

NORTHERN TERRITORY  
CARPENTARIA BASIN  
SAND PROJECTS 2022

***TERRITORY SANDS***

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# A History Lesson

- SH Griffin #4 Natural Gas Well was drilled in 1998 near a small town of 400 people called Dish, Texas.
- This well was basically the first shale well to be slick water fracked or fracked only with water, sand and chemicals – no Guar.
- This well pretty much changed the world.
- Fracking enabled America to become the world's largest producer of oil and gas within 20 years.
- Fracking enabled America to become a manufacturing powerhouse utilising cheap energy and a net exporter of natural gas.
- It led to the closure of around 200 coal mines because gas was so much cheaper and cleaner.
- It led to a America becoming the largest sand producer in the world ahead of China. 80 million tonnes of sand per year is now used in fracking.
- What can Fracking do for the Northern Territory?

# USA Frac Sand Companies

- Three categories of sand companies
  - Turnkey Oilfield Operators (Halliburton, Schlumberger and Mammoth Energy)
  - Privately held sand companies (Vista Sand, Atlas Sand, Black Mountain Sand, Preferred Sands, Alpine Silica, Sierra Frac Sand)
  - Publicly Traded Sand Companies Market Cap (2018 data)
  - US Silica (\$2.1 billion)
  - Hi Crush LP (\$1 billion)
  - Covia Holdings (\$2.27 billion)
  - Carbo Ceramics (\$272 million)
  - Smart Sand (\$227 million)
  - Emerge Energy Services (\$223 million)
- 
- In Wisconsin in 2010, there were 5 sand quarries. In 2014 there were 65. Today there are 128.
  - There are also about 25 quarries more recently established in Texas, 1500km closer to the gas fields using inferior quality but cheaper sand.



# Australian Frac Sand –The Benefits of local sand

- Two known suppliers (one in Qld, one in Adelaide)
- None in the Northern Territory
- Beetaloo Frac sand to date has either been imported or trucked north from Adelaide (roughly 2500km at a transport cost of approx \$250/tonne).
- Production fracking of Beetaloo shale would target 3km horizontal sections
- Equivalent to around 9000 tonnes of proppant (sand) per well
- A double road train holds 48 tonnes of sand and a triple road train 72 tonnes of sand
- Each Beetaloo well would require 187 double road trains of sand from Adelaide. 200 wells per year would see 37,400 extra trucks on the Stuart Highway for 2500km each way (only 2 trailers allowed in SA).
- Buying local sand from Territory Sands Pty at Larrimah would have a \$5-10 per tonne delivery cost for the bulk of the Beetaloo using triple road trains.
- This would save the NT Gas Industry around \$400 million per year and take thousands of trucks off the Stuart Highway reducing carbon emissions and improving safety.

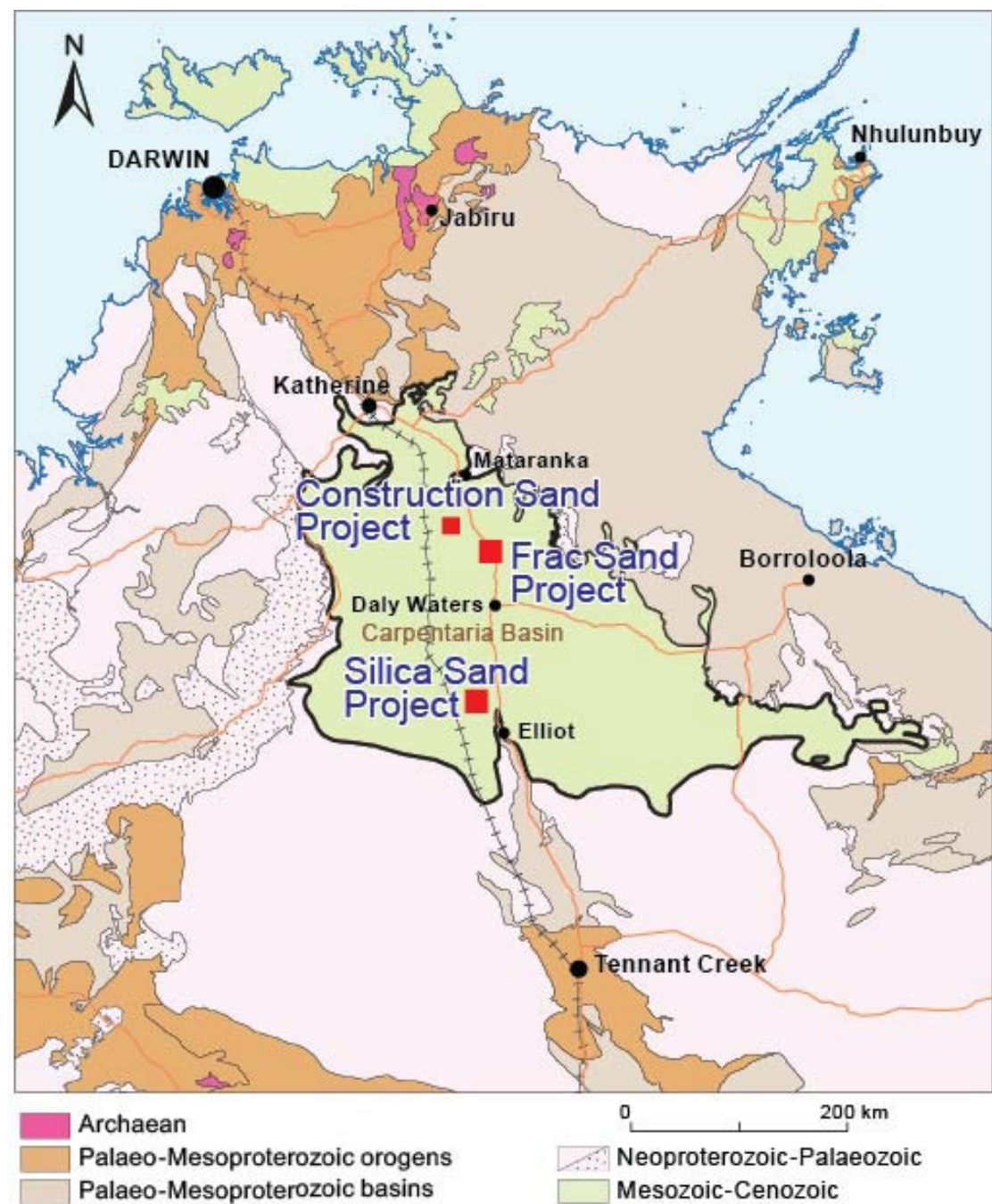


# NT SAND PROJECTS

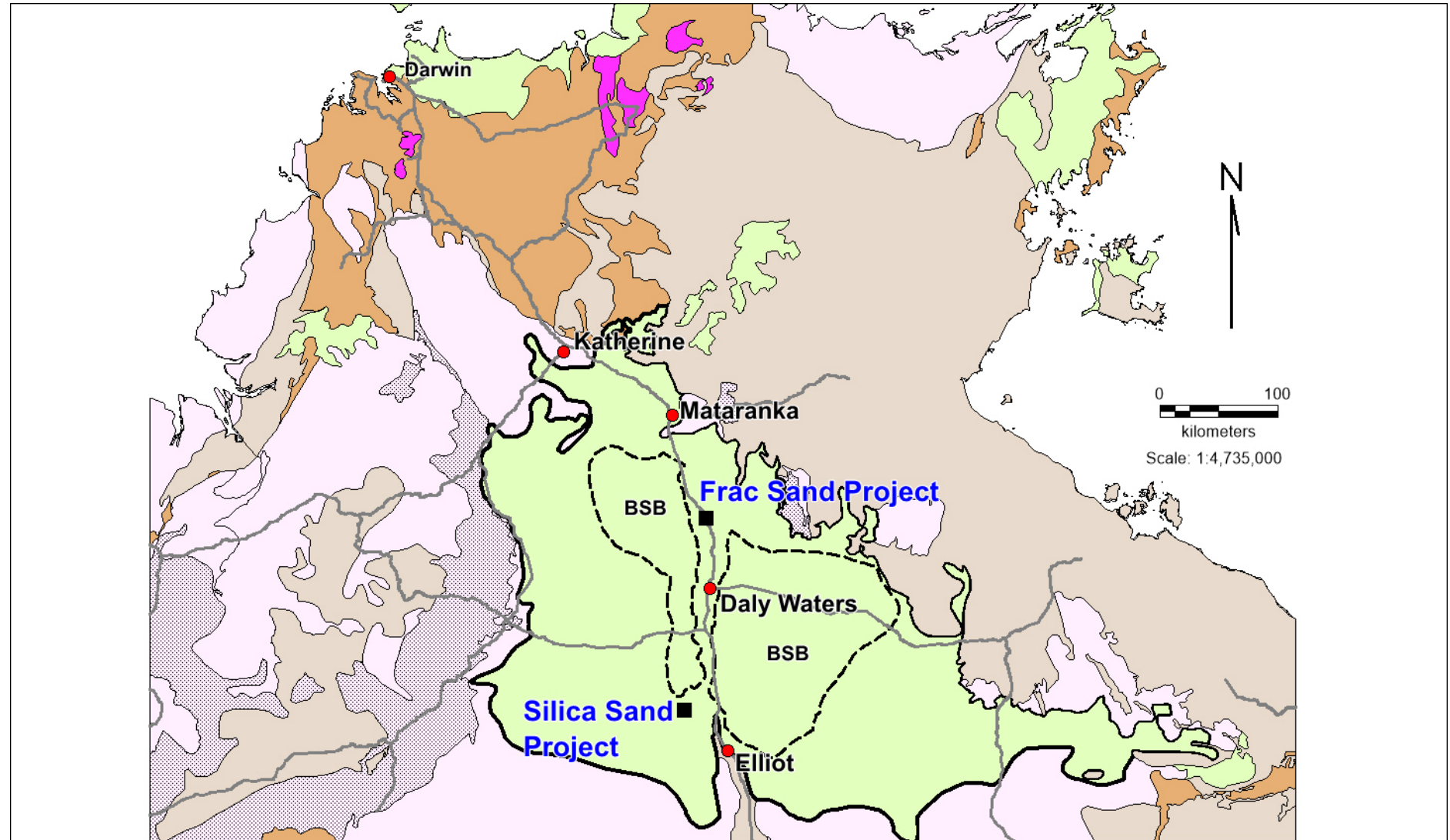
- Larrimah Frac sand/Foundry sand project
- Middle Creek construction sand/silica sand project
- Murrniji – Newcastle Waters silica sand project
- Extractive Mineral Tenure not Mineral Tenure
- We are a member of the NT Extractive Industry Association
- 20 granted EMEL's
- 12 EMEL applications
- 11 EML (Quarry Lease) applications

# TERRITORY SANDS

## Location Map Carpentaria Basin



# PROJECT LOCATION



The Beetaloo Sub-Basin is an older concealed basin under the Carpentaria Basin  
The Carpentaria Basin is the large green area between Katherine and Elliot

# BACKGROUND

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## ***TERRITORY SANDS***

- Private company established in April 2019
- First drilling of Frac sand deposits in 2020 for proof of concept, ensuring our targeting was right and obtaining samples for testing.
- 2020 sample results passed spec for Frac sand with minimal processing
- In 2021, 188 Air Core holes were drilled for 4242m to outline 4 sand deposits within 40km of Larrimah. Larrimah is located 470km south of Darwin
- We have first mover advantage in the NT Frac sand market
- We have first mover advantage in the NT silica sand export market
- We have applied for 9 Frac sand quarry leases (EMLs). We hope to be fully permitted to supply Frac sand to the Beetaloo Basin gas explorers in 2023.

