

Battery Minerals

ADD

Current price:	A\$0.084
Target price:	A\$0.23
Previous target:	A\$
Up/downside:	177.5%
Reuters:	BAT.AX
Bloomberg:	BAT AU
Market cap:	US\$27.41m
	A\$35.75m
Average daily turnover:	US\$0.10m
	A\$0.14m
Current shares o/s	425.6m
Free float:	80.0%



Price performance	1M	3M	12M
Absolute (%)	-23.6	-16	64.7
Relative (%)	-25.5	-24.8	45.8

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Going into BAT

- BAT has released a series of studies that demonstrate the outstanding economics (combined pre-tax NPV US\$524m) of producing natural and coated spherical graphite from the Montepez project.
- Unique first mover advantage as BAT is the first ASX listed graphite play to release a PFS on the production of spherical graphite and also the first ASX player to produce purified spherical graphite from its pilot plant in the USA. Spherical graphite project greatly enhances project economics (pre-tax NPV US\$377m) and will now progress straight to DFS.
- BAT has released a maiden Ore Reserve and DFS for the Montepez project. Using conservative assumptions, the study demonstrates robust economics (pre-tax NPV US\$146m) over a 30-year mine life.
- We initiate coverage with a speculative ADD recommendation and a A\$0.23/share price target. We believe the recent share price decline contradicts the significant progress being made by BAT to become a supplier of battery anode material to the growing Li-ion Battery market.

Spherical graphite plant sets BAT apart

BAT is the first ASX listed company to complete a PFS on the production of purified (coated) Spherical Graphite (battery anode material). The results of the study reveal compelling economics, pre-tax NPV of US\$377m and post-tax NPV of A\$290m (Morgans' estimate) at a price assumption of US\$7,500/t coated spherical graphite. BAT is also the first ASX-listed company producing purified spherical graphite through its pilot plant in the USA. This allows BAT to supply potential end-users with samples of the Montepez product and increases our confidence in the company securing an off-take agreement. A DFS has now commenced with results due at the end of CY17.

Montepeuz DFS is a key milestone for project development

The Montepez natural flake DFS displays robust economics producing a 100Kt per annum of 96% TGC concentrate with a pre-tax NPV of US\$146m and post-tax NPV of ~A\$100m (Morgans' estimate). The flake product pricing assumptions are conservative (US\$798/t basket pricing) in comparison to peers and are derived from extensive discussion and validation from potential end users. Throughout the study BAT identified several opportunities for improvement, which are now being explored through optimisation of the DFS. As part of the DFS, BAT released its maiden Ore Reserve for the Buffalo and Elephant deposits. Current Reserve supports a ~30-year mine-life (41.4Mt @ 8.8% TGC) and the updated Mineral Resource stands at 67.2Mt @ 7.5%TGC.

Initiating with a speculative ADD recommendation and \$0.23 TP

Our highly discounted sum-of-the-parts valuation derives a \$0.23/share valuation for Montepez, the spherical graphite plant and cash and equivalents. In our view, the current MCAP and EV (A\$36m and A\$26m respectively) belies the significant progress being made by BAT in the battery minerals space. We initiate with a speculative ADD recommendation and \$0.23 TP. The key risk to our valuation remains the market price of BAT's natural flake and spherical graphite products.

Financial Summary	Dec-15A	Dec-16F	Dec-17F	Dec-18F	Dec-19F
Revenue (A\$m)	0.11	0.00	0.00	0.00	0.00
Operating EBITDA (A\$m)	-8.52	0.00	0.00	0.00	0.00
Net Profit (A\$m)	-8.52	0.00	0.00	0.00	0.00
Normalised EPS (A\$)	(0.040)	-	-	-	-
Normalised EPS Growth	111%	(100%)			
FD Normalised P/E (x)	NA	NA	NA	NA	NA
DPS (A\$)	-	-	-	-	-
Dividend Yield	0%	0%	0%	0%	0%
EV/EBITDA (x)	NA	NA	NA	NA	NA
P/FCFE (x)	NA	2.75	NA	NA	NA
Net Gearing	(16.8%)	(63.5%)	(63.5%)	(63.5%)	(63.5%)
P/BV (x)	2.11	1.57	1.57	1.57	1.57
ROE	(73.1%)	0.0%	0.0%	0.0%	0.0%
% Change In Normalised EPS Estimates					
Normalised EPS/consensus EPS (x)					

