



Silica Sand

“Essential to World Growth”



SOUTH-WEST  
CONNECT  
ASX SHOWCASE

October 2023



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# Important information

## Disclaimer

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The information in this report that relates to Arrowsmith North, Arrowsmith Central and Muchea Probable Ore Reserves is based on data collected and compiled under the supervision of Mr David Reid, who is a full-time employee of VRX Silica. Mr Reid, BSc (Geology), is a registered member of the Australian Institute of Geoscientists and has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and the activity being undertaken to qualify as a Competent Person under the 2012 edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (JORC Code). Mr Reid consents to the inclusion of the data in the form and context in which it appears.

## Assumptions Underpinning Mineral Resources and Ore Reserves

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 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 (Muchea) 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.



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*“Sand is the main material  
that modern cities are made of”*

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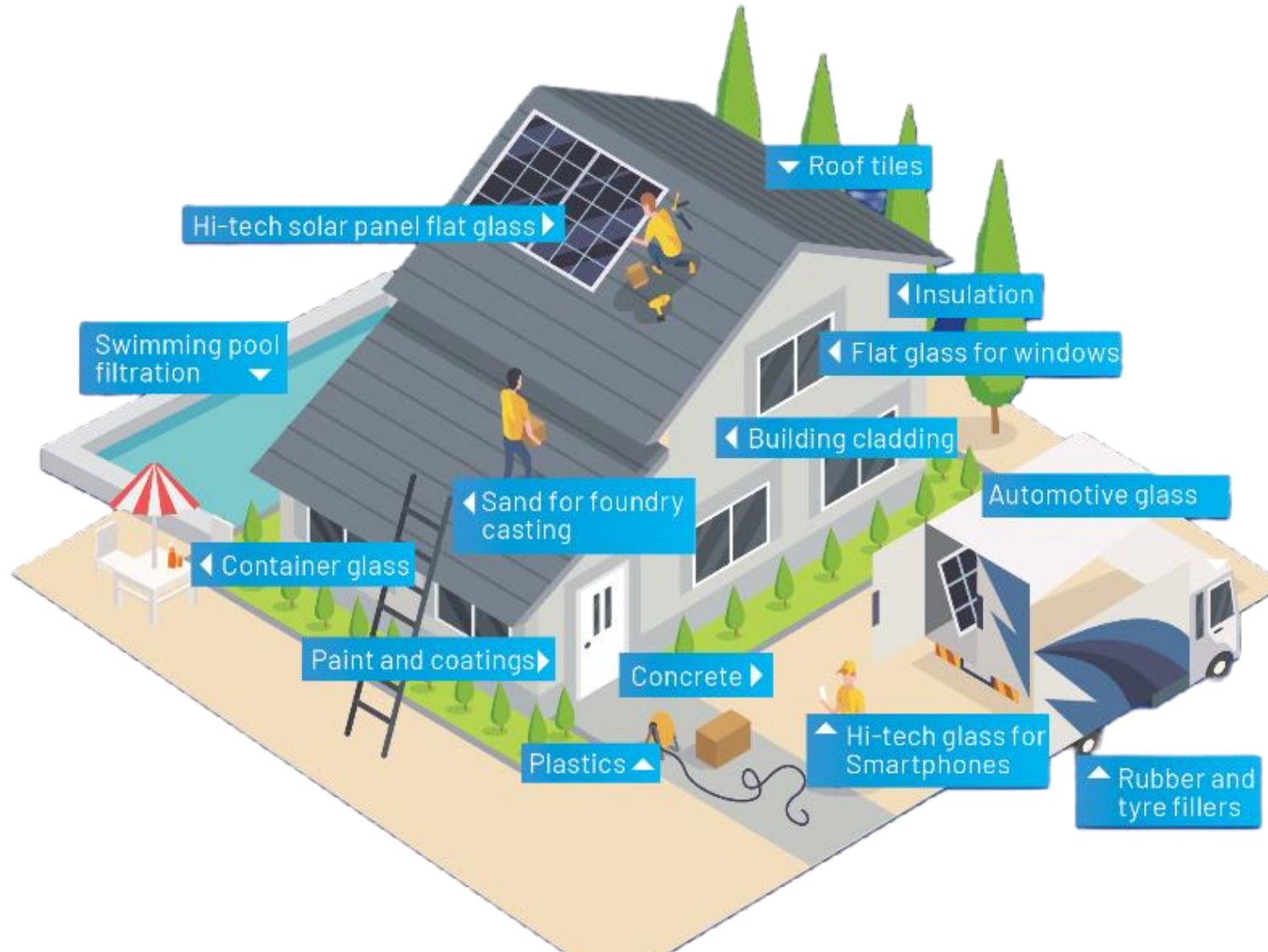
Vince Beiser

