Important Disclosure

This report has been commissioned by the company and as such a share price target and rating are not provided by GMR. All comments and forecasts are independent of the company and rely on GMR's analysis and forecasts.

Recommendation

Not Applicable

Price: A$0.50

Target Price: Not Applicable

Mcap (basic): A$100M
Mcap (diluted): A$223M

Ordinary Shares: 174.5M
Funded Shares: 404.9M

Share Price Performance

Share prices as at 10/4/2017.

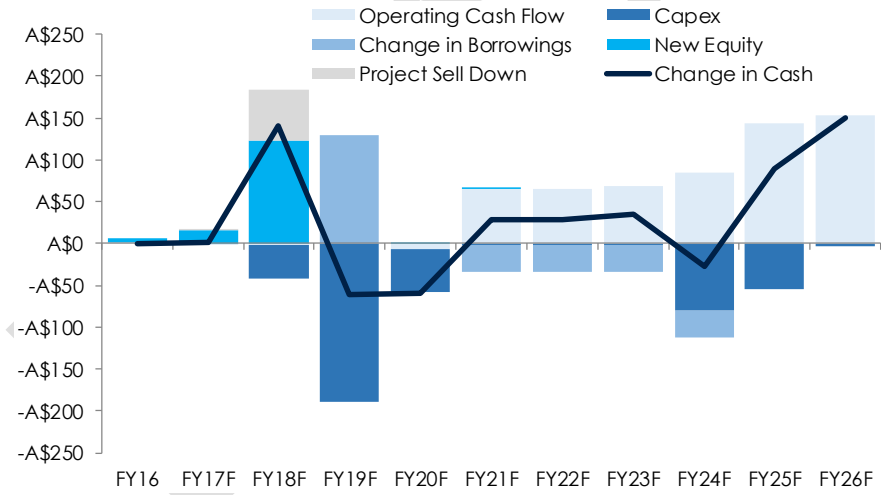
Sheffield Resources (SFX)

Thunderbirds Are Go!

Sheffield Resources is a development company, capitalised at about A$100M and focused on its advanced 100% Thunderbird minerals sands project in Western Australia. A recently released BFS highlights a robust project with zircon-rich production targeted in 2019. This is a commissioned report.

1. Significantly, de-risking of the project is targeted for 2017 with a native title agreement, granting of a mining licence and environmental approvals. This should support Sheffield's project financing and 2019 production goal.
2. Thunderbird is a A$348M project targeting to produce premium zircon and LTR Ilmenite. These higher value products, in conjunction with low strip ratios and dozer push mining, represent a high margin minerals sands opportunity. Importantly, Thunderbird should be well placed for expected zircon deficits late this decade / early next.
3. GMR values the project at US$410M with an IRR of 25%. Several potential funding scenarios result in a post funding valuation range for Sheffield of A$1.09-1.24 per share, implying an attractive risk / reward.

Fig 1: Sheffield – Key Cash Flow Drivers (Base Case Funding Assumptions, (A$M)



Source: Global Mining Research

Fig 2: Financial Summary

		2015A	2016A	2017E	2018E	2019E	2020E
NPAT (pre-Abs)	**(A$M)**	**1**	**-2**	**-7**	**-3**	**-2**	**17**
Adj. EPS	(A$/share)	0.01	-0.01	-0.04	-0.02	-0.01	0.09
PER	**(x)**	**96.0x**	**-46.5x**	**-15.3x**	**-32.2x**	**-46.3x**	**6.2x**
EBITDA	(A$M)	-1	-5	-9	-5	-5	39
EBITDA/share	(A$/share)	-0.01	-0.03	-0.05	-0.03	-0.03	0.21
EV/EBITDA	**(x)**	**-205.2x**	**-47.5x**	**-24.6x**	**-15.5x**	**-52.2x**	**8.5x**
Cash Gen/share	(A$/share)	0.01	0.01	-0.01	-0.01	-0.01	-0.03
P/Cash Gen	(x)	94.2x	79.9x	-44.0x	-63.3x	-101.6x	-16.4x
FCF Yield	**(%)**	**-2%**	**-1%**	**-1%**	**-6%**	**-26%**	**-8%**
Dividend	(A$/share)	0.00	0.00	0.00	0.00	0.00	0.00
Dividend Yield	**(%)**	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Ordinary Shares	(M)	134.4	147.4	181.0	181.0	181.0	184.7

Source: Global Mining Research

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Summary

Mineral Sands Development Play

A scalable project

Sheffield's focus is its large Thunderbird mineral sands project is located on the Dampier Peninsular of Western Australia. A recently completed BFS highlighted a robust project with management focused on permitting and financing the A$0.4B project in 2017. This a scalable project and a Stage II would increase volumes to +200ktpa of equivalent zircon production.

Attractive to Peers

5.9Mt of zircon in reserves, mine life over 40 years

Thunderbird is one of the few potential Australian mineral sands projects with scale, long life and attractive margins. A HM grade of 11.3% is relatively high with an in situ value of ~US$15/t and 5.9Mt of zircon in reserves. Thunderbird is one of only two projects targeting annual zircon production over 100kt. Existing global production is maturing creating an opportunity late this decade / early next.

Thunderbird Valued at US$410M

IRR of 25%, key risks timing/funding/market volatility

GMR values Thunderbird at US$410M with an estimated IRR of 25%, representing a robust project. There are several potential funding scenarios, with a combination of project sell down, debt and equity likely. On a fully funded basis (assuming new equity is raised at A$0.60) GMR estimates a valuation range for Sheffield of A$1.09-1.24 per share. Key risks are timing/funding/market volatility.

Mineral Sands Markets Showing Early Signs of Recovery

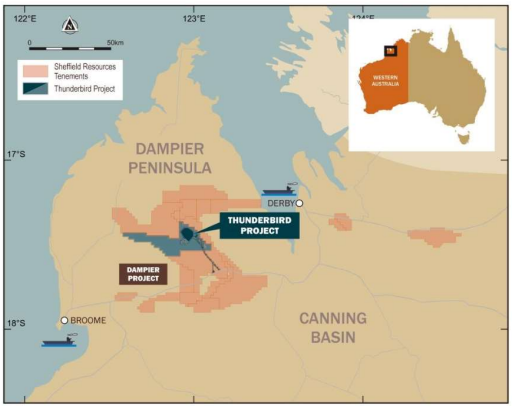
Product prices are stabilising, zircon MOU's being signed

Mineral sands compared to other commodities is a relatively small and opaque market, with Iluka Minerals and Rio Tinto dominant participants. Destocking / restock cycles by downstream consumers makes this a highly volatile sector. After a brutal five years with most product prices down 60-70% and producers like Iluka shutting in significant production, there are signs the market may have bottomed with prices stabilising. This is highlighted by the recent MOU's for 40% of premium zircon signed by Sheffield.

Key Near Term Milestones

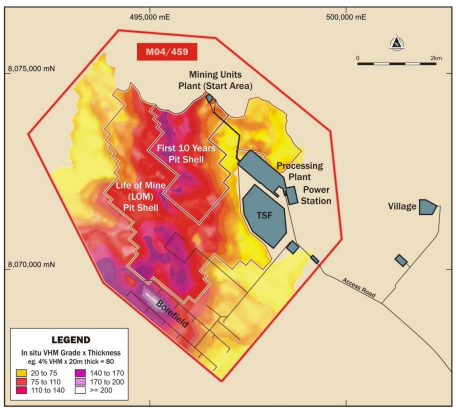
Q2 2017 - Native title determination / Grant of mining licence
Q3 2017 - State and federal environmental permits
Q2-Q4 2017 - Offtake agreements (40% of premium zircon is subject to MOU's)
Q2-Q4 2017 - Project financing
Q4 2017 - Commence construction
1H 2019 - Thunderbird commissioning
2H 2019 - Thunderbird ramp-up

Fig 3: Project Location



Source: Sheffield

Fig 4: Mining License, Project Layout & Grade x Thickness



Source: Global Mining Research

Fig 5: Financial Summary

Sheffield Resources (SFX)

