The Callista Rare Earth Element Project

Discovery and characterisation of regolith-hosted REE mineralisation, Southwark granite suite, western Arunta region

GSW Resources Pty Ltd

AGES Presentation
April 2024

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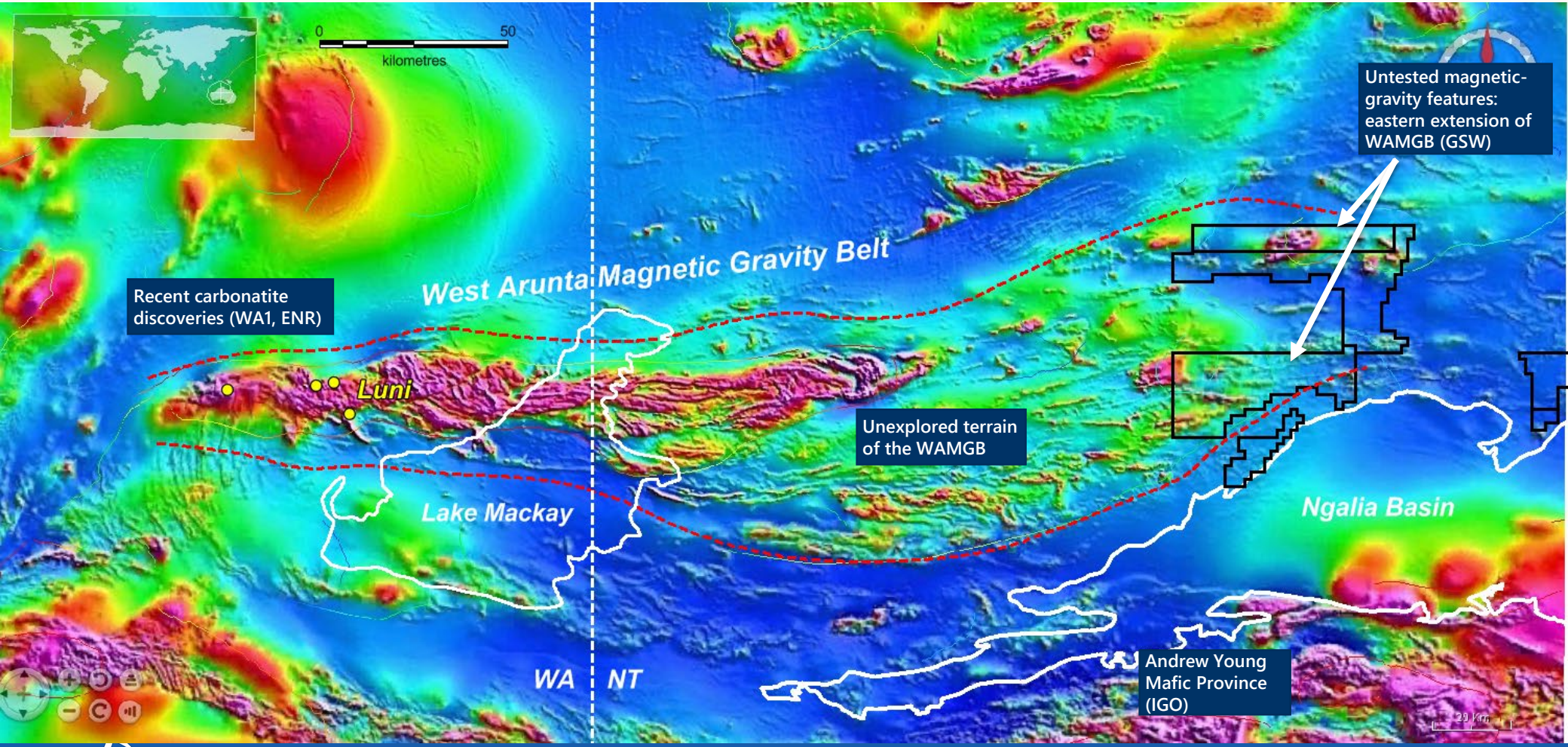
GSW Resources – who are we? – where are we?

Privately-owned, NT-focused critical minerals explorer with >1,700 km² granted tenements in the prospective West Arunta region of the Aileron Province

– an emerging Critical Metals Province – especially for rare-earth elements & niobium

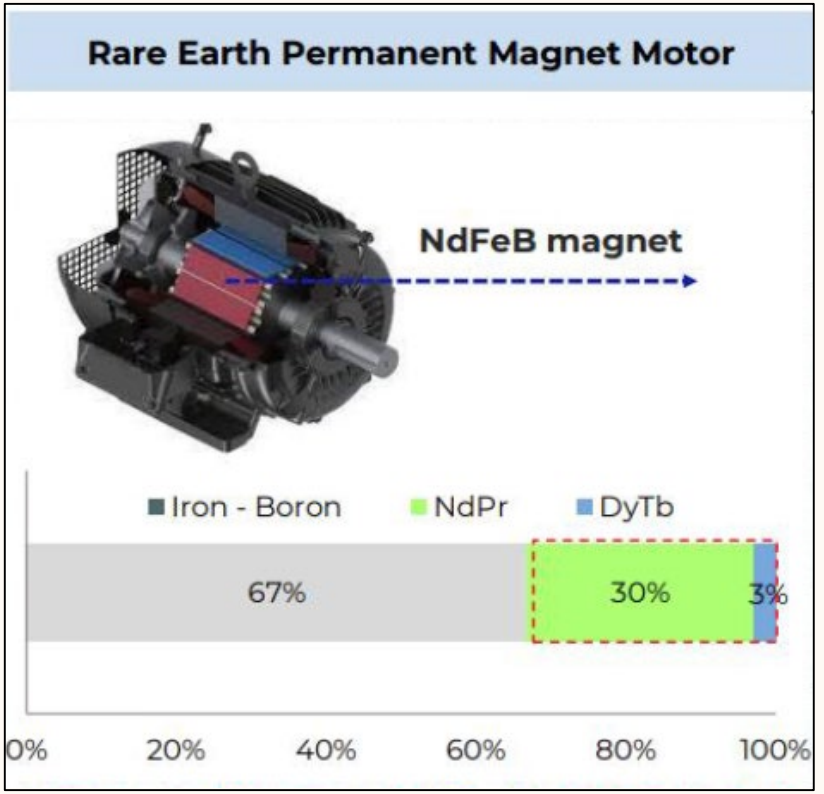
GSW tenure at eastern end of the prospective and underexplored West Arunta Magnetic and Gravity Belt