SOURCE: MORGANS, COMPANY REPORTS

Battery Minerals

BAT valuation methodology

We have used a risked sum-of-the-parts (SOTP) valuation to derive our A\$0.23/share price target. All calculations use a discount rate of 10% and a AUD to USD exchange rate of 0.75. The breakdown of the valuation can be seen below along with our rationale for the risk weighting:

Montepeuz- we have discounted the post-tax NPV of Montepeuz by 60% due to risks around realised product price. Whilst price assumptions are conservative, the lack of transparency in the market warrants caution. If BAT were to receive binding off-take agreements, we would revisit this risk weighting.

Spherical graphite project- BAT is the first ASX listed company to complete a PFS on Spherical graphite production, giving it significant first mover advantage. However, this is a greenfield sector and a product that sells into an opaque market. As such, we have discounted the spherical plant NPV by 80%. The release of a spherical plant DFS or off-take agreements would reduce the risk weighting.

Cash and non-core assets- we have estimated BAT's cash position at ~A\$10m and ascribed a A\$2m valuation to its interests in African zinc and gemstone projects.

Figure 1: Valuation summary

Valuation Summary	Unrisked A\$m	Risk Weighting	Risked Valuation	A\$/share
Montepeuz	98.7	40%	39.5 \$	0.09
Spherical Graphite Plant	288.6	20%	57.7 \$	0.14
Corporate	-10.0	100%	-10.0 -\$	0.02
Cash and non-core assets	12.0	100%	12.0 \$	0.03
BAT Valuation	389.3		99.2 \$	0.23

SOURCES: MORGANS, COMPANY REPORTS

Potential catalysts

We anticipate several potential catalysts as BAT progresses the Montepeuz project, these include:

- Off-take agreements- we believe off-take agreement on the natural or spherical graphite remains the largest upside risk for BAT.
- Reduced capex- BAT has indicated significant cost saving may be realised through the use of second hand equipment. An update is expected in the coming months.
- Increased recovery and reduced transport costs- met test-work subsequent to the DFS has achieved increased recoveries. Further test work is required and we expect an update in the coming months.
- Fast tracked production of the natural flake and spherical product- BAT is producing Spherical product at the pilot plant and has indicated it may look to increase production capacity or commence mining flake graphite at a reduced scale.

Key risks

BAT is a developing junior resources and industrial play, and as such it should be treated as a speculative investment proposition. Sector wide risks include: development risk, pricing risk, technology risk, geopolitical risk and operational risk. As mentioned in this report, realised product prices are the key risk to our BAT valuation. The company's ability to secure binding off-take agreements is the biggest downside risk to the BAT share price.

Spherical graphite plant (P-SPG) PFS

The recently released PFS was completed to a +/-30% level of accuracy and is the first of its kind for an ASX-listed company. The study delivered attractive economics of pre-tax NPV of US\$377m and post-tax NPV ~A\$290m (Morgans' estimate) using a coated spherical graphite price of US\$7,500/t.

Key points from the study include:

- Spherical plant to have a throughput of 40Kt which produces 20Kt of P-SPG (coated spherical graphite) and 20Kt of bi-product recarburiser.
- Capex for the spherical plant was estimated at US\$48m. Plant generates average annual EBITDA of ~US\$50m (Morgans' estimate).
- Plant to be located in Reno, Nevada due to the availability of cheap hydropower, ease of transport, favourable tax regime and close proximity to Li-ion battery manufacturers.
- Plant to be fed by Montepuez -106+38 micron concentrate. Average run of mine production is 38Kt per annum, with any shortfall to be made up of -180+106 concentrate.

