



Silica Sand

Essential to World Growth



AGM November 2023



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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 (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”*

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”

“World Construction Aggregates”, 2016

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VRX SILICA

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

HOME 2017 SUMMIT BACKGROUND COMMENT NATIONS PROJECTS

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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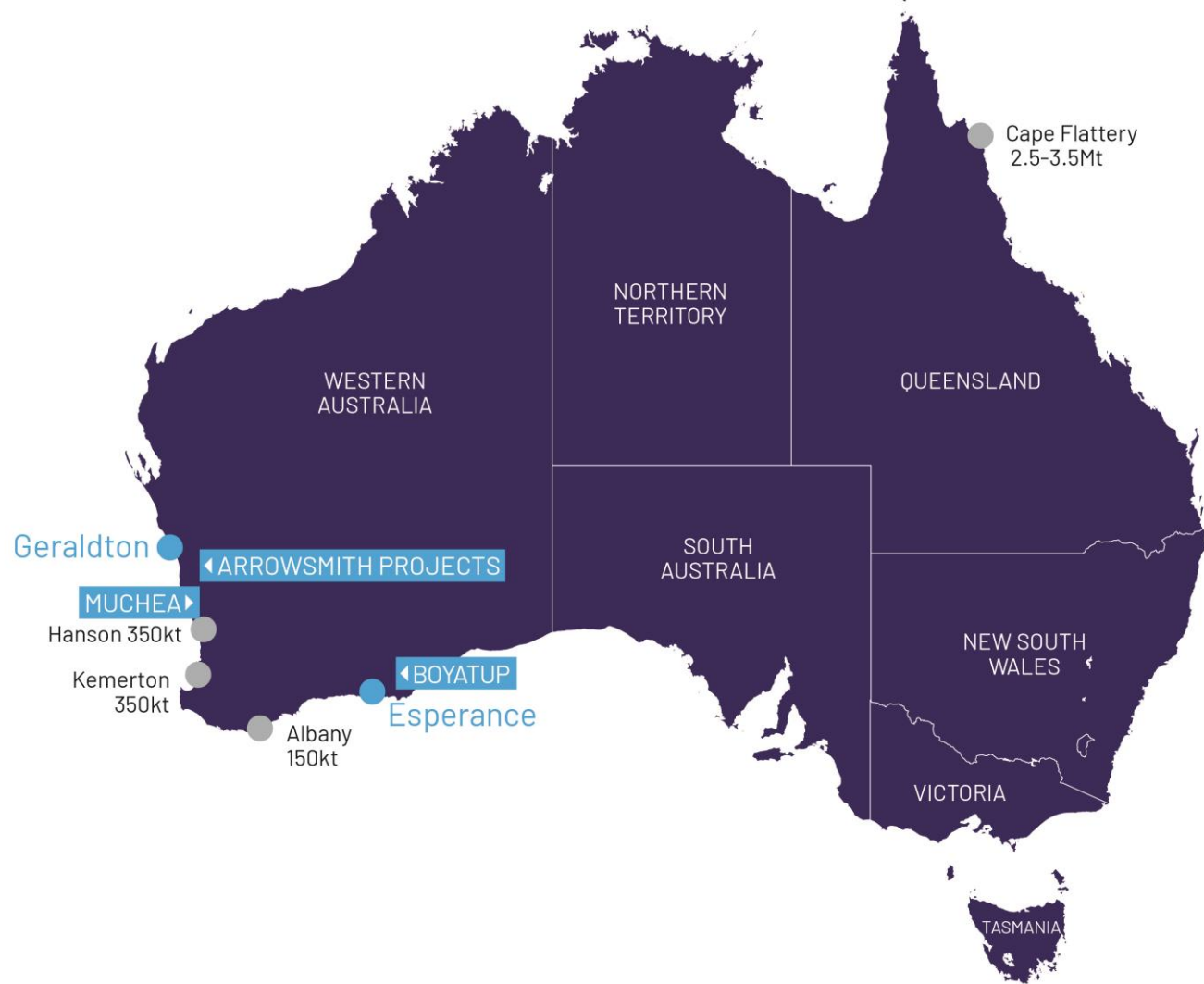
SPECIAL COVERAGE

Sand mining: Growing pains of cross-border trade

Unchecked sand mining with...