Source: Company Reports, Capital IQ, Bloomberg

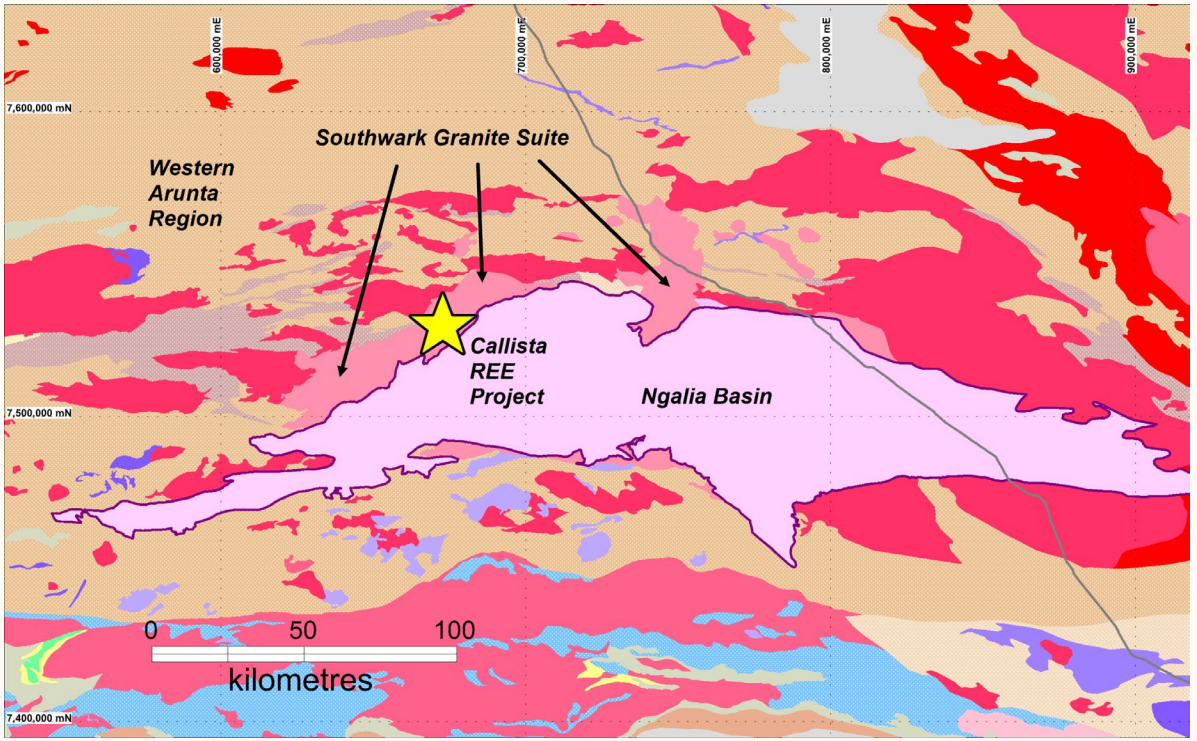
Rare Earth Element Facts

- There are 15 Rare Earth Elements including Yttrium
- 'Light' LREE – La to Eu, 'Heavy' HREE – Gd to Lu & Y
- TREO – Total Rare Earth Oxides – sum of 15 oxides
- The valuable or payable Rare Earths are the so called 'Magnet REEs' Nd, Pr, Tb, Dy because of their use in magnet technologies
- REE extraction process dependent on ore mineralogy
- Processing is capital-intensive for hard rock & heavy mineral sands deposits dominated by refractory monazite and xenotime
- Among regolith-hosted deposits those with REEs adsorbed on clays (IAC-type) have the lowest costs
- Many clay-hosted deposits are only extractable with weak acids, especially HCl (WAE-type)
- Technically challenging to separate the REEs
- REE market & technologies dominated by China
- Long-term NdPr incentive price for greenfields projects needs to be at least US$100/kg (current spot ~US$50/kg)



57 La Lanthanum | 58 Ce Cerium | 59 Pr Praseodymium | 60 Nd Neodymium | 62 Sm Samarium | 63 Eu Europium | 64 Gd Gadolinium | 65 Tb Terbium | 66 Dy Dysprosium | 67 Ho Holmium | 68 Er Erbium | 69 Tm Thulium | 70 Yb Ytterbium | 71 Lu Lutetium | 39 Y Yttrium

- AGES 2022 : interest sparked in exploration for possible IAC-style REE-in-clay deposits in the NT
- GSW decided to target the incompatible element enriched granite terrain of the West Arunta region and in particular the Southwark Granite Suite
- Callista REE Project was born