“The World in a Grain” 2018

The story of sand and how it  
transformed Civilisation



# Silica Sand - the Second-most Consumed Material on Earth



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*“Humans are estimated to consume nearly 50 billion tons of sand every year”*

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“World Construction Aggregates”, 2016

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VRXSILICA

# The world is facing a global sand crisis

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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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TOPIC BELT AND ROAD INITIATIVE

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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.

Philippines Indonesia

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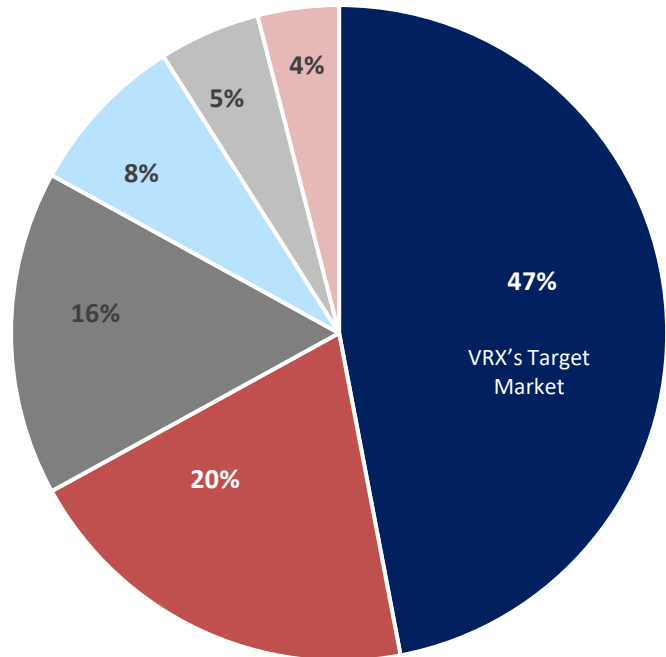


# Market Outlook

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

**VRX Target Market - Flat, Container, Architectural, Thin Film Glass, and;  
Metal Casting/Foundry for Automobile Parts**

Glassmaking silica sand demand by region\*



- Asia Pacific
- Western Europe
- Africa/Middle East
- North America
- Eastern Europe
- Central and South America

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	5 - 6Mt	+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

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



- ❑ WA-based company and management team
- ❑ Most advanced non-private silica sand projects in Australia
- ❑ 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



**WA-based, pure-play silica sand company with advanced silica sand projects**

## **100+ year production life**

- ❑ 100% owner of five high value silica sand projects in Western Australia - Tier 1 mining region
- ❑ Multi-decade-scale contiguous sand deposits with significant high-grade Resources
- ❑ Most-advanced non-private silica sand projects in Australia
- ❑ Mining Leases granted over four projects with permitting and infrastructure preparations well-advanced
- ❑ Arrowsmith North to lead staggered development. First production expected 2023 – followed by Muchea, Arrowsmith Central, Boyatup and Arrowsmith Brand
- ❑ Strong interest from customers in Southeast Asia at a time of diminishing global supply and increasing demand



