



# VRXSILICA

## Silica Sand

### *Essential to World Growth*



SUSTAINABLE  
DEVELOPMENT

GOALS



## AGM November 2024

ersonal use only



# Important Information

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## Compliance Statement

The information in this document that relates to the estimation and reporting of the Mineral Resources and Ore Reserves for the Company's silica sand projects and metallurgical testwork is extracted from releases to ASX on 28 August 2019 and 11 November 2022 (Arrowsmith North), 17 September 2019 (Arrowsmith Central), 9 May 2023 (Arrowsmith Brand), 18 October 2019 (Mucnea) and 18 August 2022 (Boyatup). The Company confirms that it is not aware of any new information or data that materially affects the information included in this document and all material assumptions and technical parameters underpinning the estimates continue to apply and have not materially changed.

# Silica Sand: The Second-most Consumed Material on Earth







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# The world is facing a global sand supply crisis

News ▾ Middle East Documentaries ▾ Shows ▾ Investigations

FEATURE / BUSINESS & ECONOMY

## Running out of sand: in numbers

*We illustrate the depletion of one the world's most sought-after commodities of the 21st century: sand.*

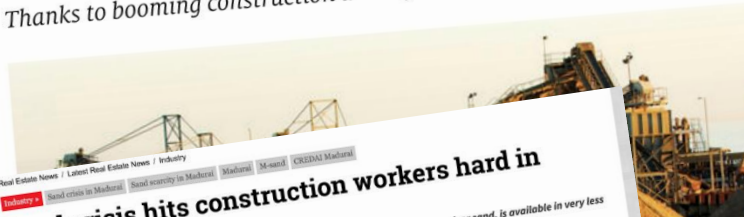
### Demand for sand leads to global ecological crisis

by Alexandra Popescu on 8 February 2018

A shore thing

## An improbable global shortage: sand

Thanks to booming construction activity in Asia, sand is in high demand



Real Estate News / Latest Real Estate News / Industry

### Sand crisis hits construction workers hard in Madurai

What has made things worse is that M-sand (manufactured sand), the alternative prescribed for river sand, is available in very less quantity and its quality is also far from desirable.

TNN | January 23, 2018, 12:00 IST

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## The world is facing a global sand crisis

September 8, 2017 6:22am AEST

Sand for use in hydraulic fracturing operations at a processing plant in Chippewa Falls, Wisconsin in 2011. AP Photo/Steve Karnowski, Author provided

When people picture sand spread across idyllic beaches and endless deserts, they understandably think of it as an infinite resource. But as we discuss in a [just-published perspective](#) in the journal Science, over-exploitation of global supplies of sand is damaging the environment, endangering communities, causing shortages and promoting violent conflict.

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## THE WORLD IS RUNNING OUT OF A RESOURCE, AND IT'S NOT OIL

A looming shortage of sand – a crucial resource once thought endless – could sink infrastructure projects, including those in China's Belt and Road Initiative

## Global Shortage of Key Resource Could Doom Key Asian Infrastructure Projects

ENVIRONMENT 03:40 07.01.2018 (updated 07:18 07.01.2018) [Get short URL](#)

6 11 0

In the city of Kampot in southern Cambodia, the extraction of sand from an estuary on the Praek Tuek Chhu river is increasing and sand extraction is so common in Asia currently that the continent may deplete all of its sand in the not-too-distant future.

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Unchecked sand mining with

## Project development pipeline to ensure disciplined, staged development of world-class assets



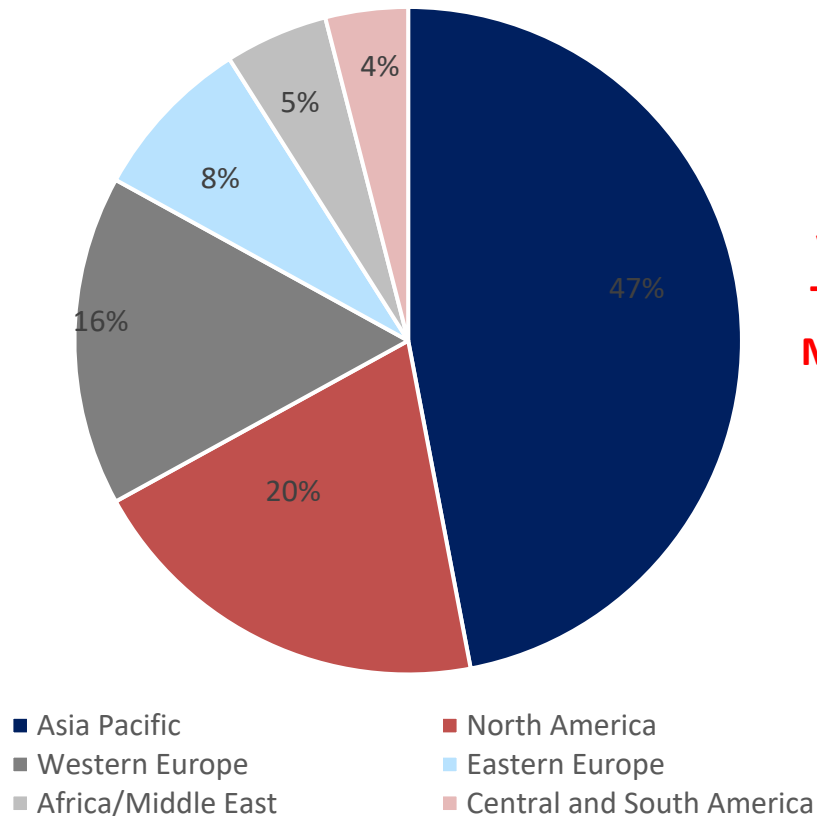
- ❑ Five very large scale, high grade and low impurity silica sand projects each project capable of independent operation to supply processed material to diverse markets
- ❑ Simple, low impact mining and processing
- ❑ Access to established infrastructure (logistics, power, water and gas)
  - rail lines to port run adjacent to all project tenements
  - gas pipelines run adjacent to each of the project areas
- ❑ Scale of projects provides long-term opportunity for silica sand export and potential glass manufacturing and downstream industries in Western Australia
- ❑ Grant of geothermal permit in the Mid West and JV with Steam Resources provides alternative energy solution

