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Graphex Mining Limited (GPX AU, \$0.21, market cap. A\$17m)

Updated PFS demonstrates highly attractive returns (>100% IRR) at Chilalo, with low capital intensity and very high margins

No clarity yet on Tanzanian legislative framework, but a few green shoots evident

- GPX has released results of an updated pre-feasibility study (PFS) for the Chilalo flake graphite project located in Southern Tanzania.
- There have been a number of positive outcomes in the economic understanding of the Chilalo project. These have been driven by a staging of capital costs, an increased level of forecast production at full capacity and by a second round of metallurgical testing, which has delivered an increase to the graphite basket price against that used in the 2015 PFS.
- GPX has been able to publish project economics (limited by ASX and ASIC guidelines) for a current ore reserve life of 6.3 years and a 'life-of-mine' case of 8.5 years (defined as reserves plus 30% of inferred resources), summarised below.
- We have taken GPX's new inputs into our project NPV which now assumes a 12 year mine life (reserves plus a 50% conversion of inferred resources). We have also assumed a ramp-up to full production in Year 2.
- The following table summarises the results of the economic evaluations of Chilalo. All demonstrate that the project is an extremely attractive investment. Included as well is a comparison between GPX's 2015 PFS, which delivered a pre-tax US\$200m NPV(10), and our current estimates for a 12 year life where the NPV(10) is 2.8 times higher.

		Mine life (Years)	Capital cost* US\$m	Full production rate ktpa	Capital intensity US\$/annual tonne**	IRR (%)	NPV(10) US\$m, post tax
GPX	Reserves, post tax	6.3	76.1	104	732	130	273
GPX	"Life of mine", post tax	8.5	76.1	104	732	131	349
BSCP	"Life of mine", post tax	12	76.1	104	732	110	412
BSCP	"Life of mine", pre-tax	12	76.1	104	732	144	568
GPX	2015, base case, pre-tax	11	73.9	69	1071	62	200
	* Updated PFS assumes staged capex: US\$43.6 pre-production; US\$32.5m in year 2.						
	** At full production rate						

- An exploration programme is currently underway to extend the mine life included in GPX's evaluation. Given the size of the existing Chilalo Mineral Resource and the history of exploration success, we consider our 12 year mine life assumption to be conservative.
- GPX's final equity in the project (driven by changes to Tanzanian legislation) and a funding solution remain the last significant impediments for a go-ahead for the project. This is such a valuable project to both GPX and Tanzania, it is hard to imagine that it will not be given the go-ahead.

- The commencement of a bankable feasibility study (BFS) is scheduled for 4Q18. Subject to the successful conclusion to current financing negotiations, first graphite production is expected in mid calendar-2020 according to GPX's recent release.
- Note in the table above, our lower estimate of the projects internal rate of return is entirely driven by the ramp-up in 2020.

