

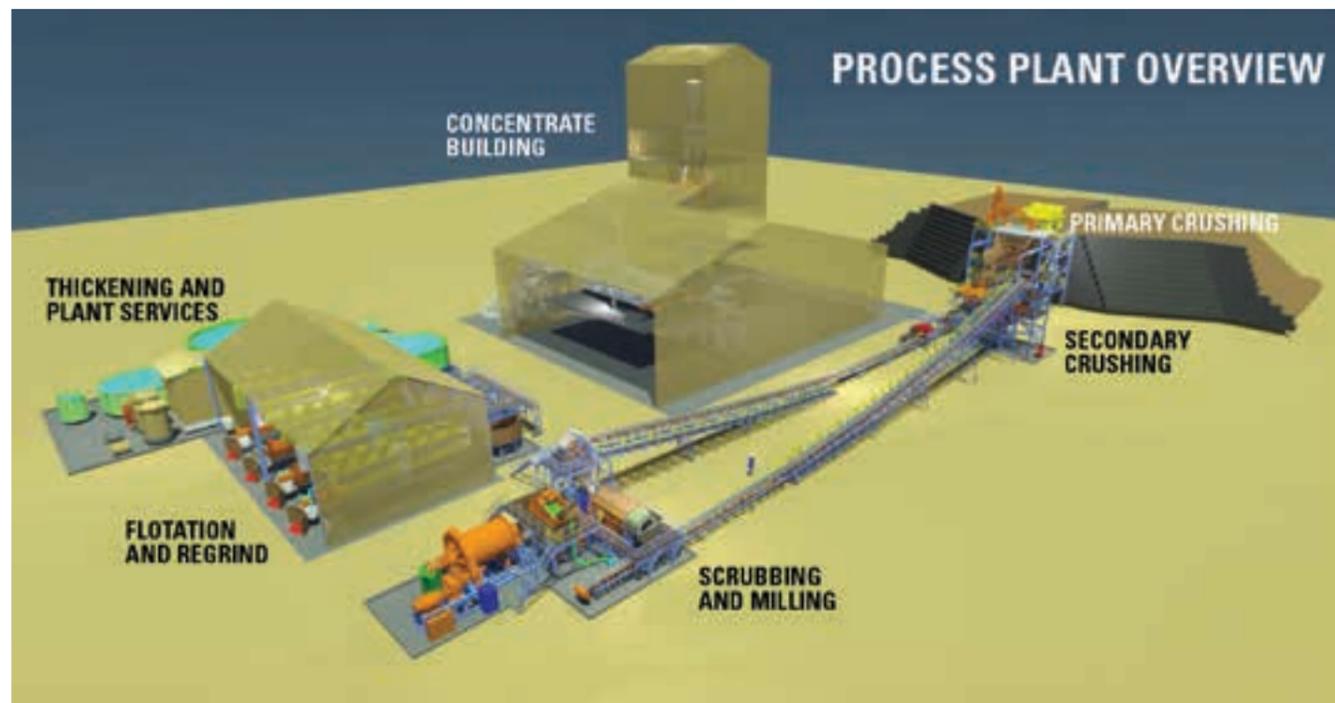
Walkabout targets early 2018 start-up for graphite project

The first of the new wave of African graphite projects to come on stream is almost certainly going to be Balama in northern Mozambique, now just months away from commissioning. The second could well be the Lindi Jumbo graphite project of ASX-listed Walkabout Resources in Tanzania. Walkabout has just completed a Definitive Feasibility Study (DFS) on Lindi Jumbo and intends fast-tracking the project into production with the target for first concentrate being the first quarter of 2018.

The Lindi Jumbo project is located in south-east Tanzania approximately 60 km inland from the coast and 200 km from the Port of Mtwara. It adjoins the Nachu graphite project of Magnis Resources, also listed on the ASX. Lindi Jumbo was acquired by Walkabout in 2015 and is now the company's flagship project. Walkabout has a 70 % stake with an option to acquire the remaining 30 % from its Tanzanian partner.

Run by mining engineer Allan Mulligan, who has over 30 years of experience in mine management and production in Africa

Tom Murrell (left), Director, and Trevor Benson, Chairman, of Walkabout Resources pictured at the recent Mining Indaba (photo: Arthur Tassell).



and Australia, Walkabout also controls the Takatokwane coal project in Botswana and the Kigoma copper project in Tanzania.

Walkabout is planning a relatively small mine at Lindi Jumbo. While Balama and Nachu, for example, will have nameplate capacities of 350 000 t/a and 240 000 t/a of graphite concentrate respectively, the equivalent figure for Lindi Jumbo is just 40 000 t/a (although this product will be of high value). The spin-off is that Lindi Jumbo will be straightforward to develop and will have a very low upfront capex of US\$38.7 million, with payback expected in 22 months. The DFS puts the pretax NPV₁₀ at US\$323 million with the pretax IRR estimated at 97 %.

