

# PATHWAY TO COMMERCIALISATION

# HIGH PURITY FLAKE GRAPHITE FOR NEW TECHNOLOGIES

The Australian Graphite Conference

27 April, 2017 Perth, Western Australia



### **Outline**

## Focus on Prefeasibility Study – this is our springboard to increasing shareholder value

- The Customer
  - Focus on Product Development & Marketing Strategy
- 2. Our Assets
  - The McIntosh Flake Graphite Project Description
- 3. Next Steps
  - PFS
  - Opportunities to enhance value
  - DFS
- 4. McIntosh Project Strengths/Opportunities/Threats/Weakness
- 5. Hexagon Corporate Snapshot
- 6. Key milestones on the Path to generate success for shareholders
- 7. Important Notices



## The Customer (starting at the end of the Path);

#### **McIntosh Flake Graphite Concentrate**

#### **Product Spec's**

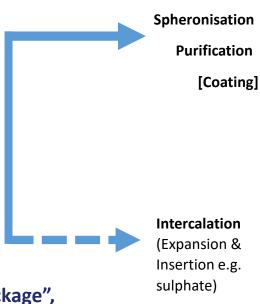
- 1. 98% total graphitic carbon<sup>1</sup>
- 2. No notable deleterious elements
- Excellent flake morphology
- 4. Maximum Reversible Capacity of ~370 mAh/g −across the entire flake size range.
- 5. Conductivity: 99.82-126.8 (Ω.cm)<sup>-1</sup>

Promising for the battery, expandable & graphene markets

<sup>1.</sup> TGC assay by double LOI method

McIntosh flake Concentrate; the "complete package", ultra pure, high-grade with peak electrical properties from simple, clean, onsite processing.

Stage 1 Processing (Concentrate production)



#### **Technical aspects-include:**

- Spheronisation Yield
- Spherical size distribution
- Surface quality
- Crystallinity
- Electrical properties

#### **Battery Industry**

HXG Aim – 99.99% spherical graphite product.

(for Li-ion Battery production)

#### **Technical aspects-include:**

- Expansion ratio
- Flake size/thickness
- Crystallinity

### **Expandable Graphite**

**Manufacturing** 

HXG Aim: High purity, med-large flake expanded Graphite.

(for high-performance gaskets, conductive fillers, electrical shielding)

**TARGET- End-User Customer** 

Stage 2 Processing (Intermediate Customer)



c. 10 – 20 X Value Uplift

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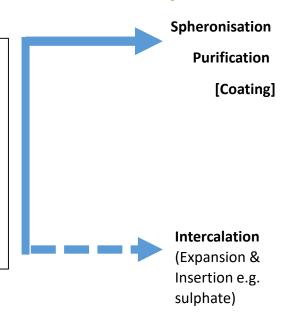
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Bulk sample currently in preparation enables HXG to

undertake this testwork starting in early June 2017.

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- Spherical size distribution
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**Stage 1 Processing** 

(Concentrate production)

**Stage 2 Processing** (Intermediate Customer)

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The quality of HXG's flake concentrate enables it to develop its marketing strategy focused on the rapidly expanding battery sector but also look to diversify its exposure to premium segments of the expandable graphite sector as well.

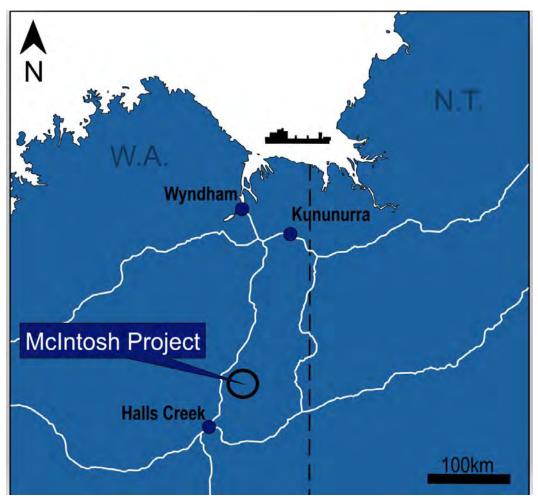
## Start at the end of the Path; the Customer

