



15 March 2018

## Caula graphite and vanadium project on track for first production in mid-2019

**Strategic review finds Caula has strong potential to produce high value vanadium products, creating a further cashflow opportunity**

Mustang Resources (**ASX: MUS**) is pleased to announce that a strategic review led by new Managing Director Dr Bernard Olivier has found that the Company's Caula Graphite Project in Mozambique is well on track for first production by the middle of next year.

The review also established that Stage 1 of Caula will produce vanadium concentrate which can be either sold or stockpiled for further processing to high purity vanadium products as part of Stage 2.

The extensive review was conducted alongside the Concept Study, which is set for completion in the June 2018 quarter.

Dr Evan Kirby, who recently joined the Mustang Board of Directors as a Non-Executive Director and consultant and has significant graphite and vanadium experience, assisted Dr Olivier in the review.

The key findings of the review were:

- Caula contains an exceptional combination of both high-grade (13% TGC) and large flakes sizes (~55% large, jumbo and super jumbo).
- Concept Study on track for completion by Q2 2018.
- The vanadium content of the ore represents an additional cashflow opportunity, especially given the structural shift in the vanadium market.
- The most effective way to develop Caula involves a two-stage process:

### COMPANY INFORMATION

Mustang Resources Ltd  
ABN 34 090 074 785  
ASX Code: MUS

Current Shares on Issue:  
771,433,387

Market Capitalisation:  
\$18.5M as at 14 March 2018

### COMPANY DIRECTORS

Ian Daymond  
Chairman

Bernard Olivier  
Managing Director

Cobus van Wyk  
Chief Operating Officer

Christiaan Jordaan  
Director

Evan Kirby  
Director

Twitter: @Mustang\_Res  
mustangresources.com.au

- Stage 1 Development Strategy:
  - Stage 1 Development Strategy comprises a robust, low-cost mining operation producing ~100,000tpa of ore for 10,000 to 15,000tpa of high-grade (97% C+) graphite concentrate.
  - From the start of operations, vanadium will be extracted to a concentrate. This will be sold to a vanadium producer or stockpiled for future production of refined vanadium pentoxide chemicals (98% and 99%+ V<sub>2</sub>O<sub>5</sub>).
  - The Stage 1 Graphite Plant is being designed to allow future incorporation of all processing equipment into the larger Stage 2 graphite plant.
  - Sale of graphite and vanadium products produced in Stage 1 will be used to secure binding off-take agreements and associated finance required for Stage 2 development.
  - Stage 1 of the project development is expected to be completed and producing sellable products in H1 2019.
- Stage 2 Development Strategy:
  - Expansion of mining operations to between 300,000 and 600,000tpa of ore.
  - Construction of a large full-scale processing plant capable of delivering 50,000 to 75,000tpa of high grade (97% C+) graphite concentrate
  - Construction of a full-scale vanadium concentrate processing plant capable of producing refined vanadium products (99.9% purity vanadium pentoxide and other vanadium chemicals such as vanadium sulfate) for the fast-growing aerospace alloy and battery markets.
  - With a hypothetical ore grade of 0.4% V<sub>2</sub>O<sub>5</sub>, a 600,000tpa mining operation could produce ~2,000tpa of V<sub>2</sub>O<sub>5</sub> (98% and 99.9% purity vanadium pentoxide chemicals) with a current market value of >US\$60 million p.a.<sup>1</sup>

## 1. Background

The Caula Graphite Project represents a unique combination of both high grade and large flake size that distinguishes the project from its peers (see Figure 1 below). The Caula project has delivered a maiden JORC Inferred Resource of 5.4Mt at an average grade of 13% TGC (6% cut-off) for more than 700,000 tonnes of contained graphite. The exploration results included exceptionally high-grade intercepts of up to 26% TGC.<sup>2</sup>

In addition, initial metallurgical test work has confirmed Caula can yield high percentages of Super Jumbo, Jumbo and Large flakes (~55% from the fresh ore) with carbon content up to 98% through simple flotation (average of 97% C across all size fractions).<sup>3</sup> Oxidised ore has also demonstrated excellent treatment characteristics.

In addition to the exceptional quality of the products, Mustang has already proven that its experienced team in Mozambique can both build and operate a mining project. The recent

<sup>1</sup> Based on 13 March 2018 pricing of US\$13.9/lb (US\$30,500/tonne) for 98% purity Vanadium pentoxide delivered in China. Source: vanadiumprice.com

<sup>2</sup> Refer to ASX Announcement dated 1 December 2017 "Maiden Mineral Resource Estimate Completed for Caula Graphite Project" inclusive of all the JORC Tables listed in the Appendix

<sup>3</sup> Refer to ASX Announcement dated 13 December 2017 "Outlook for Caula graphite project continues to grow with increased recoveries of large to super jumbo flake" inclusive of all the JORC Tables listed in the Appendix

conversion of exploration licences to mining concessions on the neighbouring ruby project is further testimony to Mustang's abilities to execute project delivery successfully in Mozambique. Furthermore, Mustang constructed and commissioned the current 200tph processing plant being utilised on the Montepuez Ruby Project that borders the Caula Graphite Project (see Figure 2). Mustang is able to utilise the infrastructure and operations camp of the ruby project to fast track the graphite project development.