# Market Outlook

***Asian glass making production increasing 5-6% per year (~8 - 10Mtpa Growth)***

***VRX Target Market - Float, Container, Solar Panel, and;  
Metal Casting/Foundry for Automobile Parts***

Glassmaking silica sand demand by region\*



**VRX's  
Target  
Market**

Use	Spec	Market in Asia	Growth in Asia
Float (Plate) Glass	99.5% SiO <sub>2</sub>	60 - 65Mt	5% - 6%
Container Glass	99.5% SiO <sub>2</sub>	70 - 75Mt	5% - 6%
Cover Glass (Solar Panels)	99.95% SiO <sub>2</sub> & Low Fe	10 - 12Mt	+30%
Smart Glass (Ultra Clear)	99.97% SiO <sub>2</sub> & Low Fe	1 - 2Mt	5% - 6%
Specialist Glass (Thin Screen)	99.97% SiO <sub>2</sub>	500 - 600kt	+10%

\*Source: Freedonia estimate

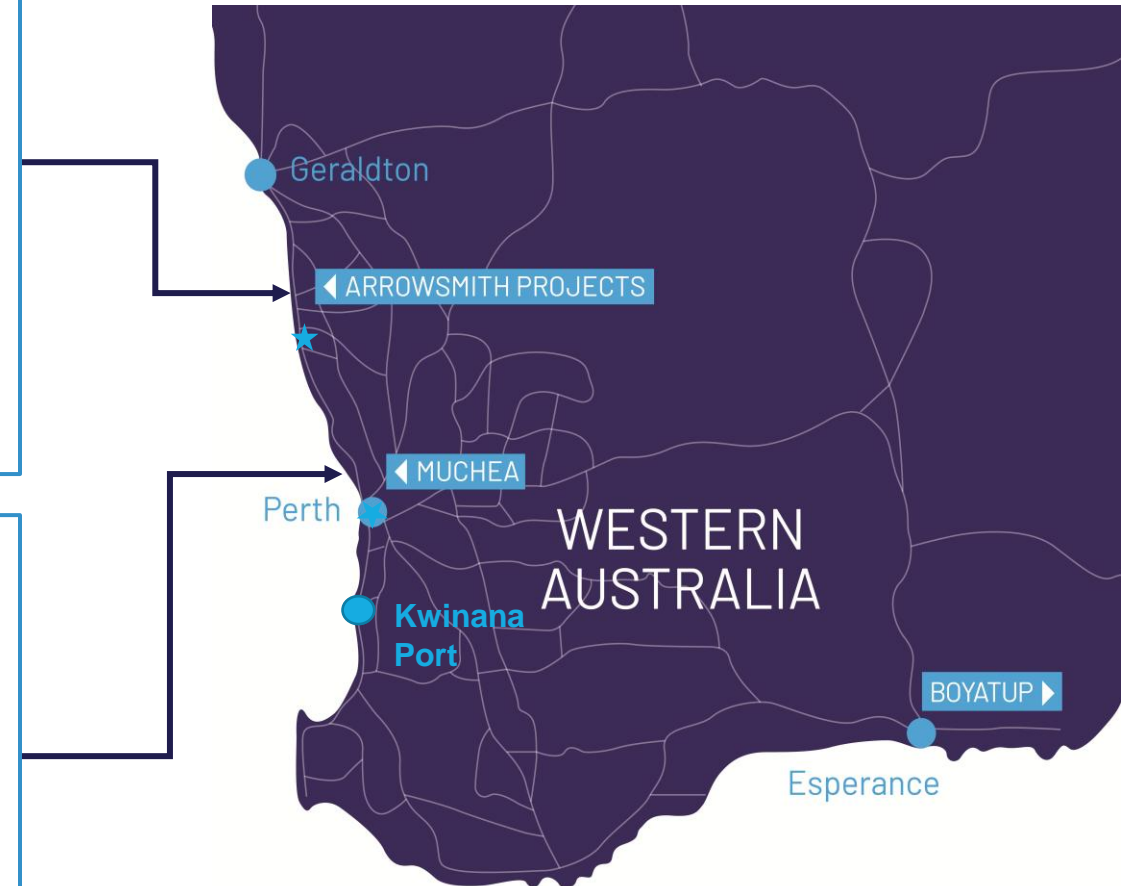


## Arrowsmith North (100%)

- High-grade with exceptional financial metrics
- Close proximity to port and rail infrastructure
- Glass making and foundry products
- Potential +100 year mine life:
  - JORC Proved and Probable Reserve of
  - **221Mt @ 99.5% SiO<sub>2</sub>**
- Updated BFS completed March 2024
- Environmental and mining approvals expected Q1 2025
- Final offtakes and financing to follow

## Muchea (100%)

- Very **high-grade** product with outstanding financial metrics
- Well located to key port and rail infrastructure
- Specialist solar panel glass products
- Potential +100 year mine life:
  - JORC Indicated and Inferred Resource
  - **208Mt @ 99.6% SiO<sub>2</sub>**
- BFS completed Oct 2019





# Arrowsmith North Silica Sand Project

Project Site

Vegetation Kwongan Heath

Loose sand/shallow root systems suitable for VDT



## **Near-term development opportunity for a world-class silica sand project**

- ❑ Production expected to commence 8-12 months following final environmental approvals
- ❑ 221Mt Ore Reserve @99.5% SiO<sub>2</sub> (100-year production) (See Reserve Table)
- ❑ Grade controlled Proved Ore Reserve 9.2Mt for first 6 years of production
- ❑ Tailored 2Mtpa processing plant with patented process circuit, revised capital estimate and DFS completed
- ❑ Access to established infrastructure –
  - ❑ Unused rail line (from Eneabba to Geraldton) runs adjacent to project tenements
  - ❑ Water from Yarragadee North deep aquifer
  - ❑ Access by adjacent Brand Highway
  - ❑ Hybrid gas and solar power supply