## Hexagon is targeting a premium product by:

- Extending a "marketing network" of qualified, connected, incentivised people across China, Europe, the USA and the Gulf States; Actually recruiting for a Marketing/Commercial Mgr to coordinate—see me!
- Developing a marketing strategy that recognises the battery sector growth potential with diversification to the high-end industrial, expandable graphite sector;
- Progressing testwork for spherical and expandable graphite which will include advanced and extensive cell analysis and testing, similar to Tier 1 battery manufacturers. HXG is working with an Australian based battery material expert and a European based battery manufacturing expert to achieve this "fast-track process";
- Likely focus is on 99.99% spherical graphite (uncoated) and high-purity, expandable applications; and
- Secondary processing testwork on the 100kg sample (in prep.) is planned to commence in early June, 2017 (first results July-Aug) and will be part of a Definitive Feasibility Study (DFS) process. Spheronisation testwork facility already engaged.



## Australia - the start of the Path.....



## McIntosh Flake Graphite Project - is well located "politically" & geographically:

- Western Australia is ranked 3<sup>rd</sup> on the Fraser Institute's (FI) 2016 global Investment Attractiveness Index.
- Western Australia is in the top ten for FI's Policy Perception Index.
- Customers are attracted by "supply" from stable, reputable countries with good environmental practices.
- Project & Port access is well positioned to key customer groups – gateway to Asia and shipping routes to Europe, Middle East and USA.



## Geology & Resources.....

JORC Classification	Tonnes (Mt)	TGC (%)	Contained Graphite (kt)
Indicated	12.4	4.5%	555
Inferred	8.5	4.5%	389
Total	20.9	4.5%	941

ASX Report 15 February, 2017; Cut-off is 3%TGC and rounding errors may occur.

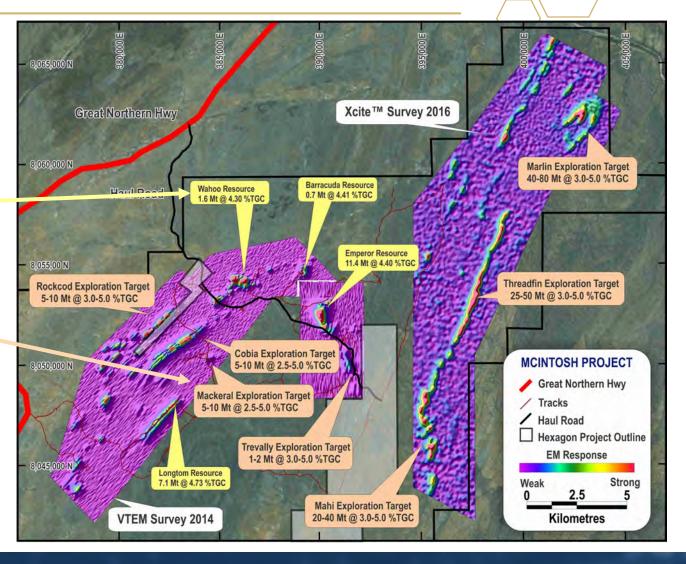
### **Exploration Target (additional to JORC Resources)**

Prospect	Tonnage Range	Grade Range	
	(Mt)	TGC (%)	
Total	110 - 220	2.5 – 5.0	

ASX Report 12 April, 2017

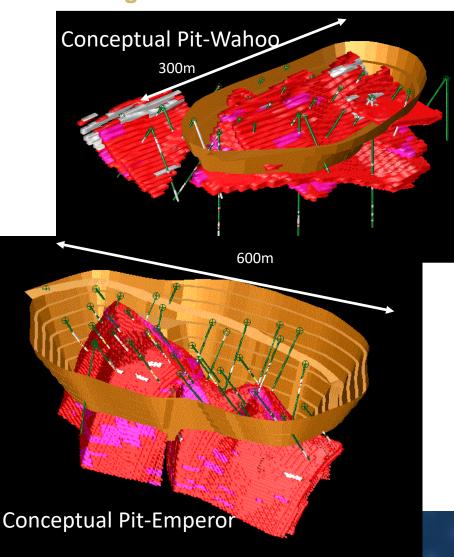
- Excellent correlation between EM "highs" and drilled mineralisation.
- Drilling has excellent potential to increase existing resources and convert "targets" into resources.