Australian Production

Potential silica sand mining sector in Australia



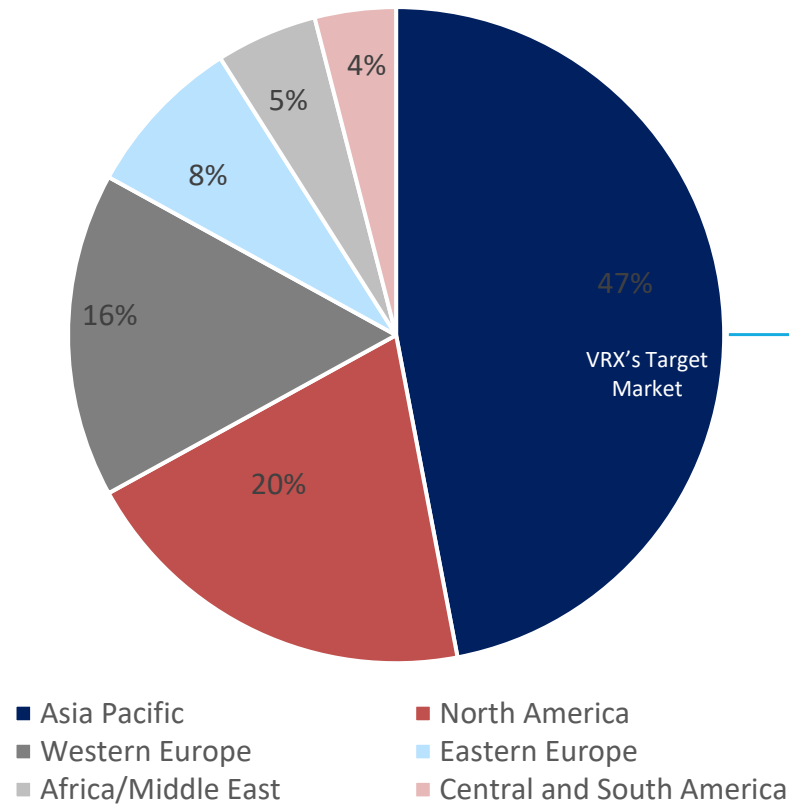
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Market Outlook

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*



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

*Source: Freedonia estimate

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Our Team

Board

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

Executive

Person	Role	Experience
Ryan Baxter	General Manager	Production: 15 years' experience in mining and construction with last 9 years exporting silica sand
David Reid	Exploration Manager	Technical: responsible for exploration and mineral processing
Steven Papadopoulos	Commercial Manager	Legal and commercial: over 25 years' experience as corporate lawyer and commercial advisor in resources and other industries
Yoonil Kim	Marketing Manager	Marketing: 19 years' experience selling silica sand in the Asian market

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

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

100+ year production life

- ❑ 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 late 2024
– 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



WA Leading Silica Sand Projects

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% SiO₂**
- Updated BFS to follow

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% SiO₂**
- 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% SiO₂ (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

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
- ❑ 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 Public Environmental Review period ended July 2023 and EPA provided Summary of Submissions September 2023
- ❑ VRX lodged the Response to Submissions October 2023 for assessment by EPA
- ❑ 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% SiO₂ - <100ppm Fe₂O₃** after processing (high-grade, low impurity)
- ❑ Raw material for premium ultra-clear cover glass production for solar panels