## Arrowsmith North Updated BFS Results

- ❑ Demonstrates robust financial metrics for a World-class silica sand project
- ❑ 221Mt Ore Reserve @99.5% SiO<sub>2</sub> (100-year production)
- ❑ Ungeared NPV<sub>10</sub> of \$167m based on 25 years mining of a +100 year Resource
- ❑ Proved and Probable Ore Reserve of 221Mt @ 99.5% SiO<sub>2</sub>
- ❑ Four products for international foundry and glassmaking industries



# Environmental and Mining Approvals

- ❑ Confirmation by Commonwealth Department of Agriculture, Water and the Environment of accredited State assessment under the EPBC Act
- ❑ State Department of Water and Environmental Regulation and Environmental Protection Authority (EPA) require a PER assessment
- ❑ Environmental Review Document (ERD) lodged in April 2022 and amended June 2022 and again February 2023 and published June 2023
- ❑ ERD Public Environmental Review period ended July 2023 and EPA provided Summary of Submissions September 2023
- ❑ VRX lodged initial Response to Submissions (RtS) October 2023 for assessment by EPA published November 2024 following year-long consultation process with EPA
- ❑ Mining Proposal and Works Approval assessed and approval subject to EPA
- ❑ Final environmental and other approvals expected Q1 2025

# Responsible Mining – the VRX Way

**A made-for-purpose mining method designed around continuous rehabilitation**

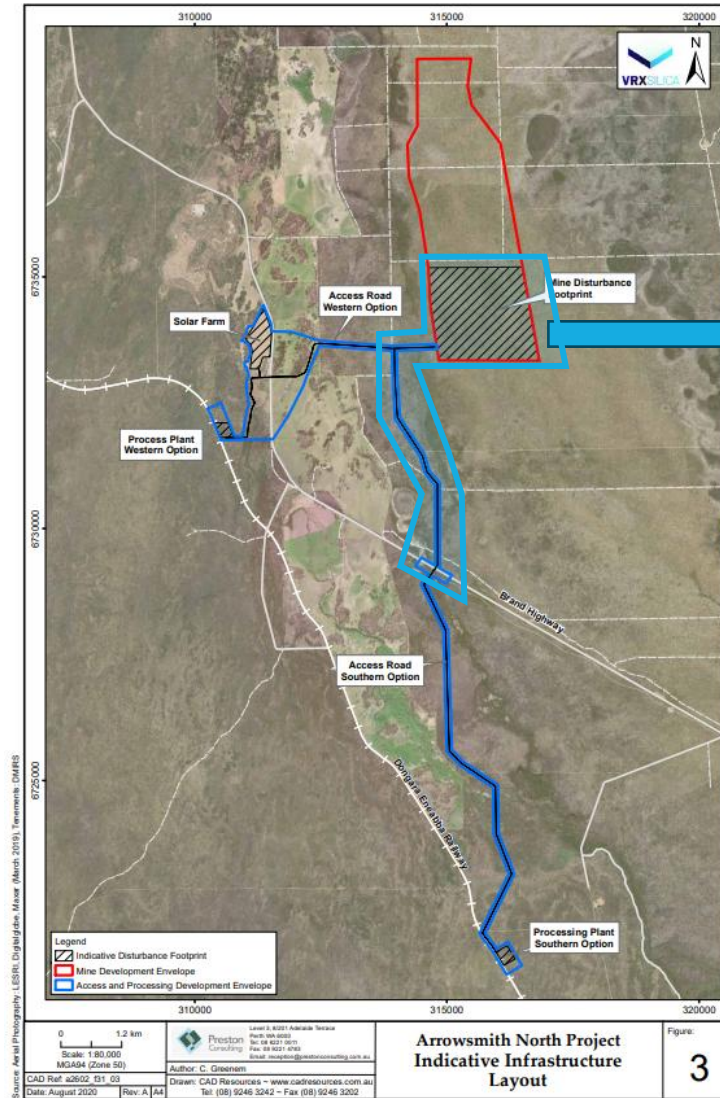
- ❑ VRX has developed a unique and progressive mining method for its silica sand projects
- ❑ The Vegetation Direct Transfer (VDT) method provides a rapid and comprehensive regeneration of mined areas based on continuous rehabilitation as mining progresses
- ❑ Removes a 400mm-deep sod with topsoil containing the vast majority of native flora and invertebrate fauna remaining intact
- ❑ Root structures in the loose sand are relatively shallow at 200-300mm in depth
- ❑ Approval granted for VDT trials at Muchea to test the practicalities of method in various vegetation types
- ❑ Modified loader bucket required for VDT fabricated and ready for use