# MANAGEMENT AND OWNERSHIP

The logo for Territory Sands is located in the top right corner. It consists of the words "TERRITORY SANDS" in a bold, white, sans-serif font. The text is set against a black rectangular background. Above and below the text are two horizontal orange lines with a dashed or dotted pattern.

***TERRITORY SANDS***

- 
- **Nigel Doyle– Darwin based Managing Director and geologist (45% shareholder) – handpicked all tenements and set up the Darwin Office, organized all drill programs, sat on the drill rig and organized all sampling and test work programs.**

**Titeline Drilling Group based in Ballarat– original funding partner and 45% shareholder**

- **Bill Ricciardi- Director and Secretary**
- **Mick Ashton- Director**
- **David D'Astoli - Director**
- **Stevin Gavin- Director**
- **Sophisticated Investors – 10%**
- **Recently raised \$2 million at \$0.50 per share to fund ongoing exploration and development**



# BEETALOO SUB-BASIN

## ***TERRITORY SANDS***

- The Beetaloo Sub-Basin is Australia's best emerging shale basin and ranked third best in the world. Recent results show potential to be on par with American basins
- Key players are Santos, Origin Energy, Tamboran Resources, Empire Energy, and Falcon Oil and Gas
- The major fracture stimulation companies are Halliburton and Schlumberger
- Production in the Beetaloo will probably not proceed without a local source of Frac sand
- We are the most advanced Frac sand company currently active in the Beetaloo region
- We have 108 million tonnes of sand under quarry lease application
- We have had preliminary discussions with Origin Energy, Empire Energy, Tamboran Resources, Schlumberger and Halliburton. All are keen to use our sand!

PHI - mm CONVERSION $\phi = \log_2 (d \text{ in mm})$ $1\mu\text{m} = 0.001\text{mm}$		Fractional mm and Decimal inches	SIZE TERMS (after Wentworth, 1922)	SIEVE SIZES		Intermediate diameters of natural grains equivalent to sieve size	Number of grains per mg		Settling Velocity (Quartz, 20°C)		Threshold Velocity for traction cm/sec	
$\phi$	mm			ASTM No. (U.S. Standard)	Tyler Mesh No.		Quartz spheres	Natural sand	Spheres (Gibbs, 1971) cm/sec	Crushed	(Nevin, 1946)	(modified from Hjulstrom, 1939)
-8	256	10.1"	BOULDERS ( $\geq -8\phi$ )									
-7	128	5.04"										
-6	64.0	2.52"	PEBBLES	2 1/2"	2"						200	1 m above bottom
-5	53.9			2.12"	2"						150	
-4	45.3			1 1/2"	1 1/2"							
-3	33.1	1.26"		1 1/4"	1.05"							
-2	32.0			1.06"								
-1	26.9			3/4"	.742"				100	50		
0	22.6	0.63"		5/8"	.525"				90	40	100	
1	17.0			1/2"	.371"				80	30	90	
2	13.4	0.32"		3/8"	.265"				70	20	80	
3	11.3	0.16"		5/16"					60	10	70	
4	9.52		SAND	4	4	1.2	.72	.6	50	20	60	
5	8.00			5	5				40	10	50	
6	6.73			6	6				30	8	40	
7	5.66			7	7				20	7	30	
8	4.76			8	8				10	6	20	
9	4.00			10	9				8	5	10	
10	3.36			12	10				6	4	8	
11	2.83			14	12				5	3	6	
12	2.38			16	14				4	2	5	
13	2.00	0.08"		18	16				3	2	4	
14	1.63	inches	SILT	20	20				2	1	3	
15	1.41	mm		25	24				1	1	2	
16	1.19			30	28				1	1	2	
17	1.00			35	32				1	1	2	
18	.840			40	35				1	1	2	
19	.707			45	42				1	1	2	
20	.545			50	48				1	1	2	
21	.500			60	60				1	1	2	
22	.420			70	65				1	1	2	
23	.354			80	80				1	1	2	
24	.297		CLAY	100	100				1	1	2	
25	.250			120	115				1	1	2	
26	.210			140	150				1	1	2	
27	.177			170	170				1	1	2	
28	.149			200	200				1	1	2	
29	.125			230	250				1	1	2	
30	.105			270	270				1	1	2	
31	.088			325	325				1	1	2	
32	.074			400	400				1	1	2	
33	.062								1	1	2	

# WHAT IS SAND

An unconsolidated sediment between 0.06mm and 2mm in diameter



# GEOLOGY OF THE LARRIMAH AREA

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- Carpentaria Basin – Cretaceous Sediments (shallow marine)
- Interbedded siltstone and sand/sandstone overlying limestone and basalt
- Friable sandstone outcrops are common. Our sand has weathered from these sandstone outcrops
- Sand is sub-angular to rounded quartz grains
- Sand is generally clean, dry and unconsolidated. Silt and clay content is 15-25%
- Sand is well sorted to poorly sorted and even conglomeratic in places
- The only Geological Map is a 1969 edition and isn't much use