Operating cost and thermal purification method

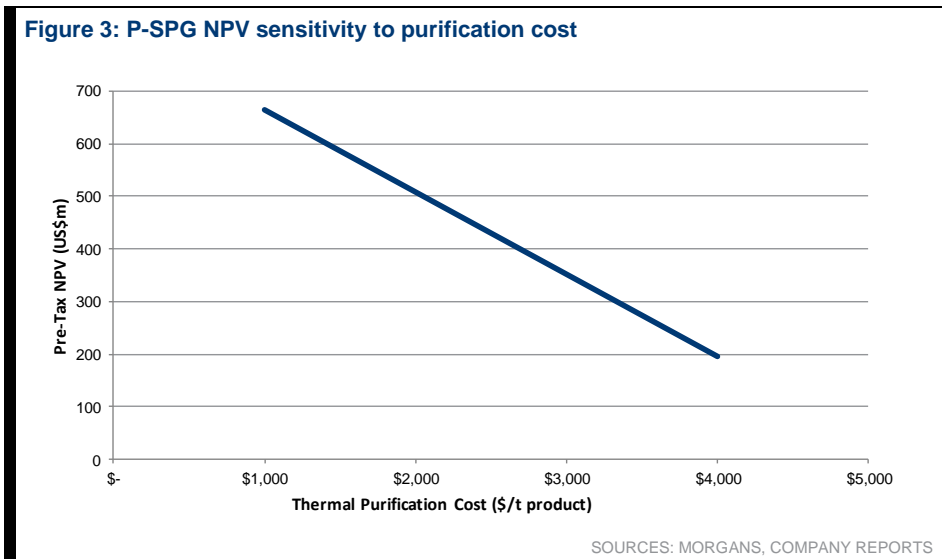
The unit operating cost for the spherical plant has been estimated at US\$5,500/t of product (versus Morgans' scoping study estimate of US\$3,500/t). The key reason for the increase in operating cost is the thermal purification process at US\$3,000/t.

Figure 2: P-SPG operating costs

Production Costs	\$/t Feed	\$/t Product
Purchase Price	539.0	1,078.0
Labour	81.9	163.7
Power	50.8	101.7
Reagents and Consumable:	17.2	34.3
Maintenance Materials	17.5	34.9
G&A	10.8	21.6
Logistics	535.7	1,071.5
SPG Opex	1,252.8	2,505.7
Purification	1,500.0	3,000.0
Total	2,752.8	5,505.7