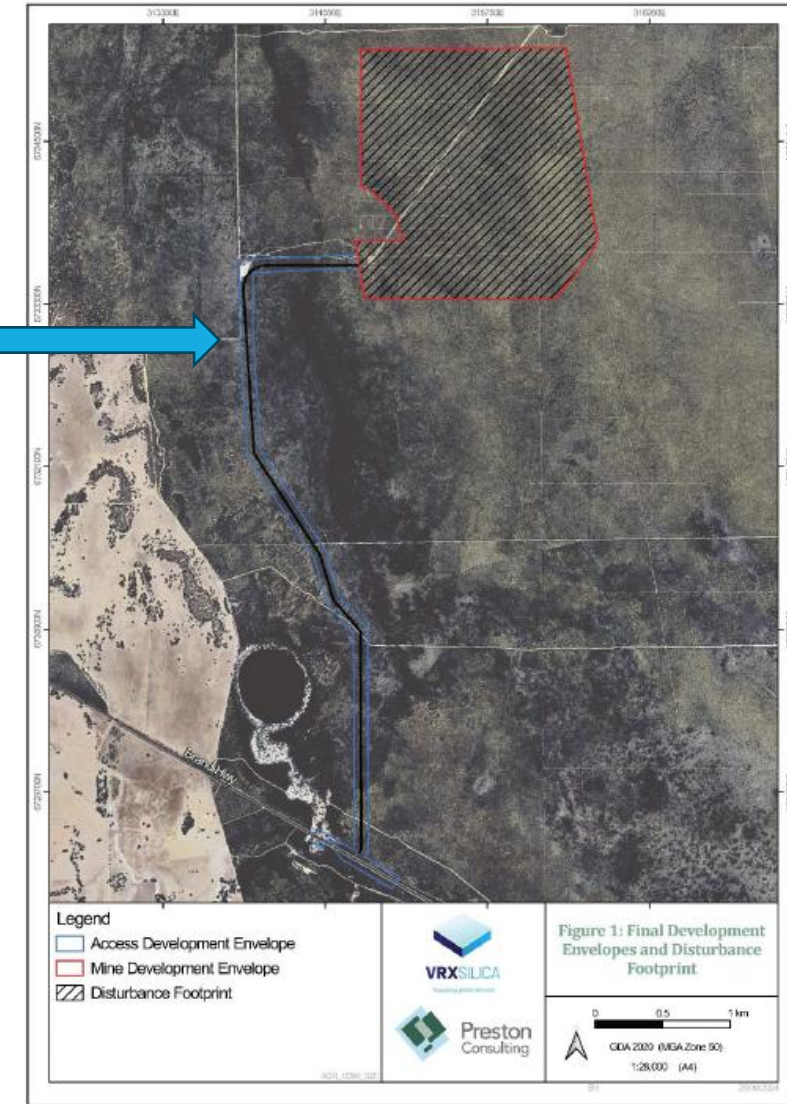


- ❑ Approved amendments since referral
- ❑ Mine development envelopes reduced from >1,000ha to 353ha
- ❑ Clearing reduced from 412.2ha to 299.1ha
- ❑ Relocation of infrastructure to within the mine area
- ❑ Redesign of access route and haulage method (rail to road)
- ❑ Reduction in onsite power generation

Original

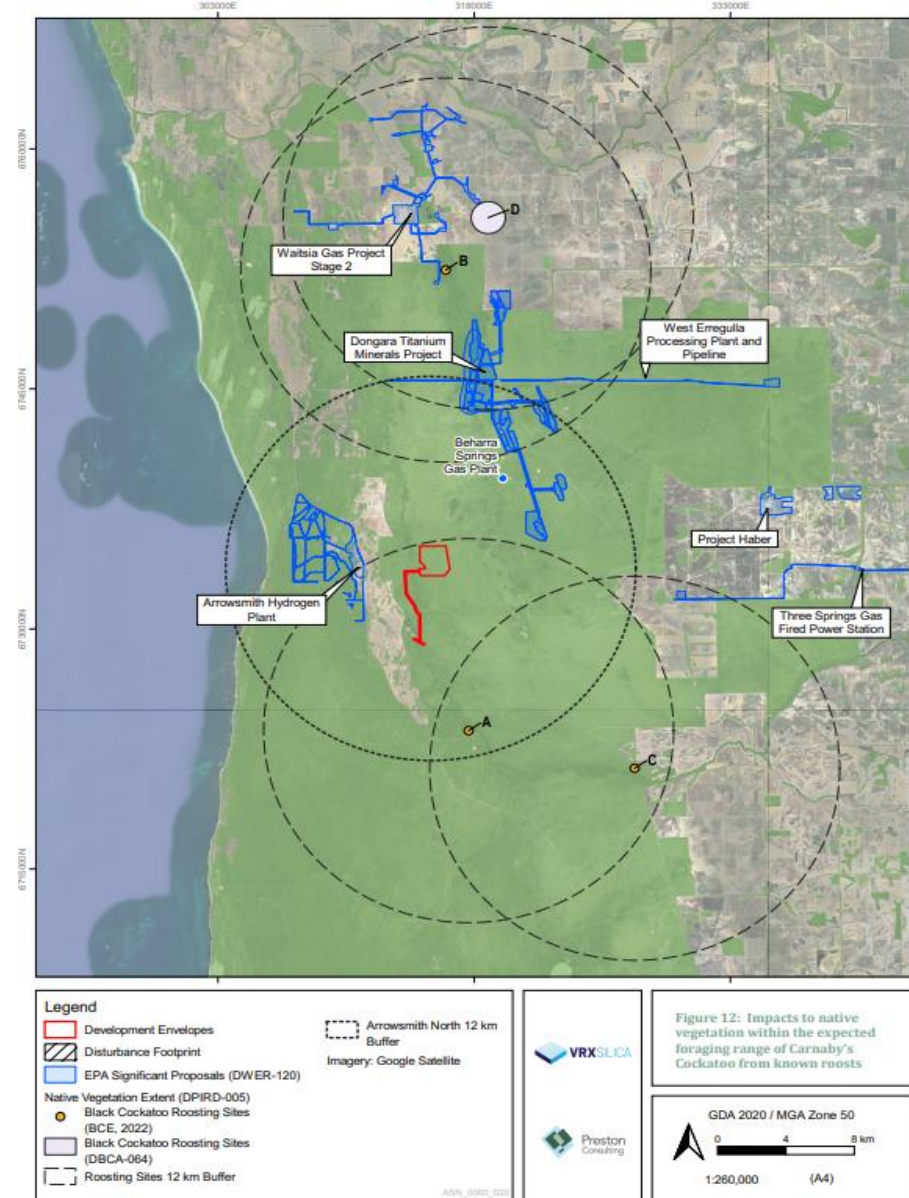


Revised



## Carnaby's Cockatoo (Endangered)

- ❑ Clearing 299.1 ha of foraging habitat.  
Avoided roosts or breeding sites
- ❑ Extent of clearing reduced significantly from original Proposal
- ❑ Impact is 0.5% of foraging habitat within 12 km, Cumulative <3%
- ❑ Access track designed to minimise vehicle strike risk (speed limited and shortest, safest route)



