Select High-Purity Silica Sand Deposits

Deposit	Location	Project Level	Tonnage	Silica Grade & Impurities	Grades & Impurities After Processing	End-Product (Potential for Non-Mines)	Projected Mine Life	Projected Annual Production	Projected OPEX	Projected CAPEX	Owner	Stock Symbol	Market Capitalization
Santa Maria Eterna	Bahia, Brazil	Active Mine (small-scale production since 2021)	Indicated: **94.9 million t** Measured: **1.8 million t**	Indicated: **99.88% Si** **48 ppm Fe** **160 ppm Ti** Measured: **99.75% Si** **158 ppm Fe** **521 ppm Ti**	After washing/scrubbing: **99.98% Si** **2.4 ppm Fe** **21.5 ppm Ti** **12.4 ppm Al** **<0.05 ppm Cr** **<0.05 ppm Mn** **<0.05 ppm Cu** (all impurities: 174 ppm)	**Solar Glass** (≤120 ppm Fe) and/or **Optical Glass Type II** (<5 ppm Fe <0.1 ppm Cr <0.1 ppm Mn <0.1 ppm Cu)	Entire Bahia Silica District: >100 years	Up to 2.5 million t (permitted)			**Homerun Resources Inc.** *(not the owner but supply agreement in place)*	TSXV: HMR	43 million CAD
Wanipigow	Manitoba, Canada	Resource Estimate (2021); Processing (2021 by CMP)	Inferred: **7.25 million t**	Technical Report (2021) does not show resource grades but "LBL-Zone" samples from 2018 drilling: **96.3% Si** **1300 ppm Fe** **1000 ppm Ti** **14400 Al** Corporate Presentation (2023) states **99.6% SiO2** and **92 ppm Fe** (presumably after chemical processing, no details disclosed)	After intense attrition + desliming, classification, density separation, 2 steps of magnetics: **99.5% Si** **100 ppm Fe** **<100 ppm Ti** **900 ppm Al** Further chemical treatment with acids recommended to ensure ≤120 ppm Fe: **99.7% Si** **60 ppm Fe** **<100 ppm Ti** **1000 ppm Al**	**Solar Glass** (patterned)	35 years	300,000 t		$400-$500 million CAD ("Class 4") for sand extraction and solar glass manufacturing facilities	**Canadian Premium Sand Inc.**	TSXV: CPS	36 million CAD
Cape Flattery	Queensland, Australia	Active Mine (since >50 years)	**>500 million t**	Not disclosed	After "extensive washing and filtering process": **99.93% Si** **100 ppm Fe** **200 ppm Ti** **300 ppm Al**	90% of the world's **flat-screen TVs** (2014); End-users not disclosed, possibly **Solar Glass**		3 million t (permitted since many years)			**Mitsubishi Corp.** *(since 1977)*	TYO: 8058	74 billion USD (11 trillion JPY)
Cape Flattery *(adjacent to Cape Flattery Mine)*	Queensland, Australia	DFS (2023)	Probable: **47 million t** Measured, Indicated & Inferred: **49.5 million t**	Reserves: **99.11% Si** **900 ppm Fe** **1400 ppm Ti** **1500 ppm Al**	Bulk sample testwork (ongoing) from first 5 years of operation indicates a final non-magnetic product with **100 ppm Fe** (from **600 ppm Fe** head grade)	**Solar Glass** (2022-MOU with Mitsui & Co., one of largest trading & investment companies from Japan)	25 years	1.5 million t	34.06 AUD/t (FOB cash costs incl. royalties; "real mid-2025")	165 million AUD	**Metallica Minerals Ltd.**	ASX: MLM	20 million AUD
Galalar *(adjacent to Cape Flattery Mine)*	Queensland, Australia	PFS (2021)	Probable: **32.5 million t** Measured, Indicated & Inferred: **75.46 million t**	Reserves: **99.20% Si** **800 ppm Fe** **1100 ppm Ti** **1300 ppm Al** Resources: **99.18% Si** **900 ppm Fe** **1200 ppm Ti** **1200 ppm Al**	After screening, gravity, attrition, classification + magnetic separation": **99.9% Si** **105 ppm Fe** **180 ppm Ti** **420 ppm Al** (from 870 kg sample: 99.6% Si 300 ppm Fe 610 ppm Ti 690 ppm Al)	**Solar Glass** and/or **Speciality Glass** (2022-JV with Sibelco from Europe with ties to Asian **fibre and display glass** market)	23.5 years (first 10 years exploiting sand with 490-930 ppm Fe, averaging 620 ppm, then <1200 ppm)	1.3 million t	33.9 AUD/t	67.9 million AUD	**Diatreme Resources Ltd.**	ASX: DRX	94 million AUD
NSP *(adjacent to Cape Flattery Mine)*		Scoping Study & Resources Estimate (2023)	Indicated & Inferred: **235 million t**	**99.29% Si** **1100 ppm Fe** **1500 ppm Ti** **1100 ppm Al**	From 5 samples with **99.5-99.7% Si** (without magnetic separation to reduce CAPEX): **99.9% Si** **110 ppm Fe** **147 ppm Ti** **297 ppm Al** (commercial plant processing likely 5-10% higher Fe and Al)	**Solar Glass** (2023-MOU with Flat Glass Group Co Ltd. from China) and/or **Speciality Glass** (2022-JV with Sibelco from Europe with ties to Asian **fibre and display glass** market)	25 years	3-5 million t	27.40 AUD/t (FOB incl. royalties)	356 million AUD (initial for 3 million t annually) plus 179 million AUD to increase production to 5 million t annually			