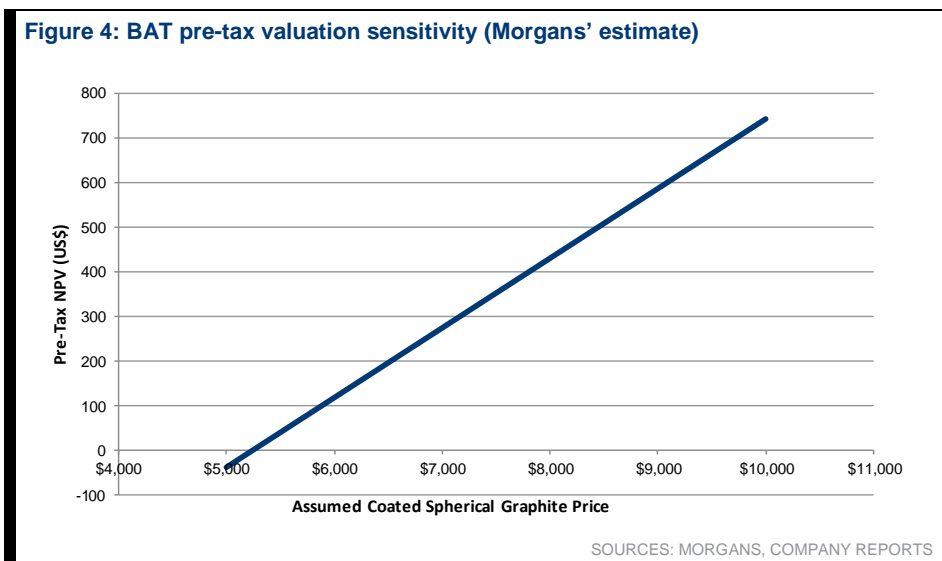
SOURCES: MORGANS, COMPANY REPORTS

BAT has elected to progress with a thermal purification method which, despite being more energy intensive, is more environmentally friendly than using Hydro-fluoric acid (HF). The acid purification method utilises hazardous chemicals and pollutes waste water. The spheronised graphite is purified (impurities are essentially burnt off) to 99% TGC by heating it in a furnace at 2,500 degrees Celsius. The impurities are the key cost driver in this process and we see potential upside in producing a higher concentrate grade to feed the spherical plant. We believe BAT will explore potential cost reductions in the spherical graphite DFS, due at the end of CY17. The following chart demonstrates the potential upside in reducing purification costs.



Price Assumptions

BAT has chosen to use coated spherical graphite price of US\$7,500/t for the Montepeuz product. This is line with peers in the space who are assuming a coated spherical product will sell between US\$7,000-US\$10,000. This price deck was derived from extensive discussion with potential end-users and industry specialists. As shown below, the valuation of the spherical plant is highly leveraged to the assumed basket price.



BAT has assumed a realised price of US\$700/t for the recarburiser product. We believe this may be slightly optimistic. However, the recarburiser is a bi-product and has minimal impact on the project's economics.

Pilot plant

BAT is currently producing battery anode material, in conjunction with four other graphite companies, at a Pilot Plant in Tennessee, USA. The mill is located in the Coulometrics battery and test facility and is being led by its CEO and President Dr Edward Buiel, a leader in the space. BAT were invited to the test facility by third party who are also funding the current series of works.

We believe the operational pilot plant provides BAT with the following advantages:

- BAT is able to provide potential end-users with coated spherical graphite suitable for battery anode material.

- Testwork demonstrates that Montepez graphite contains a suitable crystalline structure and quality to be supplied to the battery anode manufacturing industry.
- BAT is working in collaboration with industry leaders and developing relationships with key industry players.
- Plant is being funded by a non-disclosed industry player.

Definitive Feasibility Study (DFS) at Montepez

The recently released DFS was completed to a +/-15% level of accuracy and builds on the scoping study that was released in 2016. The study delivered a pre-tax NPV of A\$205m and post-tax NPV ~A\$100m (Morgans' estimates).

BAT has identified several opportunities to enhance the economics of the project, these include:

- Use of second hand processing infrastructure to reduce capex.
- Further metallurgical test work to improve recoveries.
- Reduction in transport costs.
- Mining of the shallower parts of the orebody to reduce expensive in-country blasting costs.
- Selective mining of high grade to increase the TGC grade in the early years of the project.

We understand that optimisation studies have commenced and BAT will update the market in due course.

Conservative price assumptions

BAT has chosen to use a conservative basket price of US\$798/t for its natural flake product. This price deck was derived from extensive discussion with end-user and potential off-take partners who have sampled and certified the Montepez product. We endorse the conservative approach taken by management and believe that BAT has chosen a realistic basket price in which to value its project. As shown below, BAT has assumed basket pricing significantly below its peers in the space. We believe the assumed price is a function of current market dynamics and does not relate to the quality of the Montepez product.