## Arrowsmith North (100%)

- High-grade with exceptional financial metrics
- Close proximity to port and rail infrastructure
- Glass making and foundry
- Potential +100 year mine life:
  - JORC Proved and Probable Reserve of
  - **221Mt @ 99.5% SiO<sub>2</sub>**
- Updated BFS due Nov 2023

## Muchea (100%)

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



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

- ❑ Production expected to commence 6-8 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 underway
- ❑ 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/Central Vegetation Kwongan Heath

Loose sand/shallow root systems suitable for VDT



## 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
- ❑ The VDT method 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



# Arrowsmith North

## Environmental and Mining Approvals

- ❑ Confirmation by Commonwealth Department of Agriculture, Water and the Environment of accredited State approval under the EPBC Act
- ❑ State Department of Water and Environmental Regulation and Environmental Protection Authority (EPA) require PER assessment
- ❑ Environmental Scoping Document (ESD) approved in March 2022
- ❑ Environmental Review Document (ERD) lodged in April 2022 and amended June 2022 and again February 2023
- ❑ ERD published by EPA for Public Review period ending 16 July 2023
- ❑ Mining proposal for DMIRS and Works Approval for DWER lodged for assessment in parallel with ERD

## 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)
- ❑ Raw material for premium ultra-clear cover glass production for solar panels
- ❑ Potential for manufacturing cover glass from adjacent gas/hydrogen pipeline