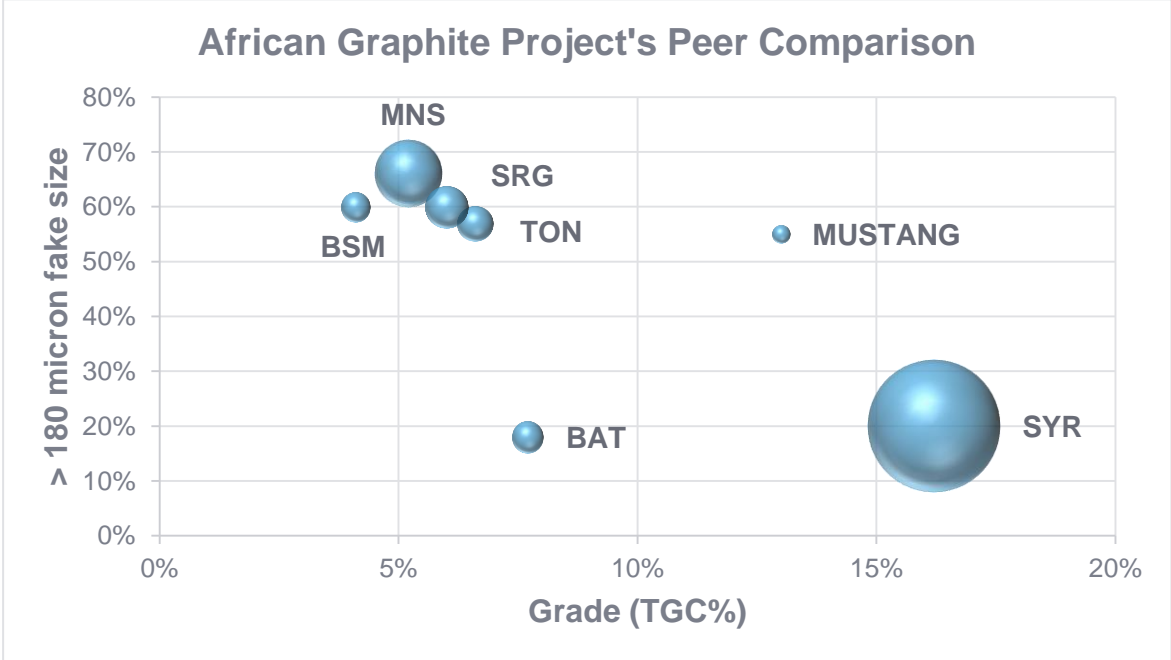


Figure 1: Comparative chart of African graphite companies based on grade and flake size. The size of the bubble for each company represents their current market capitalisation in A\$. The chart clearly shows Mustang's prime position in the top right-hand corner with both high grade and large flake size. The market capitalisation comparison further highlights the Board's view that, given the quality of the project, Mustang is greatly undervalued.