Recommendation	NA	Analyst	David Radclyffe
As at	11-Apr-17		
Year End	June		
Share Price	$0.42 US$/share	$0.55 A$/share	
Target Price	NA	NA A$/share	
Net Present Value 10%	$0.83 US$/share	$1.09 A$/share	
Market Cap*	169 US$M	* Assumes 177M new shares at 60¢	
Ordinary Shares*	405 M		
Options & Warrants	7 M		

PRICE ASSUMPTIONS - LINKED PRICES

(June Year End)		2016A	2017E	2018E	2019E	2020E
Exchange Rate	A$/US$	0.73	0.75	0.75	0.77	0.78
Zircon	US$/t	954	864	938	1,100	1,305
Rutile	US$/t	748	745	838	900	903
Ilmenite	US$/t	161	143	175	200	201
Leucoxene	US$/t	337	330	375	425	477
Oil	US$/bbl	43	52	60	65	43

FINANCIAL SUMMARY

(June Year End)		2016A	2017E	2018E	2019E	2020E
NPAT (pre-Abs)	**(A$M)**	**-2**	**-7**	**-3**	**-2**	**8**
Adj. EPS	(A$/share)	-0.01	-0.04	-0.02	-0.01	0.04
PER	**(x)**	**-45.7x**	**-15.0x**	**-31.6x**	**-45.5x**	**13.7x**
EBITDA	(A$M)	-5	-9	-5	-5	24
EBITDA/share	(A$/share)	-0.03	-0.05	-0.03	-0.03	0.13
EV/EBITDA	**(x)**	**-46.6x**	**-24.1x**	**-14.7x**	**-51.4x**	**14.4x**
Cash Gen/share	(A$/share)	0.01	-0.01	-0.01	-0.01	-0.11
P/Cash Gen	(x)	78.5x	-43.2x	-62.2x	-99.8x	-5.1x
FCF Yield	**(%)**	**-1%**	**-1%**	**-6%**	**-26%**	**-10%**
Dividend	(A$/share)	0.00	0.00	0.00	0.00	0.00
Dividend Yield	(%)	0.0%	0.0%	0.0%	0.0%	0.0%
Ordinary Shares	(M)	147.4	181.0	181.0	181.0	184.7

PROFIT AND LOSS STATEMENT - A$M

(June Year End)	2016A	2017E	2018E	2019E	2020E
Operating Revenue	**0**	**-0**	**-0**	**-0**	**52**
Other Revenue	0	0	0	0	0
Operating Costs	-3	-5	-5	-5	-29
Other Costs	-2	-4	0	0	0
EBITDA	**-5**	**-9**	**-5**	**-5**	**24**
Depreciation	-0	-0	-0	-0	-2
EBIT	**-5**	**-9**	**-5**	**-5**	**21**
Interest	0	0	1	2	-11
Pretax Profit	-5	-9	-4	-3	11
Tax on Recurring Income	3	2	1	1	-3
Profit After Tax	-2	-7	-3	-2	8
Minority interests	0	0	0	0	0
Adjusted Profit	**-2**	**-7**	**-3**	**-2**	**8**
Non Recurring Items	0	0	0	0	0
NPAT	**-2**	**-7**	**-3**	**-2**	**8**
EPS	-0.01	-0.04	-0.02	-0.01	0.04

RESERVES/RESOURCES

Sheffield Resources (SFX)	Tonnes (Millions)	HM Grade (%)	Mine Life (Years)
Published Thunderbird Reserves	681	11%	37.8
Published Thunderbird Resources	1,050	12%	58.3

DIVISIONAL EBIT - A$M

	2016A	2017E	2018E	2019E	2020E
Thunderbird	0	0	0	0	27
Other	-5	-9	-5	-5	-5
EBIT	**-5**	**-9**	**-5**	**-5**	**21**

CASH FLOW ANALYSIS - A$M

(June Year End)	2016A	2017E	2018E	2019E	2020E
Cash Flows From Operating Activities					
Receipts From Customers	0	-0	-0	-0	52
Payments To Suppliers	-2	-6	-5	-5	-29
Other	3	4	4	4	-44
Cash Flows From Investing Activities					
Acq.of Property, Plant and Equip.	0	-0	-40	-188	-51
Disposals	0	1	60	0	0
Other	-6	-13	-2	-2	-2
Cash Flows From Financing Activities					
Proceeds From Borrowings	0	0	0	130	0
Repayment of Borrowings	0	0	0	0	0
Other	5	16	124	0	0
Net Increase In Cash Held	-0	1	140	-61	-73
Cash At Beginning of Year	5	5	6	146	85
Cash At End of Year	5	6	146	85	12

BALANCE SHEET ANALYSIS - A$M

(June Year End)	2016A	2017E	2018E	2019E	2020E
Current Assets					
Cash and Cash Equivalents	5	6	146	85	12
Other	0	0	0	0	13
Non-Current Assets					
Investments	0	0	0	0	0
Fixed Assets	0	0	40	228	277
Other	32	37	38	39	40
Current Liabilities					
Borrowings	0	0	0	0	0
Creditors	2	-0	-0	-0	5
Other	0	0	0	0	0
Non-Current Liabilities					
Borrowings	0	0	0	130	130
Other	0	0	0	0	0
Shareholders Funds	35	44	224	222	207
Net Debt to Equity	-14%	-14%	-65%	20%	57%
Net Debt to Net Debt + Equity	-17%	-17%	-187%	17%	36%

MINERAL SANDS PRODUCTION - kt

Attributable	2016A	2017E	2018E	2019E	2020E
Zircon	0	0	0	0	13
Rutile	0	0	0	0	0
Primary Ilmenite	0	0	0	0	50
LTR Ilmenite	0	0	0	0	98
HiTi88	0	0	0	0	4
Total Production	**0**	**0**	**0**	**0**	**39**

MARGINS - US$/t

	2016A	2017E	2018E	2019E	2020E
Revenue	0	0	0	0	1,309
Cash Costs	0	0	0	0	585
Margin	0%	0%	0%	0%	55%

NET PRESENT VALUE

	10% NPV A$M	/ share
Thunderbird	436	1.08
Other Mineral Sands	5	0.00
Corporate	-14	-0.03
Exploration	10	0.02
Hedging	-0	-0.00
Investments	0	0.00
Net Cash	9	0.02
Options & Warrants	0	0.00
Total NPV	**446**	**1.09**
P/PNV		0.5x

Source: Global Mining Research

SWOT Analysis

Below we highlight a SWOT analysis for the Thunderbird project and Sheffield Resources.

Strengths

This is a higher margin project and is relatively vanilla with a low strip / low cost mining

- Higher value products with premium zircon and upgraded LTR ilmenite. The BFS expects Sheffield to achieve a robust margin with LOM revenues of A$19.92 per tonne of ore mined and site costs of A$11.40 per tonne.
- Building at the bottom of cycle in terms of capital costs and product pricing which bottomed in late 2016. The BFS incorporates cost estimates from early 2017, these highlight a more favourable market for development in Western Australia.
- This is a reasonable "vanilla" project with a low strip ratio (0.78:1) employing low cost mining (dozer push) and processing techniques commonly used in the industry. By not opting to toll treat HMC (heavy mineral concentrate) in China Sheffield has more control of product and comparably higher margins.

Weaknesses

The project is unfinanced, reasonably remote and the cycle has just started to turn.

- Capital requirements for Thunderbird at A$348M pre-working capital is close to four times the current market enterprise value of Sheffield. There are no guarantees Sheffield will be able to fund the development.
- This is a reasonably remote site in terms of infrastructure (e.g. Sheffield will rely on trucked LNG for power generation), while regional ports are an advantage.
- Both the ceramics and pigment markets are modest in size and reasonably opaque. A major proportion of supply is from established market participants Iluka Minerals and Rio Tinto. Prices have just started to recover from a five year down cycle.

Opportunities

- Key permitting over 2017 should significantly de-risk the project, allowing Sheffield to pursue funding scenarios, supported by an expected relatively short build / ramp-up to full production levels and cash flow. Targeting 2019 production Thunderbird could take advantage of expected deficits in the market late this decade / early next.