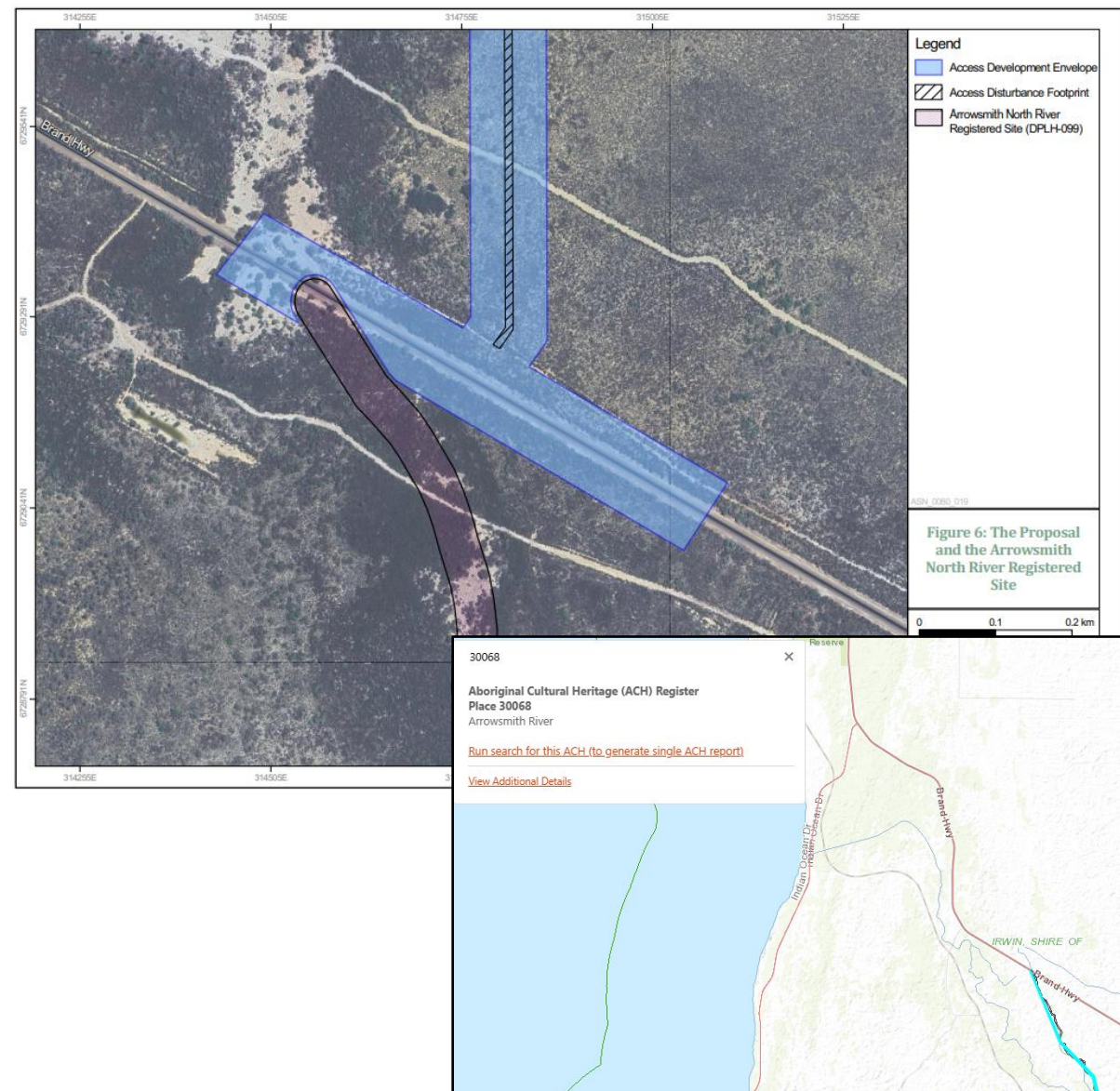




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# Environmental Approvals: Social Surroundings

- ❑ Entire site has been surveyed for Aboriginal Heritage – no sites found within current Development Envelope
- ❑ One registered Aboriginal Heritage site near the Proposal – Development Envelope amended to avoid boundary
- ❑ Arrowsmith Lake avoided – not a registered Aboriginal Heritage site
- ❑ VRX to consult with YSRC regarding monitors during clearing and undertaking rehabilitation at the Project site and offset site
- ❑ Develop a Cultural Heritage Management Plan in consultation with YSRC



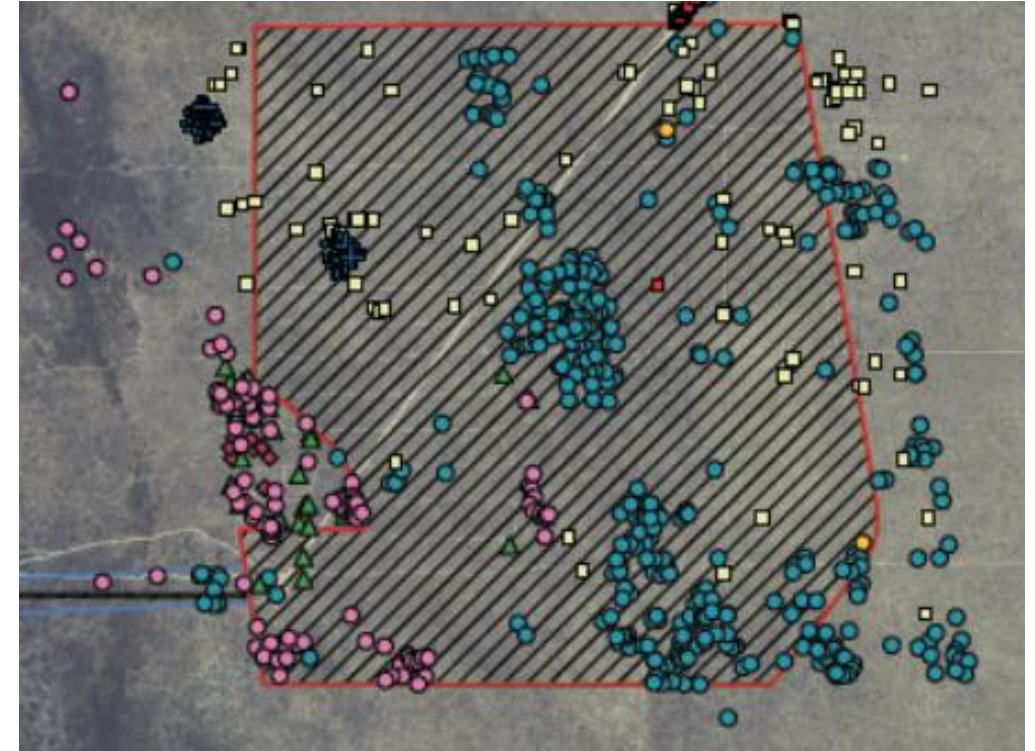
- ❑ Offsets proposed to counterbalance the medium-term loss of 299.1 ha of Carnaby's Cockatoo (CC) foraging habitat
- ❑ Two vegetated lots proposed
- ❑ Contain 958.2 ha of Excellent quality CC foraging habitat
- ❑ Area to be revegetated within previously cleared portion
- ❑ Provides connectivity to conservation estate and native vegetation