Figure 5: Assumed Basket Price Graphite Developers

Flake Description	Flake Size	BAT	MNS	SYR	VRC	BKT
Super Jumbo	>500 microns	-	4000		\$3,968	\$2,200
Jumbo	300+ micron	\$1,440	\$2,500		\$3,220	\$2,000
Large	300- 180 micron	\$976			\$2,070	\$1,450
Medium	180- 106 micron	\$813	\$2,125		\$1,389	\$1,150
Fine	106 - 75 micron				\$1,077	\$750
Amorphous	75- microns	\$539			\$403	\$400
Average Basket Price		\$798	\$2,413	\$1,000	\$1,684	\$1,236

SOURCES: MORGANS, COMPANY REPORTS

We estimate that if BAT were to use an average of its peers' basket price, pre-tax NPV would increase to US\$460m and post-tax NPV to A\$329m.

Figure 6: BAT project and peer pricing

Flake Description	Flake Size	BAT	Peer Average
Super Jumbo	>500 microns	-	\$3,417
Jumbo	300+ micron	\$1,440	\$2,454
Large	300- 180 micron	\$976	\$1,609
Medium	180- 106 micron	\$813	\$1,060
Fine	106 - 75 micron	\$539	\$889
Basket Price		\$798	\$1,235
Montepez Pre-Tax NPV		US\$146m	US\$460m

SOURCES: MORGANS, COMPANY REPORTS

Capital costs

Capex of US\$126m is in line with scoping study estimates despite the increased detail in engineering and design. Major capital components can be seen below:

Figure 7: Montepez capital estimate

Establishment Capital - Summary Table		
Area	Total USD	%
Mining	\$6,263,014	5.0%
Process plant	\$53,898,003	42.7%
TSF	\$5,037,665	4.0%
Raw water dam	\$3,784,200	3.0%
Site preparation	\$6,681,121	5.3%
Mobile equipment	\$6,870,701	5.4%
Non process infrastructure	\$8,588,977	6.8%
Indirect costs	\$1,436,6745	11.4%
Owners costs	\$10,118,9244	8.0%
Contingency	\$10,516,971	8.3%
Total	\$126,126.321	100.0%

SOURCES: MORGANS, COMPANY REPORTS

BAT is investigating the potential of using second hand plant and equipment at Montepez. This provides upside risk to project valuations.

Operating costs

The operating cost for Montepez was US\$422/t which is in line with Morgans' previous estimate of US\$400/t. Drill and Blast cost in the estimate are notably higher than most mining jurisdictions and BAT is pursuing means to reduce this cost.

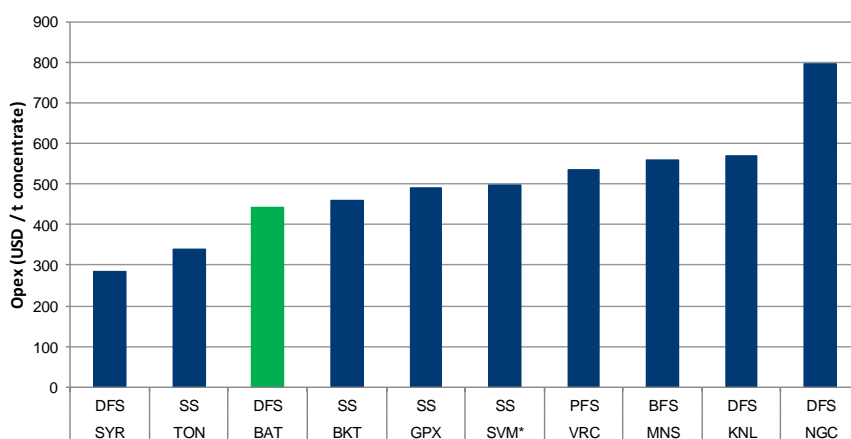
Figure 8: Operating Costs at Montepez

Activity	\$/t milled	\$/t concentrate
Labour	3.6	50.53
Power	4.07	57.05
Reagents and Consumables	4.17	58.55
Maintenance Materials	0.97	13.67
G&A	3.41	47.88
Logistics	5.42	76.01
Earthworks	0.98	13.75
Mining	7.45	104.6
Total Cash Cost (\$/t milled)	30.07	422.04