**Cautionary Statement:** The potential quantity and grade of the Exploration Targets is conceptual in nature, there has been insufficient exploration work to estimate a mineral resource and it is uncertain if further exploration will result in defining a mineral resource.





## Mining outline



## Mining:

- Simple open-cut mine methods planned;
- Planned production rate of 1.2 to 2.4mtpa; and
- Multiple pits provides operational flexibility to access ore and manage waste movements.

Pit optimisation, design and mine scheduling work is in progress for the

pre-feasibility study.

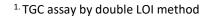
Gentle-undulating terrain with outcropping graphite mineralisation.



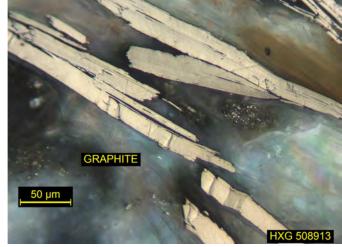
## **Processing - metallurgy**

## **Flake Concentrate testwork – key findings:**

- Consistent +98% TGC¹ concentrate produced without acid purification.
- Graphite recovery of c.+90% (93 to 95% in testwork).
- Mass pull of 4-5% into concentrate.
- No notable deleterious elements in flake concentrate ultra high purity.
- Excellent electrical properties across the entire flake size range (blended basis) ie no screening of graphite required to remove non-responsive flake sizes:
  - ✓ Reversible Capacity: ~370mAh/g\*(within experimental error of theoretical capacity)
  - ✓ Conductivity: 99.83 to 126.80 (Ω.cm)<sup>-1</sup>





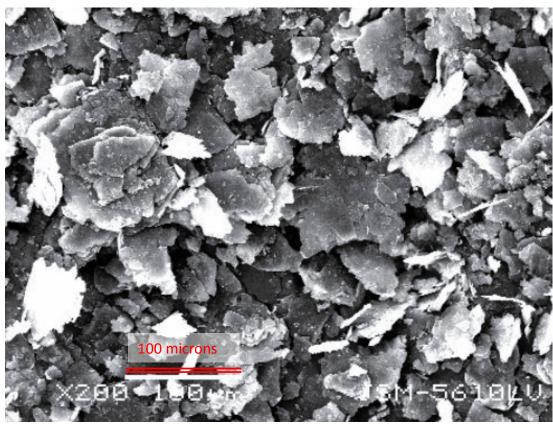




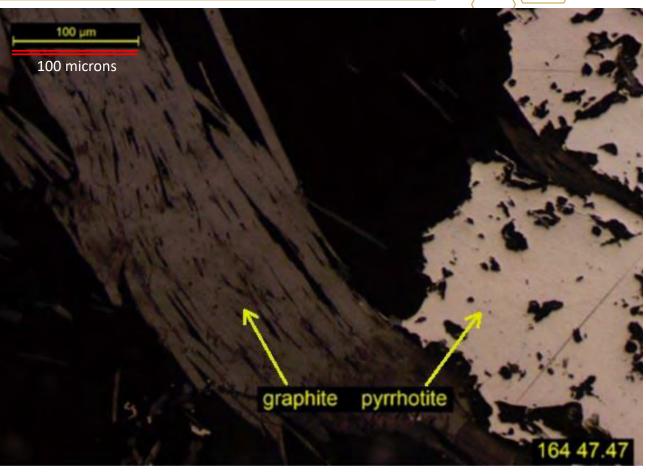


<sup>\*</sup>Industry Target is >360 mAh/g and theoretical capacity is 372 mAh/g.

## **Processing - metallurgy**



SEM image of +99% TC Flake graphite concentrate produced by simple flotation testwork. (from Emperor deposit).



Photomicrograph of Super Jumbo Flake from DDH 164 from 47.47m downhole. The image highlights highly crystalline graphite and lack of impurities within the flake.