Summary of the updated Chilalo PFS

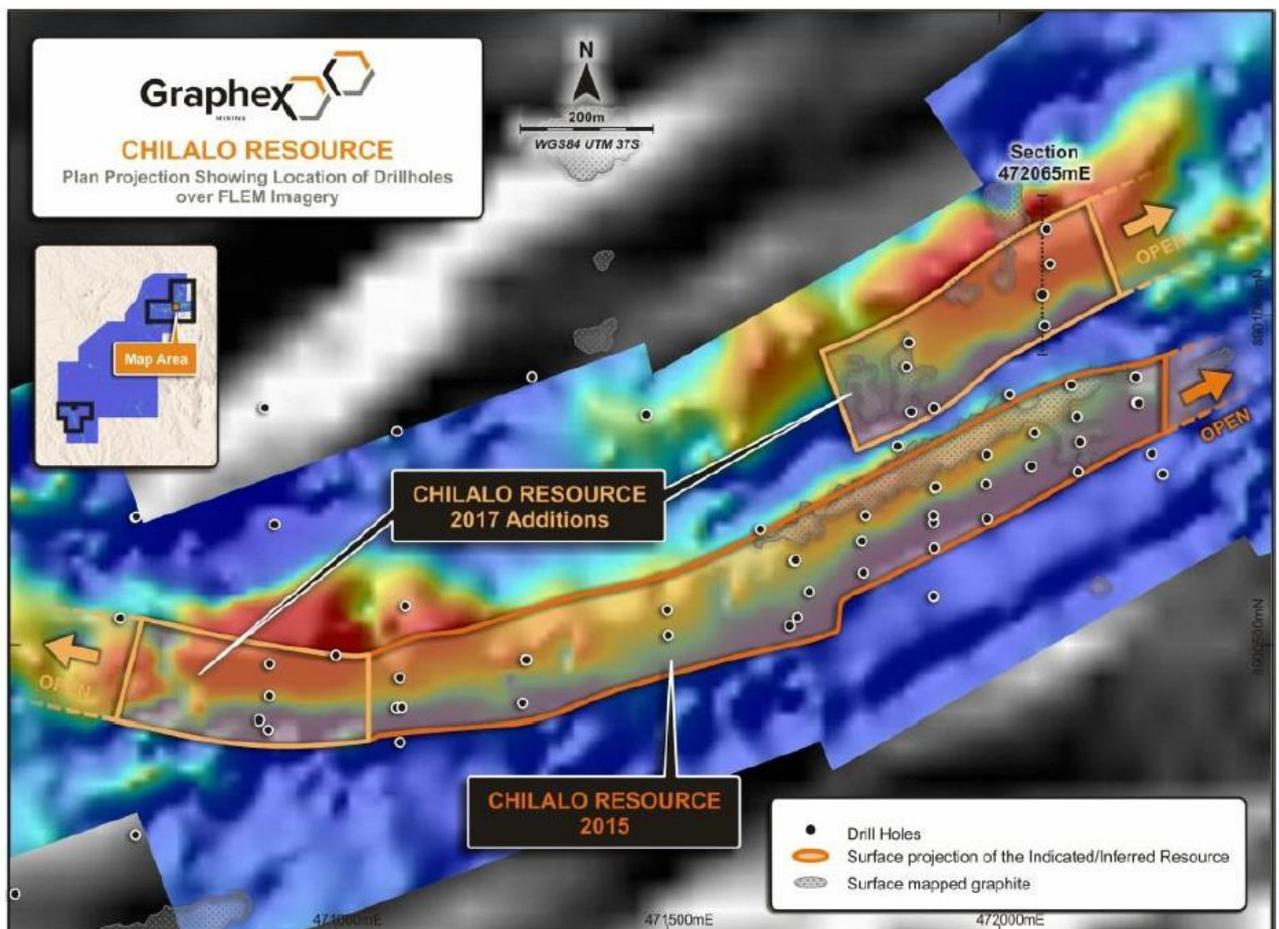
- Due to Chilalo's specific chemical properties and large flake size, GPX has successfully targeted the expandable graphite market for use in fire retardant and specialised graphite paper and foil. Large flake, expandable graphite is, increasingly, in short supply given reserve depletion and environmental restrictions in China. This has driven strong price rises, especially within the coarser flake sizes. GPX reports that supply of several of the coarser flake sizes is becoming 'critical'.
- The recently released updated PFS has identified an opportunity to stage the project's capex and production profile and significantly reduce the project's capital intensity. It is now proposed that the mine and process plant will deliver some 58ktpa in its first 2 years of production ('Stage 1'), expanding in year 3 to 104ktpa ('Stage 2'). Stage 1 capex is estimated at US\$43.6m; Stage 2 at US\$32.5m. The previous study in 2015 had envisioned 69ktpa for an estimated capex of US\$73.8m.
- At full production levels, capital intensity has reduced some 32% from US\$1071/annual tonne to around US\$732. This is particularly impressive.
- Operating costs have remained much the same as earlier estimates, around US\$500/t (FOB basis) of graphite concentrate.
- GPX has undertaken a second round of metallurgical testing to increase confidence levels regarding recoveries and the nature and specification of the final product. This was undertaken under the supervision of Australian consultants, BatteryLimits.
- This has delivered an attractive suite of product sizes, around 57% jumbo sized and above (+50 mesh). The average basket price used in the PFS has dropped from an estimate made in 2017 of US\$1917/t to a still-impressive \$1777/t, driven by a lower proportion of the very large flake than originally assumed. Given recent issues regarding graphite pricing elsewhere in the sector, we are pleased to see a more conservative appraisal.
- These price assumptions are substantially higher than that used in the 2015 PFS (US\$1217/t) driven by improved product specifications and higher prices generally.
- GPX will undertake a third round of testing with a 5 tonne bulk sample recently dispatched to a Canadian laboratory. Samples of concentrate will be supplied to potential purchasers of Chilalo graphite.
- See the table at the end of this report for our production, cost and capex assumptions (years 1-4 of a 12 year assumed production schedule).

