



# Panda Hill Niobium Project

January 2014

# ASX Capital Structure

---

|                       |                    |
|-----------------------|--------------------|
| <b>Issued Shares*</b> | <b>128,675,017</b> |
|-----------------------|--------------------|

|                                      |           |
|--------------------------------------|-----------|
| Unlisted options (May 2016 at 26.7c) | 7,687,500 |
|--------------------------------------|-----------|

|                                        |            |
|----------------------------------------|------------|
| Listed options (January 2015 at 26.7c) | 15,962,506 |
|----------------------------------------|------------|

|                      |                   |
|----------------------|-------------------|
| <b>Total Options</b> | <b>23,650,006</b> |
|----------------------|-------------------|

\* Included in Issued Shares is 37,500,000 performance shares:

- Half subject to the completion of a scoping study
- Half subject to completion of a definitive feasibility study which demonstrates an NPV 10 of US\$400 million or greater.

# Project Ownership

---

- Cradle owns 50% of the Panda Hill Project with management control
- Cradle has an option to purchase the remaining 50% before March 2017
- The option exercise price is ~US\$14 million\*, of which US\$9 million is payable in cash and US\$5 million in shares or capped royalty.

\* The precise option exercise price is US\$17.1m less 25% of project expenditure by Cradle during the option period. The estimated likely deduction is ~US\$3.1m. An instalment of US\$500,000 is payable within 2 years.

# What is Niobium?

Niobium (Nb) is used as an alloy to make steel harder  
Nb steel is known as high strength, low alloy steel (HSLA)

## Niobium Properties:

- Strengthens steel and lightens
- Corrosive resistant properties
- High temperature tolerance

## Main growth industries:

- Automotive
- Construction
- Pipelines

A “critical and strategic metal” US Geological Survey



Millau Viaduct, France



Oresund Bridge, Sweden

# Niobium Demand

---

- HSLA is a well known, commonly used steel product:
  - About 20% of steel produced in developed countries is HSLA
  - Compared to about 10% of steel in developing countries
- Solid demand growth is expected over the next six years (~30%)
- Growth in Nb demand is a combination of:
  - General growth in steel volumes
  - Potential for increased proportion of HSLA steel in developing countries (trend to higher quality products)
- Total annual demand of ~ 90,000 tpa FeNb (~\$2.2 billion pa)

# Niobium Supply

---

- Only three existing producers (CBMM, IAMGOLD, Anglo American)
- No new producers since 1976, even though market has grown several fold
- Limited suppliers result in highly stable Nb prices
- Panda Hill will initially add 3.3% to annual supply
- No greenfields supply under construction, no other projects appear likely to be developed
- Undeveloped Niobium deposits are characterised by low grade or difficult metallurgy

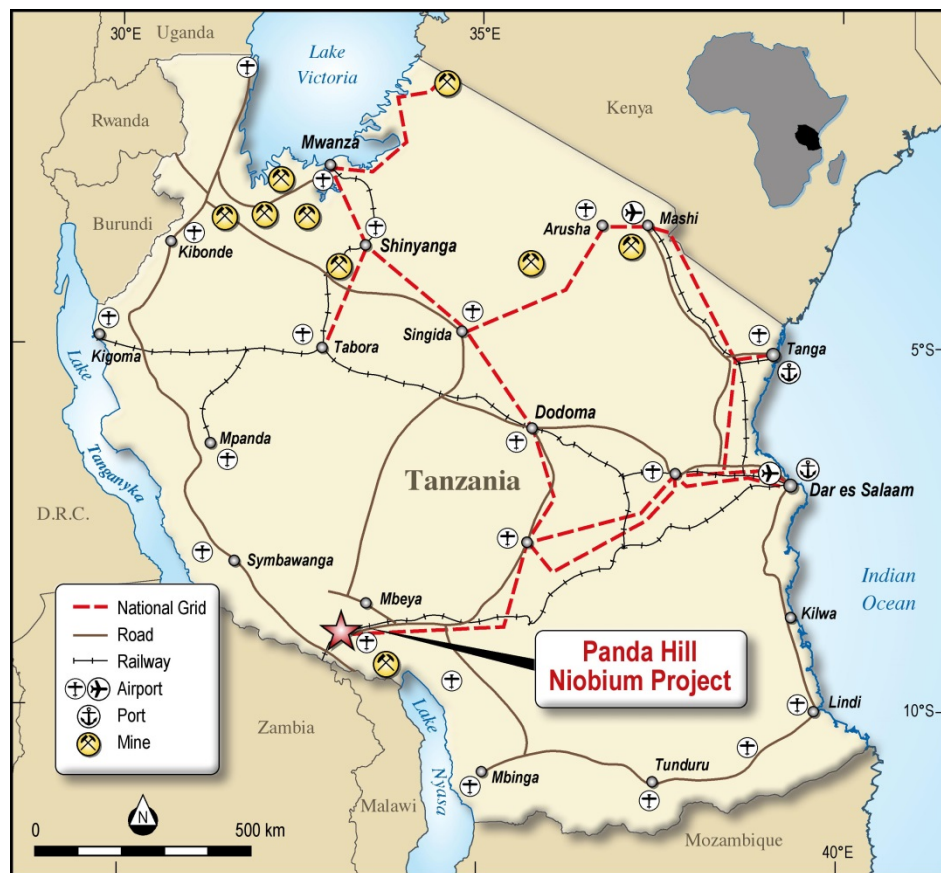


# Panda Hill Niobium Project

- Located in Mbeya region, Tanzania
- Excellent local infrastructure (grid power, roads, rail)
- 98 holes drilled 1950 – 1990s
- 13 confirmatory holes drilled 2013