# Muchea Vegetation Banksia Woodland

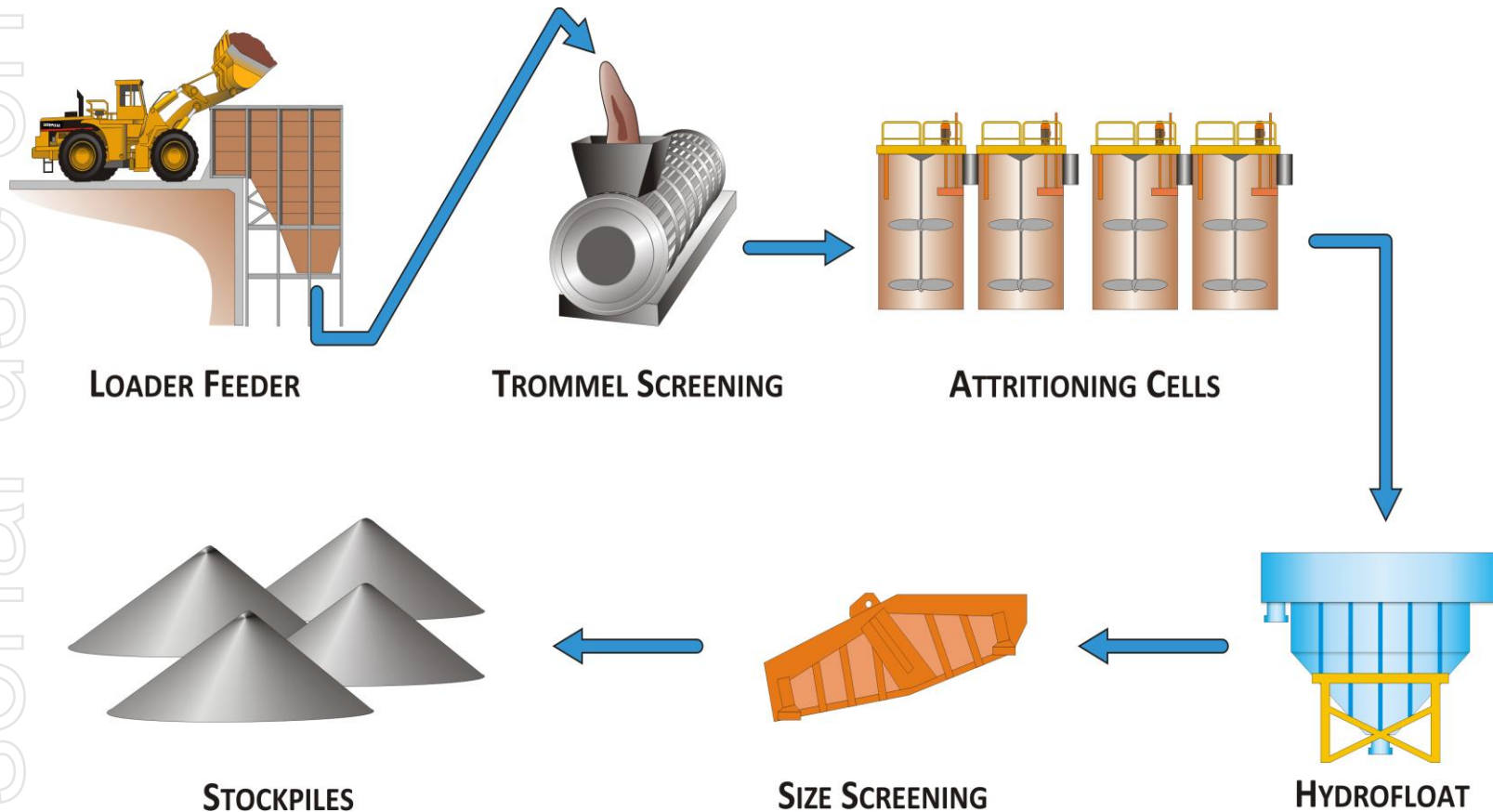
Low grasses and sedges suitable for VDT

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# Processing Flowsheet

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



### Processing Plant Design



A 3D perspective rendering of a processing plant facility, showing various structures, conveyor belts, and large piles of material.