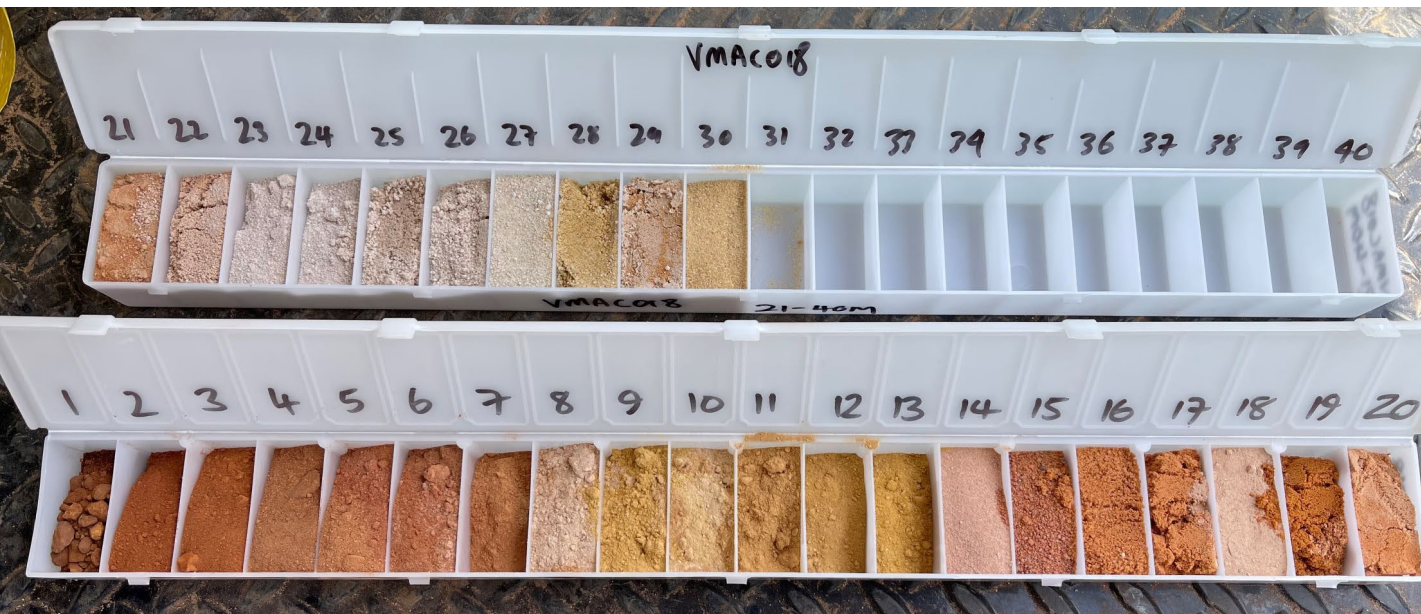




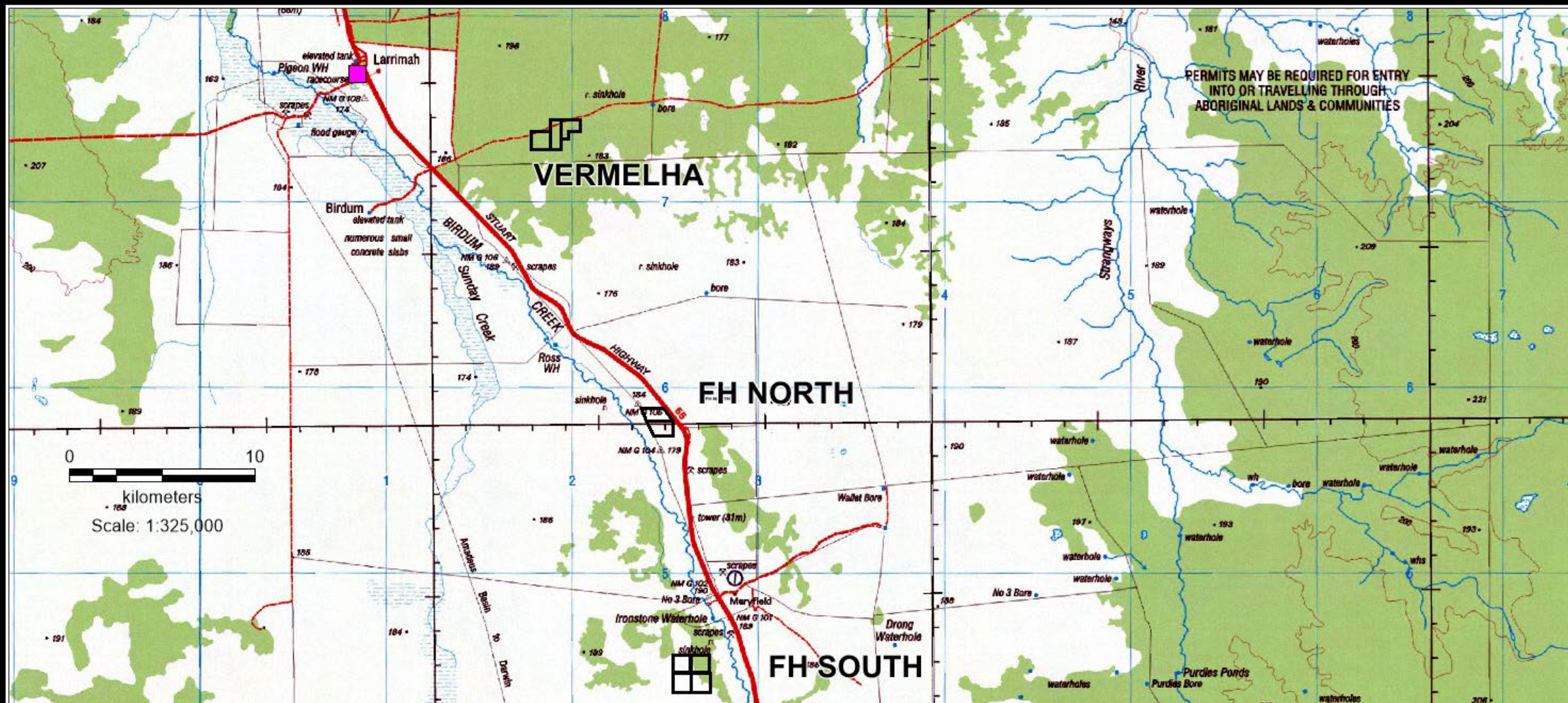












# LARRIMAH FRAC SAND PROJECT QUARRY LEASE APPLICATIONS

Deposit	EML	In Situ		Fines	Washed Sand
Frac Sand		Volume	Tonnes	Content	Tonnes
		(Million m3)	(Mt)		(Mt)
Forrest Hill North	EML 33040	9.3	13.0	19%	10.5
	EML 33041	8.8	12.4	19%	10.0
Density 1.4 t/m3	Total	18.1	25.3	19%	20.5
Forrest Hill South	EML 33033	6.0	8.4	18%	6.9
	EML 33034	7.6	10.6	18%	8.7
	EML 33035	9.1	12.7	18%	10.4
	EML 33036	8.9	12.5	18%	10.3
Density 1.4 t/m3	Total	31.6	44.2	18%	36.2
Vermelha	EML 3037	17.8	24.9	16%	20.9
	EML 3038	13.8	19.4	16%	16.3
	EML 3039	11.9	16.7	16%	14.0
Density 1.4 t/m3	Total	43.5	61.0	16%	51.2
Total		93.2	130.5		108.0

FRAC SAND GEOCHEMISTRY

			Fe <sub>2</sub> O <sub>3</sub>	Al <sub>2</sub> O <sub>3</sub>	CaO	MgO	TiO <sub>2</sub>	Na <sub>2</sub> O	K <sub>2</sub> O	Cr <sub>2</sub> O <sub>3</sub>	BaO	CoO	CuO	Li <sub>2</sub> O	MnO	NiO	P <sub>2</sub> O <sub>5</sub>	SO <sub>3</sub>	V <sub>2</sub> O <sub>5</sub>	LOI <sub>1000</sub>	LOI <sub>1000</sub>	Total Others	SiO2
UNITS	Drill Sample	Lab No	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%	%
DETECTION LIMIT			10	50	50	20	50	20	20	5	2	5	2	10	1	2	50	50	1	0.01			
A/3586	FSAC018 5-14m	T150 -425 +106µm	750	2200	1650	280	250	120	120	5	44	<5	2	10	9	4	<50	350	2	3100	0.31	0.8951	99.10
A/3587	VMAC036 15-24m	T250 -425 +106µm	410	1750	150	100	200	140	160	<5	52	<5	2	<10	7	2	<50	150	<1	1200	0.12	0.4394	99.56
A/3588	FSAC025 6-14m	T350 -425 +106µm	870	1550	350	140	200	80	120	<5	26	<5	<2	<10	8	2	<50	250	<1	1400	0.14	0.5069	99.49
A/3589	FSAC022 8-15m	T450 -425 +106µm	1600	9800	500	420	550	140	200	5	50	<5	<2	20	8	4	100	500	5	4500	0.45	1.8409	98.16
A/3590	FSAC028 6-11m	T550 -425 +106µm	570	1200	150	100	150	100	140	<5	36	<5	2	<10	6	2	<50	300	<1	1300	0.13	0.4127	99.59
A/3591	VMAC029 11-19m	T650 -425 +106µm	430	1350	100	60	150	100	140	5	36	<5	2	10	5	2	<50	100	<1	500	0.05	0.3046	99.70
A/3592	VMAC024 5-16m	T750 -425 +106µm	1330	5300	150	80	350	160	220	5	66	<5	2	10	5	2	<50	150	4	2600	0.26	1.0489	98.95
A/3593	MCAC032 14-23m	T850 -425 +106µm	540	2400	150	60	250	140	80	<5	66	<5	2	<10	4	2	<50	150	2	1100	0.11	0.5016	99.50
A/3593 Rpt		T850 -425 +106µm	540	2250	100	60	250	140	80	<5	64	<5	2	<10	4	2	<50	150	2	1100	0.11	0.4814	99.52
A/3594	FNAC09 4-12m	T950 -425 +106µm	580	2700	150	120	250	100	160	<5	32	<5	4	10	9	4	<50	100	<1	1200	0.12	0.548	99.45
A/3595	FNAC010 8-18m	T1050 -425 +106µm	650	2550	550	160	300	120	160	<5	42	<5	2	10	11	4	<50	150	2	1600	0.16	0.6371	99.36
A/3596	VMAC044 14-20m	T1150 -425 +106µm	360	1850	100	40	150	140	140	<5	52	<5	2	<10	5	2	<50	150	<1	1200	0.12	0.4262	99.57
A/3597	FSAC027 6-11m	T1250 -425 +106µm	640	1500	200	160	200	120	160	<5	42	<5	2	<10	8	2	<50	450	2	800	0.08	0.4356	99.56
A/3598	FSAC024 8-12m	T1350 -425 +106µm	690	1650	300	160	150	140	140	<5	50	<5	2	<10	6	2	<50	550	2	800	0.08	0.4712	99.53
A/3599	FNAC023 10-18m	T1450 -425 +106µm	360	2100	150	140	250	120	200	5	40	<5	2	10	6	2	<50	100	<1	900	0.09	0.4441	99.56
A/3600	FNAC015 19-16m	T1550 -425 +106µm	390	1300	100	80	200	80	140	<5	26	<5	<2	10	4	2	<50	<50	<1	900	0.09	0.3295	99.67
A/3600 Rpt		T1550 -425 +106µm	410	1500	100	80	200	100	160	<5	28	<5	<2	10	5	2	<50	<50	<1	1000	0.1	0.3658	99.63
A/3601	MCAC016 10-15m	T1650 -425 +106µm	310	1300	100	40	150	100	100	<5	30	<5	<2	<10	4	4	<50	100	<1	800	0.08	0.3111	99.69
A/3602	VMAC024 16-24m	T1750 -425 +106µm	590	2000	150	60	200	140	140	<5	54	<5	2	<10	5	2	<50	150	<1	1500	0.15	0.5064	99.49
A/3603	MCAC018 19-23m	T1850 -425 +106µm	390	1500	100	40	150	80	100	<5	26	<5	<2	<10	6	2	<50	100	<1	800	0.08	0.3367	99.66
A/3604	FNAC008 5-12m	T1950 -425 +106µm	400	1400	100	80	200	80	100	<5	22	<5	2	10	11	2	<50	<50	<1	800	0.08	0.3268	99.67
A/3605	VMAC029 19-32m	T2050 -425 +106µm	790	2200	100	60	200	120	140	5	44	<5	2	10	5	4	<50	150	2	1400	0.14	0.5287	99.47
A/3605 Rpt		T2050 -425 +106µm	770	2100	100	60	200	120	160	<5	46	<5	2	10	5	4	<50	150	<1	1200	0.12	0.4988	99.50