Panda Hill, Mbeya



# 2013 Updated JORC Inferred Resource

---

**82 Mt at 0.52% Nb<sub>2</sub>O<sub>5</sub>** (at 0.30% cut-off)

- Resource verified and increased by recent in-fill drilling program
- Resource estimated by Coffey Mining, independent mining consultants
- Includes a weathered cap – 11 Mt at 0.80% Nb<sub>2</sub>O<sub>5</sub>
- Resource is open at depth and to the south
- 40 years mine life at planned throughput
- Open cut, less than 1:1 strip ratio



# Niobium Extraction Process

---

**Well known, simple extraction process similar to base metals**

- Two stage flotation to produce a concentrate (~50% Nb<sub>2</sub>O<sub>5</sub>)
- Then a converter to produce FeNb (~66% Nb)
- This process is used by all existing Niobium producers
- FeNb is marketed directly to steel mills as a direct feed
- Initial metallurgical test work is positive
- Targeting 65% recovery (or 75% recovery post de-sliming)

# Scoping Study

---

## **Scoping study will be completed in January 2014**

- Base case - 2 Mtpa operation
- Most study items will be to pre-feasibility level
- Resource update and mining study (Coffey)
- Metallurgical test work (SGS Lakefield)
- Capital and operating costs estimates (Lycopodium)
- Social and environmental plan (MTL)
- Being driven by an experienced owners team

# Project Metrics

---

## **Panda Hill is a robust project**

From work completed, the scoping study is expected to demonstrate:

- First 10 years mine life > 0.7% Nb<sub>2</sub>O<sub>5</sub>
- Low cash costs/high margin operation
- Short payback period
- Capital cost ~ US\$190M for 2 Mtpa throughout
- Long mine life

# Niobec – Case Study

---

Niobec is an existing Nb producer (a subsidiary of IAMGOLD, TSX listed)

- A 2m tpa underground operation located in Canada
- Same flow sheet as Panda Hill, except underground mining
- Characterised by solid earnings and a stable metal price

| Year | Nb Price<br>US\$ | EBITDA<br>US\$ | Head grade<br>Nb <sub>2</sub> O <sub>5</sub> |
|------|------------------|----------------|----------------------------------------------|
| 2008 | \$34/kg          | \$79m          | 0.62%                                        |
| 2009 | \$37/kg          | \$86m          | 0.61%                                        |
| 2010 | \$37/kg          | \$79m          | 0.61%                                        |
| 2011 | \$39/kg          | \$68m          | 0.57%                                        |
| 2012 | \$41/kg          | \$72m          | 0.55%                                        |

Note: Extracted from Annual Reports of IAMGOLD Limited (rounded)









# Estimated Cost to DFS

---

|                         |                  |
|-------------------------|------------------|
| Drilling Program        | US\$4.0M         |
| Metallurgical Test work | US\$2.2M         |
| ESIA                    | US\$0.7M         |
| Engineering             | US\$1.5M         |
| Corporate               | US\$1.6M         |
| <b>Total</b>            | <b>US\$10.0M</b> |

**PFS completed in 3<sup>rd</sup> Quarter 2014 ~US\$6M**

# Planning Schedule - PFS

| Project Activities                       | Q1 2014                                                                             | Q2 2014                                                                             | Q3 2014                                                                             | Q4 2014 |
|------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------|
| <b>Prefeasibility Study</b>              |   |                                                                                     |                                                                                     |         |
| Project Planning / Contracting           |   |                                                                                     |                                                                                     |         |
| Resource / Infill Drilling               |                                                                                     |  |                                                                                     |         |
| Mineral Resource / Mining                |                                                                                     |                                                                                     |  |         |
| Metallurgical Testwork                   |  |                                                                                     |                                                                                     |         |
| Preliminary Engineering                  |                                                                                     |  |                                                                                     |         |
| Environmental & Social Impact Assessment |                                                                                     |  |                                                                                     |         |
| Reporting                                |                                                                                     |                                                                                     |  |         |
|                                          |                                                                                     |                                                                                     |                                                                                     |         |



# Production Scenario's- PFS

---

| Scenario     | Production                        | Metric                                                                                                                               | Description                                                                                 |
|--------------|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| Initial Plan | 2 Mtpa                            | <ul style="list-style-type: none"><li>- Base case capital</li><li>- Base case OPEX</li><li>- Base case production</li></ul>          | Optimised pit shell with all capital committed upfront for final expected production output |
| Modular Plan | 1 Mtpa with expansion to 2.3 Mtpa | <ul style="list-style-type: none"><li>- Significant reduced upfront capital (~ US\$100M with modular expansion capability)</li></ul> | Lower capital cost, softer entrance to niobium market with production upside after year 3   |

# Planning Schedule - DFS

| Project Activities                       | Q4 2014 | Q1 2015 | Q2 2015 | Q3 2015 | Q4 2015 |
|------------------------------------------|---------|---------|---------|---------|---------|
| <b>Definitive Feasibility Study</b>      |         |         |         |         |         |
| Project Planning / Contracting           |         |         |         |         |         |
| Infill Drilling                          |         |         |         |         |         |
| Resource Definition                      |         |         |         |         |         |
| Mining / Reserve Definition              |         |         |         |         |         |
| Piloting Testwork                        |         |         |         |         |         |
| Basic Engineering                        |         |         |         |         |         |
| Environmental & Social Impact Assessment |         |         |         |         |         |
| Reporting                                |         |         |         |         |         |
|                                          |         |         |         |         |         |