Targeting a 2019 start this is a relatively short time to market when the market could be short

- The project is scalable with multiple expansion opportunities. The initial Stage I project at 7.5Mtpa is expected to be followed by a Stage II doubling of capacity to 17Mtpa at a cost of A$195M within the first five years. At this rate the mine life is still expected to be over 40 years, leaving potential for subsequent stages.
- Regional exploration is prospective, including Night Train some 20 km to the SE of Thunderbird which returned 7.5m at 8.23% HM (heavy mineral – assemblage 15% zircon, 61% Leucoxene Hi-Ti).

Threats

- A key threat identified by our analysis is to the project time table with potential for any one factor, such as a key permit, to delay the project. Therefore, our base case assumption allows for a six-month delay to the Sheffield timetable.

Native title and EPA approvals are outstanding, further compared to similar projects there is a higher proportion of oversize

- Native title and environmental approvals are key elements of the current timeline. The Mt Jowlaenga claim is currently in arbitration with the National Native Title Tribunal and a result is expected in May. Environmentally, Sheffield has management plans for the Greater Bilby, classed as a vulnerable species.
- Operating risk lies primarily with oversize material and the potential impact on mining rates. Oversized material is estimated at 12% of the reserve (and above peers) and has been incorporated into the trap design. Pit excavation as part of the BFS confirmed dozer push as the preferred mining method. Slimes are <20% of the reserve and predominantly silt rather than clays.

Peer Analysis

Globally there are several undeveloped minerals sands deposits at various stages of studies/permitting/financing. In Australia, GMR have identified some eight projects at a relatively advanced stage including the Thunderbird project. Significantly, in the sector no two projects are the same, with different grades/assemblages/product suites and challenges to production. The table below summarises some of the key features of these Australian projects to highlight the key metrics of the Thunderbird deposit.

Some key advantages of the Thunderbird project to peers are:

Thunderbird is a larger asset with scale and life to peers

- Higher spot in situ values at +US$15/t, along with Fingerboards and Boonanarring
- Substantially longer mine life to peer projects on current reserves at 42 years
- Significant zircon within the reserve at 5.9Mt well above peer project despite lower zircon assemblage of ~8%
- Only Cataby and Thunderbird have total product volumes >350ktpa and only Thunderbird and Fingerboards are targeting >100kt of zircon products

Some key disadvantages of the Thunderbird project to peers are:

- Not all peers report numbers, however Thunderbird has higher oversize to peers at an estimated 16% or reserves, and slimes at 12% (Boonanarring is higher)

A number of projects have permitting already

- Capital intensity is higher at US$24/t of milling capacity and US$1,091/t of annual product. However, several projects plan to utilise external Mineral Separation Plants (MSPs) reducing apparent capital intensity. Iluka and Tronox projects will use existing infrastructure.
- Several of the non-committed projects already have permitting. Assuming permits are received in the next two quarters Sheffield will be on par with peers.

Fig 6: Australian Advanced Mineral Sands Development Projects

	Balranald	Boonanarring	Cataby	Cyclone	Colburn	Cooljarloo West	Fingerboards	Thunderbird
Owner	Iluka	Atlas	Iluka	Diatreme	Strandline	Tronox	Kalbar (private)	Sheffield
Stage	DFS	DFS	Awaiting Commitment	DFS	DFS	Permitting	DFS	BFS
Resource	36Mt @ 32.9% HM	43.8Mt @ 5.6% HM	874Mt @ 4.8% HM	211Mt @ 2.3% HM	979Mt @ 1.3% HM	106Mt @ 2.0% HM	2,742Mt @ 1.9% HM	1050Mt @ 12.2% HM
Reserve	NA	14.4Mt @ 8.3% HM	120Mt @ 5.7% HM	138Mt @ 2.6% HM	308Mt @ 1.2% HM	NA	126Mt @ 4.5% HM	681Mt @ 11.3% HM
HM in Reserve (Mt)	NA	1.2	6.8	3.6	3.7	NA	5.7	77.0
Notional Insitu Value* (US$/t)	**NA**	**25**	**12**	**11**	**4**	**NA**	**16**	**15**
Zircon in Reserve (Mt)	NA	0.3	0.6	1.0	0.9	NA	1.1	5.9
Mine Life	NA	10	8.5	14	19	6	20	42
Mining Method	Underground	Open Cut	Open Cut / Dozer Push	Open Cut	Open Cut	Dredge	Open Cut	Open Cut / Dozer Push
HM Assemblage								
Ilmenite	64%	47%	60%	13%	48%	62%	41%	27%
Zircon	11%	24%	9%	28%	23%	11%	20%	8%
Rutile	12%	3%	4%	3%	7%	6%	14%	
Hi-Ti / Leucoxene	NA	6	NA	30%	5%	NA	6%	5%
Clay/Slimes	6%	17%	12%	5%	3%	6%	NA	16%
Oversize	NA	NA	NA	5%	3%	NA	NA	12%
Target Production	**NA**	**2018**	**NA**	**2018**	**NA**	**NA**	**2019**	**2019**
Capex (A$M)	NA	64	263	161	173	NA	100	543
Capital Intensity (US$/milled t)	NA	15	14	12	6	NA	10	24
Capital Intensity (US$/product t)	NA	358	434	1011	516	NA	259	1091
MSP in Australia	Yes	No	Yes	No	Yes	Yes	No	Yes
Annual Throughput (Mt)	NA	3	14	10	23	NA	8	17
Annual Product (kt)								
Ilmenite	NA	89	380	NA	182	NA	108	265
Zircon	NA	32	50	65	50	NA	108	101
Rutile	NA	9	30	NA	0	NA	32	0
Hi-Ti / Leucoxene	NA	5	0	56	24	NA	45	13
Total Product (I/Z/R/H/L)	NA	136	460	121	255	0	293	378
Permitting								
Native Title	No	Yes	Yes	Yes	Yes	No	No	No
ML	No	Yes	Yes	Yes	Yes	No	No	No
EPA	No	No	Yes	Yes	Yes	No	No	No

Source: Global Mining Research * Based on spot for I/Z/R/H/L pre-realisations. Note Balranald is applying to variations to its existing permits

NPV Analysis

GMR's valuation for Sheffield is based on a sum of the parts basis, with projects valued using a discounted cash flow (DCF) approach. Sheffield is valued at A$446M or A$1.09 per share fully diluted and assumes new equity to fund development of the Thunderbird project. Key components of the modelling are:

(i) a 10% nominal discount rate, and key long term prices of US$1,300/t for zircon, US$210/t for LTR Ilmenite, US$475/t for Hi-Ti88 and an Australian / US dollar exchange rate of $0.78,

(ii) Production commences in FY20 which assumes a six-month delay to the Sheffield timetable,

(iii) the valuation is diluted for A$130M of new equity issued at an assumed A$0.60/share,

(iv) GMR's base case is a 20% project sell down raising A$60M (50% of company NPV), and A$130M debt financing for Sheffield's share of residual project financing and working capital,

(v) GMR assumes the Stage II expansion is self-funded

NPV rises strongly to A$1.88 per share in three years

Importantly, as capital is deployed and cash flows commence our Sheffield NPV rises strongly to A$1.86 per share in three years.

NPV Range Based on Three Funding Scenarios

Funded valuation range of A$1.09-1.24 per share

In addition to our base case a range of funding scenarios have been calculated: (i) a 30% project sell down at 70% of NPV raising A$126M is valued at $1.24 per share, and (ii) a 60% debt finance / 40% equity model with no sell down at A$1.19 per share. Therefore, we see a valuation range for the business as A$1.09-1.24 per share.