# Forest Hill South EML Applications

Legend

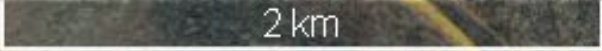


Google Earth

Image © 2021 Maxar Technologies  
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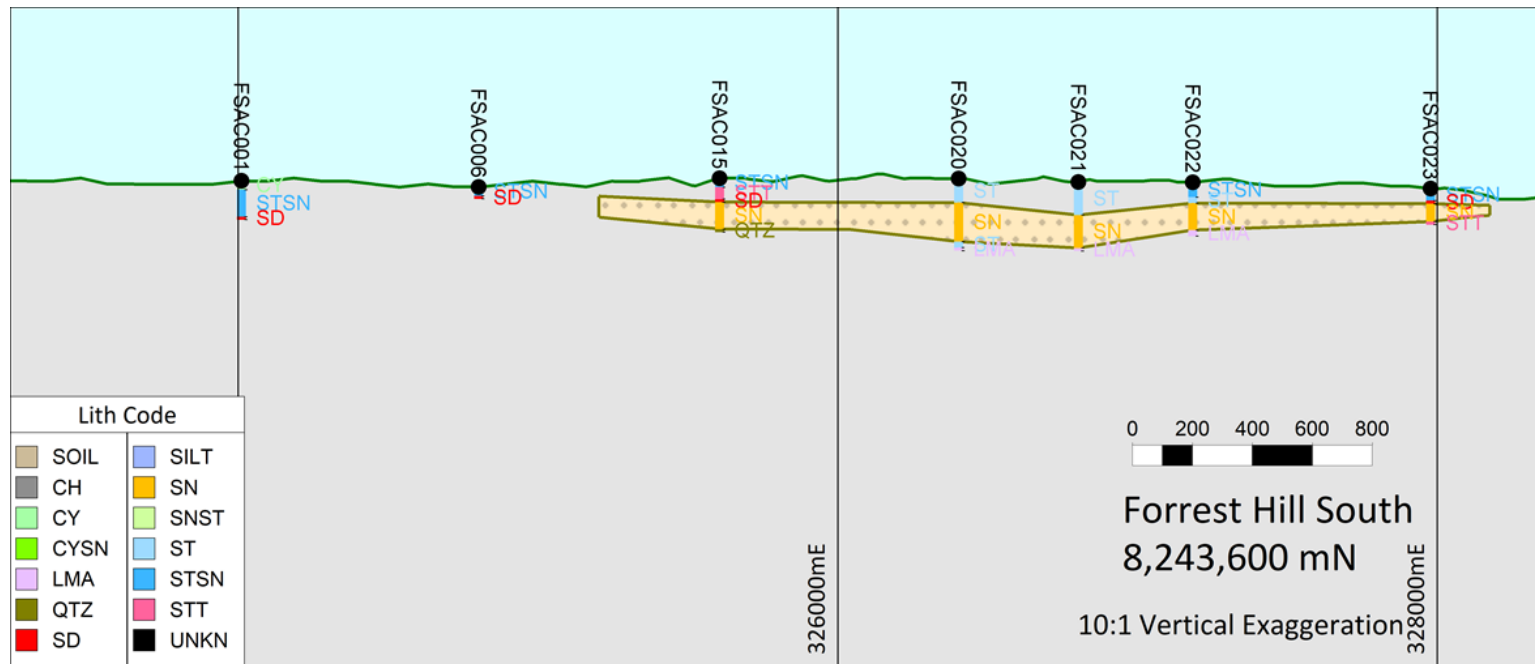
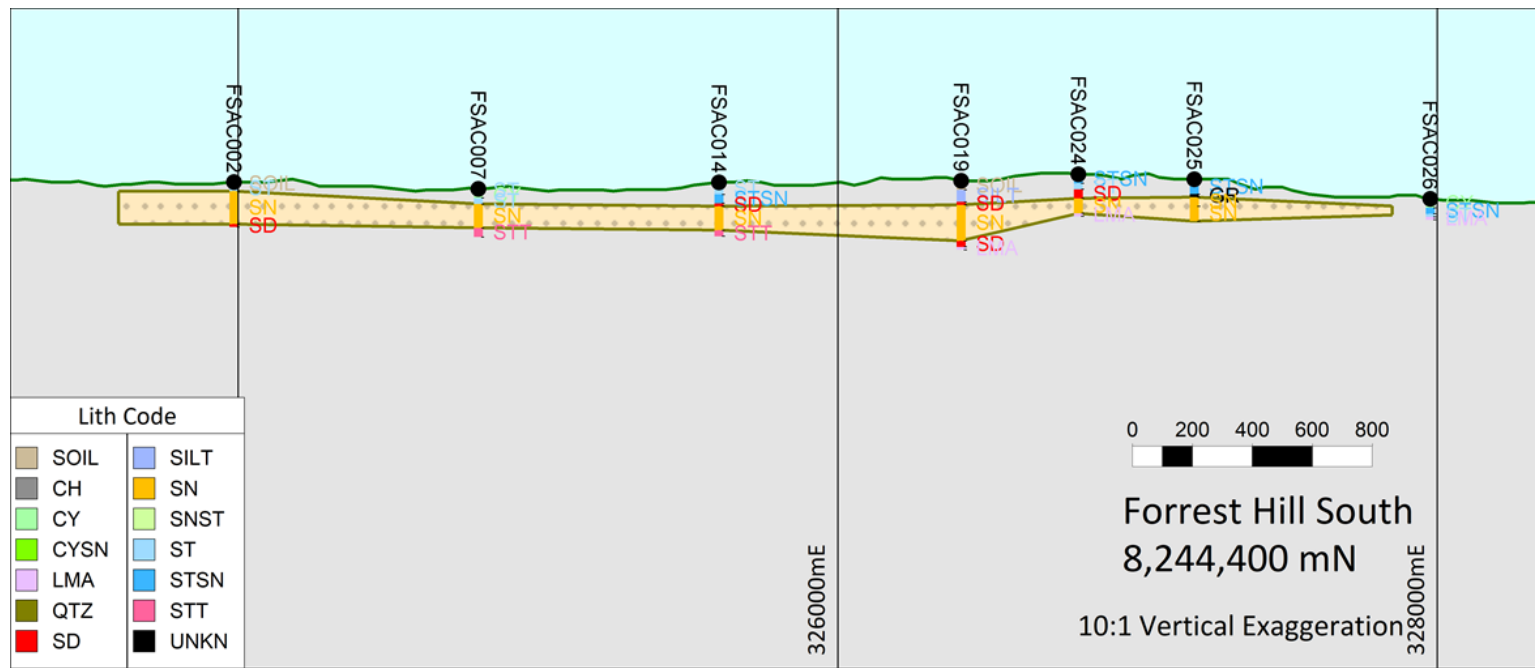


N



2 km





## Forest Hill North EML Applications

Legend

Google Earth

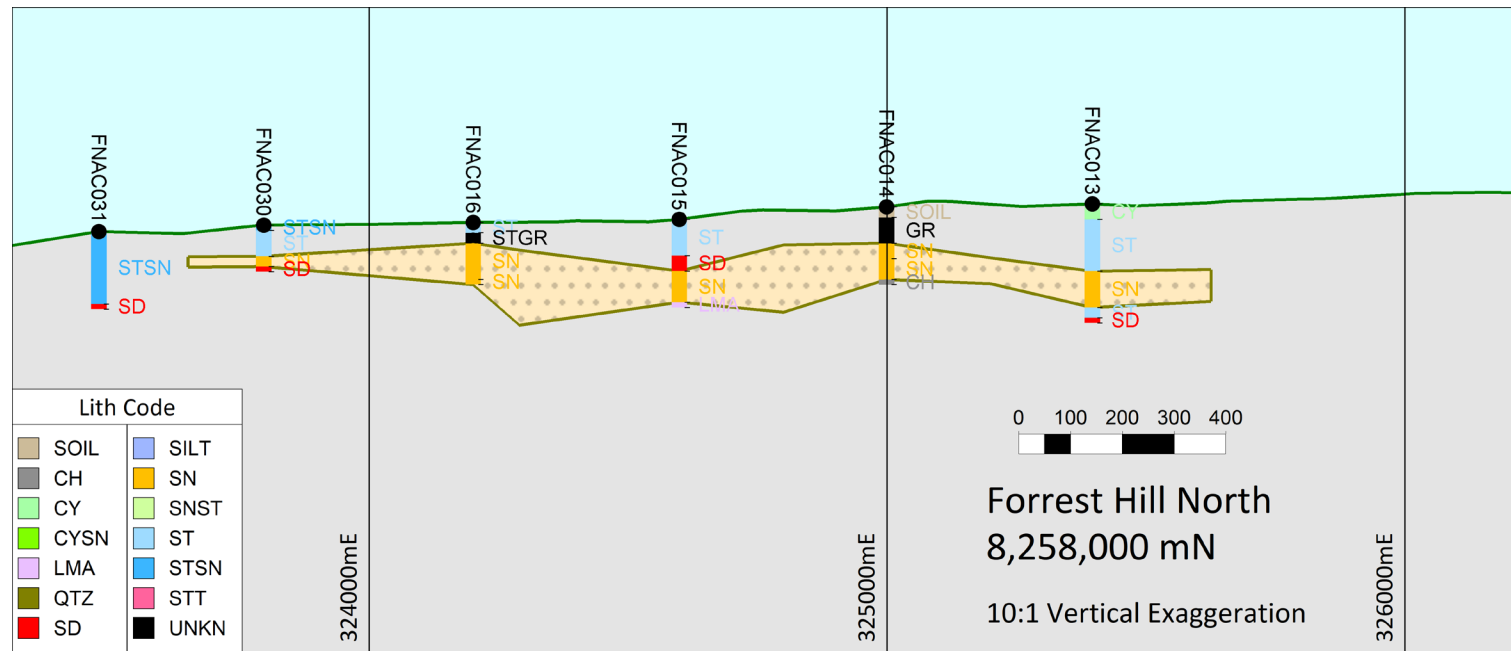
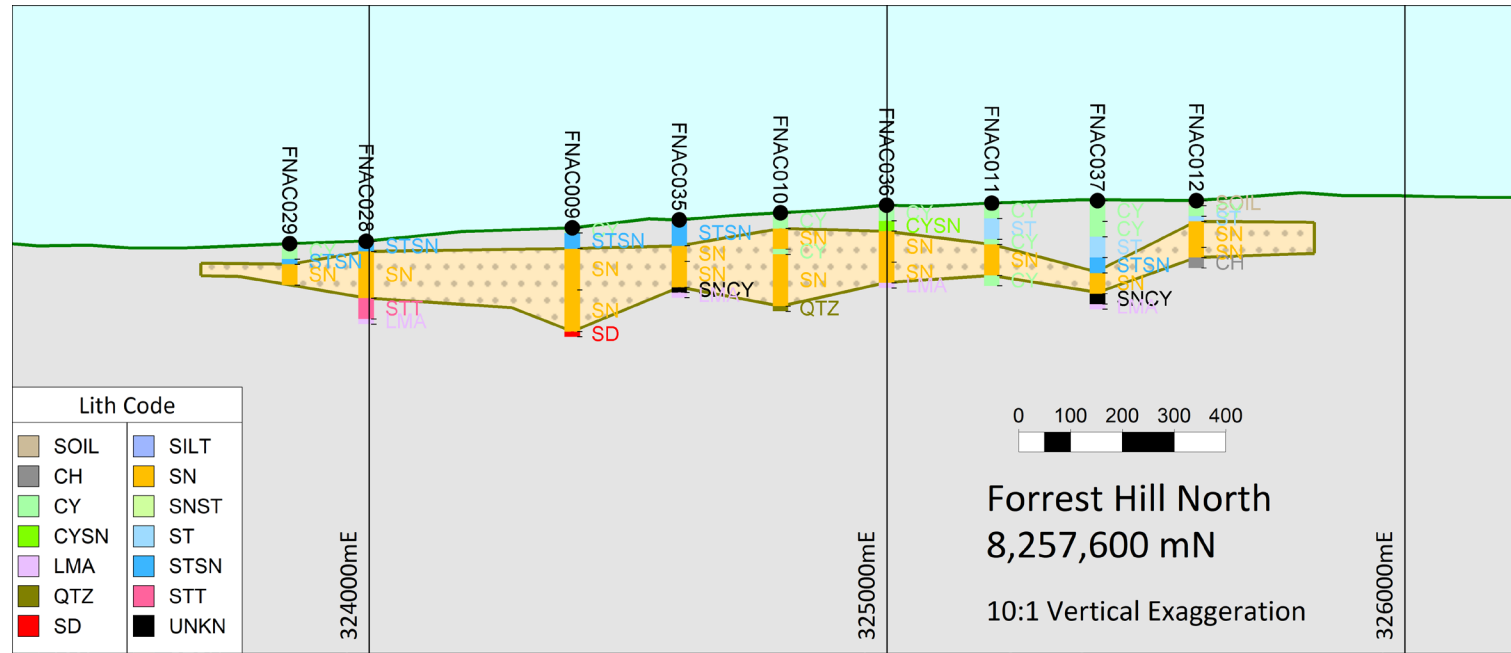
Image © 2021 Maxar Technologies