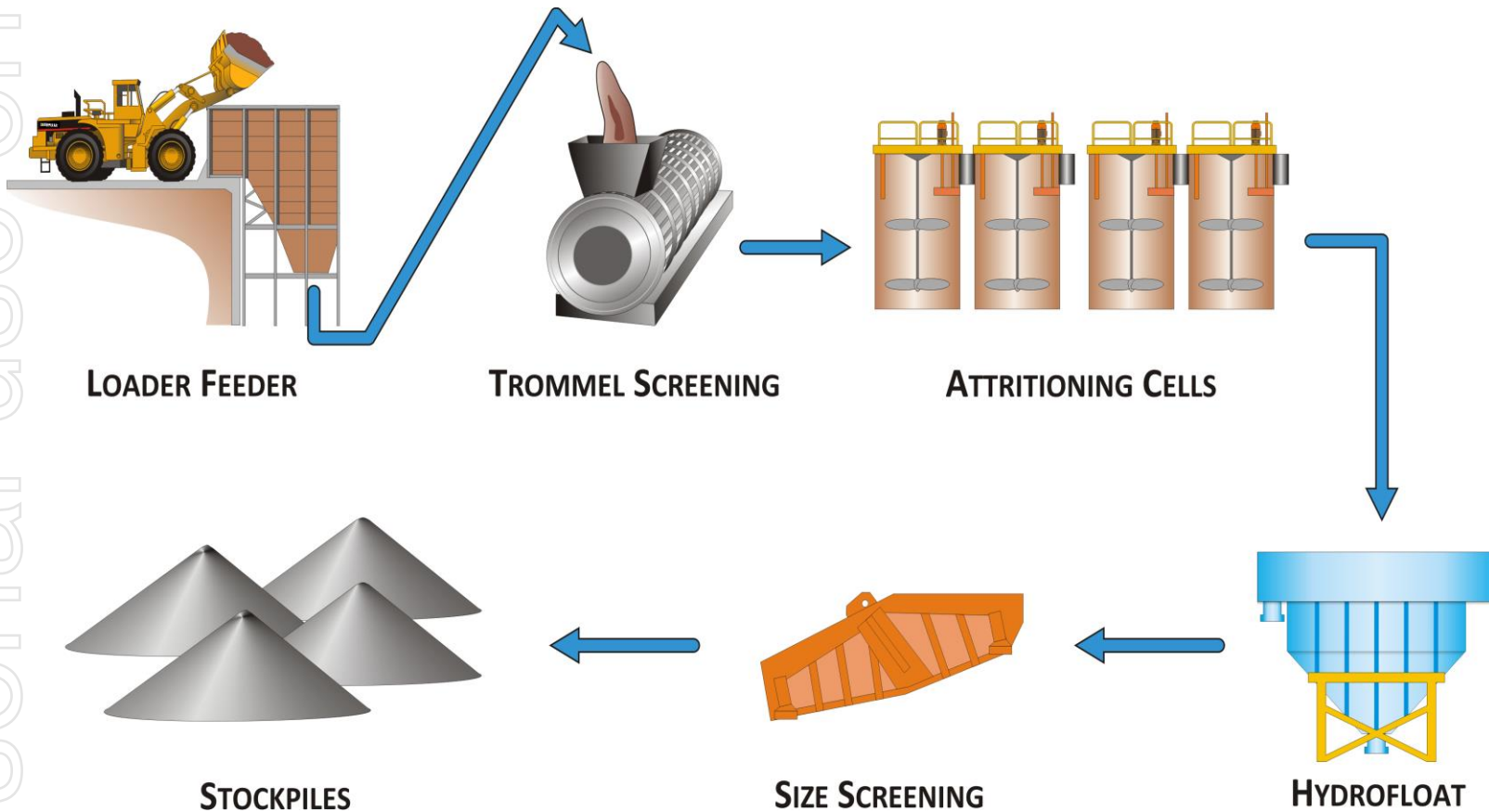
Muchea Vegetation Banksia Woodland

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

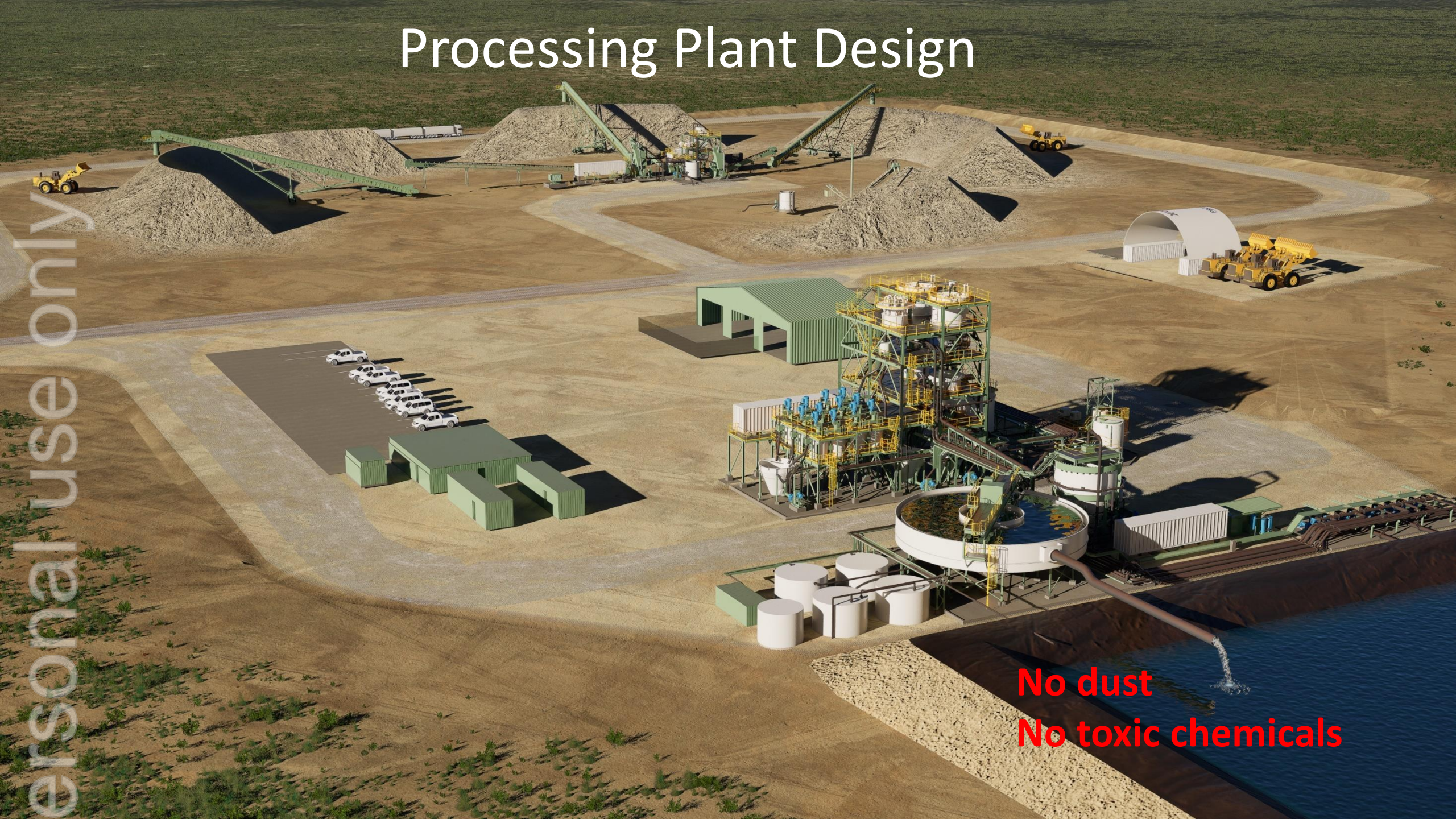


- Arrowsmith North, Arrowsmith Central and Muchea to each have 2 Mtpa processing capacity
- No toxic reagents required

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Processing Plant Design

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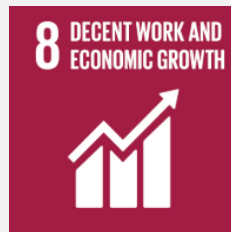


No dust
No toxic chemicals

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

VRX is investigating potential downstream products and cost saving initiatives

- ❑ Critical Minerals Prospectus – VRX Muchea project to be included in the 2023 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
 - ❑ 1 tonne sample despatched to Germany for specialist testwork
- ❑ Geothermal Energy – Granted a geothermal permit at Dandaragan
 - ❑ Farm-in agreement with Steam to provide technical personnel and expertise for development of the project
- ❑ Trials of VDT - VRX has applied for a NVCP at Muchea to trial the practicalities of VDT in various vegetation types at Muchea
 - ❑ VRX has fabricated the modified loader bucket required for VDT



Capital Structure

Share Price	10.5 cps *
Ordinary Shares on Issue	583 million
Options on Issue	57 million