PROJECT BEGINNINGS & EXPLORATION TIMELINE

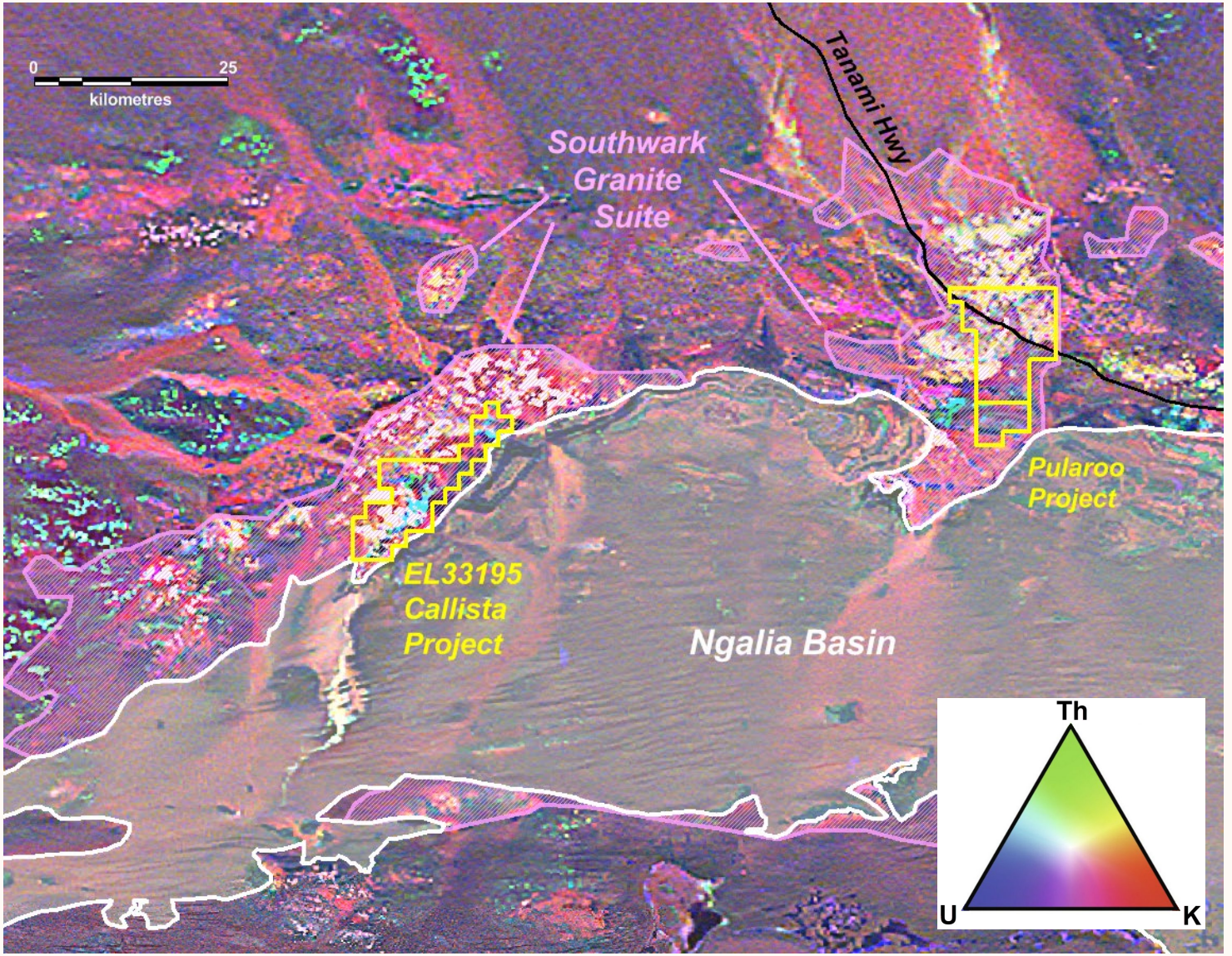
- Regional Targeting 2022
- Prospect Identification and Ground Acquisition
- Surface Regolith Sampling
- Geological Model
- Co-funding Application 2023
- Initial Aircore Drilling
- REE Mineralisation Identified
- Regolith Profile Characterised
- Initial Metallurgical Testing 2024
- Early Mineralogical Insights

Callista Project Targeting – Southwark Granite Suite

Southwark granite suite is a 1570 Ma aged, radiogenically anomalous, incompatible-element-enriched granite suite on the Ngalia Basin margin.

Reports of elevated rare earths in regolith developed on the Southwark granite by previous uranium explorers who followed up an aerial radiometric anomaly.

EL33195 acquired by GSW for REE-in-regolith exploration in 2022, other tenements to the east added later.