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2 km



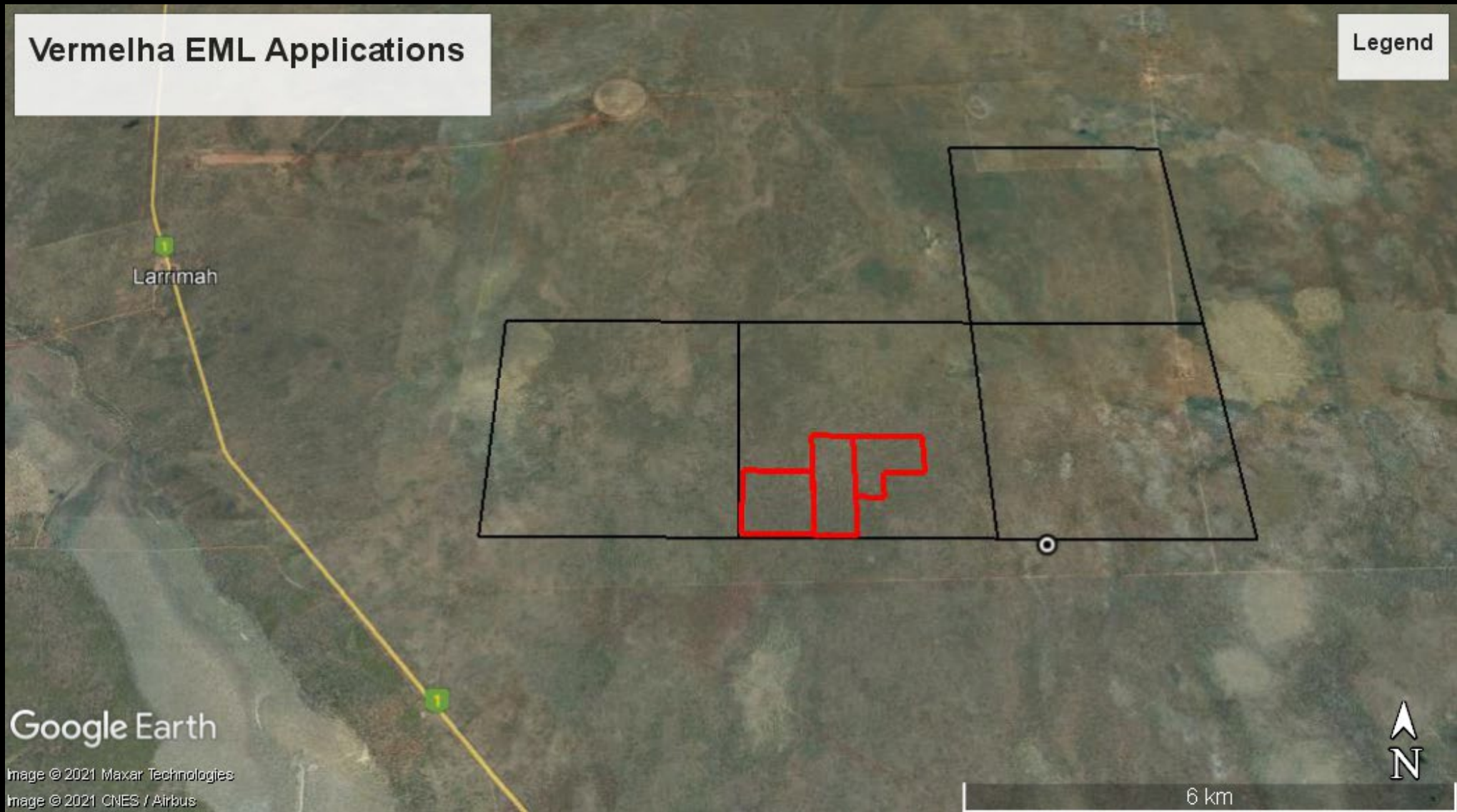
**FORREST HILL NORTH FRAC SAND  
QUARRY LEASE APPLICATIONS**



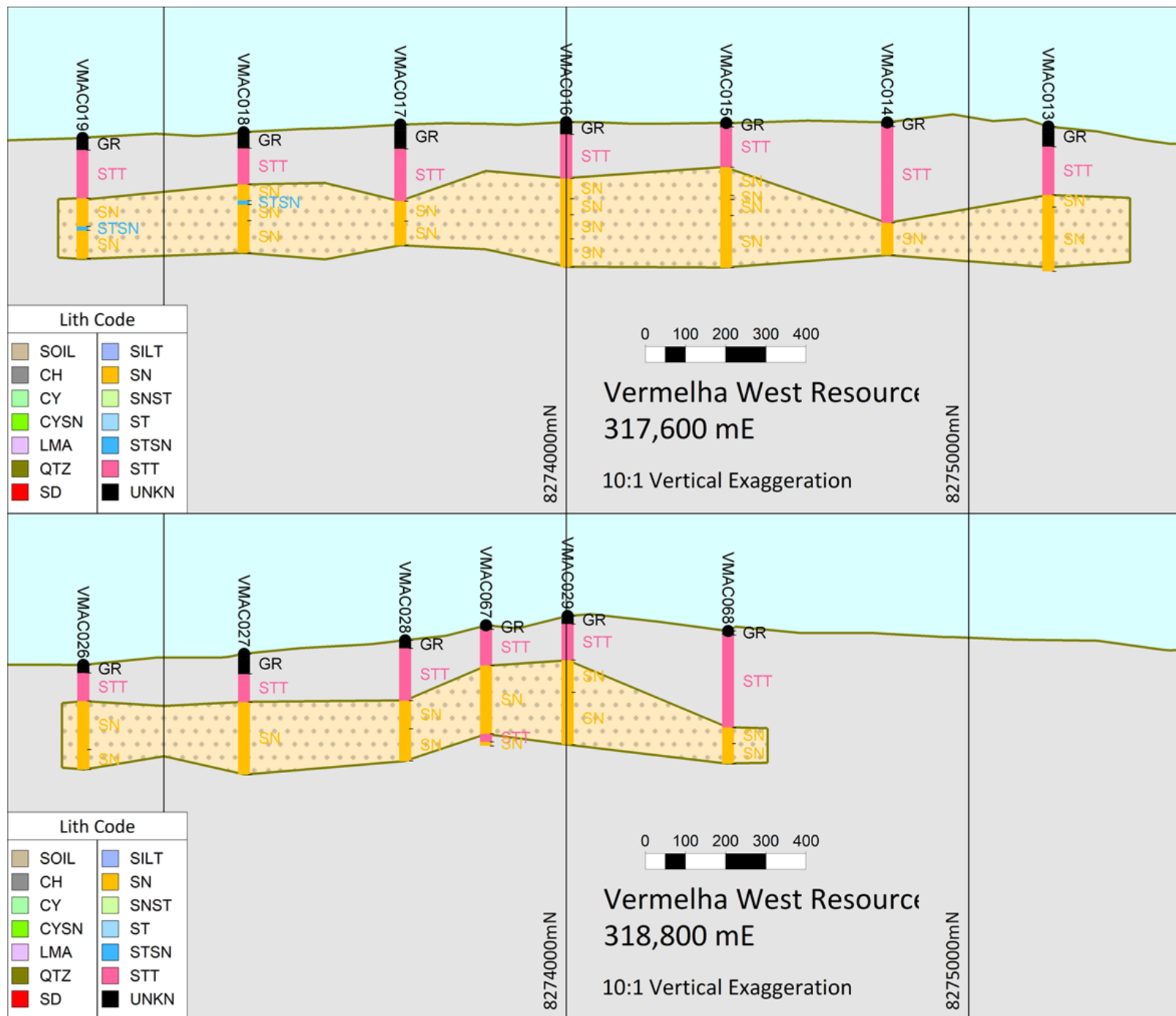


## Vermelha EML Applications

Legend



## VERMELHA FRAC SAND PROJECT QUARRY LEASE APPLICATIONS



# FRAC SAND TESTING

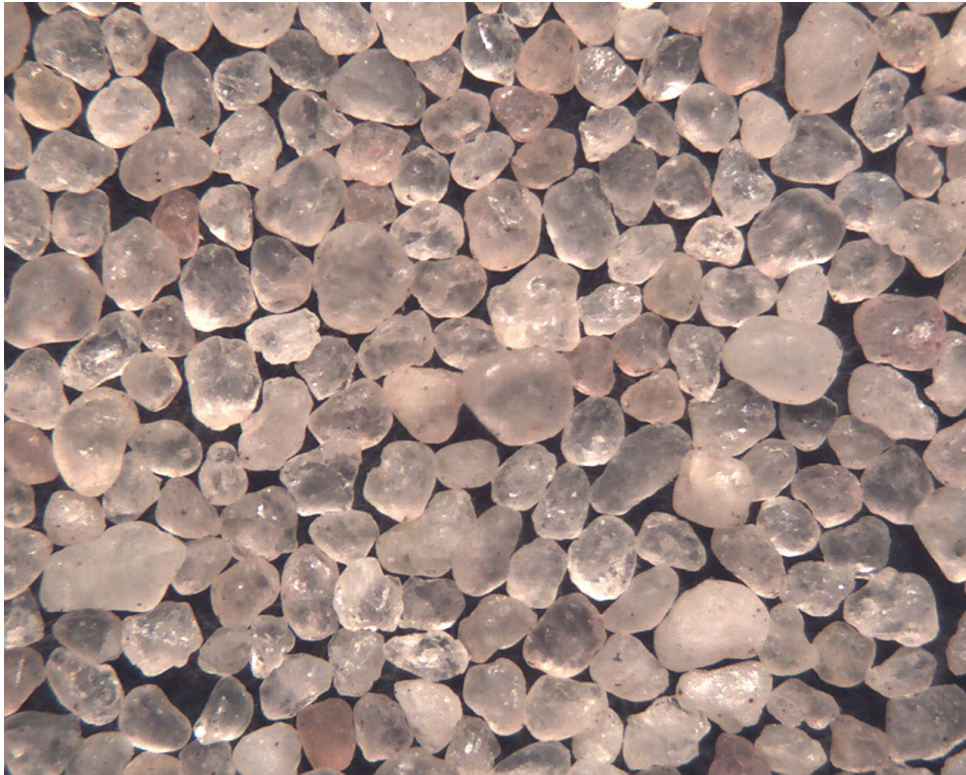
- PARTICLE SIZE DISTRIBUTION
- PROPPANT SIZES 20/40 – 30/50 - 40/70 -70/140 – 100 mesh
- SPHERICITY
- ROUNDNESS
- CRUSH STRENGTH TEST
- BULK DENSITY
- TURBIDITY
- ACID SOLUBILITY