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

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# Processing Plant Design

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**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**

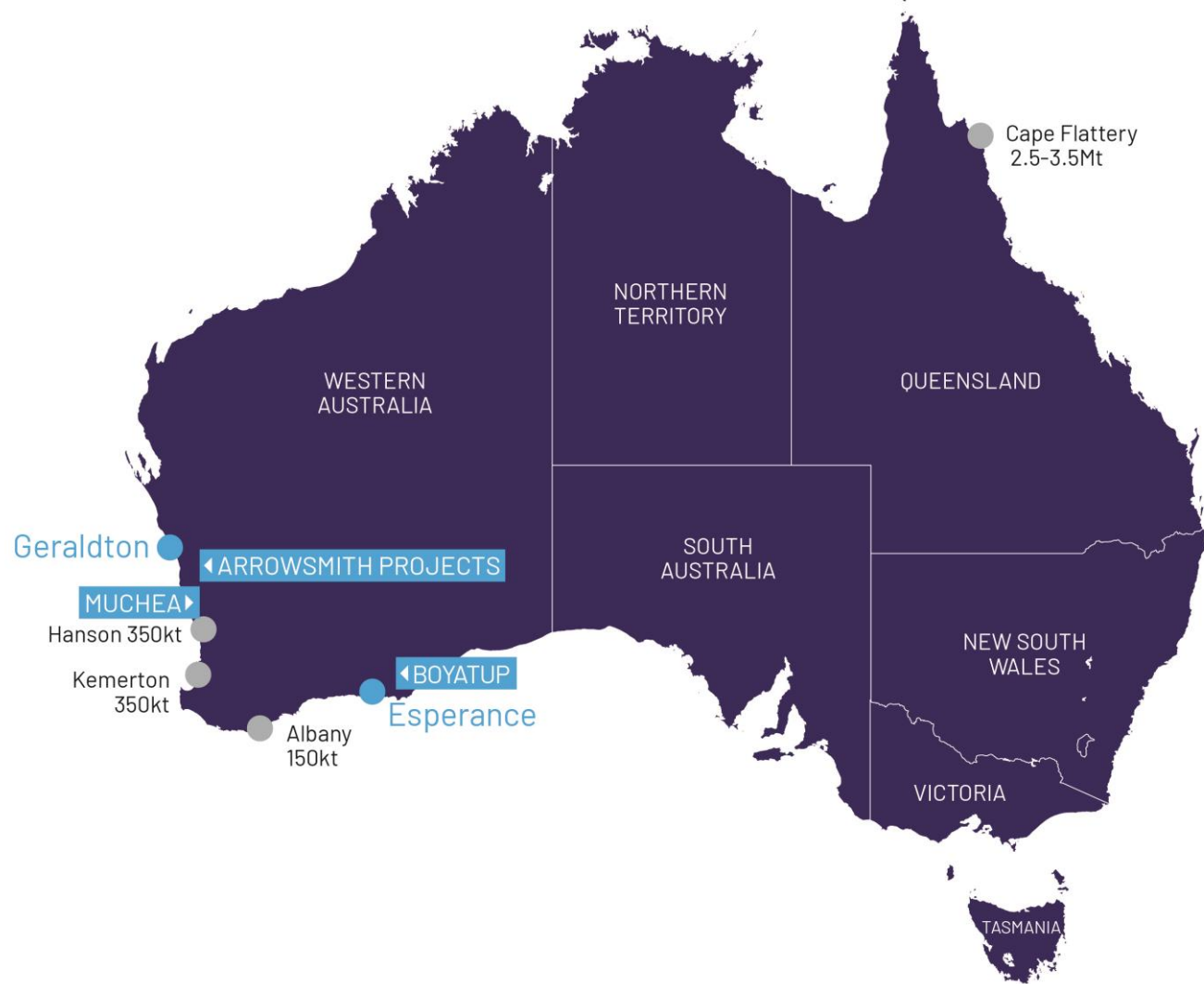
Employing direct vegetation transfer as a unique rehabilitation method