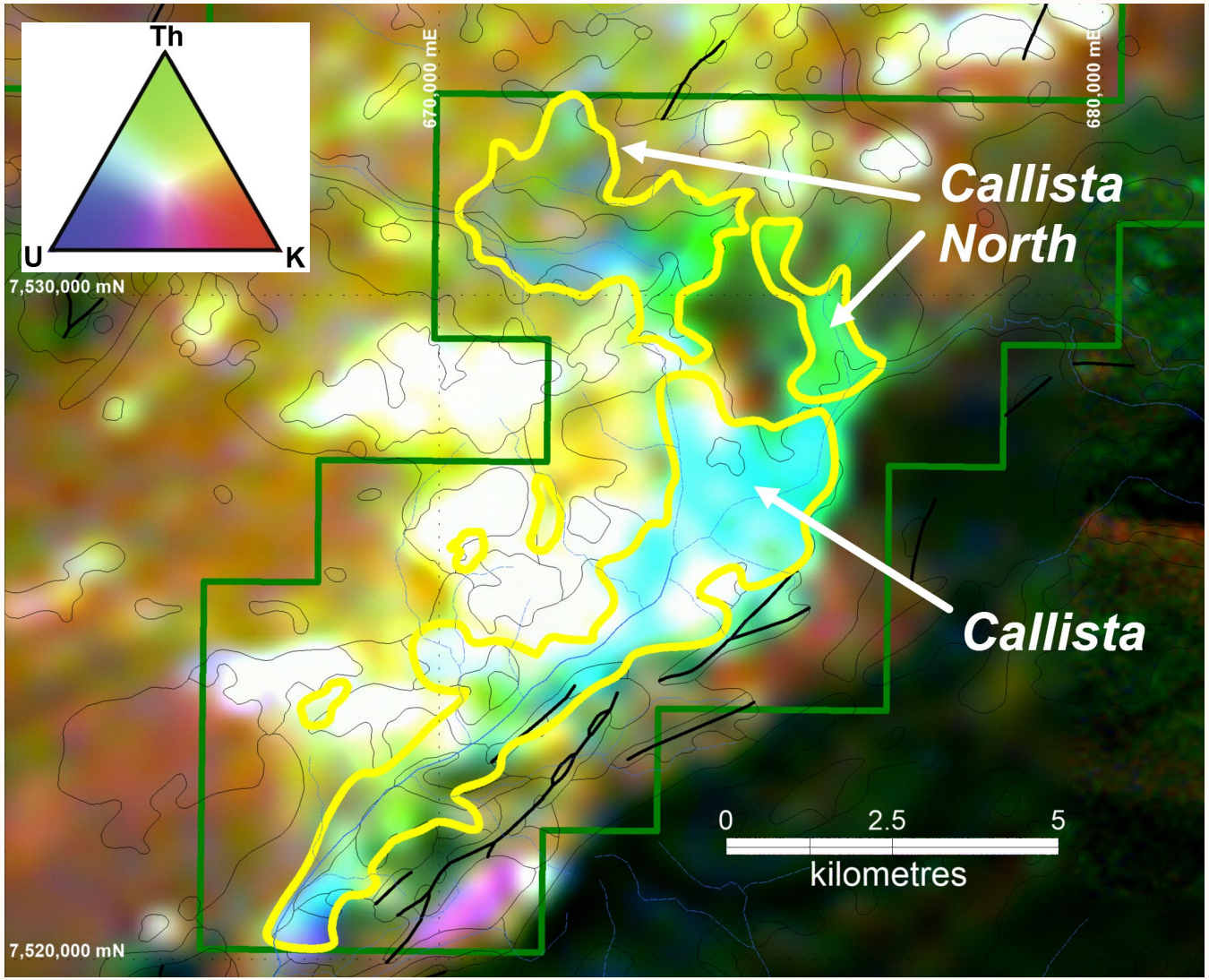


Callista Project Targeting – Radiometrics

Th and U broadly correlate with REE abundance in incompatible element rich granites

Anomalous Th and U radiometric response adjacent to outcrop of 'hot' Southwark granite

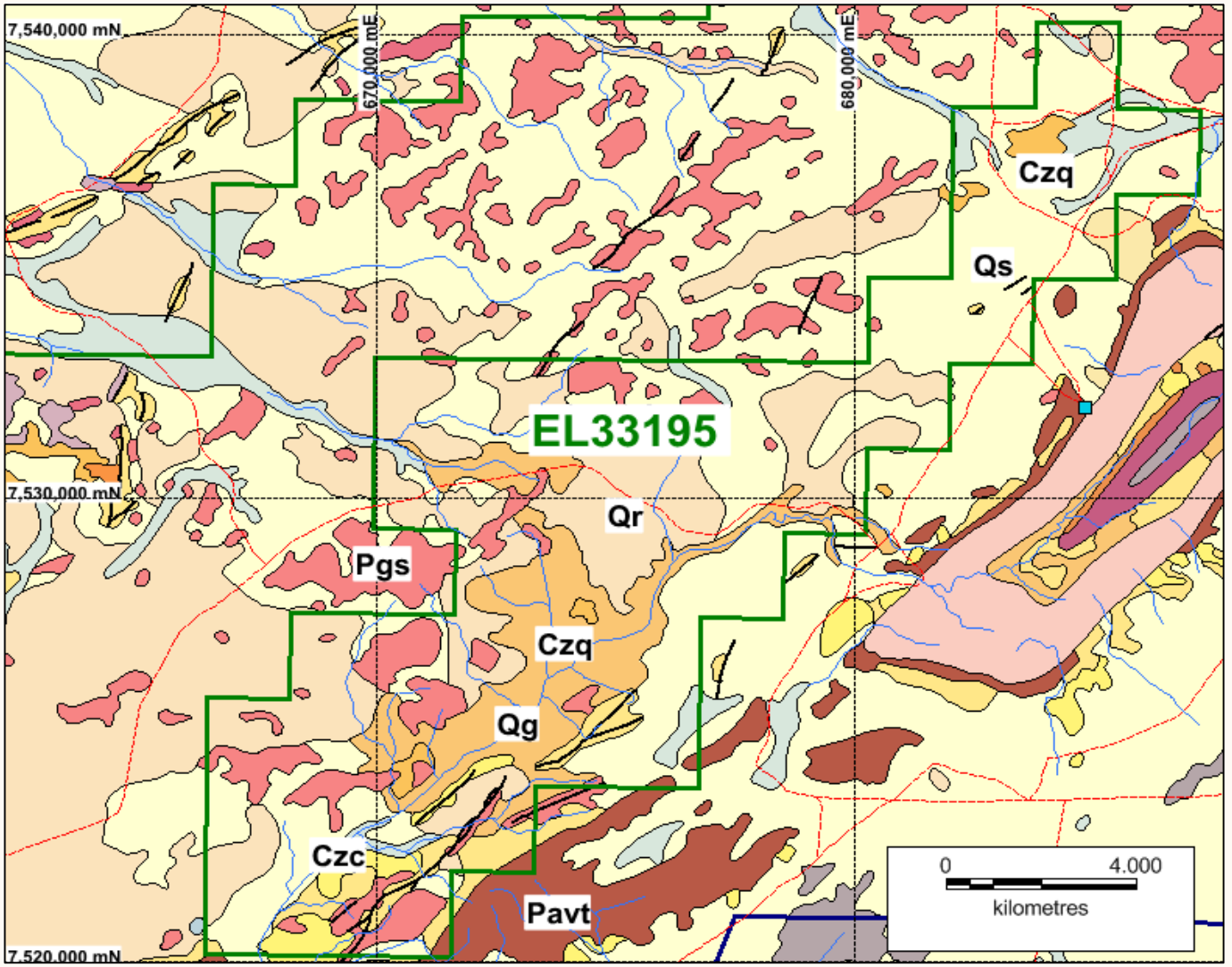
GSW focused on two main prospect areas: Callista and Callista North



Source:

Callista Project Targeting – Surface Geology

Radiometric anomalies coincide with mapped regolith units including residual quartz gravel and clay (unit Czq) developed on the Southwark granite (Pgs)