Green highlighted grades: ≤99.5% Si; **Blue highlighted grades:** Potentially suitable for solar glass with ≤120 ppm Fe; **OPEX:** Operating Expenditures (production/cash costs per unit); **CAPEX:** Capital Expenditures (for construction of mine and processing facilities); **HLS:** Heavy Liquid Separation; **HAL:** Hot Acid Leach; **BFS:** Bankable Feasibility Study; **DFS:** Definitive Feasibility Study; **PFS:** Pre-Feasibility Study; **t:** metric tons; **FOB:** Free On Board (includes transportation to vessel); Silica grades in **%** and impurities in **ppm** (parts per million; e.g. 48 ppm = 0.0048%); **Si** = silicon dioxide SiO2; **Fe** = iron oxide Fe2O3; **Ti** = titanium dioxide TiO2; **Al** = aluminum oxide Al2O3; **Reserves** (Probable); **Resources** (Measured, Indicated and/or Inferred).
NOTES: Australian resource/reserve estimates according to JORC; Brazilian and Canadian resource/reserve estimates according to NI 43-101). Some companies' market capitalizations are not only based on the referenced projects.
Sources: Rockstone Research, public company reports and financial company information as of September 5, 2023.

Select High-Purity Silica Sand Deposits

Deposit	Location	Project Level	Tonnage	Silica Grade & Impurities	Grades & Impurities After Processing	End-Product (Potential for Non-Mines)	Projected Mine Life	Projected Annual Production	Projected OPEX	Projected CAPEX	Owner	Stock Symbol	Market Capitalization
Arrowsmith North	Western Australia	BFS (2019); Resource Estimate (2022)	Probable: **209 million t** Measured, Indicated & Inferred: **768 million t**	Reserves: **99.7% Si** **500 ppm Fe** **350 ppm Ti** **2000 ppm Al** Resources: **98% Si** **3000 ppm Fe** **2000 ppm Ti** **9000 ppm Al**	After "screening, attrition & magnetic separation": **99.67% Si** **410 ppm Fe** **200 ppm Ti** **1800 ppm Al** (from sample: 97.79% Si 3880 ppm Fe 1100 ppm Ti 11310 ppm Al)	**Glass; Foundry; Ceramics**	25 years (all reserves: 102 years)	1.8 million t	30.18 AUD/t	28.3 million AUD	**VRX Silica Ltd.**	ASX: VRX	62 million AUD
Arrowsmith Central *(in May 2023, both projects were somewhat combined into newly named Arrowsmith Brand)*		BFS (2019)	Probable: **16.8 million t** Indicated & Inferred: **76.5 million t**	Reserves: **99.6% Si** **400 ppm Fe** **300 ppm Ti** **2500 ppm Al** Resources: **96.8% Si** **4000 ppm Fe** **2000 ppm Ti** **15000 ppm Al**	After "screening, attrition & magnetic separation": **99.46% Si** **300 ppm Fe** **2600 ppm Ti** **1300 ppm Al** (from sample: 97.35% Si 2500 ppm Fe 5700 ppm Al)	**Flat Glass; Container Glass; Foundry; and /or Ceramics**	25 years	2 million t	27.67 AUD/t	25.9 million AUD			
Muchea		BFS (2019)	Probable: **18.7 million t** Indicated & Inferred: **208 million t**	Resources: **99.6% Si** **200 ppm Fe** **1000 ppm Ti** **600 ppm Al**	After "screening, attrition, classifier, spiral & magnetic separation": **99.84% Si** **70 ppm Fe** **18 ppm Ti** **26 ppm Al** (from sample: 99.64% Si 170 ppm Fe 410 ppm Ti 560 ppm Al)	**Solar Glass**	25 years (initially)	2 million t	32.74 AUD/t	32.8 million AUD			