GPX is now aiming for an increased mine life

- We have commented in previous reports that we believe the least concern for the Chilalo project is resources and reserves. Chilalo is a remarkably continuous graphite deposit and

we see little risk in the project achieving a minimum 15 mine life, noting that 10% of the deposit's strike length identified by geophysics has been tested.

- GPX is a company which has always been challenged with its limited cash balance. Management have therefore chosen to husband its resources and to limit expenditure on exploration and the definition of a reserve base longer than is necessary to establish economic viability.
- However, the higher PFS production profile (as well as ASX and ASIC disclosure requirements) has seen the assumed mine life drop to 6.3-8.5 years (from 11 years in the 2015 study). This has necessitated a 3000m drill-out of inferred resources to indicated status. Assuming success, this should allow for a significant upgrade to ore reserves. Historically, this has been the case.
- The drilling programme is currently under way, and upgraded resources are likely to be reported during 4Q18. (As well, GPX geologists are completing a geotechnical drilling programme, required for the BFS).
- The figure below demonstrates that there are areas of wide-spaced drilling which need to be infilled.



Source: Graphex Mining

Offtake agreements

- As announced in March 2018, GPX has signed five Statements of Sales Intent for the supply of flake graphite to expandable graphite producers and traders in China. The SSIs cover 80,000 tonnes per year of Chilalo graphite and the Company anticipates that further SSIs will be signed in the future.
- GPX states that it expects to convert the SSIs into binding offtake agreements in the near future. A revised production profile (58ktpa growing to 104ktpa) will undoubtedly require revisions to the volumes summarised below.
- Graphite is very much a 'customer facing' commodity, and we consider GPX the best positioned of the 'new generation' flake graphite producers with regard to Chinese markets. In our view, the company has a deep knowledge and understanding of graphite markets in its core market, China, and the rest of Asia.

Company	Description	Quantity required	Product specifications
Qingdao Banghai Carbon Product Co. Ltd	Integrated private graphite company, located in Pingdu, Qingdao. Its major business is producing and selling expandable graphite, graphite foil and other graphite products.	20ktpa	+20 mesh to +80 mesh
Yingkou Baijiatai	Located in Dalian. Graphite trading company mainly selling flame retardant materials. Annual trading volume in graphite product is 30ktpa.	25ktpa	Various specifications
Yingkou Runshuangda	Located in Yingkou. Trading company specializing in flake graphite sales to international flame retardant material manufacturers in the USA, Europe, India, and Japan. Annual sales approx. 20ktpa of flake graphite concentrate for these markets.	15ktpa	Various specifications
Jixi Xin Run Graphite Co. Ltd	Private Jixi-based graphite company producing 20ktpa flake graphite concentrate, 10ktpa of expandable graphite, 5ktpa of high-purity graphite, 1ktpa of graphite electrodes and 500tpa of graphite paper. Chilalo product required for expandable graphite production.	10ktpa	Various specifications
Jixi HuanYu New Energy Materials Co., Ltd	Private Jixi-based graphite company specialising in production of flake graphite concentrate, expandable graphite and purified graphite. Chilalo product required for expandable graphite production.	10ktpa	Various specifications
Total		80ktpa	

Source: GPX release 27 March 2018

Final permitting

- Changes to the Tanzanian Mining Act in July 2017 stopped the industry in its tracks. Seemingly targeting the gold sector (and one company in particular) investment in the sector has ground to a halt. This had a dramatic impact on the ability of all companies to raise capital for new mining projects.
- It is important however to remember that GPX has been successful in obtaining a mining licence covering the Chilalo graphite deposit. What needs to be resolved are specific details of the new Mining Act to allow the project to be financed.

- There seems little doubt that the Tanzanian Government will seek free carried interest in mining projects going forward. The revised mining legislation singles out this issue:

10(1). In any mining operations under a mining licence or special mining licence the Government shall have not less than sixteen percent non-dilutable free carried interest shares in the capital of a mining company depending on the type of minerals and the level of investment.