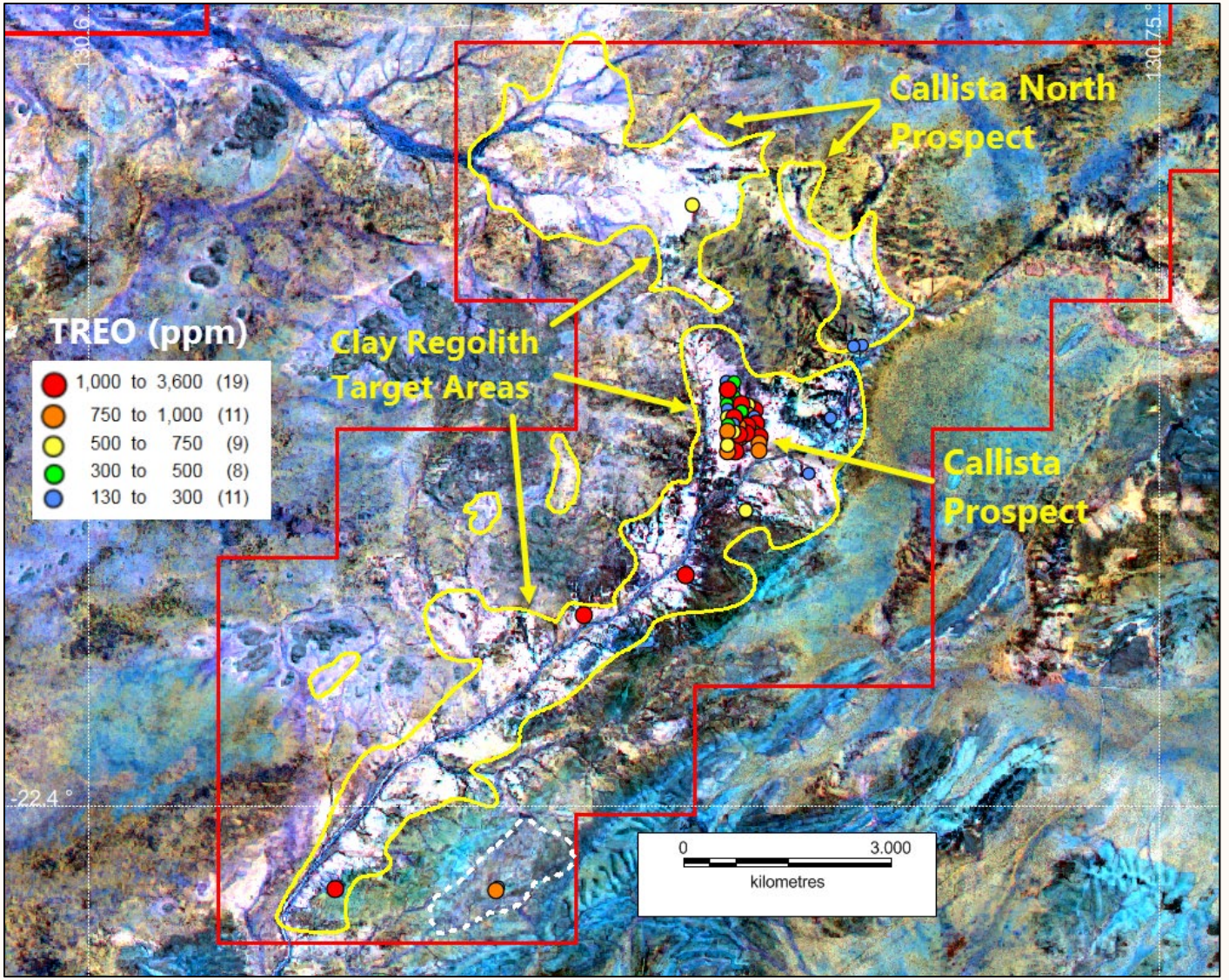


Source:

Callista Project Targeting - Sentinel Imagery & Soil Sampling

Multispectral remote sensing imagery showed large areas of exposed kaolinitic clays

Soil sampling confirmed anomalous REEs present with many samples over 1,000ppm TREO (Total Rare Earth Oxides)

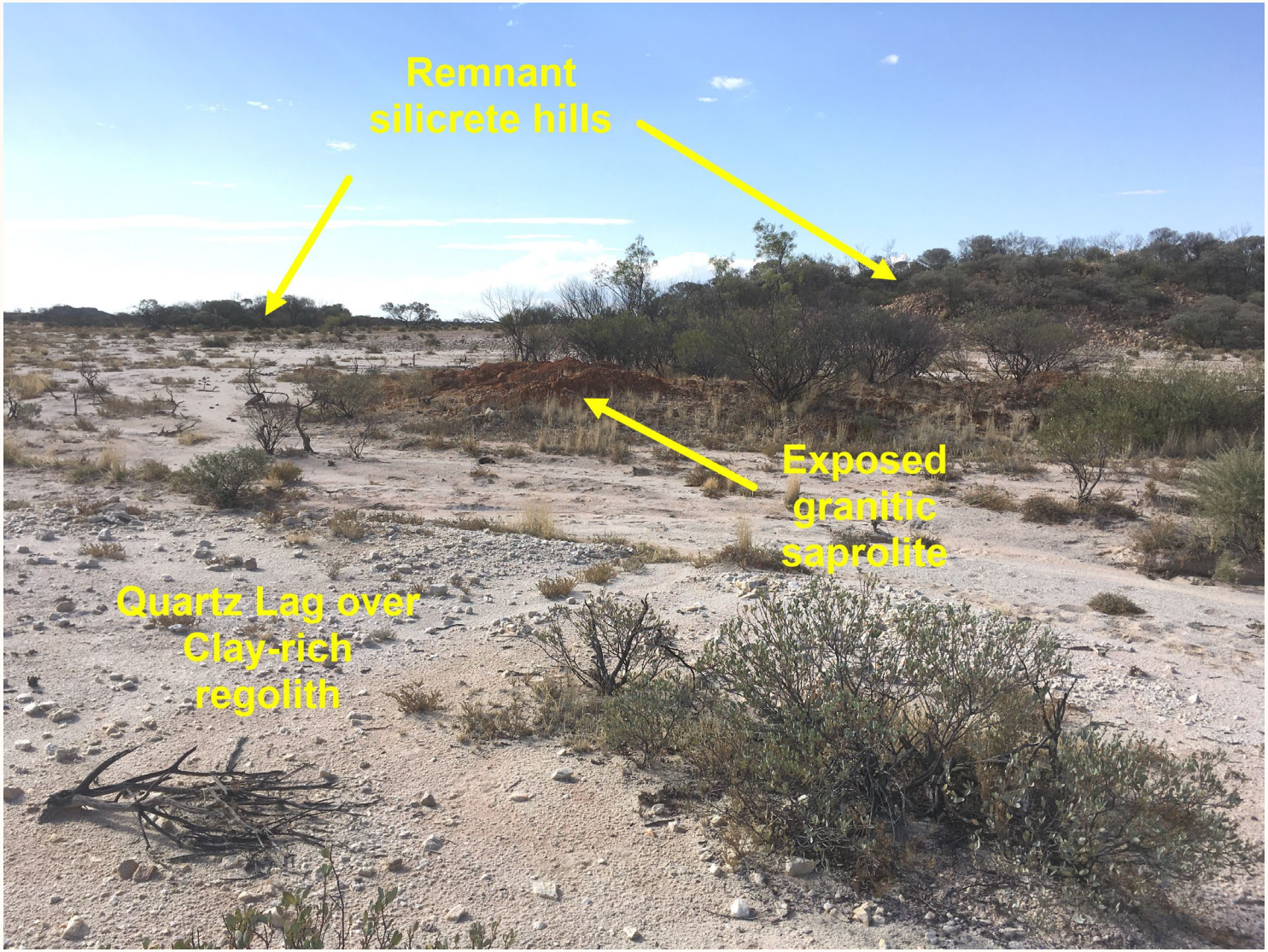


Source:

Callista Project - Surface Geology

Plains comprising quartz lag over clay-rich regolith, exposed zones of granitic saprolite and remnant silcrete capped hills.

Base of a Cenozoic drainage system – typical Central Australian inverted topography.

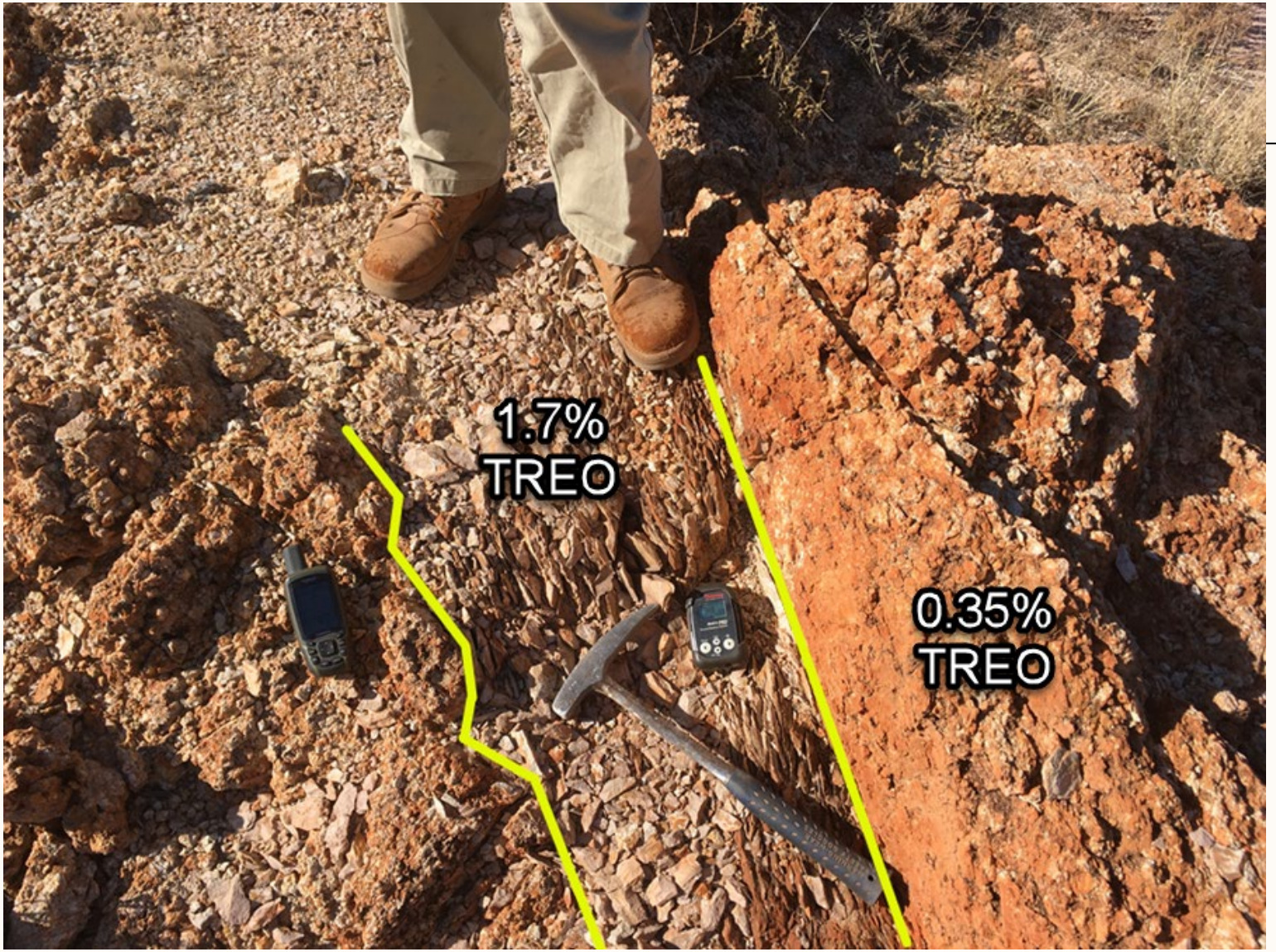


Callista Project - Unusual HREE-enriched zones

The weird and wonderful:

Saprolitic microsyenite dykes (opaline silica & kaolinite) cut granitic saprolite