## **Processing - metallurgy**





## Testwork aimed at battery market (in progress):

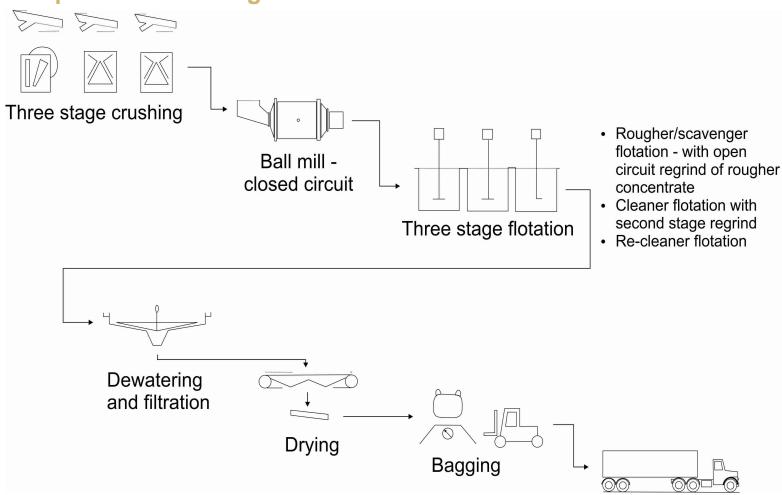
- Complete piloting of 2.5t bulk sample to create c. 100kg of high purity flake concentrate (due 26 May 2017).
- Spheronisation testwork in China starting early June 2017 (First results in July/August).

## Followed by

- Purification testwork-looking at a new, fast thermal process.
- HXG is working with battery material and battery design experts in Australia and Europe. We plan to tailor HXG product to specific customer's needs.
- HXG has achieved excellent outcomes related to graphene and has initiated expanded graphite work.



## **Proposed Processing Plant**



## **Proposed Process Plant for PFS**

- Rate: 1.2 to 2.4 mtpa processed
- Product c. 55 to 110kt of concentrate pa
- Design:
  - ✓ ALS Minerals processing testwork;
  - ✓ End user focussed product specification; and
  - ✓ Simple scalable process plant by engineer, Scope Australia (Perth)



## **Processing - metallurgy**

## **Flake Concentrate testwork – key findings:**

- McIntosh flake Concentrate; the "complete package", ultra pure, high-grade with peak electrical properties from simple, clean, onsite processing;
- Spherical graphite for batteries needs to be between 5 and 50 microns ie large flakes need to be ground down ("micronised") to meet this size specification; and
- High purity flake concentrate means less energy and chemicals (acids) to achieve purity specifications.

Initial testwork indicates – HXG graphite flake concentrate is highly promising for Li-ion batteries and high-end expandable sector.









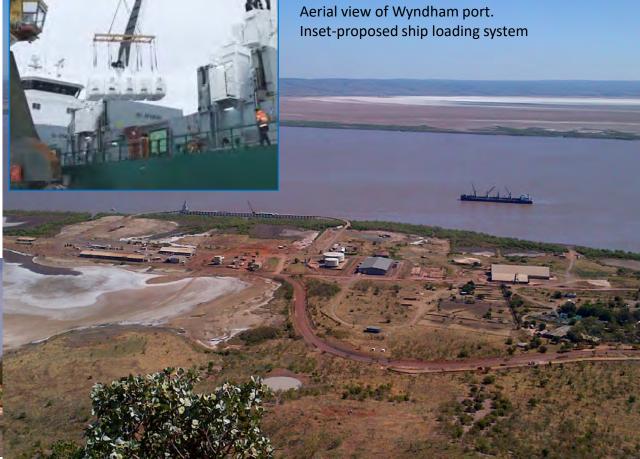


## Easy access to an established product logistics solution

## **Close to existing infrastructure:**

- Internal project haulage road linking key deposits;
- 14km from plant site to regional highway;
- 295km to Wyndham Port via sealed all weather Highway; and
- Support services from regional towns & airports –
   Kununurra, Halls Creek & Broome.









Review – Strengths, Weaknesses, Opportunities & Threats

### **STRENGTHS**

- Ultra pure concentrate
- High grade concentrate +98%
- Excellent electrical properties
- Diverse end user; batteries and expandables
- Simple flotation concentration
- Multi-open pit operation planned
- Local logistics infrastructure
- Scale; +50 year project life potential
- Location Australian jurisdiction

## **OPPORTUNITIES**

- Ore Sorting
- Downstream Processing-value add
- Large Scale resource potential
- Increasing graphite demand for tech applications

## **WEAKNESSES**

 Test work and studies are still in progress

#### **THREATS**

 Supply side uncertainties in flake graphite market.