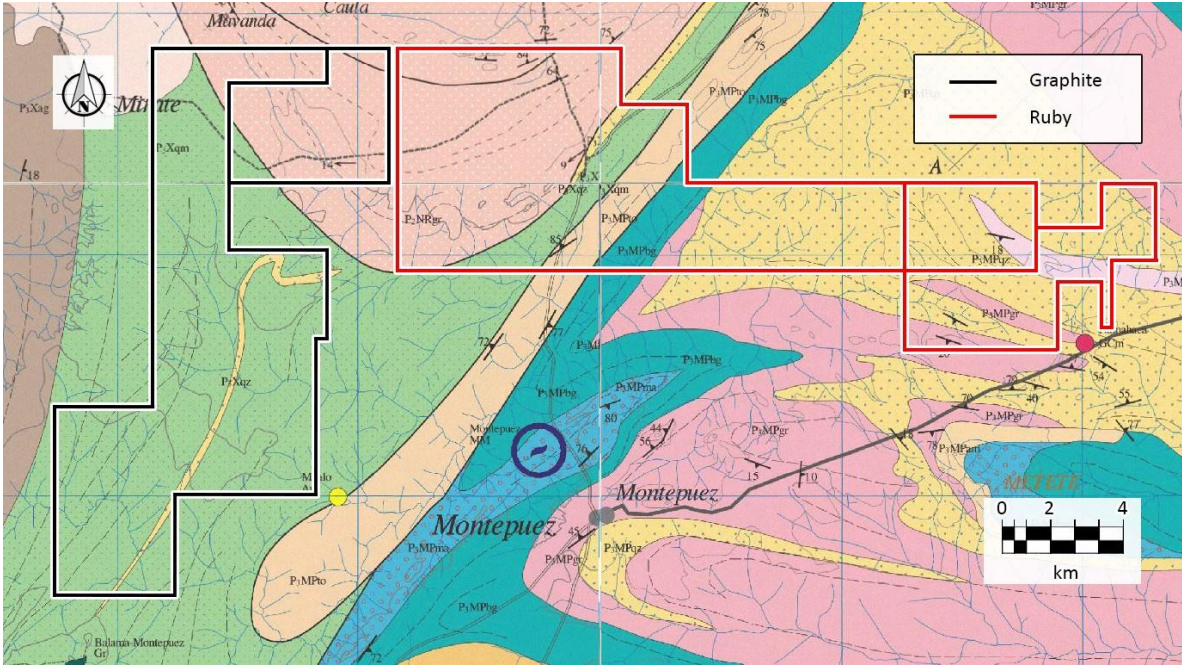


Figure 2: Mustang's Caula graphite and vanadium project located adjacent to its Montepuez Ruby Project in Northern Mozambique. Mustang's two projects share a tenement boundary and utilise the same office infrastructure and operations camp.

For personal use only

## 2. Concept Study Update

As announced on 5 February 2018<sup>4</sup>, the Company has completed the 1,400m diamond drilling campaign which will underpin the Concept Study of the Caula Graphite Project. The Concept Study remains on track for completion in Q2 this year. Approximately 1.2 tonnes of diamond drill core, comprising 51 samples from the current drilling program, have been delivered to Nagrom Laboratories in Perth for graphite and vanadium recovery test work. The samples, representing oxide and fresh ore, will be tested both as composites and as individual samples to investigate orebody variability. Multi-element analysis of the samples is being performed by SGS South Africa and full results are expected shortly.

## 3. Development Strategy

Given the potential of both the graphite and vanadium component of the Caula ore, Mustang is developing a dual extraction flowsheet that will allow extraction of both graphite and vanadium from the feed ore. The two-stage development strategy also suits the team's operational skills and abilities as well as ensuring that binding off-take agreements can be secured to finance Stage 2 of the development plan which represents the vast majority of the development costs. Binding off-take agreements and associated project finance typically require considerable quantities of final graphite concentrates for product qualification and the Company considers that its staged development strategy will ensure delivery of cost-effective products within a very short timeframe. The Company estimates that, subject to the final results of the Concept study, it can fast track the Stage 1 development phase for completion and sellable product delivery in H1 2019.

### 3.1 Stage 1

Stage 1 consists of the establishment of a low-cost mining operation delivering approximately 100,000tpa of ore to a robust cost-effective processing plant capable of producing 10,000tpa to 15,000tpa of high-grade graphite concentrate. Notably, the required feed grade of 100,000tpa (~20 tonnes per hour) is considerably smaller than the Company's current 200tph processing plant located on the neighbouring ruby tenements.

Vanadium will be extracted to a concentrate from the inception of the project and the vanadium extraction process will be integrated into the Stage 1 plant. Vanadium concentrate will be sold to a vanadium chemicals producer or stockpiled for future production of refined vanadium chemicals (98% and 99%+ vanadium pentoxide products). The Stage 1 Graphite Plant is being designed to allow future incorporation of all processing equipment into the larger Stage 2 Graphite and Vanadium plant. Through the production of both graphite and vanadium concentrates, the Company is confident that it will be able to secure binding off-take agreements and associated finance required for Stage 2 development. Stage 1 of the project's development is expected to be completed and producing a sellable product in H1 2019.

### 3.2 Stage 2

Stage 2 comprises of the expansion of mining operations to between 300,000tpa and 600,000tpa of ore. Stage 2 is aimed at delivering a large full-scale processing plant capable of delivering 50,000 tpa to 75,000 tpa of high grade (97% C+) graphite

---

<sup>4</sup> Refer to ASX Announcement dated 5 February 2018 "Concept study drilling completed, intersects additional wide shallow zones of graphite at Caula" inclusive of all the JORC Tables listed in the Appendix.

concentrate as well as the integrated construction of a full-scale vanadium concentrate processing plant capable of producing refined vanadium chemicals for the fast growing high-tech markets (e.g. battery and aerospace markets).

Preliminary considerations indicate that the vanadium processing plant could potentially deliver between 1,200 to >2,000 tpa of  $V_2O_5$  as high-purity products that will sell at significant premiums to ferro-vanadium or standard grade 98% vanadium pentoxide flake.