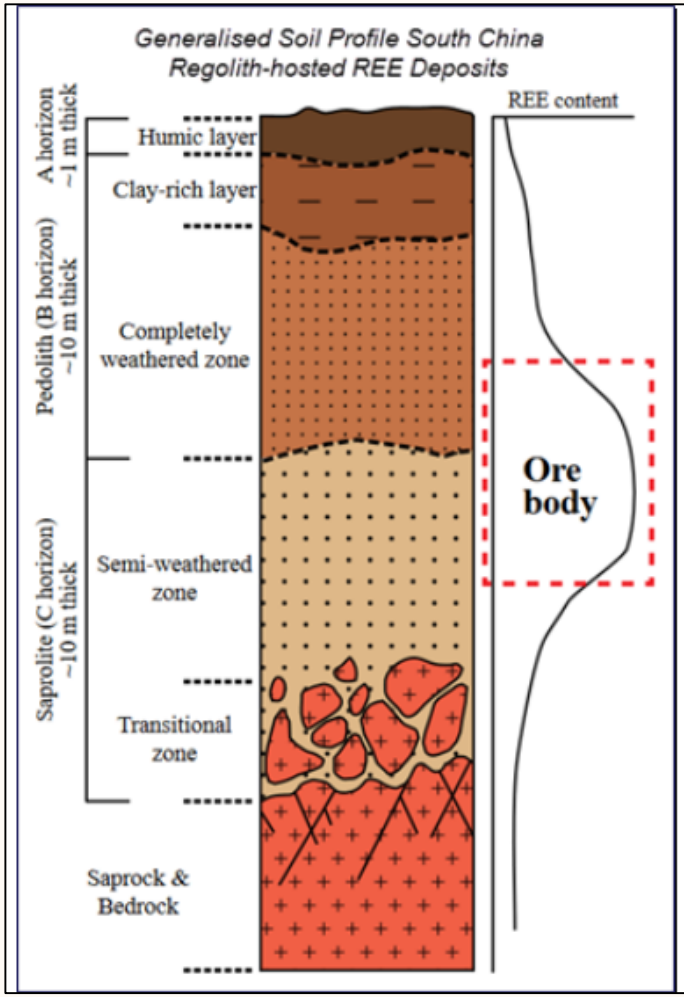
1.7% TREO
6,700 ppm Y

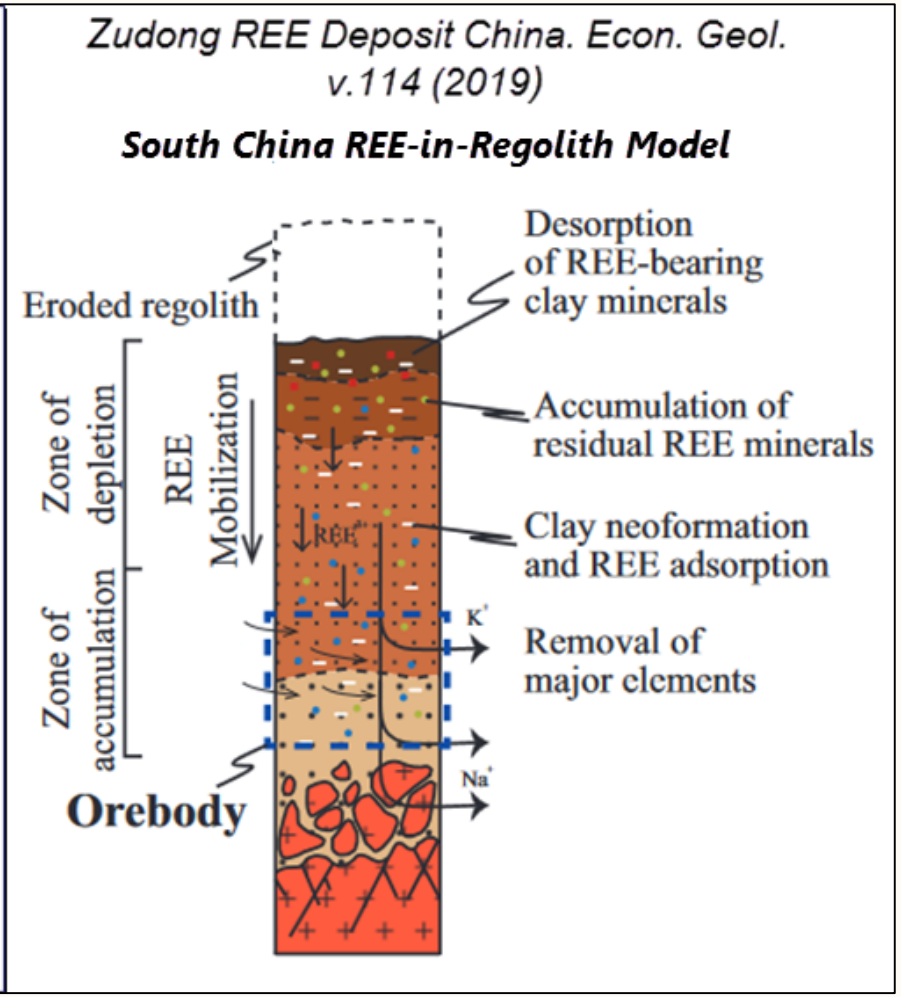


Source:

Callista Project – South China Geological Model

Acidic groundwaters mobilise the REEs in the regolith column which accumulate in a deeper zone by adsorption onto clays or by reprecipitation of secondary REE minerals. Surface zone is depleted in mobile REEs, major elements such as K are leached.