# Project Summary

---

- **Scoping study complete in January 2014**
- **Main focus of PFS:**
  - Increase the confidence of the Mineral Resource Estimate
    - 15 – 20 million tons in indicated
  - Complete metallurgy development work on the primary and secondary rock types
  - Continue with ESIA baseline study
  - Scenario planning to optimise the project economics
  - Update the engineering design
- **PFS scenario planning to include a modular processing plant construction which will:**
  - Optimise and reduce upfront capital
  - Enter the niobium market responsibly – reduced niobium production in first 3 - 4 years

# Disclaimer and Competent Person

---

The summary information contained herein has been provided by Cradle Resources (“Cradle” or the “Company”). No representation, express or implied, or warranty as to the accuracy or completeness of the information contained herein is made by any party and nothing contained herein is or shall be relied upon as a promise or representation as to the future. In all cases, recipients should conduct their own investigation and analysis of Cradle.

The information contained within is only for distribution to the direct recipient and is not to be released to any third parties

All statements, trend analysis and other information contained in this document related to markets for Cradle, trends in revenue, gross margin and anticipated expense levels, as well as other statements about anticipated future events or results, constitute forward-looking statements. Forward-looking statements often, but not always, are identified by the use of words such as ‘seek’, ‘anticipate’, ‘believe’, ‘plan’, ‘estimate’, ‘expect’, ‘intend’, ‘forecast’, ‘project’, ‘likely’, ‘potential’, ‘target’ and ‘possible’ and statements that an event or result ‘may’, ‘will’, ‘would’, ‘should’, ‘could’ or ‘might’ occur or be achieved and other similar expressions. Forward-looking statements are subject to known and unknown business and economic risks and uncertainties and other factors that could cause actual results of operations to differ materially from those expressed or implied by the forward-looking statements. Forward-looking statements are based on estimates and opinions of management at the date the statements are made.

Cradle does not undertake any obligation to update forward-looking statements even if circumstances or management’s estimates or opinions should change. For the reasons set forth above, investors should not place undue reliance on forward-looking statements.

The reported Resources that relate to the Panda Hill Niobium Deposit are based on information compiled by Ms Ellen Maidens, who is the Competent Person for the Mineral Resource and 2013 Exploration Data. Ms Maidens is a Member of the Australian Institute of Geologists and is a full-time employee of Coffey Mining. Ms Maidens has sufficient experience, relevant to the style of mineralisation and type of deposit under consideration and to the activity which is being undertaken, to qualify as Competent Person as defined in the 2012 edition of the “Australasian Code for Reporting of Mineral Resources and Reserves”.

The full resource statement is available on the Cradle website: [www.cradleresources.com.au](http://www.cradleresources.com.au)

The information in this document that relates to the Panda Hill Geology and Exploration Data is based on information compiled by Mr Neil Inwood, who is a Fellow of the Australasian Institute of Mining and Metallurgy and a Member of the Australian Institute of Geoscientists. Mr Inwood is a full time employee of Verona Capital and 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 in the 2012 edition of the “Australasian Code for Reporting of Mineral Resources and Reserves”. Mr Inwood has consented to the inclusion of this information in this document in the form and context in which it appears.



## Appendix

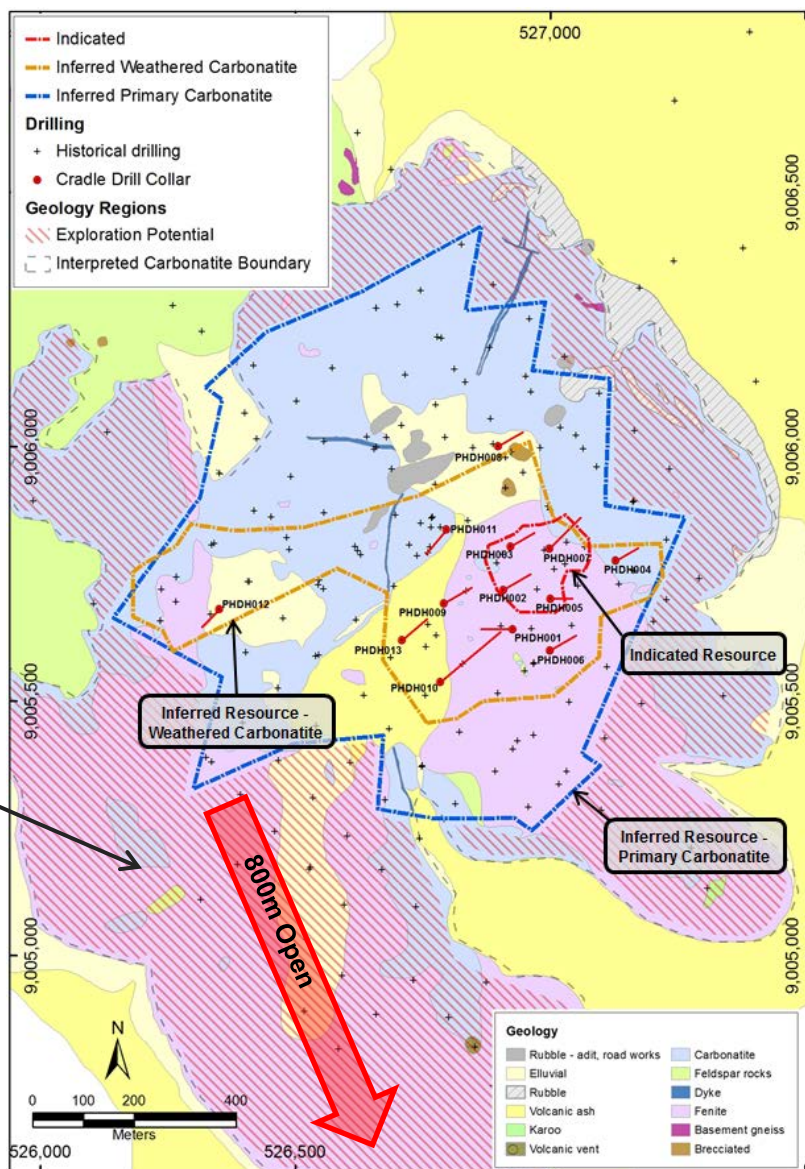
# 2013 Updated JORC Resource by Coffey Mining