Market Capitalisation	\$64 million*
Cash	\$3.7 million**
Debt	Nil
Enterprise Value	\$60 million

Shareholders

Board and Management	12%
Top 20 Total	33%

* Closing share price on ASX on 15 November 2023

** Cash at 30 September 2023

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% SiO₂ 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/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 Australia

Thank you

Bruce Maluish

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Mineral Resources - as at 30/06/2023

Project	Classification	Mt	SiO ₂ %	Al ₂ O ₃ %	Fe ₂ O ₃ %	TiO ₂ %	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
	Total	208	99.6	0.1	0.02	0.1	0.2
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
	Total	513	98.0	0.9	0.3	0.2	0.4
Arrowsmith Brand	Inferred	523	97.3	1.4	0.4	0.2	0.6
	Total	523	97.3	1.4	0.4	0.2	0.6
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
	Total	76.5	96.8	1.5	0.4	0.2	0.7
Boyatup	Inferred	60	97.8	0.8	0.2	0.1	0.9
	Total	60	97.8	0.8	0.2	0.1	0.9

Total Mineral Resource 1,381 Million Tonnes

Ore Reserves - as at 30/06/2023

Project	Classification	Product	Mt	SiO ₂ %	Al ₂ O ₃ %	Fe ₂ O ₃ %	TiO ₂ %	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 ₂	2.2			<1%	2%		
Arrowsmith Central Ore Reserve			18.9	Million Tonnes					
Total Ore Reserve			259	Million Tonnes					