New Equity Price Sensitivity

GMR expects Sheffield's share price to trend higher the company de-risks the Thunderbird project over the next few quarters through key approvals (native title, mining licence and environmental licences). Therefore, our assumption of new equity issued at A$0.60 is close to the current price, and implies a future discount. Notably the NPV changes depending on the issue price:

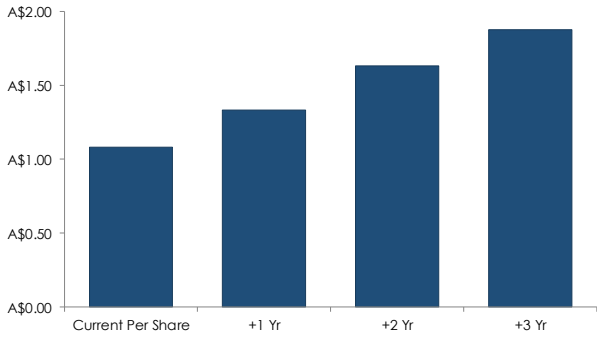
- at A$0.40/share the diluted NPV is A$0.86,
- at A$0.50/share the diluted NPV is A$0.98,
- at A$0.70/share the diluted NPV is A$1.18,
- and at A$0.80/share the diluted NPV is A$1.25

Fig 7: Diluted NPV Composition (AM, A/sh)

Valuation (NPV @ 10%)	$M	Current Per Share
Thunderbird	436	$1.08
Other Mineral Sands	5	$0.00
Corporate	-14	-$0.03
Exploration	10	$0.02
Hedging	0	$0.00
Investments	0	$0.00
Options	0	$0.00
Net Cash	9	$0.02
Total	**446**	**1.09**

Source: Global Mining Research

Fig 8: Diluted NPV Curve (A$/sh)



Source: Global Mining Research

Sensitivities

The following table shows the valuation sensitivities to GMR's base case post-tax $NPV_{(10)}$ of A$547M. Specifically, this tests the variability to some common factors which drive resource project valuations such as commodity prices, discount rates and capital.

Commodity price sensitivity highlights Thunderbird has robust margins

Not surprisingly, commodity prices are a large driver of value for the project with a 10% change in zircon assumptions resulting in +/- 18% to the NPV. However, the quantum of this change suggests margins are robust as a more marginal project would show significantly higher leverage. On the downside for every additional A$50M of capital or year delay in the project the NPV is impacted by 7-9%.

Fig 9: Thunderbird (100%) NPV Sensitivity Analysis

	Units	Change (A$M)	Change (%)
Zircon Price	+/- 10%	99	18%
All Commodities	+/- 10%	180	33%
Operating costs	+/- 5%	-53	-10%
Thruoughput	+/- 5%	38	7%
Royalties	+/- 5%	-23	-4%
A$	+/- 1¢	-23	-4%
Capex	+/- A$50M	-40	-7%
Project Timing	+/- 1 Year	-50	-9%
Discount Rate	+/- 1%	109	20%

Source: Global Mining Research

Sheffield's BFS Valuation

Key differences in the Sheffield and GMR NPV include timing and price assumptions

In the recent BFS Sheffield reported a project pre-tax $NPV_{(10)}$ of A$676M and a post-tax $NPV_{(8)}$ of A$620M. GMR has calculated a 100% project $NPV_{(10)}$ post-tax of US$410M or A$547M. Sheffield hasn't reported a $NPV_{(10)}$ post-tax, so a direct comparison isn't possible. However, key elements that are expected to result in a difference in the respective valuations (albeit they are reasonable close) is:

(i) GMR assumes a six-month delay to the Sheffield timetable allowing for potential delays and

(ii) (ii) there are differences in GMR's product price assumptions as highlighted below.

Fig 10: Long Term Real Product Price Assumptions (US$/t)

Product	GMR LT Price (US$/t)	SFX LT Prices (US$/t)
Premium Zircon	1,300	1,387
Zircon Concentrate	650	677
LTR Ilmenite	210	183
Hi-Ti88	475	500
Titano-magnetite	50	48

Source: Global Mining Research

Project Funding Scenarios

Plant construction is the largest element of the A$348M development capital

The BFS identified Stage I of the Thunderbird development is expected to cost A$348M which includes a A$24M (or 7.5%) contingency, deployed over a two-year construction/commissioning period. Much of the capital, as highlighted below, relates to plant construction costs of A$270M, with infrastructure at A$29M and owner's costs of A$24M. A Stage II expansion (to 17Mtpa throughput) with construction commencing in year three is budgeted at A$195M (without contingency). A key difference to some of the other Australian potential development projects is Sheffield's decision to build a MSP on site for additional product processing (such as a low temperature roast for ilmenite). This adds some A$140M to capital, however in the long run allows Sheffield greater control of its product and improved margins (lower discounts and tolling charges).

Fig 11: Thunderbird Project Stage I Capital Cost

Description	US$M	A$M
Direct Costs		
Plant Area Concrete, Civils & Buildings, Process Water Systems	19.0	25.3
Wet Concentrator Plant (WCP)	43.5	58.0
Concentrate Upgrade Plant (CUP)	25.7	34.3
Zircon Processing Plant	59.2	78.9
Ilmenite Processing Plant	22.7	30.2
Low Temperature Roast (LTR)	32.6	43.4
Sub-Total	**202.6**	**270.1**
Non-Processing Infrastructure (NPI) Costs		
Site Preparation & Materials, Roads & Access	5.0	6.7
Tailings Dams, HV Distribution, Bore field Infrastructure	12.0	16.0
Derby Port Facilities	5.0	6.6
Sub-Total	**22.0**	**29.3**
Owners Costs		
Labour & Operational Readiness	6.7	8.9
Trial Pit, Mining Services, Mobilisation and Infrastructure	4.6	6.1
Accommodation Village Services and Infrastructure	3.9	5.2
Systems, Insurances, Administration & Services	3.2	4.2
Sub-Total	**18.3**	**24.4**
Contingency	**18.1**	**24.2**
TOTAL CAPITAL COST	**260.9**	**347.9**

Source: Sheffield

Sheffield has A$13.9M of cash on hand and no debt

At the end of 2016 Sheffield had A$13.9M of cash on hand and no debt, with expected expenditures over the March quarter of A$4.2M. Assuming key milestones are met, the company is expected to seek funding for the Stage I Thunderbird development in Q2/Q3 2017, with the BFS identifying initial expenditures for early works and FEED commencing in Q3 2017.

Funding Scenarios

A 20-30% asset sell down is a preferred funding scenario by management

There are a number of potential funding options for the project including traditional debt/equity financing, the introduction of a partner, offtake financing and combinations of these. Sheffield has already commenced discussions with potential banks and private equity with regards to debt and or hybrid financing options. This could be in conjunction with a potential direct project investment of 20-30% (a preferred option by management) or pre-purchase agreements with offtake partners (more likely of TiO_2 products). A clearer picture of project funding is expected over coming quarters. However, for the purposes of this review we have used the following scenario:

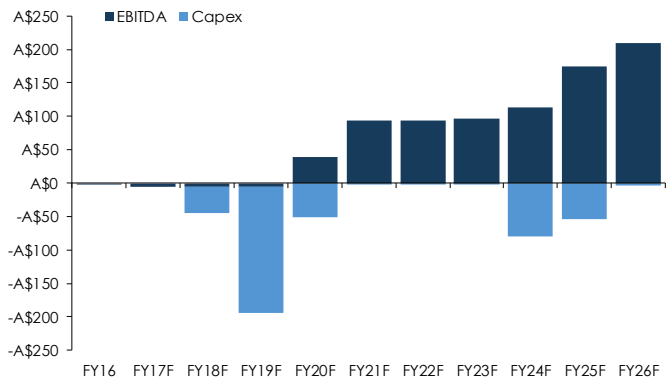
- Capex of A$348M plus A$45M of working capital for a gross A$393M
- 20-30% project sell down at 50% to 70% of NPV raising A$60M-A$125M
- High yield (+7%) debt for 50-60% of residual raising A$75M-A$130M
- New equity A$60M-A$130M for100M-216M new shares at A$0.60 per share

An additional scenario was considered in the valuation analysis being a vanilla 60% debt finance / 40% equity model with no project sell down. However, this is understood not to be a preferred option of management.

Key Financial Assumptions

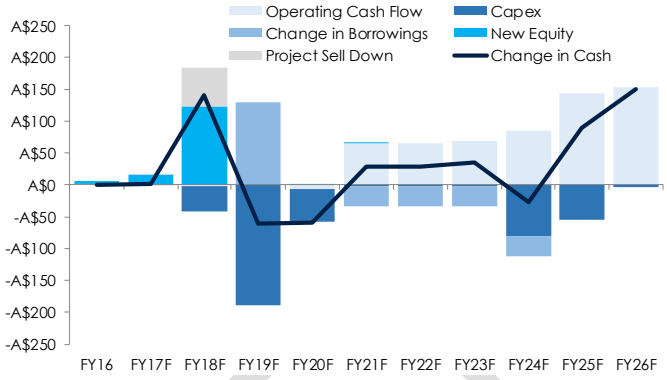
The following charts highlights our key financial assumptions for Sheffield and the Thunderbird project.