| 2013 Panda Hill 2013 Resource – Reported Above a 0.3% Nb <sub>2</sub> O <sub>5</sub> Lower Cut-off^ |                |                                  |                                             |
|-----------------------------------------------------------------------------------------------------|----------------|----------------------------------|---------------------------------------------|
| Combined                                                                                            |                |                                  |                                             |
| Lower Cut-off (Nb <sub>2</sub> O <sub>5</sub> %)                                                    | Million Tonnes | Nb <sub>2</sub> O <sub>5</sub> % | Nb <sub>2</sub> O <sub>5</sub> Content (KT) |
| Indicated                                                                                           | 5.4            | 0.62                             | 33                                          |
| Inferred                                                                                            | 76.4           | 0.51                             | 390                                         |
| <b>Total</b>                                                                                        | <b>81.8</b>    | <b>0.52</b>                      | <b>423</b>                                  |
| Weathered Carbonatite                                                                               |                |                                  |                                             |
| Lower Cut-off (Nb <sub>2</sub> O <sub>5</sub> %)                                                    | Million Tonnes | Nb <sub>2</sub> O <sub>5</sub> % | Nb <sub>2</sub> O <sub>5</sub> Content (KT) |
| Indicated                                                                                           | 2.1            | 0.77                             | 16                                          |
| Inferred                                                                                            | 8.6            | 0.81                             | 69                                          |
| <b>Total</b>                                                                                        | <b>10.7</b>    | <b>0.80</b>                      | <b>86</b>                                   |
| Primary Carbonatite                                                                                 |                |                                  |                                             |
| Lower Cut-off (Nb <sub>2</sub> O <sub>5</sub> %)                                                    | Million Tonnes | Nb <sub>2</sub> O <sub>5</sub> % | Nb <sub>2</sub> O <sub>5</sub> Content (KT) |
| Indicated                                                                                           | 3.2            | 0.52                             | 17                                          |
| Inferred                                                                                            | 67.8           | 0.47                             | 319                                         |
| <b>Total</b>                                                                                        | <b>71.1</b>    | <b>0.47</b>                      | <b>336</b>                                  |

^Ordinary Kriged estimate using a 25mN x 25mE x 5mRL parent block.



# Resource Region and Exploration Focus



- Area to south and north poorly explored historically
- 800m trend
- 3 historical holes show mineralisation of up to 1.4%  $\text{Nb}_2\text{O}_5$
- Resource open at depth and only drilled to 90m vertically on average.