SOURCES: MORGANS, COMPANY REPORTS

Opex of US\$422/t places BAT in a competitive cost position, as can be seen in the following chart. It is important to note the level of detail in which the cost estimate was developed (SS- Scoping Study, PFS - Pre-feasibility study, DFS- Definitive Feasibility Study)

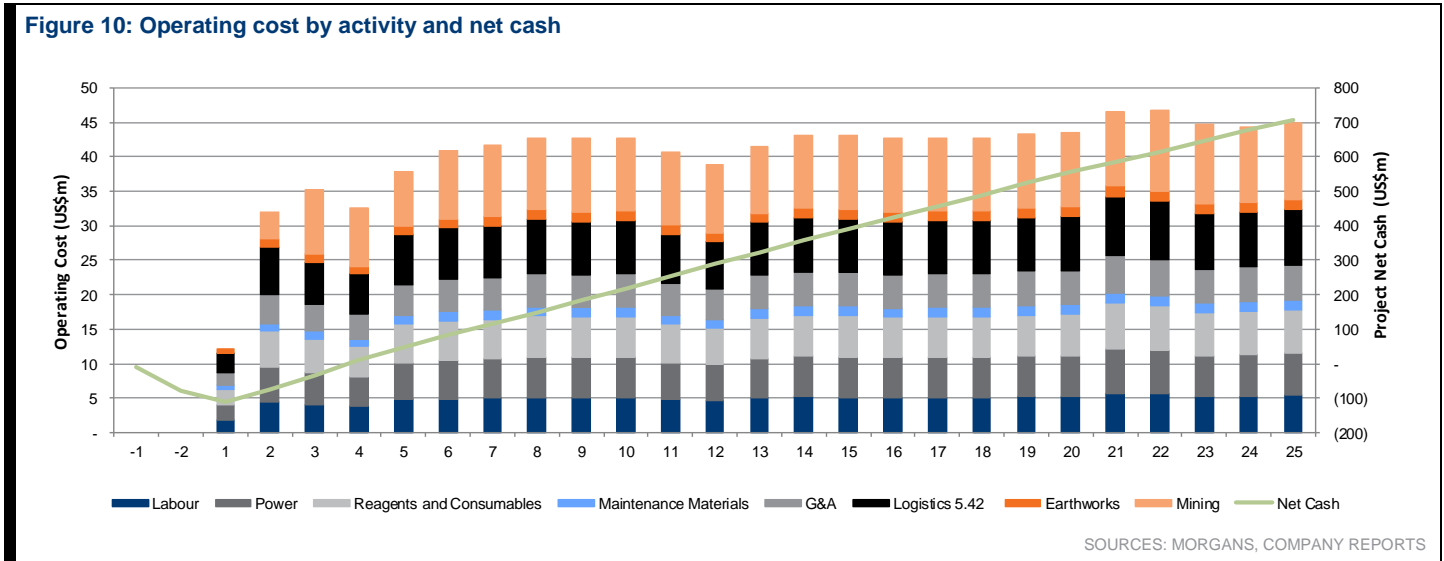
Figure 9: Operating cost (US\$/t) comparison



SOURCES: MORGANS, COMPANY REPORTS

Morgans' estimate of the operating cost and net cash profile for years 1-25 can be seen below.