# Environmental Approvals: Avoidance and Minimisation of Impacts

- ❑ Reduce Development Envelopes from to avoid Priority Flora and Aboriginal Heritage site
- ❑ Reduced impact to Carnaby's Cockatoo foraging habitat
- ❑ “Gold Standard” VDT rehabilitation method proposed – slow, progressive clearing and direct replacement of topsoil sods
- ❑ Area fully surveyed (10 m spacing) for Sandplain Duck-orchid – no records found
- ❑ Weed and dieback hygiene controls
- ❑ All mining above water table
- ❑ No chemical processing

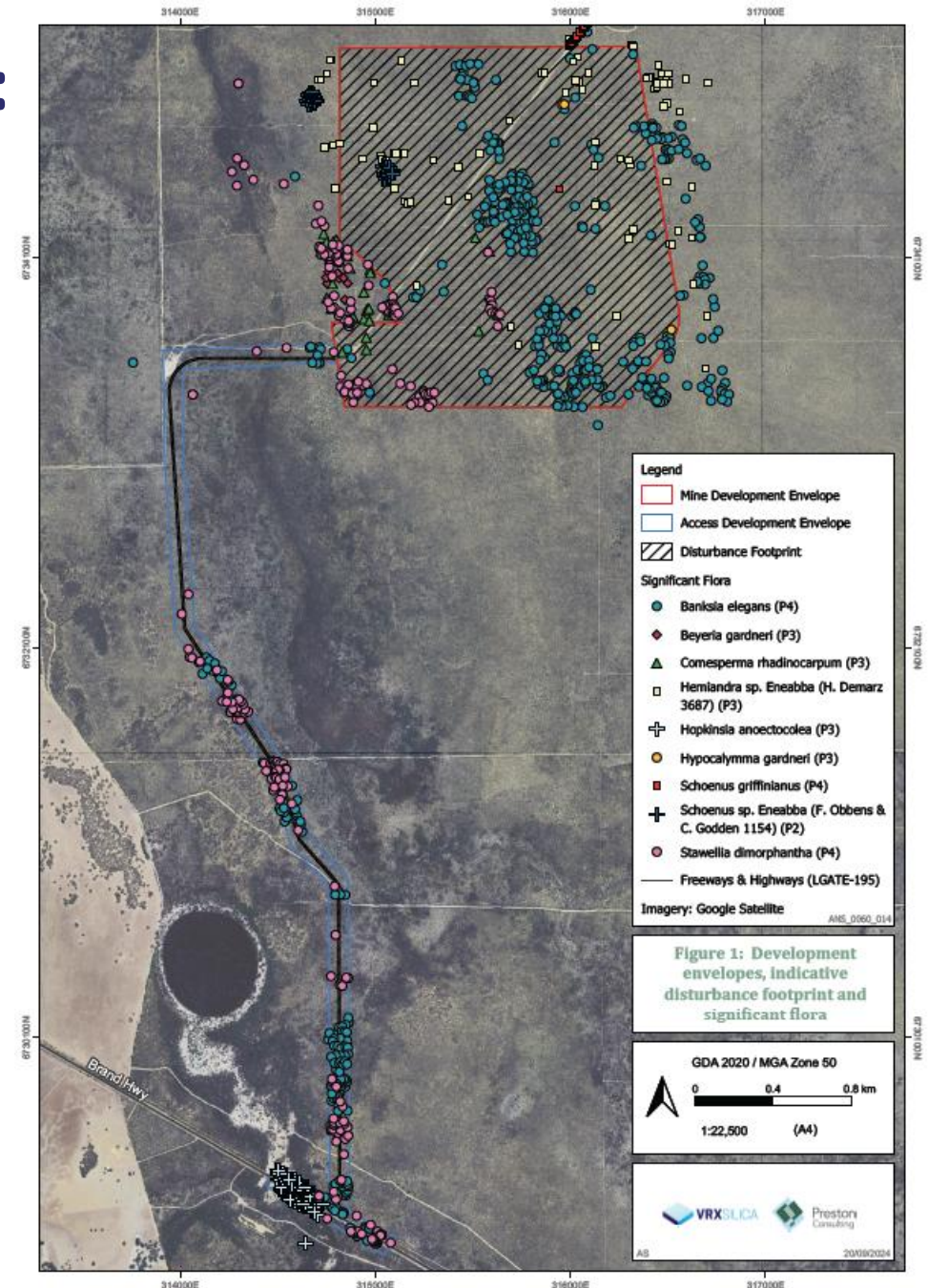






# VRXSILICA Environmental Approvals: Priority Flora

- 7 species recorded within Development Envelope, of which 5 will have >5% local records disturbed
- Development Envelope revised to keep impacts to local records <21%
- Proposal impacts to regional records all <6.1%
- Cumulative losses of all species <8% other than *Comesperma rhadinocarpum* (P3) – 17.6%
- Only 10 *Comesperma rhadinocarpum* individuals to be disturbed
- 16 other recorded populations – no counts available therefore percentage loss is conservative (assumed 1 individual per record)