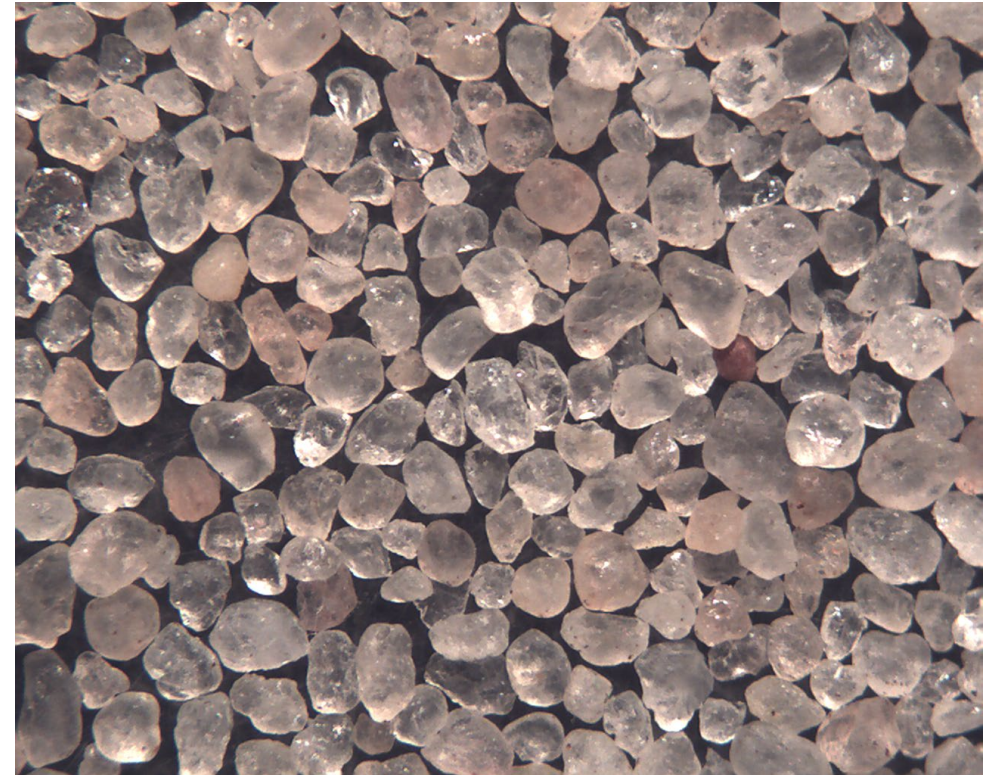
# 2020 FRAC SAND PHOTOGRAPHS – SAND GRAINS LARRIMAH AREA SPEC PASSED FOR 20/40, 40/70 AND 40/140 PROPPANTS

2021 Sample testing is in progress – but using better processing prior to testing  
Produces better test results

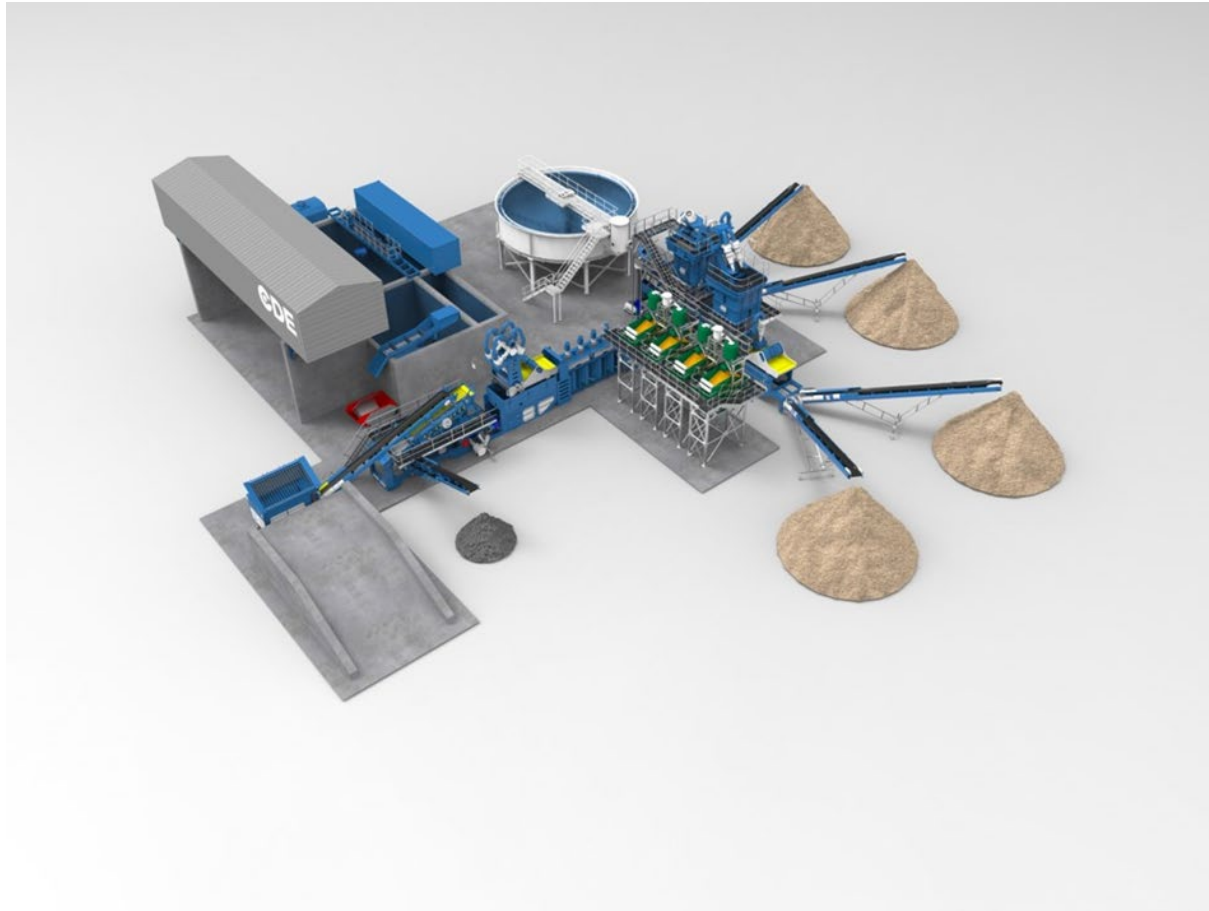
20/40 PROPPANT



40/70 PROPPANT



# WHAT DOES A FRAC SAND PLANT LOOK LIKE







# VERTICAL STORAGE — SILOS

From Black Mountain Frac sand mines USA

# SAND BOX OR SAND CANS

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# FRAC SAND NUMBERS

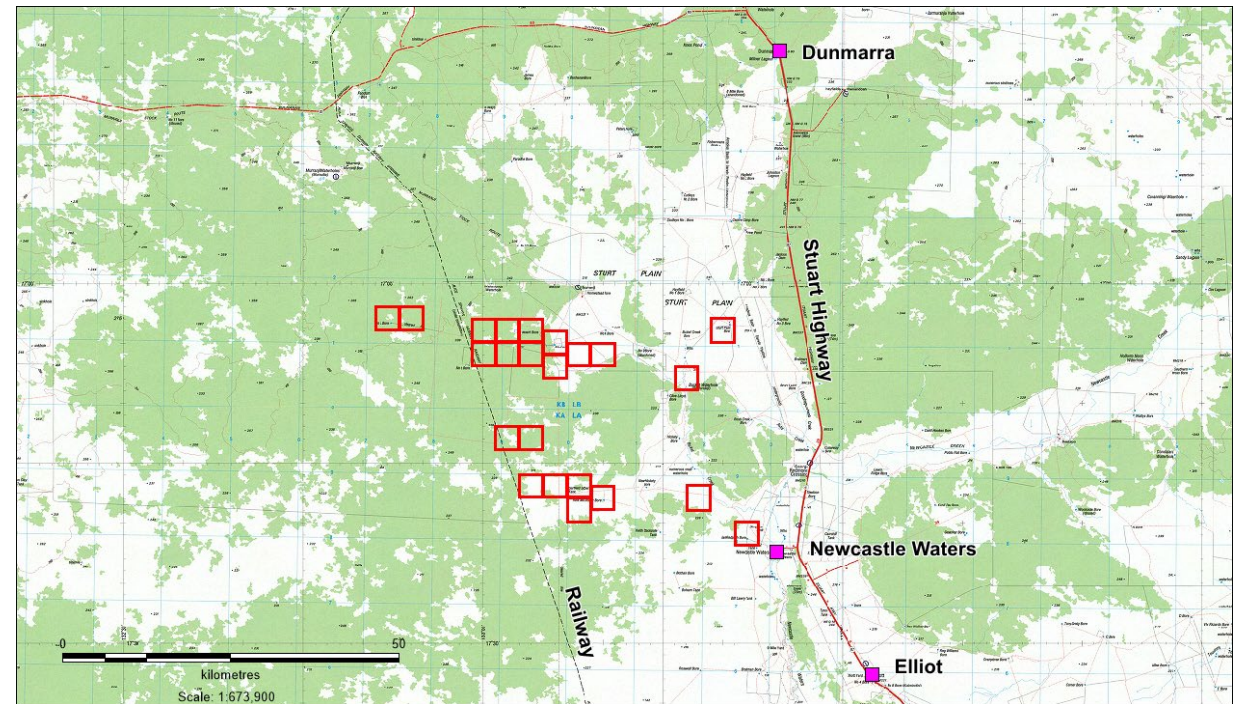
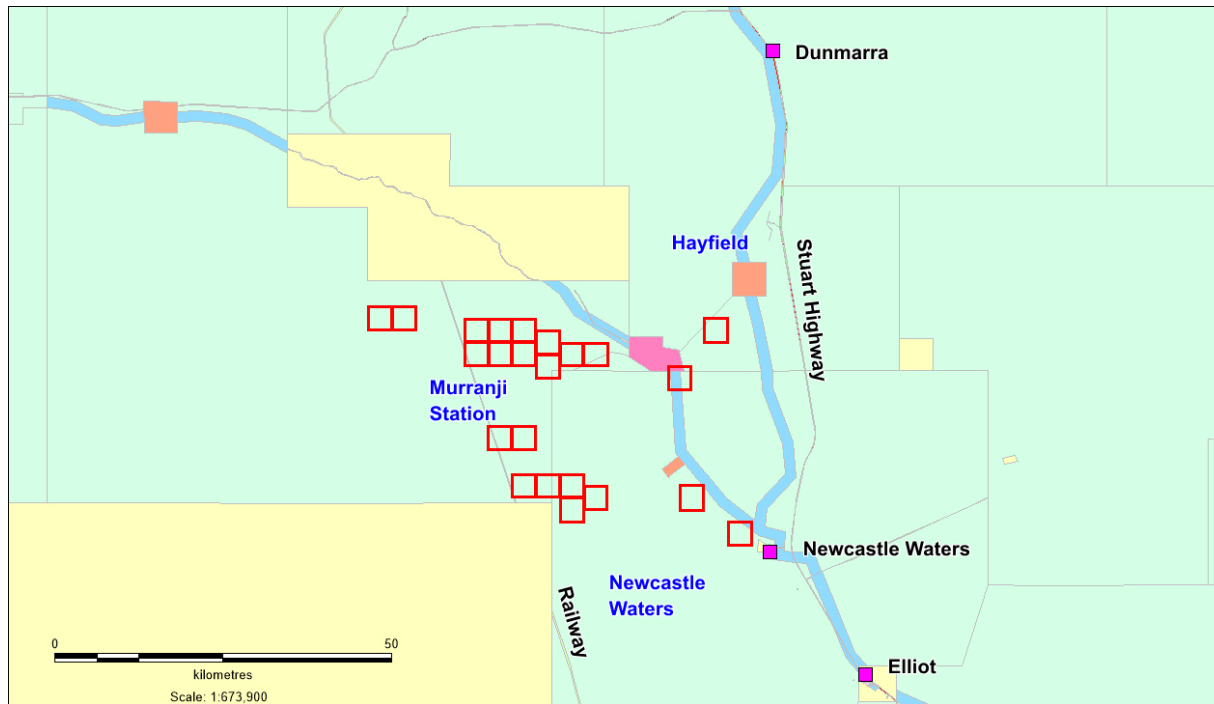
- 9000 TONNES OF SAND PER HOLE
- AROUND 125 TRUCK DELIVERIES PER HOLE (Triple Road Trains)
  - SAND CAN/SAND BOX CAN HOLD 24 TONNES
- POSSIBLE PEAK DEMAND OF 3-5 MILLION TONNES OF SAND PER YEAR