Figure 10: Operating cost by activity and net cash

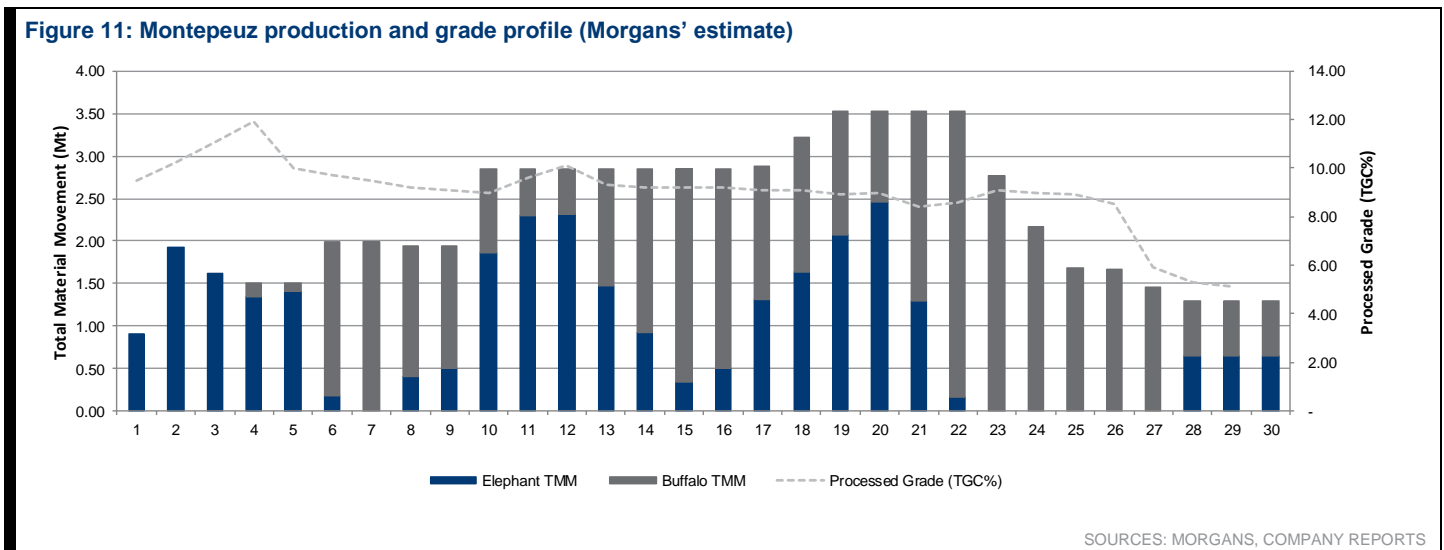


Mining

The DFS confirmed that Montepeuz can be mined by conventional open pit mining methods. Highlights include

- Montepeuz able to produce a 100Kt of 96% TGC concentrate for ~30 years at current Mineral Reserves.
- High grade ore is accessed in the early years leading to reduced operating costs and improved economics.
- Low strip ratio of 0.2 for the first seven years and 0.6 for the life of the operation. The first 15-20m of material is free-dig and the maximum depth of the open pit operation is 150 vertical metres.
- Due to the low strip ratio the annual material movement is low (average of 2.5mtpa) and can be completed using a contract miner.

Figure 11: Montepeuz production and grade profile (Morgans' estimate)



Processing

Montepeuz processing facility has an average throughput of 1.38mt per annum. The plant will produce 100Kt of concentrate at an average grade of 96% TGC. The flake distribution from Montepeuz can be seen below;

Figure 12: Annual flake Pproduction

Montepeuz Flake Product	Prod Split	Annual Prod (t)
+300 micron	9%	8,780
-300+180 micron	22%	21,590
-180+106 micron	31%	31,140
-106+38 micron	38%	38,490
Total	100%	100,000

SOURCES: MORGANS, COMPANY REPORTS

Montepeuz Reserve and Resource Update

BAT released its maiden Ore Reserve for the Elephant and Buffalo deposits at Montepeuz. Current inventory is sufficient for a ~30 year mine life and may be extended with further definition.