# Muchea Silica Sand Project Site

Vegetation: Banksia Woodland  
Low grasses and sedges suitable for VDT





## Large scale, world class high-grade and low impurity silica sand project

- ❑ Production to follow Arrowsmith North subject to EPA approval
- ❑ Utilise VDT and duplicate plant
- ❑ Access to established infrastructure
  - ❑ Underutilised railway connects to Kwinana (100km)
  - ❑ Grid power
  - ❑ Water from Yaragadee deep aquifer
  - ❑ Adjacent to Brand Highway
- ❑ Granted Mining Lease and Miscellaneous Licences for access
- ❑ Significant metallurgical testwork **+99.9% SiO<sub>2</sub> - <100ppm Fe<sub>2</sub>O<sub>3</sub>** after processing (high-grade, low impurity)

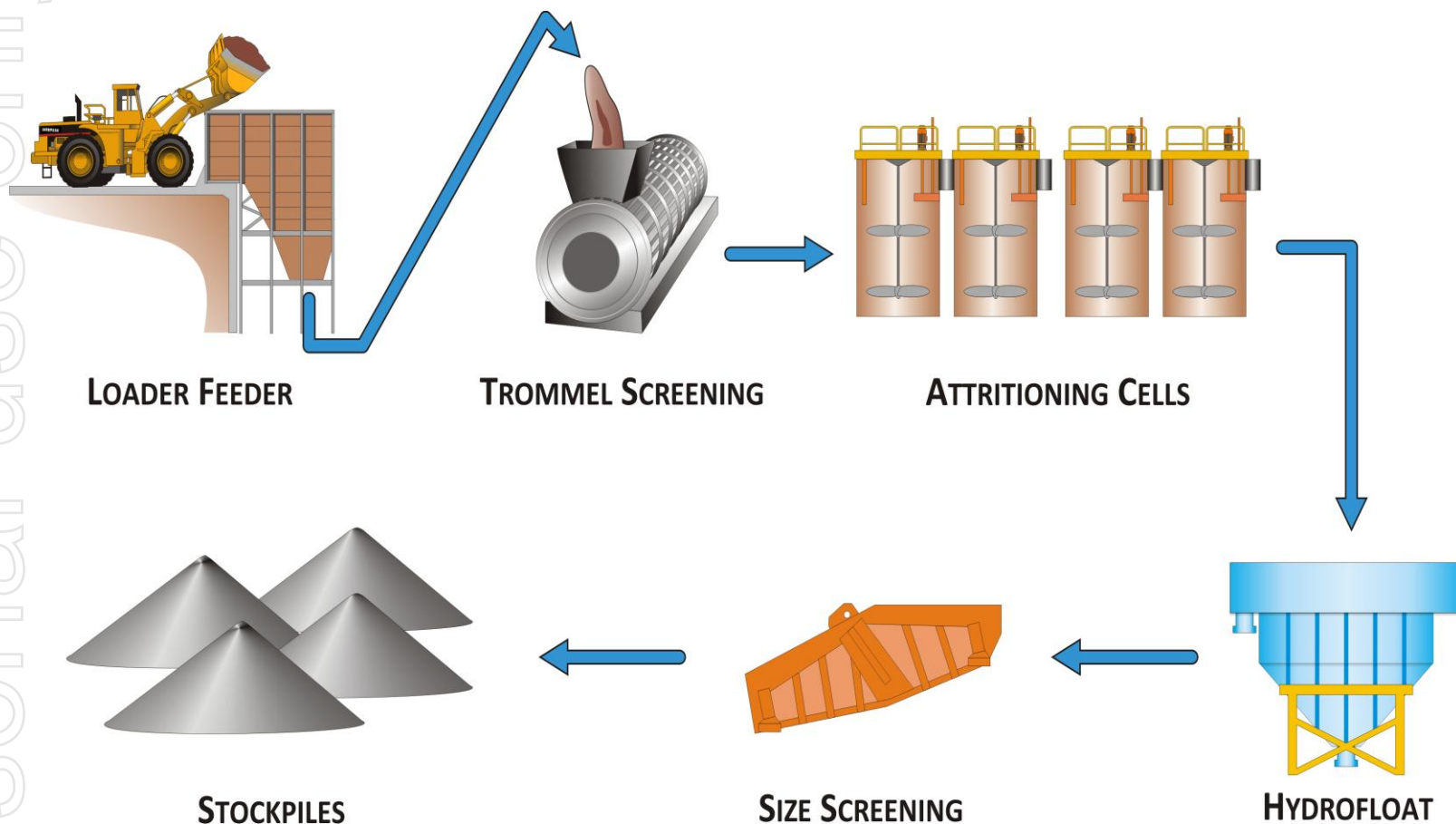


## Downstream processing capabilities

- ❑ Critical Minerals Prospectus – VRX Muchea project is included in the 2024 Critical Minerals Prospectus published by Austrade (now online)
- ❑ Raw material for premium ultra-clear cover glass production for solar panels
- ❑ Potential for production of solar panels in Western Australia
- ❑ Potential for production of silica flour for LCDs and other applications
- ❑ IAF Grant - VRX has received a grant from the Western Australian Innovation Attraction Fund to investigate the production of silica flour:
  - ❑ 1 tonne sample successfully tested by specialist laboratory in Germany
  - ❑ Samples despatched to potential buyers
  - ❑ Significant interest in products capable of production

# Processing Flowsheet

**Simplified wet processing, multiple products, no dust, 2mtpa processing plant at each site**



## Processing Plant Design



- Arrowsmith North, Arrowsmith Central and Muchea to each have 2 Mtpa processing capacity
- No toxic reagents required



# Processing Plant Design

ersonal use only



**No dust**  
**No toxic chemicals**



# Sustainability, Environment, Social and Governance (ESG)

VRX is delivering on its ESG responsibilities aligned to the UN's Sustainable Development Goals

## SUSTAINABLE DEVELOPMENT GOALS



### CLEAN ENERGY

Utilising reliable, renewable modern energy



### ECONOMIC GROWTH

Enhancing economic and productive employment



### INDUSTRY INNOVATION

Building resilient infrastructure and fostering innovation



### SUSTAINABLE COMMUNITIES

Respecting heritage values



### RESPONSIBLE PRODUCTION

Employing sustainable mining methods



### CLIMATE ACTION

Reducing emissions from production



### REHABILITATION PLAN

Employing direct vegetation transfer as a unique rehabilitation method

# Corporate Summary



## Capital Structure

Share Price	A\$0.054*
Ordinary Shares on Issue	628 million
Options on Issue	92 million
Market Capitalisation	A\$34 million*
Cash	A\$1.8 million**
Debt	Nil
Enterprise Value	A\$32.2 million