Fig 12: Sheffield – EBITDA & Capex Profile (A$M)



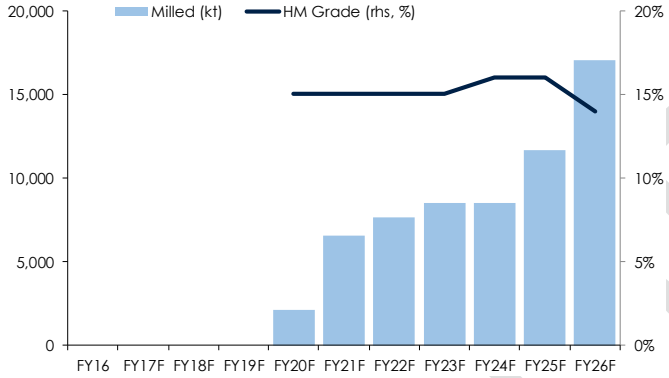
Source: Global Mining Research

Fig 13: Sheffield – Key Cash Flow Drivers (A$M)



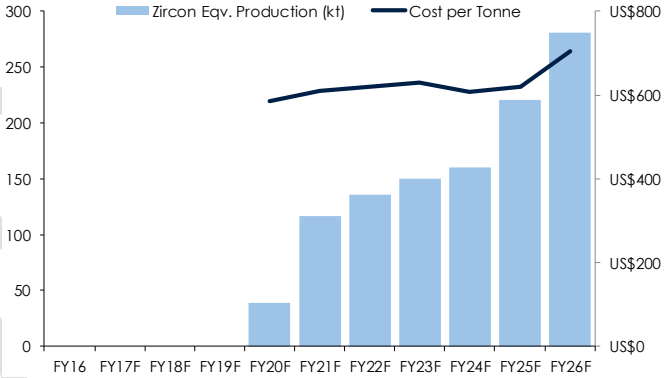
Source: Global Mining Research

Fig 14: Thunderbird – Throughput & HM Grade Profile (Mt, %)



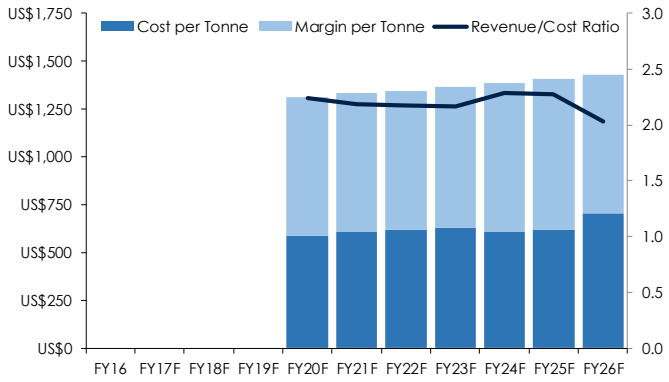
Source: Global Mining Research

Fig 15: Zircon Eqv. Production & Cost Profile (kt, US$M)



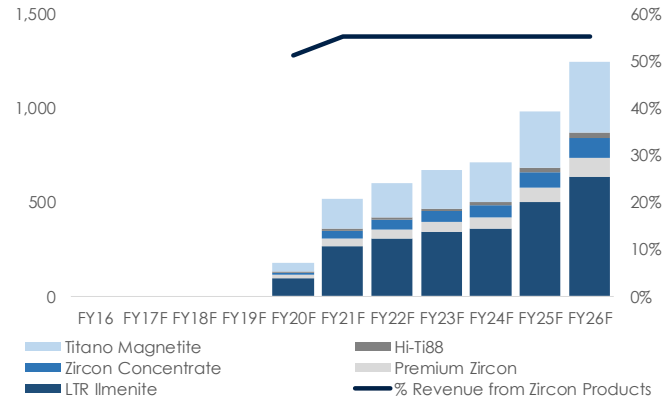
Source: Global Mining Research

Fig 16: Thunderbird - Zircon Eqv. Margin % Revenue/Cost (US$/t, %)



Source: Global Mining Research

Fig 17: Thunderbird – Product Suite & Zircon Revenues (kt, %)



Source: Global Mining Research

Thunderbird Project

The Thunderbird project is located in Western Australia on the Dampier Peninsular, between the coastal towns of Broome and Derby (70km to the east) and 25km north of the Great Northern Highway. The project comprises 483km^2 of exploration tenements and a mining licence application.

History

Resource delineated in 2012

Sheffield was granted an exploration licence in late 2011, which quickly lead to the discovery and announced a maiden resource at Thunderbird in December 2012. The project has since been assessed as Significant to the Western Australian state. The company has since conducted further exploration and project studies culminating in the March 2017 Bankable Feasibility Study.

Geology

Key differences are Thunderbird is an old deposit and fine-grained

Thunderbird is located in the Canning Basin and formed during an Early Cretaceous marine regression. Mineralisation is hosted by Jurassic-Cretaceous fine sands and tuffs, occurring as a NW striking sheet over an area 11km by 7km. The deposit has been interpreted by Sheffield geologists to have formed in an off-shore, sub-wave base depositional environment. Mineralisation shows good continuity and hosted within well-sorted and rounded fine to very-fine-grained sand unit. The key difference to other Australia mineral sands deposits is the age of the deposit, its fine-grained nature, and sheet geometry compared to strandlines.

On average the deposit is 45m thick starting from 24m below surface, and gently dips to the west (to ~150mbs). The Thunderbird greater resource represents an area of 3km x 6.5km and defined by 680 drill holes is 3.2Bt at 6.9% HM using a 3% HM cut-off grade. A higher-grade portion of the ore body (using a 7.5% HM cut-off) has been named the GT zone and on average is 15m thick, and is the focus of mining plans. The GT zone has a resource of 1.05Bt at 12.2% HM for 50.4Mt of contained HM.

Native Title & Access

Native title claim with tribunal

The area is subject to two native tile claims, with the Mt Jowlaenga claim pertaining to the Mining License with the National Native Title Tribunal (NNTT). The company hopes to have a resolution in the next few months, which will then allow the mining licence application (M04/459) to be granted.

The project lies on two pastoral leases owned by the Yeeda Pastoral Company. Sheffield is currently in negotiations with Yeeda for rights to operate the mine on the lease. Yeeda stands to benefit from the infrastructure (power, water, roads) that the Thunderbird project will bring to the area.

Environmental

Environmental permitting for the project is advanced with the company's submission to the EPA from January 2017 (see here) currently in the review stage. Sheffield as part of its environmental studies identified the key potential impact from the project as being to the habitat on the immediate mine site of the Greater Bilby, listed as vulnerable, and therefore a matter of national environmental significance. The company has proposed an offsets package including the establishment of the Kimberley Greater Bilby Trust.

Timeline

Sheffield target first production in 2019

The following chart details the company's timeline for the approvals, offtake, financing and construction of the Thunderbird project. This targets first production from the project in 2019 reflecting the near-term opportunity of the project. In GMR modelling to reflect the potential slippage to mining development projects, has assumed a six-month lag to production.