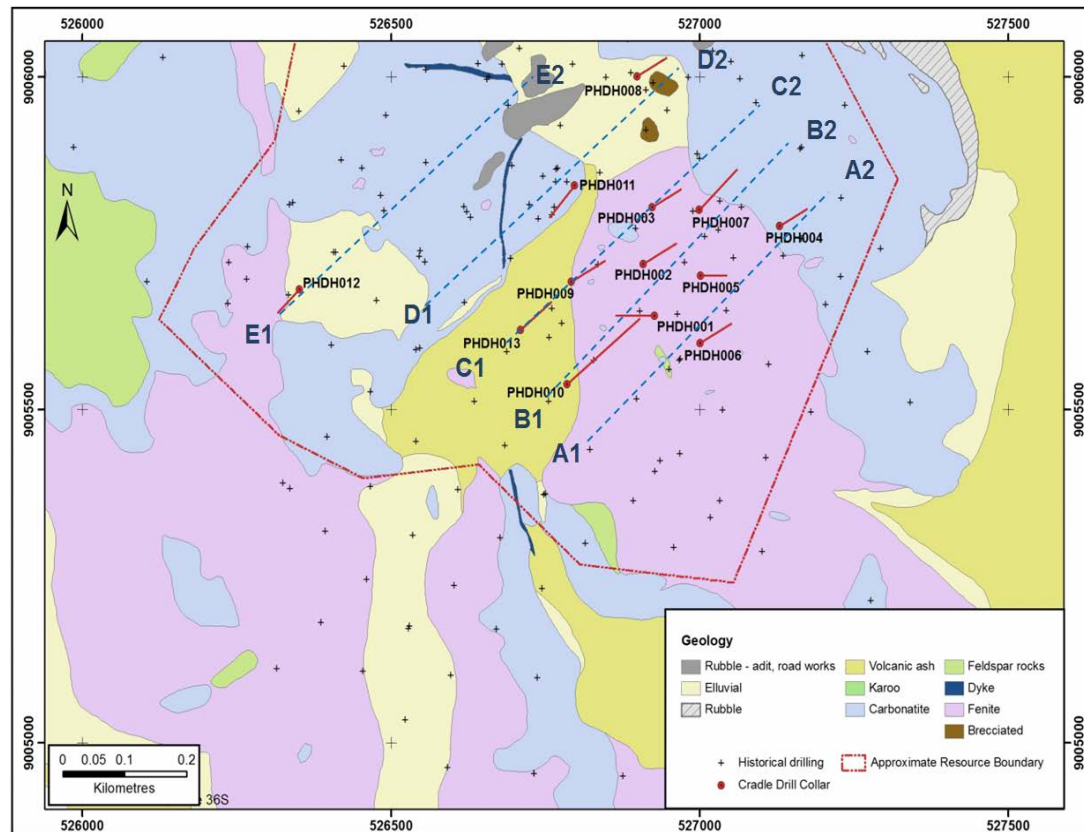
# Scoping Study

**Maturity Matrix - Panda Hill Niobium Project**

| General Project Data              | Classification             | Effective Study Level | Company                   |
|-----------------------------------|----------------------------|-----------------------|---------------------------|
| Project Scope Definition          | Preliminary                | Scoping Study         | Cradle                    |
| Facility Capacity                 | Defined                    | Pre-feasibility Study | Cradle                    |
| Plant / TSF Location              | Preliminary                | Pre-feasibility Study | Knight Peasold/Lycopodium |
| Master Schedule                   | Preliminary                | Pre-feasibility Study | Lycopodium                |
| Contracting Strategy              | Assumed                    | Scoping Study         | Cradle                    |
| Geology, Resource & Mining        | Classification             | Effective Study Level | Company                   |
| Mineral Resource Estimate         | 90:10 Inferred : Indicated | Scoping Study         | Coffey                    |
| Mining                            | Preliminary                | Scoping Study         | Coffey                    |
| Engineering                       | Classification             | Effective Study Level | Company                   |
| Metallurgical Testwork            | Preliminary                | Pre-feasibility Study | SGS                       |
| Block Flow Diagrams               | Defined                    | Pre-feasibility Study | Lycopodium                |
| Process Design Criteria           | Preliminary                | Pre-feasibility Study | Lycopodium                |
| Equipment List                    | Preliminary                | Scoping Study         | Lycopodium                |
| Infrastructure                    | Preliminary                | Pre-feasibility Study | Knight Peasold/Lycopodium |
| General Arrangement Drawings      | Preliminary                | Scoping Study         | Lycopodium                |
| Capital & Operating Cost Estimate | +35% -20%                  | Pre-feasibility Study | Lycopodium                |
| Environmental (ESIA)              | In Progress                | Pre-feasibility Study | MTL                       |

# Assay Results Confirm Historical Drilling

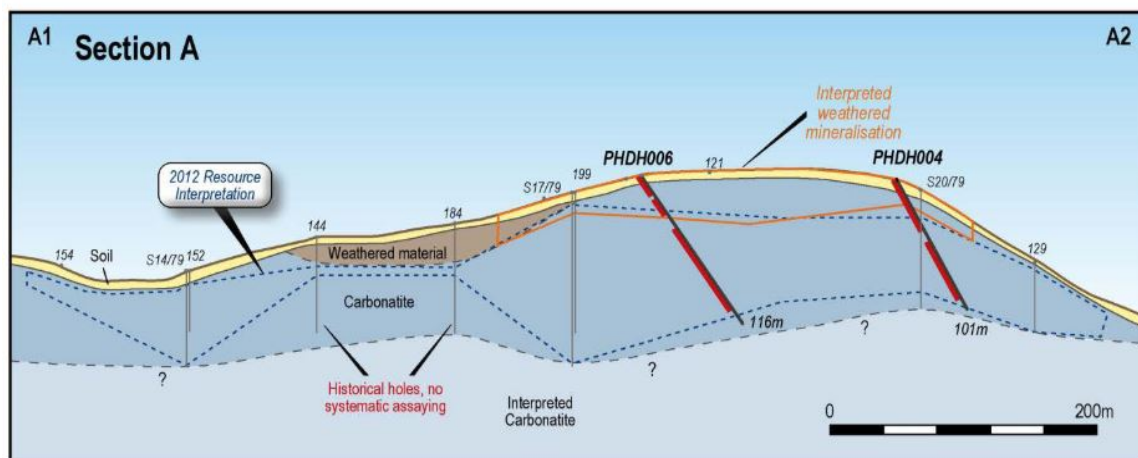
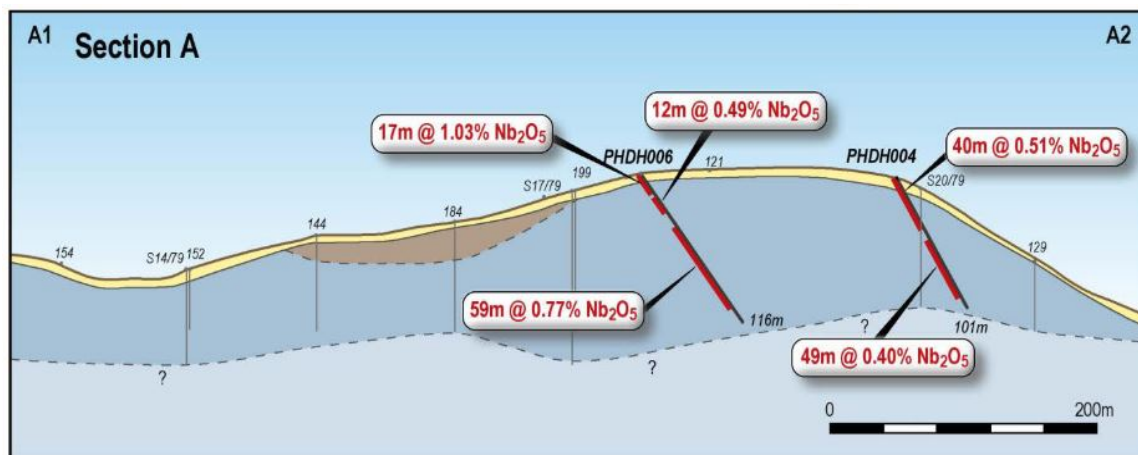
- Pervasive mineralisation, open at depth and along strike
- High-grade zones identified
- Boundaries of mineralisation extended



