenous product
- LTR Ilmenite feedstock can produce high grade TiO<sub>2</sub> slag (88% TiO<sub>2</sub>) and HPPI co-product
- Soluble in sulphuric acid, TiO<sub>2</sub> solubility > 95%
- Highly reactive (FeO:Fe<sub>2</sub>O<sub>3</sub> of 1.2)

**HiTi88**

TiO <sub>2</sub>	Fe <sub>2</sub> O <sub>3</sub>	Cr <sub>2</sub> O <sub>3</sub>	CaO	MgO	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	D <sub>50</sub>
87.8%	2.9%	0.07%	0.04%	0.00%	3.4%	0.5%	71µm

- High titanium grade (87.8% TiO<sub>2</sub>)
- Suitable for flux cored wire welding market or titanium sponge markets.
- Blended feedstock for processing via the chloride process.
- Low in key contaminants Cr<sub>2</sub>O<sub>3</sub>
- Very low in alkalis CaO and MgO

**Zircon Concentrate**

ZrO <sub>2</sub> +HfO <sub>2</sub>	TiO <sub>2</sub>	Fe <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	CeO <sub>2</sub>	D <sub>50</sub>
43.7%	20.1%	0.9%	23.3%	1.7%	0.2%	62µm

- Initially focussing on a ZrO<sub>2</sub> rich (~44%) concentrate for process upgrading by the customer.
- Target zirconium chemicals industry

**Titanomagnetite**

Fe	TiO <sub>2</sub>	P	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	Cr <sub>2</sub> O <sub>3</sub>	MnO	D <sub>50</sub>
56.2%	11.3%	0.05%	7.8%	0.9%	0.05%	0.20%	67µm

- Co-product produced as from magnetic separation post the LTR process
- Targeting steel feeds industry, protection against erosion of the blast furnace hearth