Fig 18: Project Timeline

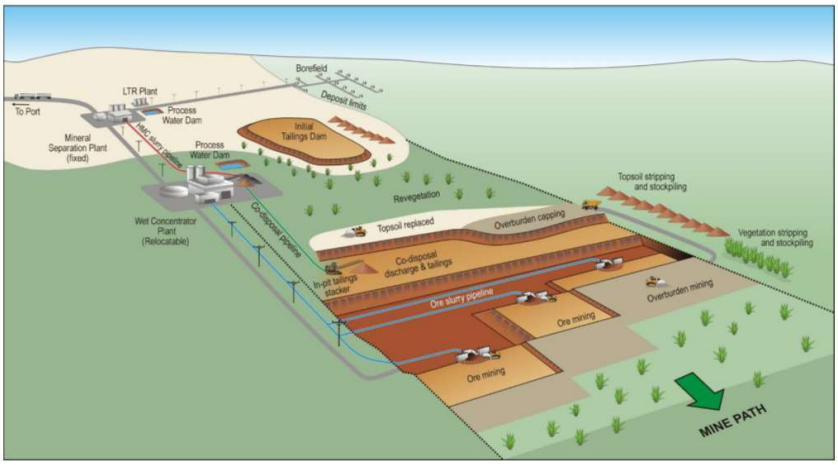
Source: Sheffield

Mining

Dozer push / trap mining

A reserve of 680Mt at 11.3% HM has been defined for the project representing a mine life of some 42 years. Ore is to be extracted through progressive open pit mining (pit depths <80mbs) using bulk techniques. Test pits during study work has confirmed Thunderbird is suitable for dozer trap mining. This involves dozers pushing sand into dozer traps, this material is fed to a screening plant where +2mm material is rejected. Ore is then slurried to a wet concentration plant (WCP). It is expected that mining will occur above the water table for first 15 years.

Fig 19: Schematic of Project Layout

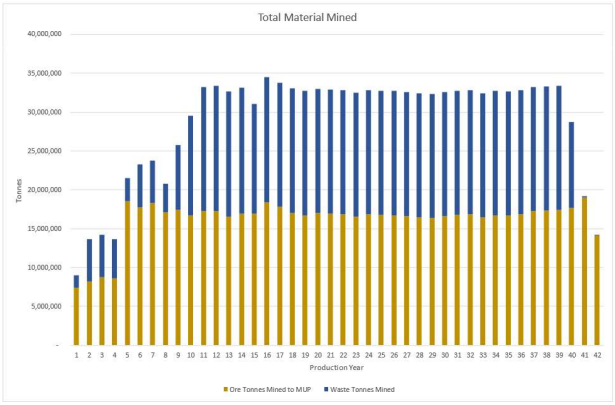


Source: Sheffield

Low strip ratio, higher grades in first 10 years

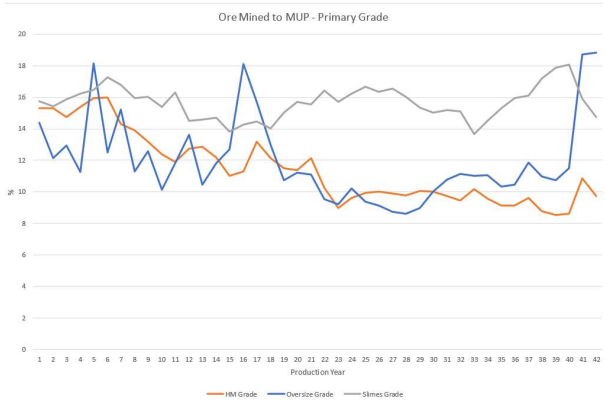
The first stage of mining is at a rate of 8.5Mt of ore, with Sheffield targeting a two year ramp up to full production levels. A subsequent planned doubling of the operation to 17Mt, given a strip ratio of 0.78:1, would see the operation peak at nearly 35Mtpa of material movement. Significantly, grades at the project are front end loaded with mining in the first 20 years above reserve grade and in the first five years the HM grade is expected to average 14-15%.

Fig 20: BFS Profile - Ore & Waste BFS Profile



Source: Sheffield

Fig 21: BFS Profile - HM, Oversize, Slime Grade



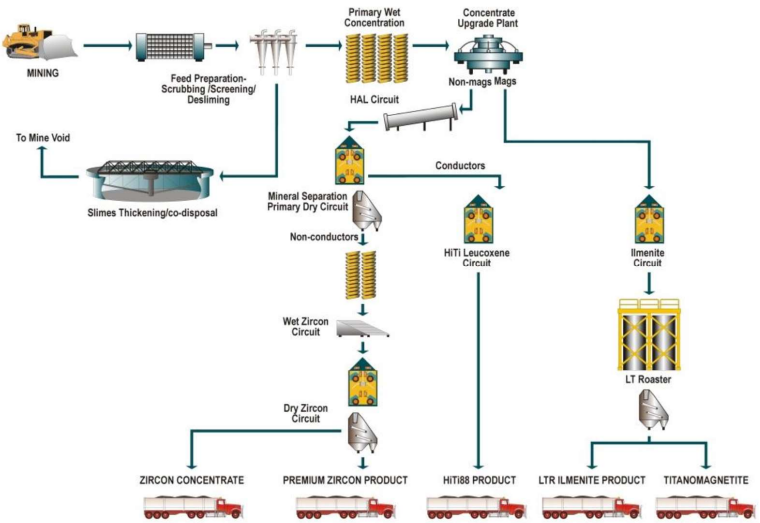
Source: Sheffield

Processing

Relatively simple flow sheet

An ore slurry will initially be processed through a wet concentration process to produce a heavy mineral concentrate (HMC). This process also produces two waste streams, a coarse sands fraction and a finer slimes fraction. Waste will be backfilled into the open pit from year three of the operation. The HMC is then processed through a concentrate upgrade plant which separates concentrate into magnetic and non-magnetic fractions. The zircon rich non-magnetic fraction is then treated with a mild hot acid leach (HAL) with 56.1% of zircon recovered as premium zircon and 33% recovered as a zircon concentrate (44% zircon). The magnetic fraction is then subject to a low temperature roast (LTR) upgrading / homogenising the ilmenite and producing a titanomagnetite by-product.

Fig 22: Process Flow Sheet



Source: Sheffield

Products will be trucked some 140km by road to the under utilsed ports of Broome and Derby (requires restoration and new storage). It is planned that zircon bulka bags will be exported from Broome. Derby will utilise transshipping and allow bulk loading of small vessels.

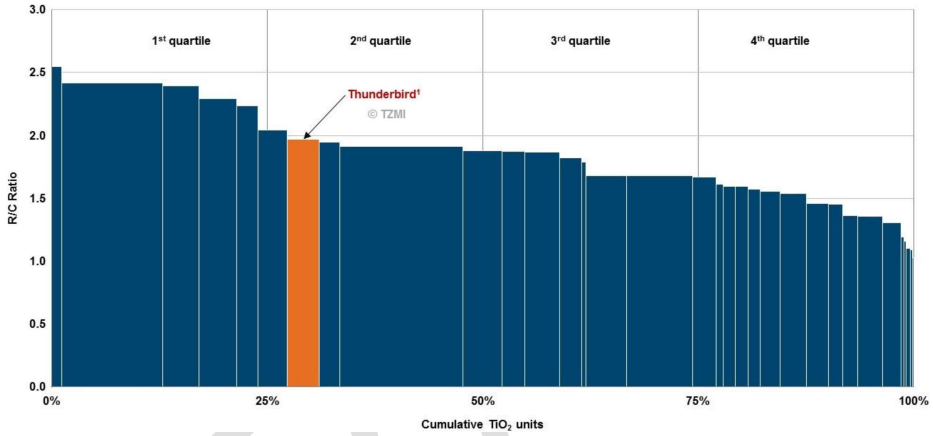
Costs & Margin

The BFS has estimated operating costs at A$11.22/t over the life of the project on the basis of tonnes milled. This comprises A$2.69/t for mining, A$6.01/t for processing, A$1.48/t for logistics, A$1.04/t G&A and an additional A$0.18/t for sustaining capital.

2nd quartile producer

On this basis the overall revenue to cost ratio for Thunderbird is expected to be ~2x, equivalent to a 2nd quartile producer, as highlighted by the following industry chart for 2020 by TZMI.

Fig 23: 2020 Revenue to Cost Ratio for the Mineral Sands Sector



Source: Sheffield / TZMI

Products from Thunderbird

Sheffield expects to produce five products from Thunderbird on site being two zircon products, an upgraded LTR ilmenite, Hi-Ti88 and by product titano-magnetite product. Target volumes for Stage I and Stage II are highlighted below.