# Assay Result – Section A

- PHDH004\* :
  - 40m @ 0.51% Nb<sub>2</sub>O<sub>5</sub>  
(3.2g/t Au equivalent<sup>1</sup>)
  - 49m @ 0.4% Nb<sub>2</sub>O<sub>5</sub>  
(2.5 g/t Au equivalent<sup>1</sup>)
- PHDH006\* :
  - 59m @ 0.77% Nb<sub>2</sub>O<sub>5</sub>  
(4.7g/t Au equivalent<sup>1</sup>)
  - 17m @ 1.03% Nb<sub>2</sub>O<sub>5</sub>  
(6.3 g/t Au equivalent<sup>1</sup>)

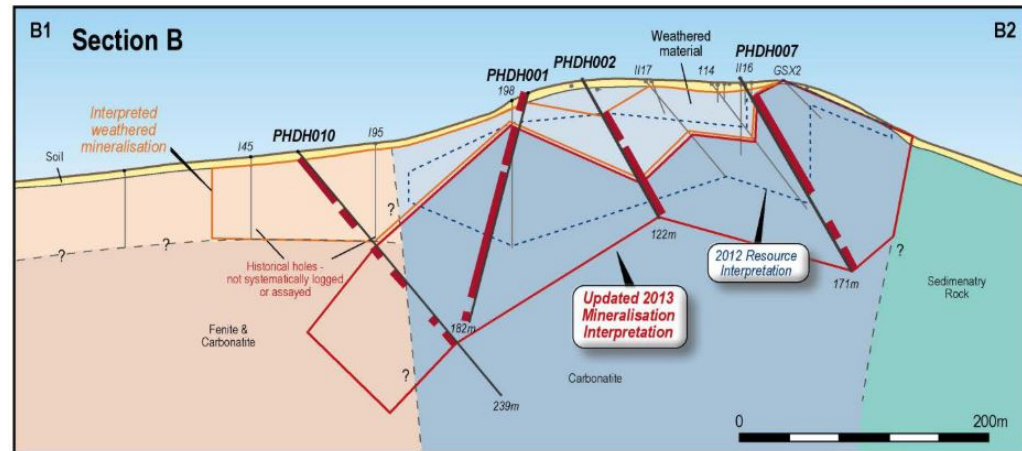
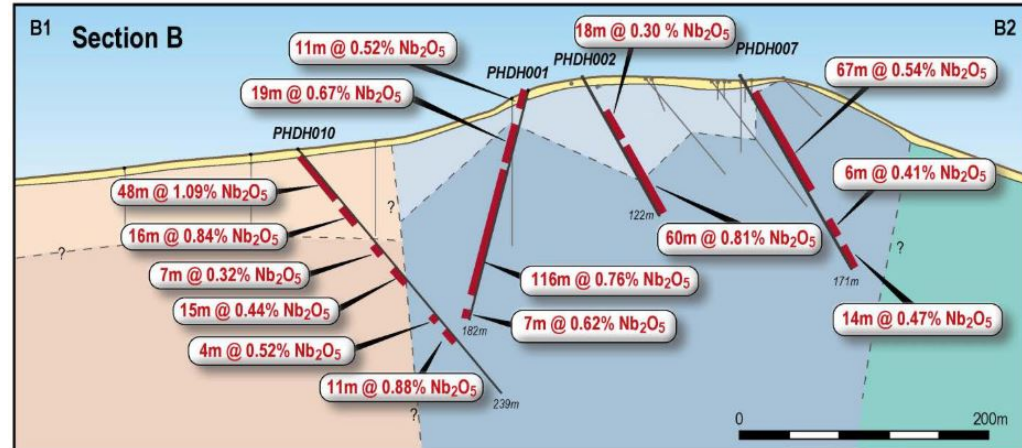
\*Note: <sup>1</sup> Au equivalent grades have been based upon a Au spot price of US\$1390/Oz and an Nb price of \$40/kg. This has been shown to illustrate Nb<sub>2</sub>O<sub>5</sub> grade data relative to a more traditional commodity only and is not meant to indicate the presence of Au. No recovery factors have been applied.