Eneabba / Nova	Western Australia	Scoping Study (underway); Resource Estimate (2021)	Inferred: **132 million t**	**99.24% Si** **500 ppm Fe** **400 ppm Ti** **3600 ppm Al**							**Suvo Strategic Minerals Ltd.**	ASX: SUV	22 million AUD
Beharra	Western Australia	PFS (2021)	Probable: **64.1 million t** Indicated: **125.8 million t**	Reserves: **98.6% Si** **1950 ppm Fe** **3460 ppm Ti** **4240 ppm Al** Resources: **98.2% Si** **2300 ppm Fe** **3600 ppm Ti** **4100 ppm Al**	After screening, desliming, gravity, magnetic separation: **99.6% Si** **276 ppm Fe** **369 ppm Ti** **1789 ppm Al**	**Glass; Foundry**	32 years	1.5 million t	43 AUD/t FOB	39 million AUD	**Perpetual Resources Ltd.**	ASX: PEC	12 million AUD
Stockyard	Western Australia	Scoping Study (underway); Resource Estimate (2023)	Indicated & Inferred: **12.4 million t**	**98.8% Si** **1278 ppm Fe** **2377 ppm Ti** **2578 ppm Al**	No news with detailed metallurgical results since extraction of 20 t bulk sample (washed) in 2022 shipped to potential offtake partner Shandong Hongbote Solar Technology Co. Ltd. In 2023, 200 kg samples sent to China for processing testworks achieving **99.7% Si, 100 ppm Fe, 100 ppm Al, 1000 ppm Ti** with attrition + permanent magnet + wet high intensity magnetic separation.						**Industrial Minerals Ltd.**	ASX: IND	26 million AUD
Sparkler	Western Australia	Resource Estimate (2022)	Inferred: **70 million t**	**96.84% Si** **3400 ppm Fe** **4300 ppm Ti** **11700 ppm Al**	After wet screening, attrition, HLS float & magnetic separation: **99.66% Si** **200 ppm Fe** **300 ppm Ti** **600 ppm Al**	**Glass; Foundry**					**Ailup Silica Ltd**	ASX: APS	2 million AUD
Albany / Mindijup	Western Australia	Active Mine (since 28 years); Reserves (2021); Grades (from samples according to Geological Survey of Western Australia, 2003)	Reserves: **5 million t**	**99.5% Si** **<100 ppm Fe** **400-1700 ppm Ti** **200 ppm Al** (from samples)	Wet screening and gravity (60% of mined sand is exported, rest oversize and undersize): **99.9% Si** **500 ppm Ti** **100 ppm Al**	**Glass; Foundry;** End-users not disclosed, possibly **Solar Glass**	**11 years** (2032)	170,000 t (2004-2021)			**AustSand Mining Ltd.** *(71% Tochu Corp.; 20% Toyota Tsusho Corp.; 9% Tsuneishi Holdings Corp.)*	Private	-
Albany *(adjacent to Albany / Mindjup Mine)*	Western Australia	Scoping Study (underway) / Resource Estimate (2021)	Inferred: **8.2 million t** (fine) and **3.4 million t** (coarse)	Fine: **99.93% Si** **46 ppm Fe** **410 ppm Ti** **145 ppm Al** Coarse: **99.91% Si** **43 ppm Fe** **668 ppm Ti** **137 ppm Al**		**Solar Glass**		0.5-1 million t			**Australian Silica Quartz Group Ltd.**	ASX: ASQ	21 million AUD

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