Fig 24: Target Production Levels

Production (Average tonnes per annum)	Financial Year 2019 – 2023[5]	Financial Year 2024 – 2033[6]	LOM[8]
Premium Zircon	51,500	88,700	76,100
Zircon Concentrate	49,100	80,100	68,500
LTR Ilmenite	264,500	481,600	387,800
HiTi88	12,800	23,000	20,300
Titano-magnetite	156,600	285,300	229,800

Source: Sheffield

Zircon – the project is expected to produce two zircon products; a premium zircon grading over 66% for use in the cermamics market and a zircon concentrate for use in the zircon chemicals market.

In early April 2017 Sheffield announced that it has signed two non-binding MOU's for ~20% of Stage I premium zircon production (~10ktpa), with Ruby Ceramics of India and CFM Minerales of Spain. This shortly was followed by an MOU with Indian group Sukaso Ceracolours for an additional 20% of the Stage 1 premium zircon product

LTR Ilmentite – studies show that Thunderbird LTR Ilmentite with a TiO_2 grade of 56.1% is higher than other LTR Ilmentites in the market which range from 48-53% TiO_2. While Thunderbird's ilmenite does have a lower Fe2O3 to other products TZMI sees other elements as within thresholds for sulphate pigment production.

Hi-Ti88 – a by-product of the non-magnetic circuit suitable to production of titatium spounge or welding products.

Titano-magnetite – a by-product of the roasting to produce LTR ilmenite.

Fig 25: Product Grades

Item	TiO_2	Fe_2O_3	SiO_2	ZrO_2	ZrO_2+HfO_2
Ilmenite (LTR Product)	56.1%	18.5%	0.9%	0.1%	
Hi-Ti88	87.8%	2.9%	3.4%	3.2%	
Premium Zircon	0.0%	0.0%	32.5%		66.3%
Zircon Concentrate	20.1%	0.9%	23.3%		43.7%
Tiano-magnetite	11.4%	81.1%	7.8%		

Source: Sheffield

Environmental & Native Title

In the company's submission to the EPA in January 2017 (see here) currently in the review stage. Sheffield identified the key impact as being to the Greater Bilby, listed as vulnerable and therefore a matter of national environmental significance. the company has proposed an offsets package including the establishment of the Kimberley Greater Bilby Trust.

The area is subject to two native tile claims, with the Mt Jowlaenga claim pertaining to the Mining License with the National Native Title Tribunal (NNTT).

Minerals Sands

Mineral sands is the sub sector of the resources market represented by the extraction and production of titanium and zircon for the pigment and ceramics industries respectively. The name mineral sands relate to the most common occurrence of these minerals which is in buried or outcropping sand deposits.

Geology 101

These are sand deposits which contain TiO_2 and Zircon minerals

Deposits form through the weathering of igneous derived rocks containing titanium oxides and silicates (containing from 35-96% TiO_2) such as ilmenite, rutile, and leucoxene, also zircon (occurring as $ZrSiO_4$). The minerals are commonly transported by water and enriched through gravity and trapped in alluvial deposits (e.g. strandlines). These can be a few million tonnes up to billions of tonnes in size. Grade is measured as the concentration of heavy minerals in the deposit (or HM), which is commonly in the range of 1-10% HM. Heavy minerals comprises TiO_2 minerals, zircon and trash/gangue elements. Valuable heavy minerals (or VHM) refers the economic grade or subset of the heavy minerals. The percentage proportion of these minerals within HM or VHM is referred to as the assemblage.

Output and Key Players

Global production of ilmenite and rutile is 6.6Mtpa and a further 1.5Mtpa of zircon

Global production of ilmenite and rutile was some 6.6Mt in 2016 with Australia output of 1.1Mt and South Africa representing some 1.4Mt of output according to the USGS. Similarly, global production of zircon was 1.5Mt in 2016 with Australia and South Africa representing some 1.0Mt of output. The two largest producers in the world of TiO_2 and zircon products are: (i) Rio Tinto who operate Richards Bay Minerals, Rio Tinto Fer et Titane and QIT Madagascar Minerals, and (ii) Iluka Minerals with Australian (Eucla, Murray Perth Basins), Sierra Leone (Sierra Rutile) and US (Virginia) assets (of which not all assets are currently in production).

Key Uses – Paints, Coatings and Ceramics

TiO_2 is primarily used in the production of pigments used in paint or coatings, plastics or paper to make them bright, white or opaque. A small part of the market ~10% is the production of welding rods and titanium metal (a strong and lightweight material used in aerospace etc.).

The process of producing TiO_2 pigment follows two methods – the chloride process is generally applied to higher grade feedstocks and the sulphate process to lower grade feedstocks. Broadly, the sulphate process (ilmenite is mixed with sulphuric acid and then heated in a kiln) represents 45% of the global market for pigment and is dominantly a Chinese product. The chloride process is 55% of the market with key producers the US and Europe. The value of a TiO_2 feedstock corresponds to the proportion of TiO_2 contained (e.g. rutile at 92-96% TiO_2 is price higher than ilmenite at 35-65% TiO_2).

Zircon is valued for its hardness, and high melting point with its primary use in glazing of ceramics (e.g. wall tiles, toilets, sinks, baths).

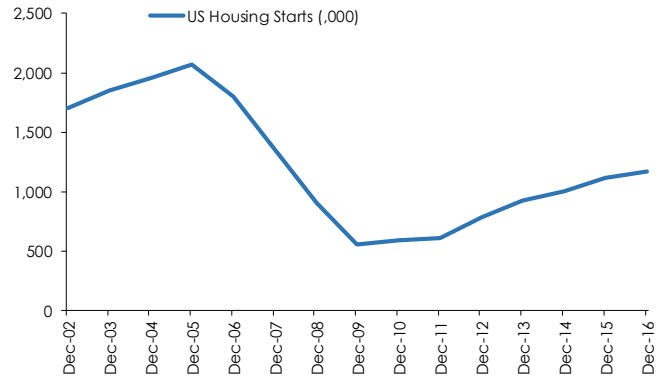
Mineral Sands Markets

Most product prices down 60-70% from highs of 2012

The minerals sands markets are characterised as being small and opaque in nature. End market demand for both zircon and TiO_2 is closely linked industrial and commercial uses with over 50% of demand from both the Chinese and US markets. Therefore, the US and Chinese housing markets, GDP and IP are key high level indicators of demand for mineral sands products. The last five years have been a brutal market for the mineral sand industry with over-supply / weak demand seeing most product prices down 60-70% from highs of 2012.

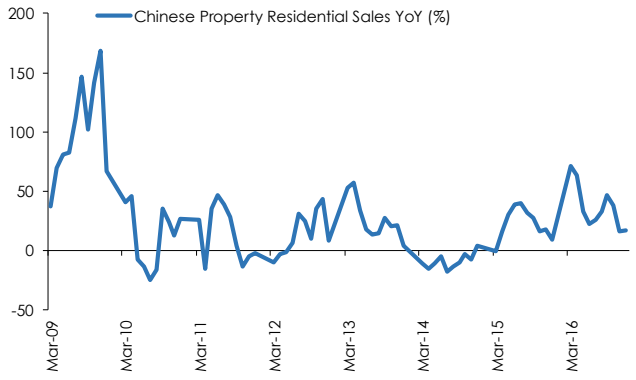
Significantly, as highlighted in the following series of charts the broad economic indicators for the sector have been positive with a progressive improvement in the US economy and housing starts over the last 12 months. China has been more subdued with a broad up trend (despite volatility) in property since 2014, while economic activity appears to have stabilised after a weak five years.

Fig 26: US Housing Starts ('000)



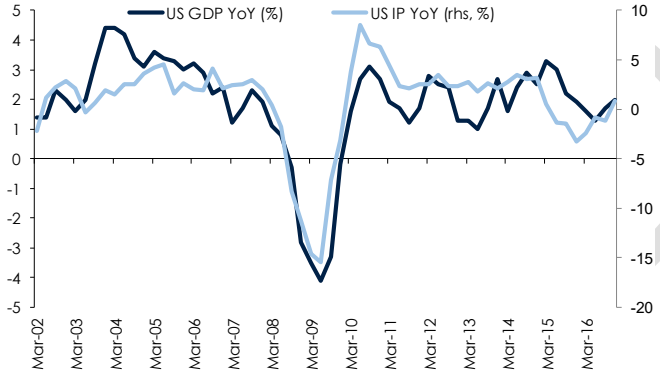
Source: Bloomberg

Fig 27: Chinese Property Residential Sales (%)



Source: Bloomberg

Fig 28: US GDP & IP (%)



Source: Bloomberg

Fig 29: Chinese GDP & IP (%)

Source: Bloomberg

Iluka State of Play

Major industry play ILU has shut in substantial capacity and is running down inventory

Given a tough market over the last five years the supply side has had to react. Leading producer Iluka has suspended mining and concentrating at Jacinth-Ambrosia in South Australia, ceased mining at the Murray Basin in Victoria, are currently running its Hamilton and Narngulu MSP's at 50-60% of capacity, have idled a SynRutile kiln and closed its US operations. Iluka through 2012-2015 has maintained a high inventory level of approximately A$800M comprising finished goods and work in progress.