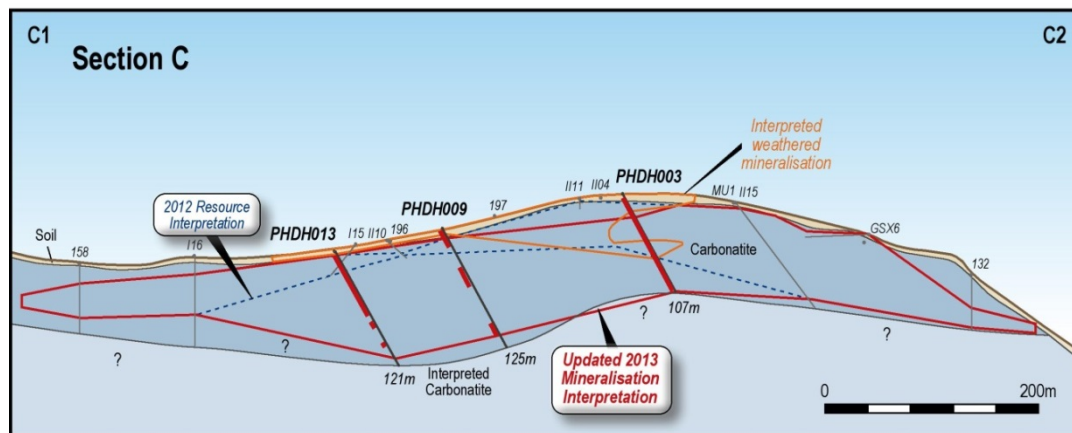
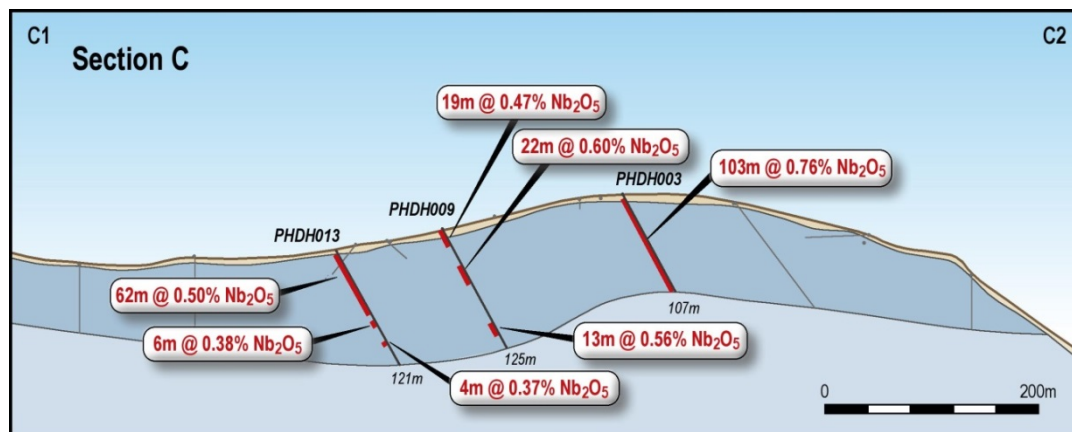
# Assay Result – Section B

- PHDH001\* :
  - 116m @ 0.76% Nb<sub>2</sub>O<sub>5</sub>  
(4.5g/t Au equivalent<sup>1</sup>)
- PHDH002\* :
  - 60m @ 0.81% Nb<sub>2</sub>O<sub>5</sub>  
(5g/t Au equivalent<sup>1</sup>)
- PHDH007\* :
  - 67m @ 0.54% Nb<sub>2</sub>O<sub>5</sub>  
(3.4g/t Au equivalent<sup>1</sup>)
- PHDH010\* :
  - 48m @ 1.09% Nb<sub>2</sub>O<sub>5</sub>  
(6.8g/t Au equivalent<sup>1</sup>)
  - 16m @ 0.84% Nb<sub>2</sub>O<sub>5</sub>  
(5.2g/t Au equivalent<sup>1</sup>)
  - 11m @ 0.88% Nb<sub>2</sub>O<sub>5</sub>  
(5.5g/t Au equivalent<sup>1</sup>)



# Assay Result – Section C

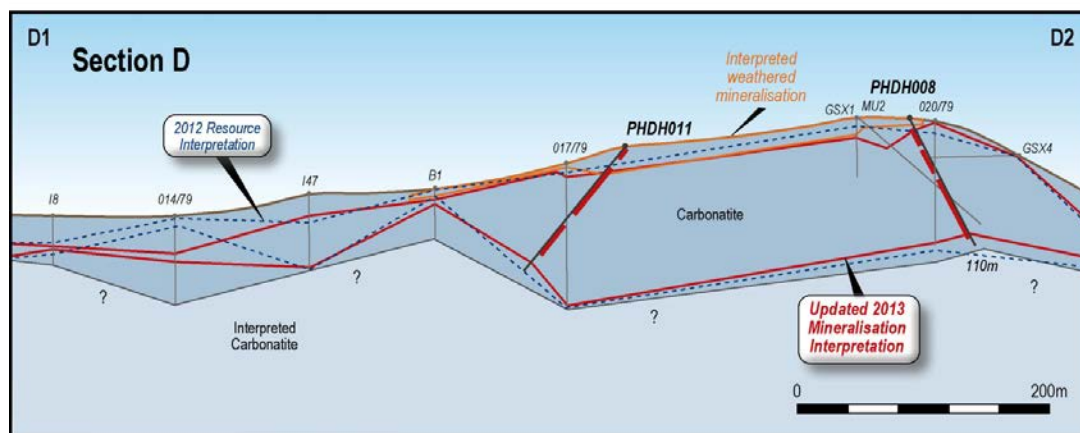
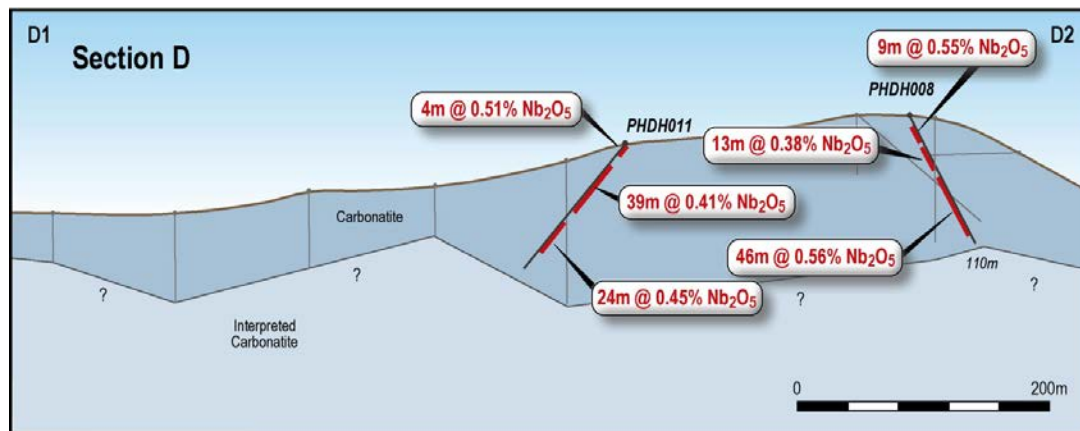
- PDHD003\* :
  - 103m @ 0.76% Nb<sub>2</sub>O<sub>5</sub>  
(4.5g/t Au equivalent<sup>1</sup>)
- PDHD009\* :
  - 22m @ 0.60% Nb<sub>2</sub>O<sub>5</sub>  
(3.7g/t Au equivalent<sup>1</sup>)
- PDHD013\* :
  - 62m @ 0.50% Nb<sub>2</sub>O<sub>5</sub>  
(3.1g/t Au equivalent<sup>1</sup>)