## Shareholders

Board and Management	12%
Top 20 Total	33%

\* Closing share price on ASX on 28 November 2024

\*\* Cash at 31 September 2024

# Our Team

## Board

Person	Role	Experience
<b>Paul Boyatzis</b>	Chairman	Governance: over 30 years' experience in investment, equity markets and managing public companies
<b>Bruce Maluish</b>	Managing Director	Technical and finance: over 40 years' experience in mining industry including previous roles as ASX MD and General Manager
<b>Peter Pawlowitsch</b>	Non-Executive Director	Senior executive: finance and corporate roles
<b>David Welch</b>	Non-Executive Director	Senior executive: responsible for strategy, business transformation and performance, commercial negotiations

## Executive

Person	Role	Experience
<b>Ryan Baxter</b>	General Manager	Production: 15 years' experience in mining and construction with 10 years exporting silica sand
<b>David Reid</b>	Exploration Manager	Technical: responsible for exploration and mineral processing
<b>Steven Papadopoulos</b>	Commercial Manager	Legal and commercial: over 25 years' experience as corporate lawyer and commercial advisor in resources and other industries
<b>Yoonil Kim</b>	Marketing Manager	Marketing: 19 years' experience selling silica sand in the Asian market



## Opportunity for WA to capture its economic advantages of abundant silica sand and domestic gas reserves to build world-class glass manufacturing and downstream processing industries

- ❑ Very long life, high-grade silica sand supply with combined 1.4 billion tonne Resource, 96% to 99.6% SiO<sub>2</sub> grade
- ❑ Arrowsmith North environmental and other approvals expected Q1 2025
- ❑ WA domestic gas reserves and burgeoning hydrogen projects in mid-west, with exposure to geothermal energy solutions
- ❑ Long term supply of essential raw materials and potential **green** energy for **glass** manufacturing (LNG gas/wind/solar/hydrogen)
- ❑ High-tech ultra-clear glass and HPQ production capability from Muchea
- ❑ Manufacturing of solar panels in WA for a huge and growing market in Australasia

# Thank you

## **Bruce Maluish**

Managing Director  
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West Perth WA 6005

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Email: [info@vrxsilica.com.au](mailto:info@vrxsilica.com.au)

# Silica Sand Resources and Reserves

## Mineral Resources - as at 30/06/2024

Project	Classification	Mt	SiO <sub>2</sub> %	Al <sub>2</sub> O <sub>3</sub> %	Fe <sub>2</sub> O <sub>3</sub> %	TiO <sub>2</sub> %	LOI %
Mucua	Indicated	29	99.6	0.1	0.03	0.1	0.2
	Inferred	179	99.6	0.1	0.02	0.1	0.2
	<b>Total</b>	<b>208</b>	<b>99.6</b>	<b>0.1</b>	<b>0.02</b>	<b>0.1</b>	<b>0.2</b>
Arrowsmith North	Measured	10	95.9	1.9	0.7	0.3	0.7
	Indicated	237	97.7	1.0	0.4	0.2	0.5
	Inferred	266	98.4	0.7	0.3	0.2	0.4
	<b>Total</b>	<b>513</b>	<b>98.0</b>	<b>0.9</b>	<b>0.3</b>	<b>0.2</b>	<b>0.4</b>
Arrowsmith Brand	Inferred	523	97.3	1.4	0.4	0.2	0.6
	<b>Total</b>	<b>523</b>	<b>97.3</b>	<b>1.4</b>	<b>0.4</b>	<b>0.2</b>	<b>0.6</b>
Arrowsmith Central	Indicated	28.2	96.6	1.7	0.4	0.2	0.7
	Inferred	48.3	96.9	1.5	0.4	0.2	0.7
	<b>Total</b>	<b>76.5</b>	<b>96.8</b>	<b>1.5</b>	<b>0.4</b>	<b>0.2</b>	<b>0.7</b>
Boyatup	Inferred	60	97.8	0.8	0.2	0.1	0.9
	<b>Total</b>	<b>60</b>	<b>97.8</b>	<b>0.8</b>	<b>0.2</b>	<b>0.1</b>	<b>0.9</b>

**Total Mineral Resource 1,381 Million Tonnes**

## Ore Reserves - as at 30/06/2024

Project	Classification	Product	Mt	SiO <sub>2</sub> %	Al <sub>2</sub> O <sub>3</sub> %	Fe <sub>2</sub> O <sub>3</sub> %	TiO <sub>2</sub> %	LOI %
Muchea	Probable	F80	10.2	99.9	0.02	0.008	0.03	0.1
		F80C	4.25					
		F150	4.25	99.8	0.07	0.015	0.035	0.1
Muchea Ore Reserve			18.7	Million Tonnes				
Arrowsmith North	Proved	AFS20	0.8	99.5	0.25	0.07	0.05	0.1
		AFS35	3.9	99.5	0.5	0.06	0.05	0.1
		AFS55	2.7	99.2	0.5	0.1	0.05	0.1
		Local	1.8					
	Proved Ore Reserve			9.2	Million Tonnes			
	Probable	AFS20	24.2	99.5	0.25	0.07	0.05	0.1
		AFS35	102.5	99.5	0.5	0.06	0.05	0.1
		AFS55	51.1	99.2	0.5	0.1	0.05	0.1
		Local	34.1					
Probable Ore Reserve			212	Million Tonnes				
Arrowsmith North Ore Reserve			221	Million Tonnes				
Arrowsmith Central	Probable	CF400	4.2	99.6	0.25	0.04	0.03	0.1
		C20	8.4					
		C40	4.2					
		High TiO <sub>2</sub>	2.2			<1%	2%	
Arrowsmith Central Ore Reserve			18.9	Million Tonnes				
Total Ore Reserve			259	Million Tonnes				