#### 4. Graphite and Vanadium economical potential

The Caula ores are considered to be broadly similar to ore at the nearby Balama Project of Syrah Resources (ASX:SYR). In July 2014, Syrah published the results of its vanadium scoping study.<sup>5</sup> The outcome of the study was very positive and most of the conclusions drawn have relevance to the Caula Graphite Project. The following points were noted:

- The vanadium in the ore did not report to the graphite concentrate and graphite concentrate samples were below the detection limit for vanadium analysis.
- There was strong correlation between graphite and vanadium grades in the ore.
- Vanadium could be recovered to a concentrate by a combination of froth flotation and wet high intensity magnetic separation (WHIMS). These are well established processing methods commonly applied in the mining and minerals industry.
- A vanadium chemicals plant could be sourced from China where there is extensive experience with vanadium extraction from graphitic and carbonaceous ores.

During the last year, the supply and demand picture for vanadium has changed dramatically. Depending on the vanadium price and graphite basket price, Stage 1 of the development process is estimated to produce more revenue than the total all-in costs for the processing plant within the first 12 months of production. Furthermore, during Stage 2, with a hypothetical ore grade of 0.4%  $V_2O_5$ , a 600,000tpa mining operation could produce >2,000tpa of  $V_2O_5$  (98% and 99%+ purity vanadium pentoxide chemicals) with a current market value of >US\$ 60 million p.a.<sup>6</sup>

Worldwide, the major use of vanadium is as an alloying agent in full alloy and high strength low alloy steels. China has recently increased the minimum specification for reinforcing steel used in buildings and as a result, domestic vanadium consumption is expected to increase by 10,000 tonnes per year (Metal Bulletin, August 2017). The vanadium market has already experienced a structural shift, changing China from being a net exporter of vanadium to becoming a net importer of vanadium. The use of vanadium in vanadium redox flow batteries (VRFB batteries), used for large scale energy storage is set to drive a further increase in demand. Consequently, vanadium supplies have tightened and the price of vanadium has increased sharply over the last two years to current levels of ~US\$30,500/tonne, making it the best performing battery metal of 2017<sup>7</sup>.

For and on behalf of the Company.



Dr. Bernard Olivier  
**Managing Director**

<sup>5</sup> Refer to Syrah Resources' ASX Announcement dated 30 July 2014 "Vanadium Scoping Study Finalised"

<sup>6</sup> Based on 13 March 2018 pricing of US\$13.9/lb (US\$30,500/tonne) for 98% Vanadium pentoxide delivered in China. Source: vanadiumprice.com

<sup>7</sup> "Best performing battery metal of the year isn't cobalt", Mark Burton. Bloomberg. January 26, 2018

**FOR FURTHER INFORMATION, PLEASE CONTACT:**

**Managing Director:**  
**Bernard Olivier**  
[bernard@mustangresources.com.au](mailto:bernard@mustangresources.com.au)  
**+61 (0) 4 08948 182**  
**+27 (66) 4702 979**

**Media & Investor Relations:**  
**Paul Armstrong**  
[paul@readcorporate.com.au](mailto:paul@readcorporate.com.au)  
**+61 (0) 8 9388 147**

**FORWARD-LOOKING STATEMENTS:**

This document may include forward-looking statements. Forward-looking statements include, but are not necessarily limited to the Company's planned exploration program and other statements that are not historic facts. When used in this document, words such as "could", "plan", "estimate", "expect", "intend", "may", "potential", "should" and similar expressions are forward-looking statements. Although the Company considers that its expectations reflected in these statements are reasonable, such statements involve risks and uncertainties, and no assurance can be given that actual results will be consistent with these forward-looking statements.

**COMPETENT PERSON STATEMENT:**

Information in this report that relates to the Caula Graphite Project's Exploration Targets, Exploration Results, Mineral Resources or Ore Reserves is based on information compiled by Johan Erasmus, a Competent Person who is a registered member of the South African Council for Natural Scientific Professions (SACNASP), which is a Recognised Professional Organisation (RPO) included in a list posted on the ASX website. Mr Erasmus is an independent consultant who was engaged by the company to undertake this work. Mr Erasmus has sufficient experience, which is relevant to the style of mineralisation and type of deposit under consideration and to the activity, which he is undertaking to qualify as a Competent Person as defined by the 2012 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves. Mr Erasmus consents to the inclusion of the data in the form and context in which it appears.

Mustang confirms that it is not aware of any new information or data that materially affects the information included in the original market announcements referenced throughout this announcement and that all material assumptions and technical parameters underpinning the estimates in the relevant market announcement continue to apply and have not materially changed. Mustang confirms that the form and context in which the Competent Person's findings are presented have not been materially modified from the original market announcement.