The DFS estimates the on-mine cash cost at US\$292/tonne in concentrate delivered at the mine gate and US\$352/tonne FOB at the Port of Mtwara.

Modern Mining talked to one of Walkabout's directors, Tom Murrell, at the recent Mining Indaba in Cape Town. He said that Walkabout was totally committed to bringing Lindi Jumbo into early production. "We've gone from discovery to completion of a DFS in only 17 months, which is incredibly fast," he said. "We're now ready to start construction as soon as we obtain funding. This process is

well advanced and we are currently in discussions with several parties regarding funding options. We believe that if we secure the necessary funding by the end of April this year, then we will be able to complete construction of the mine and produce our first product by the end of the first quarter of 2018."

Elaborating on the Lindi Jumbo resource, Murrell told *Modern Mining* that it contained three very high-grade zones – known as Domains 7, 8 and 9 – extending to surface, which presented the opportunity for selective, high-grade mining. "As explained in our DFS, these zones can be extracted with minimum contamination from lower-grade material and will allow us to achieve a high-grade feed to the mill which will be in excess of 17.5 % Total Graphitic Content (TGC) for the first three years of the mine life – with the life of mine average mill feed grade being above 16 % TGC."

Murrell said that another distinguishing feature of Lindi Jumbo was the project's ability to produce a premium product. "Based on our testwork, we estimate that up to 50 % of the graphite in concentrate we produce will be in the Super Jumbo (+500 µm) or Jumbo (+300 µm) categories, which command much higher prices in the market. With so many new graphite projects under development,

there is a risk of over-supply conditions developing but we anticipate demand remaining strong for large flake graphite."

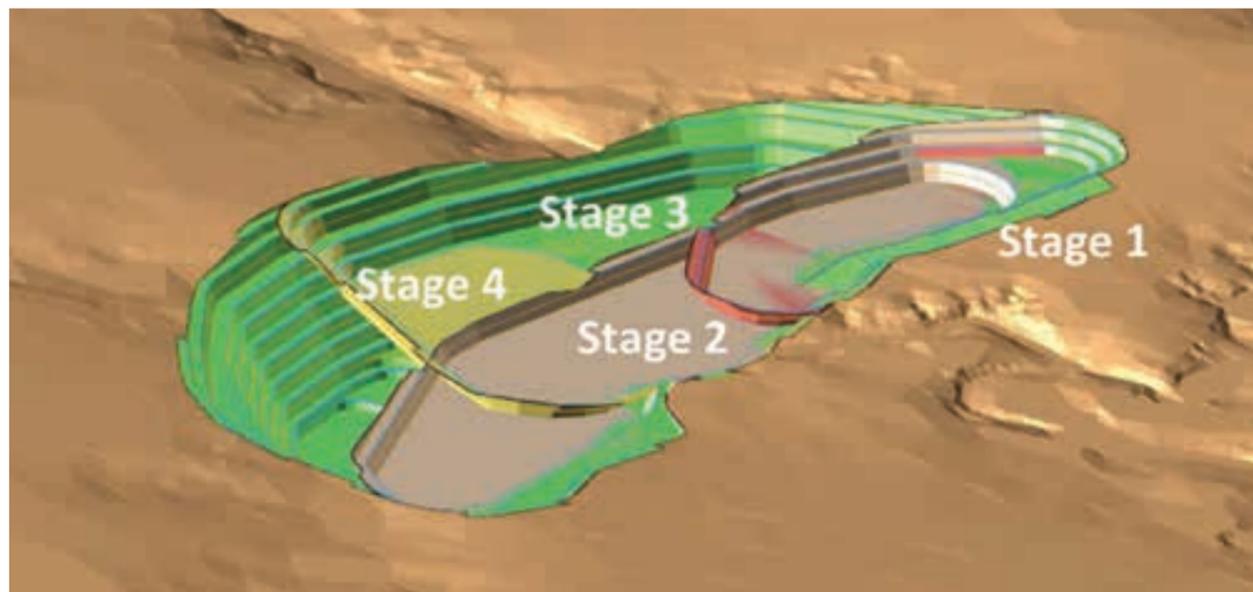
In implementing the project, Walkabout is adopting a fully outsourced model. "We will outsource the mining and plant operations, as well as functions such as power supply, to what we call 'Specialist Partner Suppliers' and we are already in advanced negotiations with various parties in this respect," said Murrell. "The mine camp, for example, will be built, owned and operated by a suitable partner."

He added that the process plant would be of modular design. "Our intention is that the plant will be trial assembled in the factory and then disassembled and shipped to the project in containers, allowing fast erection on site. The modular design will also allow the plant to be

easily expanded. This is an important consideration as we anticipate that the resource at Lindi Jumbo will grow as our exploration

Drilling at the Lindi Jumbo project in 2016.





Oblique view from the south-east of the Lindi Jumbo pit shell with four mining stages.

“We have four separate licences and we have thus far drilled in only one of the licence areas.”

proceeds. We have four separate licences and we have thus far drilled in only one of the licence areas.”