# Assay Result – Section D

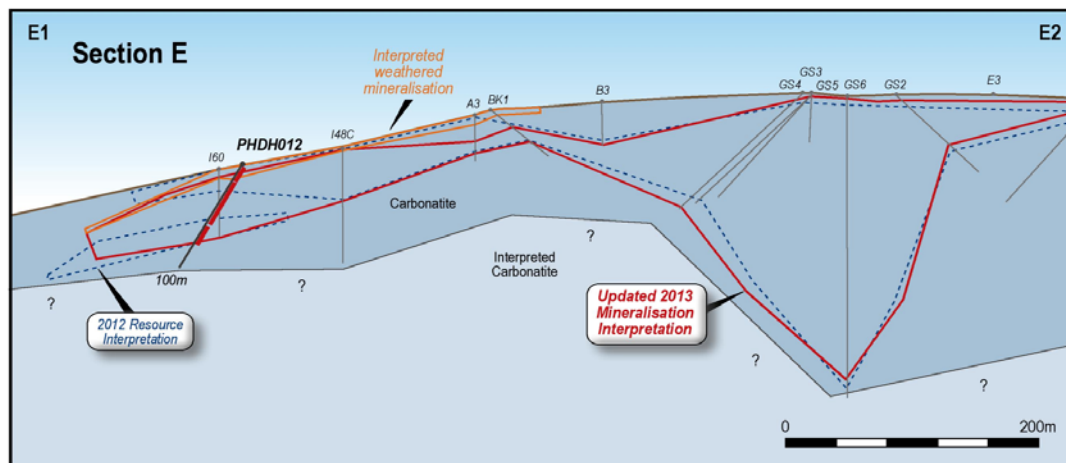
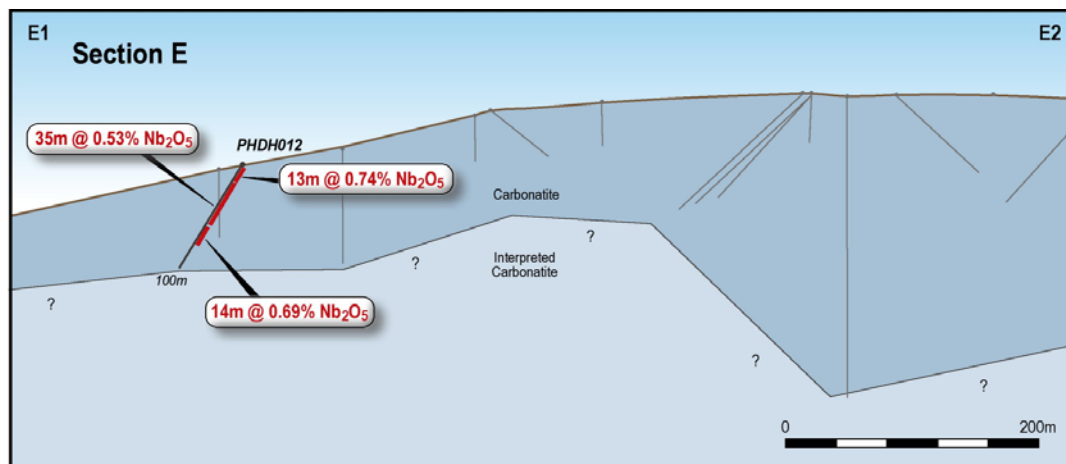
- PDHD008\* :
  - 46m @ 0.56% Nb<sub>2</sub>O<sub>5</sub>  
(3.5g/t Au equivalent<sup>1</sup>)
- PDHD011\* :
  - 39m @ 0.41% Nb<sub>2</sub>O<sub>5</sub>  
(2.5g/t Au equivalent<sup>1</sup>)
  - 24m @ 0.45% Nb<sub>2</sub>O<sub>5</sub>  
(2.8g/t Au equivalent<sup>1</sup>)



# Assay Result – Section E

## ➤ PDHD012\* :

- 13m @ 0.74% Nb<sub>2</sub>O<sub>5</sub>  
(4.6g/t Au equivalent<sup>1</sup>)
- 35m @ 0.53% Nb<sub>2</sub>O<sub>5</sub>  
(3.3g/t Au equivalent<sup>1</sup>)
- 14m @ 0.69% Nb<sub>2</sub>O<sub>5</sub>  
(4.3g/t Au equivalent<sup>1</sup>)





For additional information contact:

Grant Davey  
Managing Director  
[admin@cradleresources.com.au](mailto:admin@cradleresources.com.au)  
+61 8 9389 2000