# SILICA SAND PROJECT TENEMENTS

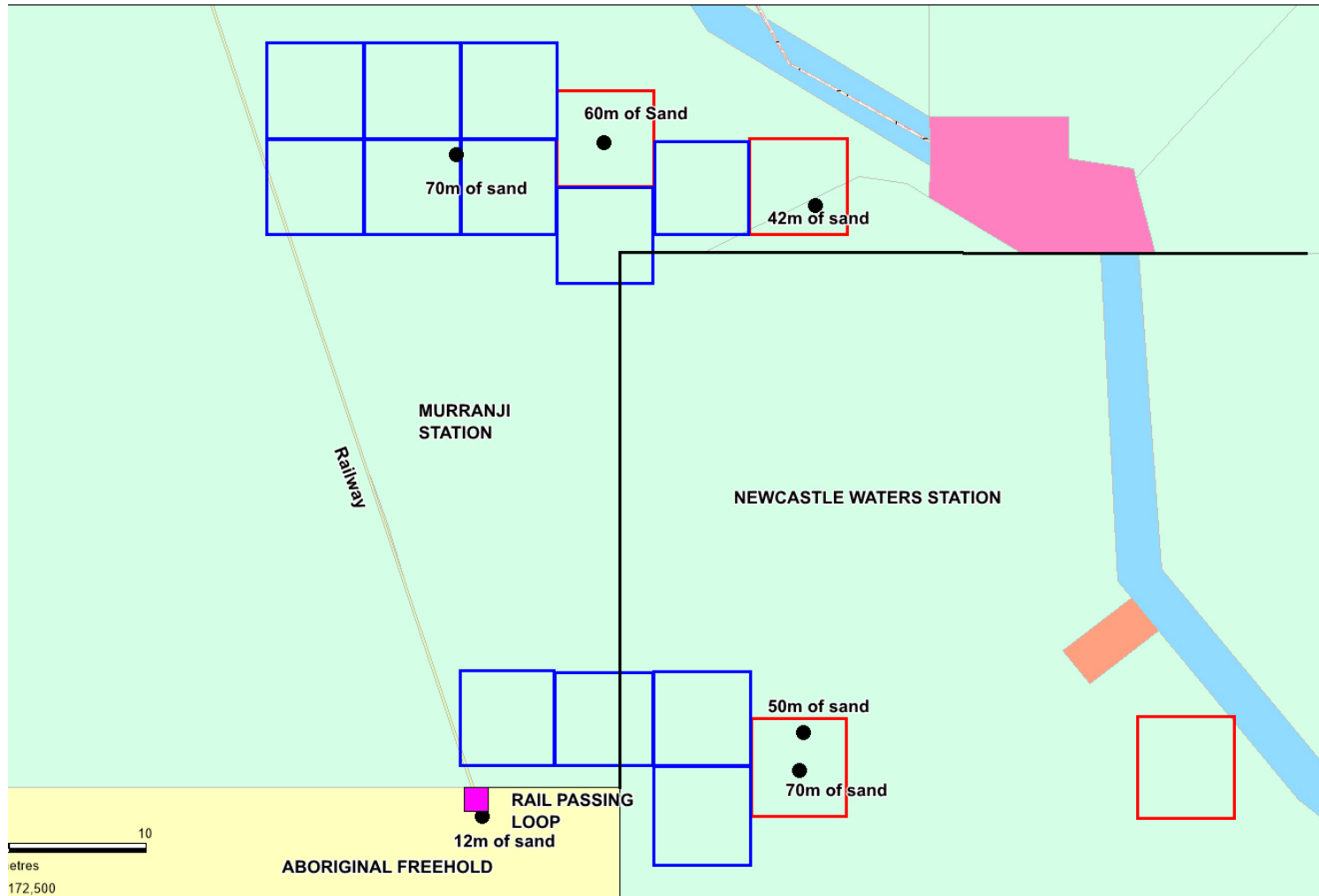
Targeting purity of  $>99.5\%$   $\text{SiO}_2$  and  $<300\text{ppm}$   $\text{Fe}_2\text{O}_3$

Location – Murrانji and Newcastle Waters Stations



Why look here?