Figure 13: BAT maiden Ore Reserve estimate

Pit	Ore Type	Class	Ore Reserve	TGC	Contained Graphite
			Mt	%	Mt
Buffalo Pit	Weathered	Proved	0	0	0
		Probable	3.90	8.80	0.34
	Fresh	Proved	0	0	0
		Probable	10.50	9.80	1.03
	Total	Proved	0	0	0
		Probable	14.40	9.50	1.37
Elephant Pit	Weathered	Proved	0	0	0
		Probable	4.10	8.30	0.34
	Fresh	Proved	0	0	0
		Probable	22.90	8.40	1.93
	Total	Proved	0	0	0
		Probable	27.00	8.40	2.26
Buffalo & Elephant Pit	Weathered	Proved	0	0	0
		Probable	8.00	8.50	0.68
	Fresh	Proved	0	0	0
		Probable	33.50	8.80	2.96
	Total	Proved	0	0	0
		Probable	41.40	8.80	3.64

SOURCES: MORGANS, COMPANY REPORTS

BAT released an updated Mineral Resource statement that now stands at 67.20Mt @ 7.5%TGC. We believe the current Reserve and Resource are drilling constrained as BAT has decide to prioritise capital expenditure. Further upside may exist in both tonnes and grade if BAT were to increase in-fill and extensional drilling.

Figure 14: Montpezuz site layout

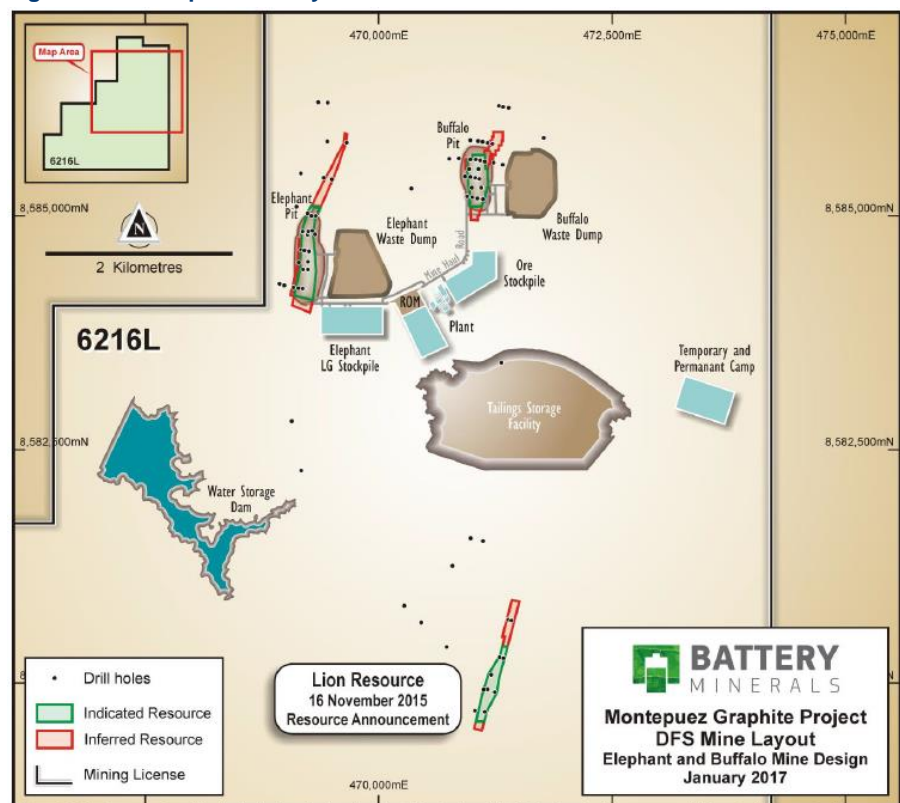


Figure 3. Montpezuz Graphite Project mine design showing Elephant and Buffalo classified resources, pit boundaries, waste dumps, ore stockpiles, plant, ROM as well as the tailings storage facility, water storage dam and mine camp.

SOURCES: MORGANS, COMPANY REPORTS

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