- As we've said in past reports, given the robust economics of Chilalo, the allocation of a 16% free carried interest to Tanzania is unlikely to be a show-stopper.
- Other issues to be considered are likely to relate to the export of concentrate and in-country banking arrangements. Details here are yet to be clarified.
- The wording of the amended Act, together with the fact that industrial minerals (such as graphite) were excluded from the increases in royalty rates, suggests that the Government may take a more lenient view of, say, industrial minerals. Perhaps this could include graphite and the smaller mining projects.
- However, 12 months on there is still significant uncertainty regarding the legal and regulatory framework governing the mining sector.
- In June, the Company met with the Minister of Minerals and (we are assured) received a good hearing. GPX has since delivered a comprehensive submission to the Minister outlining the company's view on a number of issues. The submission included contributions from a number of independent experts in the fields of project finance, African law and political risk insurance and sought to make comparisons of the Tanzanian system with other jurisdictions.
- Recently the Mining Commission issued the Mining Commission (Guidelines for Submission of Local Content Plan) 2018 in which holders of mining licences are required to submit a local content plan.
- On a further positive note, two Australian mining 'hopefuls' were granted mining licences last month: Walkabout Resources (over a modest expandable graphite resource) and Strandline Resources (over coastal mineral sands assets). In addition, Kibaran Resources was notified that upon expiry, its existing mining licence will be renewed for a further 10 years. No comment was made regarding the fiscal and equity terms for these investments. So, things are happening, albeit slowly.

Our view

- *Is this all too good to be true?* These extremely attractive valuation metrics are clearly driven by the high prices currently commanded by coarse flake expandable graphite and also a higher production rate.
- In the longer term, prices such as these will likely incentivise new production. GPX is well ahead of its competitors, so should be able to break into this market sooner than most, and hopefully achieve these attractive prices. There is some risk that as new African production emerges, prices come under pressure. However, this might be offset by declining production from China.

- *And the impact on the GPX share valuation?* GPX have stated that the CN Docking-led consortium will not advance its financing package until Tanzanian uncertainty is resolved. Understandably, GPX is seeking alternative sources of capital, and state that “the Updated PFS is an important milestone towards an investment decision by <GPX’s> potential financiers, which have identified Chilalo as an outstanding project in the graphite sector”.
- We are unable to produce an equity NPV for GPX until details of the finance package are agreed and disclosed. It seems likely that the Tanzanian Government will seek a 16% free-carried interest in Chilalo.
- With a market capitalisation of under A\$20m it is not difficult to argue that GPX is dramatically undervalued when compared to our unfunded NPV(10) for Chilalo of anywhere between US\$273m and US\$412m.

BSCP production/cashflow/valuation assumptions (2019-2023).

Chilalo Project		Year 0	Year 1	Year 2	Year 3	Year 4
100% basis		2019/20	2020/21	2021/22	2022/23	2023/24
12 year total life assumed						
Annual production	Kt	0	40	58	80	104
Sales price (average)			1777	1777	1777	1777
Revenue	US\$m	0.0	71.1	103.1	142.2	184.8
Costs	US\$m	0.0	-28.4	-27.8	-38.4	-49.9
EBITA	US\$m	0.0	42.7	75.2	103.8	134.9
Tanzanian royalty (4%)	US\$m	0.0	-2.8	-4.1	-5.7	-7.4
D&A	US\$m	0.0	-1.2	-1.8	-2.4	-3.2
EBIT	US\$m	0.0	38.6	69.3	95.6	124.3
Taxation (30%)	US\$m	0.0	-11.6	-20.8	-28.7	-37.3
NPAT	US\$m	0.0	27.0	48.5	66.9	87.0
Cashflow	US\$m	0.0	28.3	50.3	69.4	90.2
Add back tax relief		0.0	11.6	20.8	0.0	0.0
Capex	US\$m	-43.6	-0.5	-32.5	-0.5	-0.5
Net cashflow	US\$m	-43.6	39.3	38.6	68.9	89.7
NPV (10%)	US\$m	\$412.6				
IRR		110%				
AUD/USD		0.75				
NPV (10%)	A\$m	\$550.1				

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Dr Chris Baker, an authorised representative of BCP, certifies that the advice in this report reflects his honest view of the company. He has 29 years investment experience in wholesale capital markets. He worked as a mining analyst for brokers BZW and UBS for 11 years and has a further 16 years' experience as a mining analyst and portfolio manager with Colonial First State and Caledonia Investments. He now provides independent financial advice on a part time basis. He may own securities in companies he recommends, but will declare this when providing advice. He currently owns shares in GPX. He is remunerated from corporate finance fees.