Significantly, ILU has begun to work down inventory levels and at the end of 2016 the value of inventory had decreased to A$700M. It is expected the company will continue to run inventory levels down over 2017 before it looks to restart idled production.

Zircon Market

The existing zircon production base is maturing

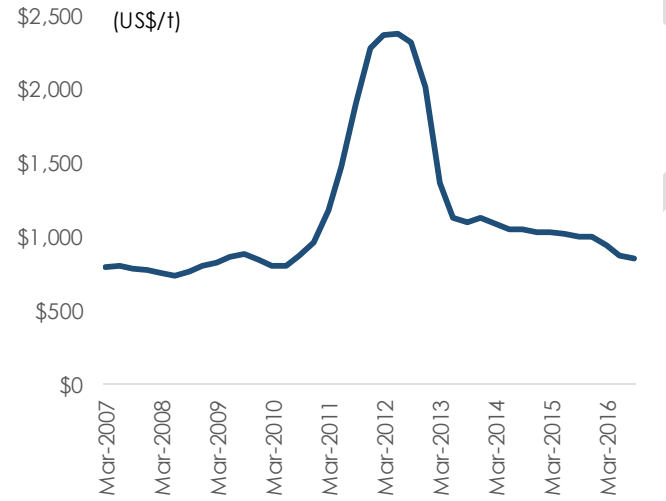
Zircon prices as highlighted below after peaking in 2012 declined for five straight years, with the first sign of recovery reported in the 2H of 2016 by market participants. Nevertheless, China remains a key driver of near term prices. While demand is variable key players such as Iluka have reported some evidence of restocking by customers and the market in 2017 appears broadly balanced. Near-term prices are expected to recover to the US$1,000/t level and long term GMR forecasts a price of US$1,300/t. This is driven by an expected continued decline in existing producers (e.g. Iluka peaked in 2011 at 0.6Mt and is expected to be at 0.3Mt in 2017).

Titanium Feedstock Market

TiO_2 driven by stock draw down and falling Chinese production

TZMI has forecast the feedstock market to be in deficit over 2016-2019, placing it in a stronger position to zircon short term. Key factors expected to support the feedstock markets in 2017 according to market participants is that Chinese ilmenite production has decreased, supporting imports while feedstock inventory levels have declined. Near term, GMR forecasts sulphate ilmenite prices to recover towards US$200/t and remain around those levels into the longer term.

Fig 30: Zircon Price (US$/t)

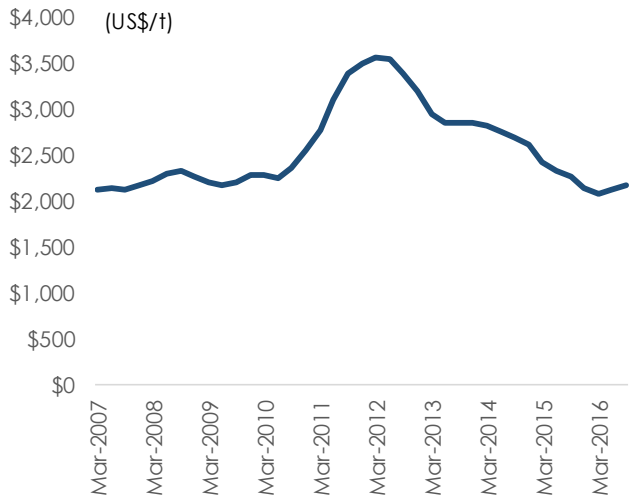


Source: Bloomberg

Fig 31: Ilmenite Price (US$/t)

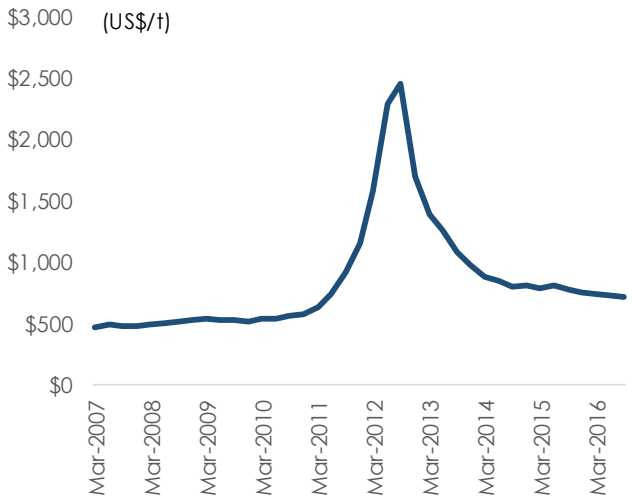
Source: Bloomberg

Fig 32: Titanium Dioxide Pigment Price (US$/t)



Source: Bloomberg

Fig 33: Rutile Price (US$/t)



Source: Bloomberg

Other Projects

In addition to the cornerstone Thunderbird project, Sheffield has three other projects of note:

- **The Eneabba project**. Located near Geraldton the Eneabba project contains five mineral sands deposits: West Mine North, Ellengail, Yandanooka, Durack, and Drummond Crossing. These have a combined resource of 172Mt at a grade of 3.0% HM. Sheffield's strategy is to continue to build scale in the region.
- **The McCalls project.** Is located 110km to the north of Perth and has a large inferred resource of 4.4Bt at 1.2% HM. The project contains some 40Mt of chloride ilmenite.
- **Fraser Range tenements.** Sheffield has formed a JV with Independence Group (IGO) which is earning into five tenements in the Fraser Range region of WA. IGO can earn up to a 70% interest in the tenements through spending A$5M on exploration over a five-year period. The most advanced prospect is Red Bull where the company drilled a geophysical anomaly in 2014. Regionally this area is prospective and some 20km from IGO's Nova mine.

Board and Key Management

Will Burbury (Non-Executive Chairman) – is a lawyer who has held senior management and board positions on several private and listed mining companies including Warwick Resources, Lonrho Mining and Nkwe Platinum.

Bruce McFadzean (Managing Director) – is an engineer with more than 35 years' industry experience. This includes positions with BHP and RIO and as MD of Catalpa Resources.

David Archer (Technical Director) – is a senior geologist who has held senior industry positions including at Renison Goldfields and as director of Archer Geological Consulting where he has been involved in a number of discoveries.

Bruce McQuitty (Non-Executive Director) – is a geologist with over 30 years' experience in the sector. He has held senior positions with Warwick Resources, Consolidated Minerals, Renison Goldfields and Gympie Gold.

Stuart Pether – (Chief Operating Office) – is a mining engineer with over 25 years' experience and the most recent manager to join Sheffield. Previously, he was CEO of Kula Gold, VP Development for Evolution and COO for Catalpa Resources.

Mark Di Silvio – (Chief Finance Office) – is an accountant and finance professional with over 25 years' experience. He has held senior finance positions with Woodside, as well as CFO for Centamin and Mawson West.

Neil Patten-Williams – (Marketing Manager) – has 18 years' experience in the minerals sands industry in both marketing and operations where he has held a number of senior positions.

Capital Structure

Sheffield has 181M ordinary shares on issue. In addition, there are a number of out-of-the-money unlisted options (8.7M strikes from A$0.65-A$1.16) and performance options comprising 7.2M at a A$0.01 strike and 0.2M at a average A$0.80 strike.

Blackrock is the key institution on the share register with an 8.98% interest. NZ based investor Walter Yovick holds 6.2%, and former MD Bruce McQuitty has a 4.4% interest.

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