Murrell told *Modern Mining* that the plant flowsheet would incorporate Walkabout's own in-house developed mill float regime designed to protect the integrity of the jumbo flakes during the liberation process.

The DFS on Lindi Jumbo was centrally managed from Johannesburg by independent mining consultancy Bara International. The study assesses the development of a mining and processing operation at Lindi Jumbo to produce an annual output of 40 000 t/a of four discrete products of graphite concentrate for sale FOB from the Port of Mtwara. This level of production will entail the milling of only 5 Mt over the 20-year life of mine, an average of 260 000 t/a (22 000 tonnes per month).

A geotechnical study was undertaken to determine the design criteria for the open-pit mine design and pit optimisation. The pit optimisation exercise was repeated with a range of cut-off grades in order to optimise the cost per tonne of product produced. A cut-off grade of 8 % TGC was selected. Additional factors used in selection of the ultimate pit shell were the production rate and life of mine.

It was specified that the production rate should be limited to 40 000 t/a of concentrate as this is limited by potential market constraints. In order to achieve a mine life of at least 20 years at the specified production rate, an in-pit resource of around 3 Mt is required. This guided the selection of the ultimate pit shell to use in the mining schedule.

According to the DFS, the key to de-risking the mine through the mining schedule is the

start-up zone in stages 1 and 2 where the ultra-high grades of resource domains 7, 8 and 9 are accessed to ‘sweeten’ the plant feed.

Weathered ore and waste will be excavated using a hydraulic shovel and loaded onto 30-t dump trucks for hauling out of the pit to the ROM stockpile, low grade stockpiles or waste dumps. Where the weathered material requires ripping by dozer before excavating, this will be done using a tracked dozer. Fresh ore and waste will be drilled and blasted before being loaded and hauled in a similar manner.

A graphite processing flowsheet was developed based on an extensive metallurgical test work programme. The focus of the test work programme, carried out under the supervision of Dr Evan Kirby of Metallurgical Management Services (MMS) at Nagrom Laboratories in Perth, has been the preservation of flake size into concentrate within a minimum concentrate grade of 95 % TGC.

This has been achieved across a range of ore grades and aligned with the proposed mining vertical profile. The Lindi Jumbo project boasts up to 85 % of natural flake sizes above 180 µm, the highest amongst its peer group.

Follow up test work has been carried out in Germany and China to confirm that the methodology employed is effective across bench scale operations and can be up-scaled. Confirmation of attritioning regimes, mill charges and speeds and retention times has been undertaken. Further test work will be undertaken prior to detailed design to be undertaken upon project commitment.

The proposed flowsheet includes primary and secondary crushing, scrubbing, milling (via a primary rod mill), sequential rougher/

scavenger flotation, regrind cleaner flotation, filtration and concentrate drying, screening of final product concentrate and bagging of concentrate.

The plant has been sized for a feed of 300 kt/a of ore with a grade of >16 % TGC to produce a graphite flake concentrate with an average grade of 97 % TGC. This corresponds to a graphitic carbon recovery of between 85 and 90 %.

The DFS says that much of the equipment is likely to be sourced from China where several decades of graphite processing IP is located.

Four high purity products (96 % to 98 % TGC) are planned to be produced at Lindi Jumbo and the life of mine average ratio includes a weathered allocation of ore and a fresh allocation with a cut off being determined to be 10 m below surface. The products are targeted towards the high end markets with an estimated 8 000 t/a of Super Jumbo (+500 µm) and 14 000 t/a of Jumbo (+300 µm) products suitable for the expandable natural flake markets.

Design for a tailings storage facility (TSF) has been progressed beyond the 20 % design stage. The proposed TSF will cover an area of approximately 17 hectares and consist of an initially engineered waste rock wall with a maximum height of 8 m (at the lowest point), sufficiently high to contain the tailings material during the initial period with a rate of rise greater than the specified maximum of 2 m per year. The TSF will be constructed in phases.

The bulk power supply will be provided by diesel driven generators pending connection to a high reticulation feed while the bulk water supply will be derived from a bore field in close proximity to the mine.

Photos (unless otherwise acknowledged) courtesy of Walkabout Resources



Trench mapping at Lindi Jumbo.

Lindi hosts the highest grade resource in Tanzania

The measured, indicated and inferred resources at Lindi Jumbo total 29,6 Mt at 11 % TGC. Approximately 40 % of the resource is in the measured (6,4 Mt at 12,2 % TGC) and indicated (5,5 Mt at 11 % TGC) categories for 1,38 Mt of contained flake graphite.

The resource includes 4,7 Mt of super high grade material at 22,8 % TGC in three discrete shallow zones of which 1,7 Mt are in the measured category – confirming this to be by far the highest grade resource in Tanzania, says Walkabout. ■



ALLIED CRANE HIRE

Setting the Standard!

0800-CRANES

Info@alliedcranehire.co.za
www.alliedcranehire.co.za

Branches covering Sub-Saharan Africa