## **Review - Opportunities**

### 1. Ore Sorting:

- a. Preliminary results indicated mineralised intervals can be divided into:
  - Low Density Conductive graphite stream;
  - Low Density Non Conductive silica and waste stream; and
  - High Density Conductive sulphides and pyroxene (waste stream).
- b. The opportunity is to:
  - Reduce scale of processing equipment ie capital investment;
  - Reduce operating costs and improve processing efficiency; and
  - Reduce downstream effects e.g. acidification of tailings by rejecting high-sulphide material prior to grinding.

## 2. Downstream Processing

- a. Spheronisation & purification (battery market).
- b. Intercalation (for expandable graphite market).
- c. The opportunity is to benefit directly from the high quality McIntosh flake concentrate with reduced downstream costs and gain the value-add margin by selling premium product.

### 3. Resource expansion

a. Verify the 50+ year potential project life indicated by Exploration Target estimate to attract and retain customers.





## **Corporate Snapshot – Hexagon Resources Limited (ASX:HXG)**

Shares on Issue	246.3M
Options on issue (unlisted)	20.7M
Share price (24/4/17)	A\$0.15
Market Capitalisation	A\$37.0M
Top Twenty	43.4%
Cash (31/3/17)	A\$2.0M
Investments (2M BMR shares)	A\$1.3M*

<sup>\*</sup> BMR currently raising funds at US\$0.5/share

## **Top 5 Shareholders**

HSBC CUSTODY NOMINEES (AUSTRALIA) LIMITED	14,211,090	5.768%
CITICORP NOMINEES PTY LIMITED	10,506,503	4.265%
INVESTORLINK GROUP LIMITED	9,219,777	3.742%
FORSYTH BARR CUSTODIANS LTD <forsyth barr="" ltd-nominee<="" td=""><td></td><td></td></forsyth>		
A/C>	8,624,646	3.501%
J P MORGAN NOMINEES AUSTRALIA LIMITED	7,111,115	2.886%

#### **Directors:**

Neville Miles (Chairman), Mike Rosenstreich (MD)
Charles Whitfield, Gary Plowright & Tony Cormack (NEDS)





## **Next steps on the Path**

## 1. Deliver PFS late May 2017, demonstrating:

 High grade, high purity flake graphite concentrate production, ie a viable, Australian graphite project.

## 2. Management & Board changes

- New MD, and further board & management strengthening, more commercial and marketing focus
  to commercialise project; and
- Injected more technical processing skills, study manager and new graphite marketing relationships.

## 3. Off-take & Financing

- Varied discussions in progress (incomplete & preliminary)
- Will ramp up as PFS and then DFS outcomes emerge.

## 4. Feasibility Study

- Plan for fast transition some DFS work already started;
- Anticipate 6 month feasibility study time line.

Plan to run as much Feasibility, financing and product marketing work in parallel as possible





#### Mike Rosenstreich

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## **Important Notices**



## **Competent Person**

The information within this report that relates to exploration results, Exploration Target Estimates, geological data and Mineral Resources at the McIntosh Project is based on information compiled by Mr Shane Tomlinson and Mr Mike Rosenstreich who are both employees of the Company. Mr Rosenstreich is a Fellow of The Australasian Institute of Mining and Metallurgy and Mr Tomlinson is a Member of the Australian Institute of Geoscientists. They both, individually have sufficient experience relevant to the styles of mineralisation and types of deposits under consideration and to the activities currently being undertaken to qualify as a Competent Person(s) as defined in the 2012 edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves and they consent to the inclusion of this information in the form and context in which it appears in this report.

### **Technical Detail**

This Report aims to provide a high level summary of various technical aspects of the Company's projects. For more details on the underlying technical parameters the reader is referred to the ASX Reports on the Hexagon Resources Limited website, www.hexagonresources.com.

## **Forward-Looking Statements**

This document includes forward-looking statements. Forward-looking statements include, but are not limited to, statements concerning Hexagon Resources Limited's planned development and exploration programmes and other statements that are not historical facts. When used in this document, the words such as "could," "plan," "estimate," "expect," "intend," "may," "potential," "should," and similar expressions are forward-looking statements. Although Hexagon Resources Ltd believes that its expectations reflected in these forward-looking 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.