Sand from previous drilling is 40-70m thick



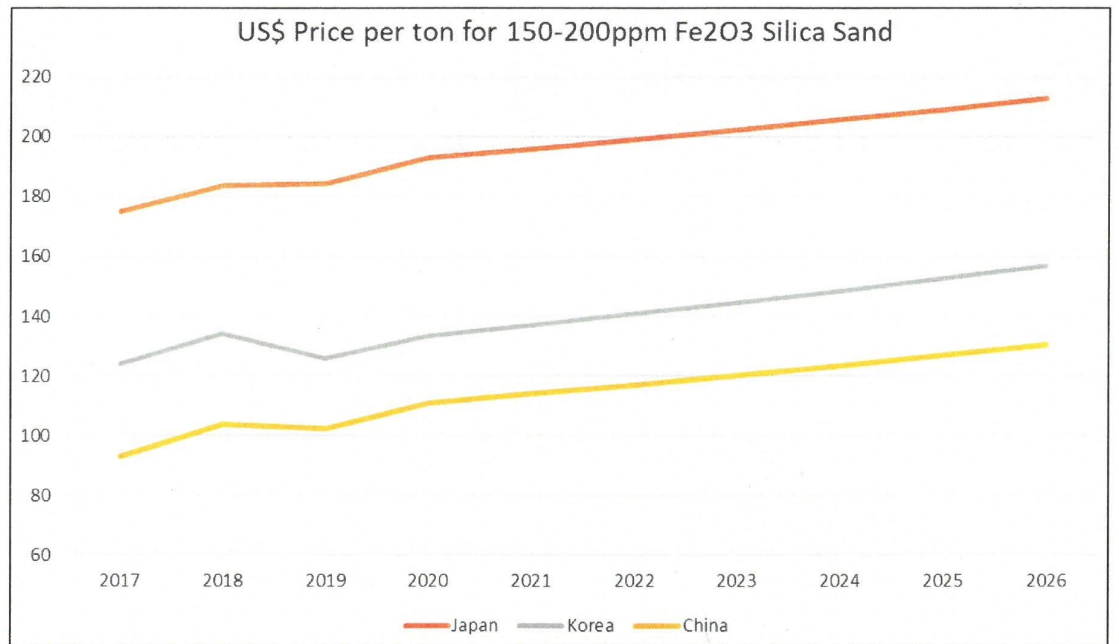






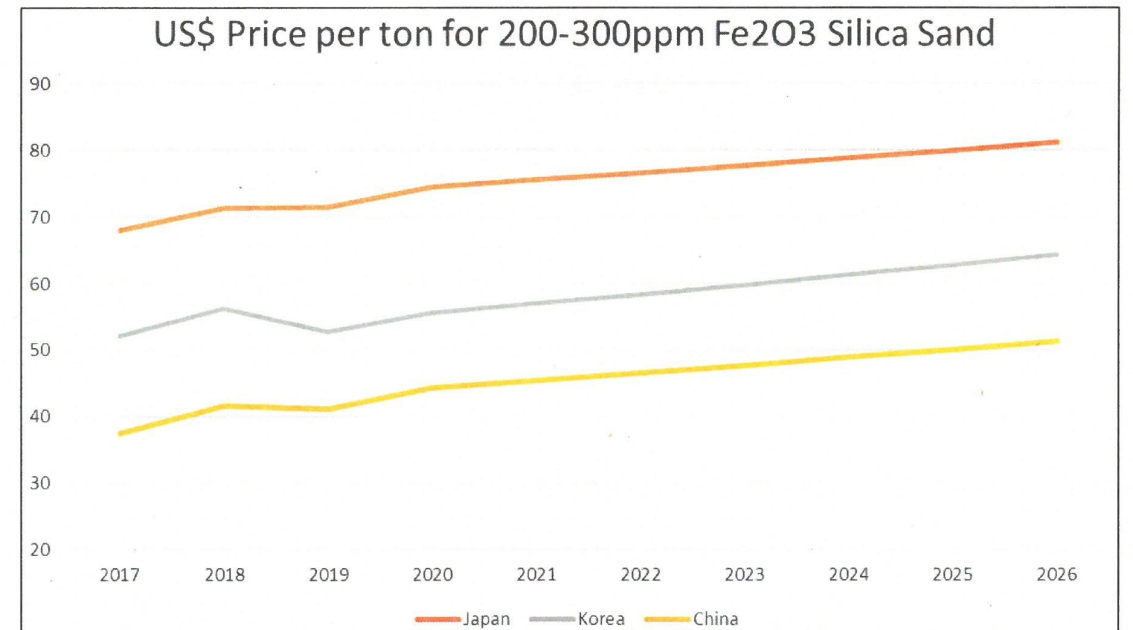


# SILICA SAND PRICING



**Figure 2.11** Silica sand pricing in APAC region

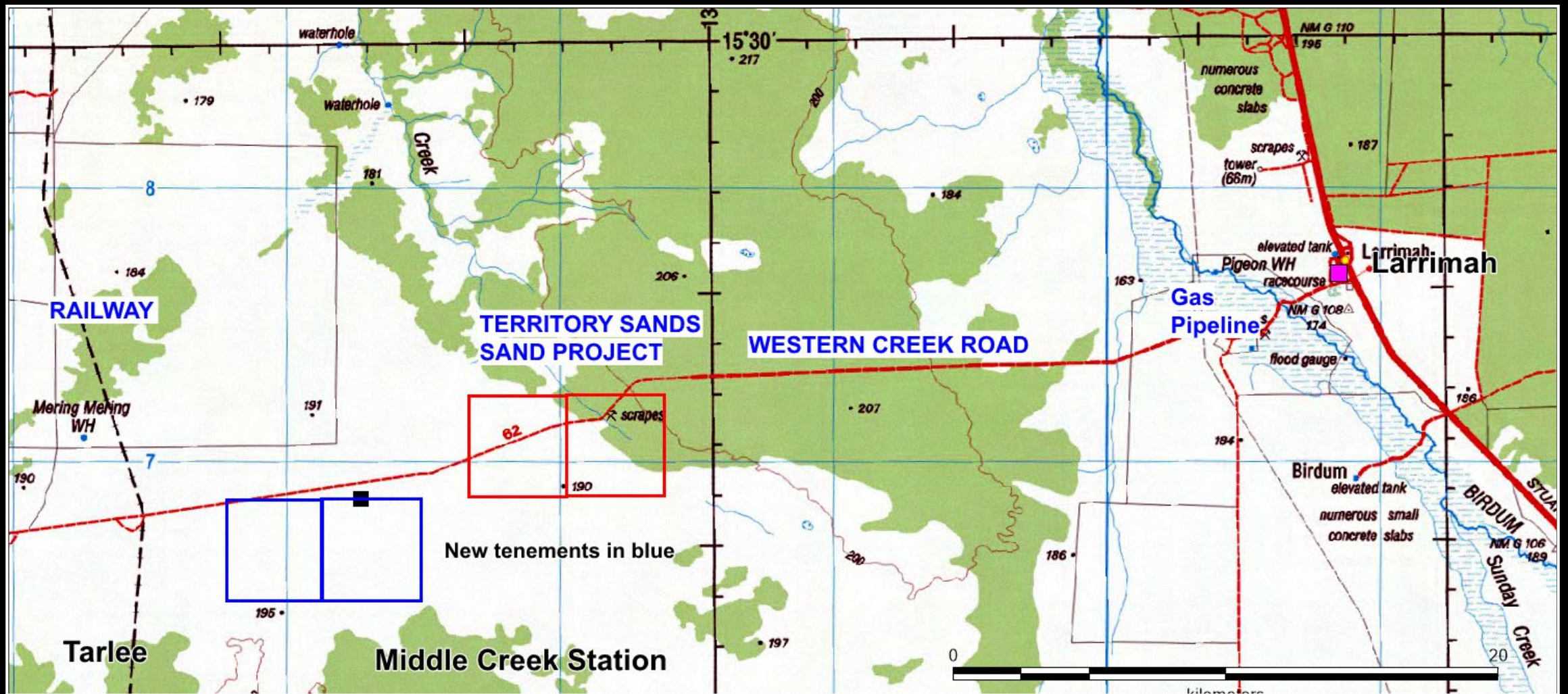
Source: IMARC



**Figure 2.12** Silica sand pricing in APAC region

Source: IMARC





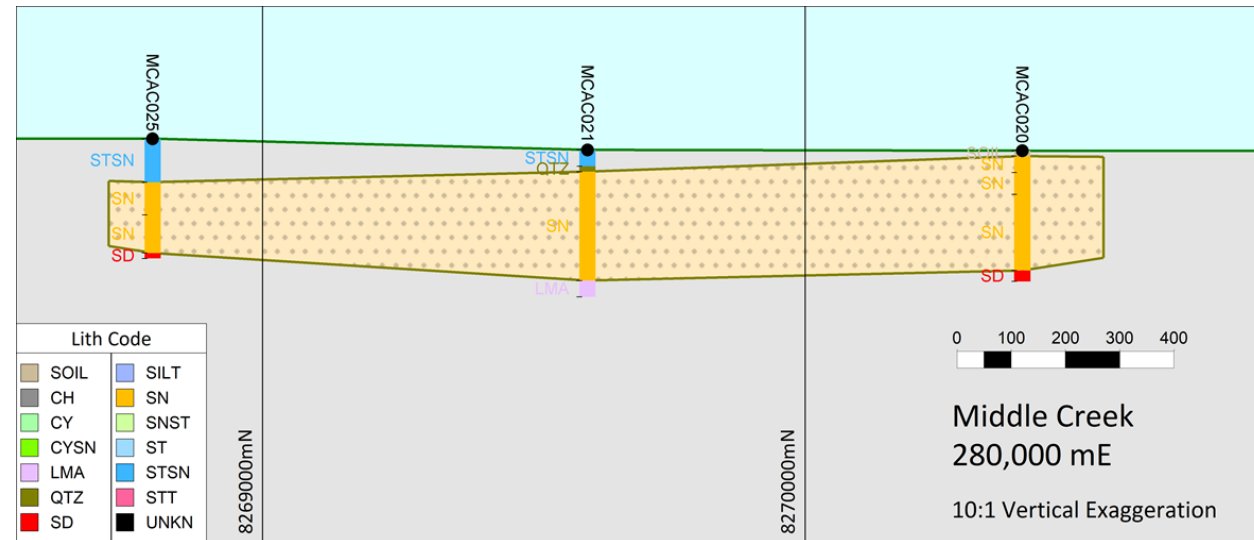
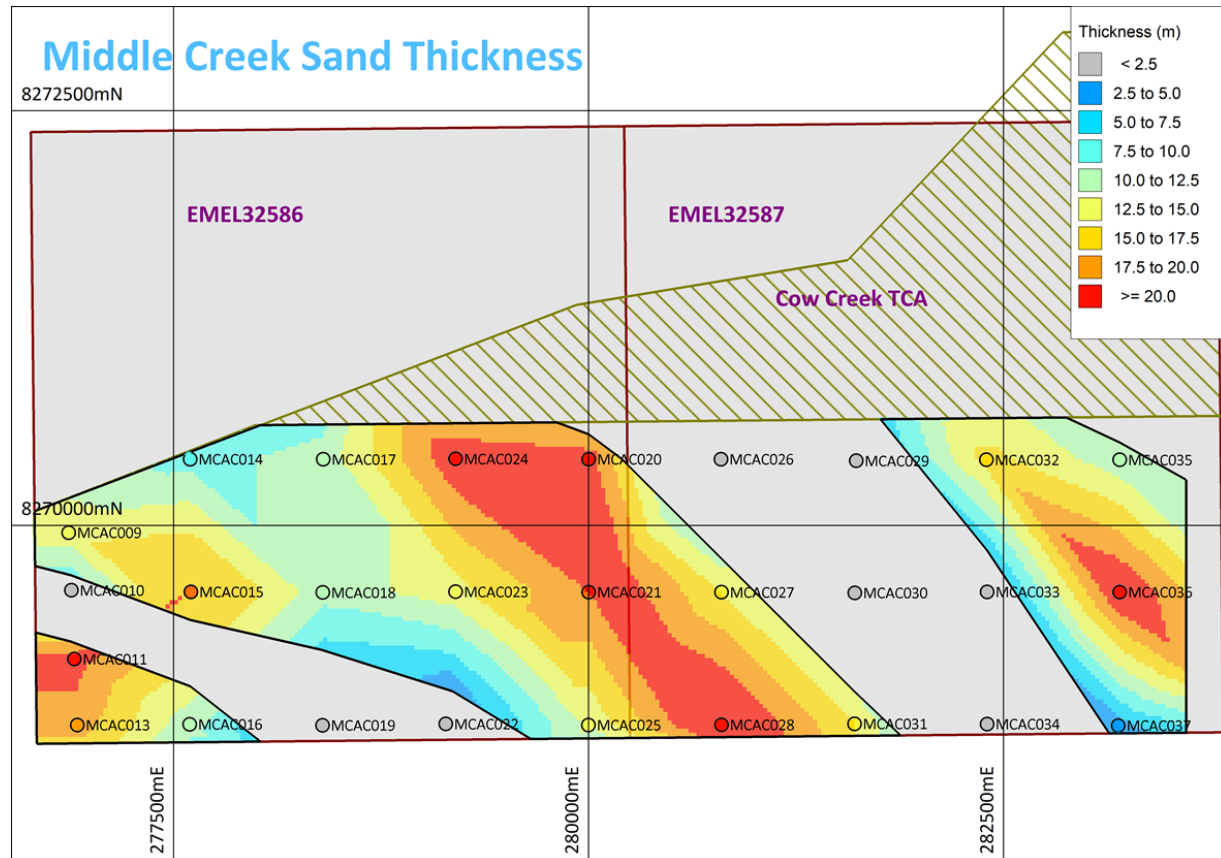
**WESTERN CREEK CONSTRUCTION SAND PROJECT**  
131 million tonnes of Inferred sand resources on the red tenements  
Drilling planned on the blue tenements in 2022

# CONSTRUCTION SAND EXPORT TO SINGAPORE

- Singapore imports 63 million tonnes of sand per year
- Asian countries are stopping exports to Singapore due to illegal mining practices and environmental concerns
- Singapore is looking for new long term suppliers of quality sand from regulated mining activities and jurisdictions
- Australasian Sands out of Western Australia signed in 2020 to export 1.1 million tonnes per year but are restricted by rail and port costs
- Darwin Port has 6-7 million tonnes capacity?
- One Rail/Aurizon has no capacity constraints?
- Good potential for a stable, sustainable long term export business utilising the railway and Darwin Port

# MIDDLE CREEK CONSTRUCTION SAND

Tonnage is currently 131 million tonnes of washed sand







- Proposed Rail Loading facility Western Creek Road
- (similar to this site in the USA)





THANKS