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# Australian Production

## Potential silica sand mining sector in Australia



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## Other Initiatives

**VRX is investigating other potential downstream products and cost saving alternatives**

- ❑ Critical Minerals Prospectus – VRX projects at Arrowsmith North and Muchea were included in the Critical Minerals Prospectus published by Austrade
- ❑ IAF Grant - VRX has received a grant from the State Innovation Attraction Fund to investigate the production of silica flour
- ❑ Geothermal Energy – Granted a geothermal permit at Dandaragan
- ❑ Trials of VDT - VRX has applied for a NVCP at Muchea to trial the practicalities of VDT in various vegetation types at Muchea

# Our Team

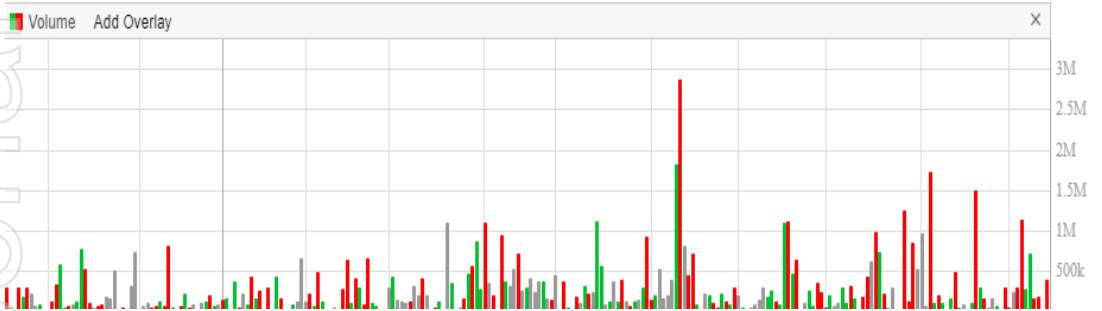
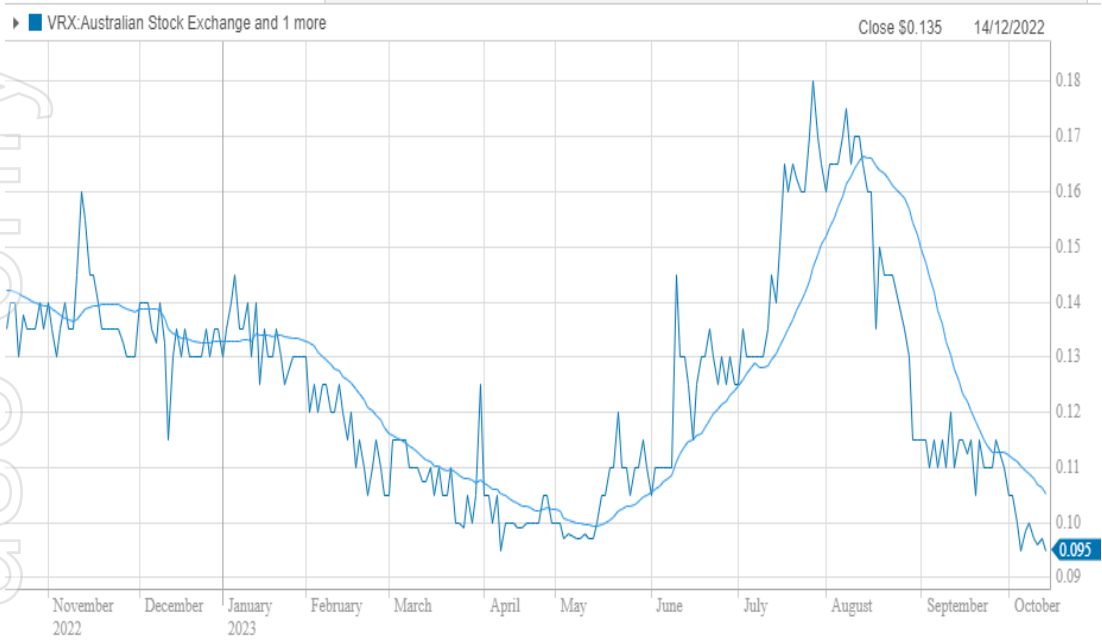
## Board

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 last 9 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 20 years' experience as corporate lawyer and commercial advisor in resources and other industries
<b>Yoonil Kim</b>	Marketing Manager	Marketing: 18 years' experience selling silica sand in the Asian market

# Corporate Summary



## Capital Structure

Share Price	9.5cps *
Ordinary Shares on Issue	583 million
Options on Issue	61 million
Market Capitalisation	\$56 million*
Cash	\$3.8 million
Debt	Nil
Enterprise Value	\$52 million

## Shareholders

Board and Management	12%
Top 20 Total	33%

\* Closing share price on ASX on 17 October 2023

# Right Time, Right Place

**Opportunity for WA to capture its economic advantages of silica sand and 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**
- ❑ **WA domestic gas reserves and burgeoning hydrogen projects in mid-west**
- ❑ **Long term supply of essential raw materials and green energy for glass manufacturing (gas/solar/hydrogen)**
- ❑ **High-tech ultra-clear glass production capability from Muchea**
- ❑ **Manufacturing of solar panels in WA for a huge and growing market in Australia**





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# Thank you

## Bruce Maluish

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# Silica Sand Resources and Reserves

## Mineral Resources - as at 30/06/2023

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 %
Muchea	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 30/06/2023

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	
<b>Muchea Ore Reserve</b>			<b>18.7</b>	<b>Million Tonnes</b>					
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						
	<b>Proved Ore Reserve</b>			<b>9.2</b>	<b>Million Tonnes</b>				
	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							
<b>Probable Ore Reserve</b>			<b>212</b>	<b>Million Tonnes</b>					
<b>Arrowsmith North Ore Reserve</b>			<b>221</b>	<b>Million Tonnes</b>					
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%		
<b>Arrowsmith Central Ore Reserve</b>			<b>18.9</b>	<b>Million Tonnes</b>					
<b>Total Ore Reserve</b>			<b>259</b>	<b>Million Tonnes</b>					