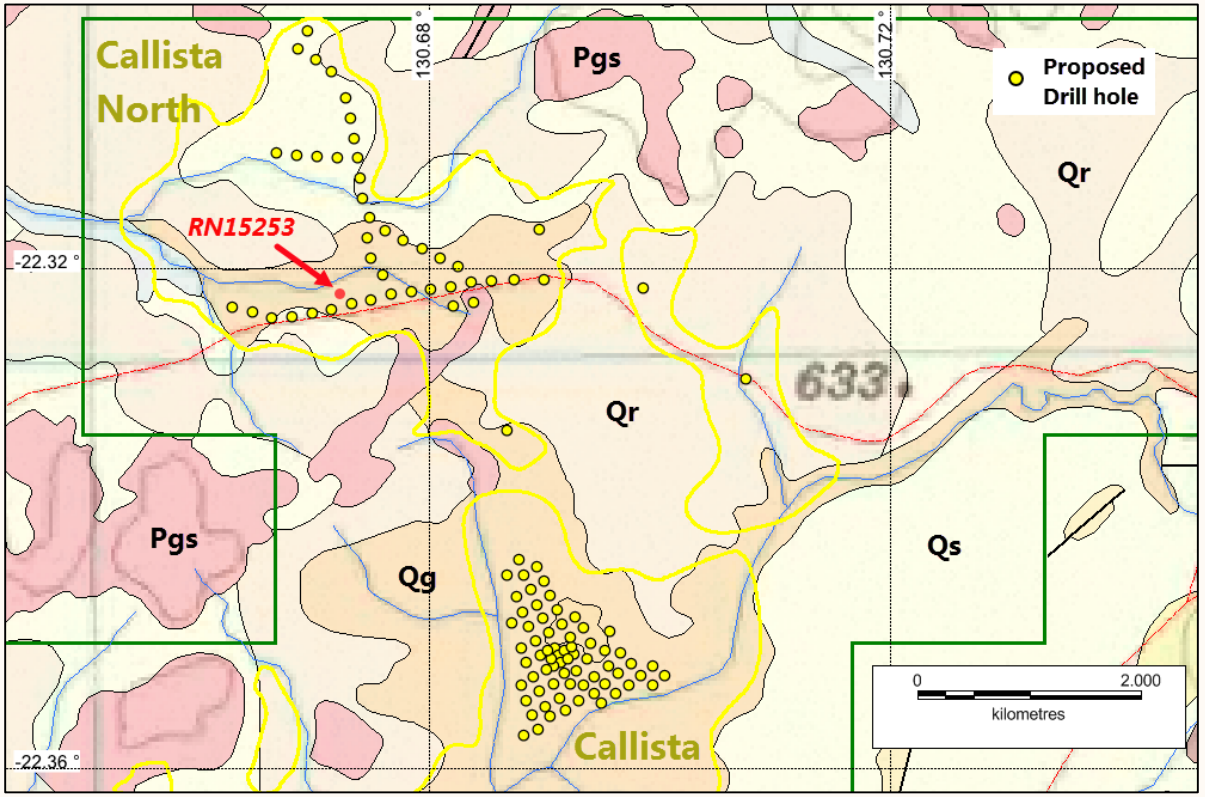


Source:

Callista Project – Co-funded Aircore Drilling Round 16

No exploration drilling had previously taken place on EL33195. A failed water bore drilled 20m of clay.

110 x ~25m deep holes planned at Callista (mainly at ~140m spacing) and Callista North prospects (reconnaissance along existing tracks at ~180m spacing). Co-funding awarded and drill program completed July 2023.



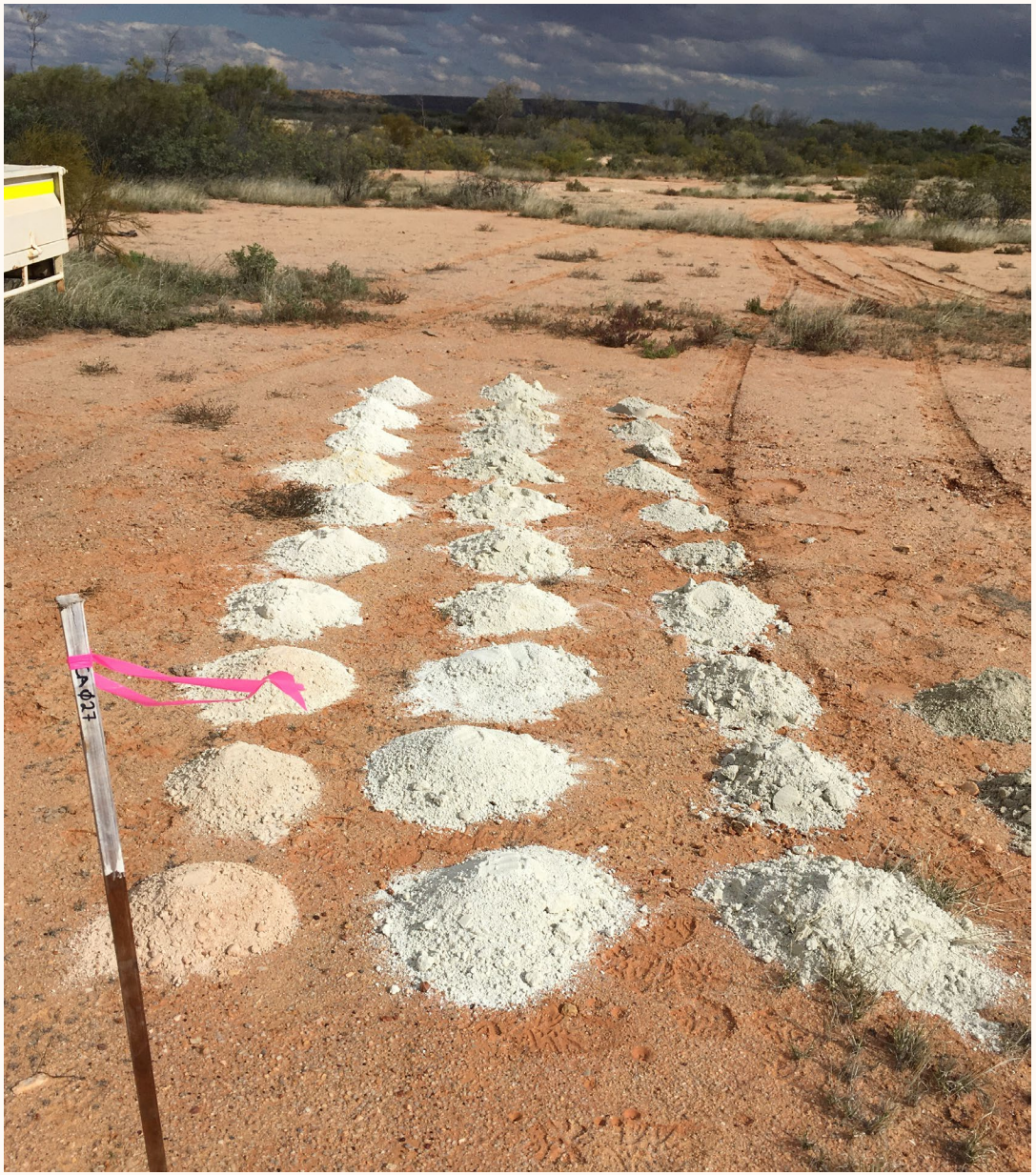
Source: Company Reports, Capital IQ, Bloomberg

Callista Co-funded Aircore Drilling

Drill Results

Drill spoil dominated by friable clays. Two distinct saprolite units were noted: an upper saprolite mostly consisting of light-coloured, often white kaolinitic clays, and a lower saprolite unit comprising darker, grey to yellow-brown clays.

Thick intervals of REE mineralisation averaging **18m** at **0.18% TREO** at Callista and **0.15% TREO** at Callista North (using a 900ppm TREO cut-off) were encountered mostly **from surface**. Soil cover typically 1-2m.



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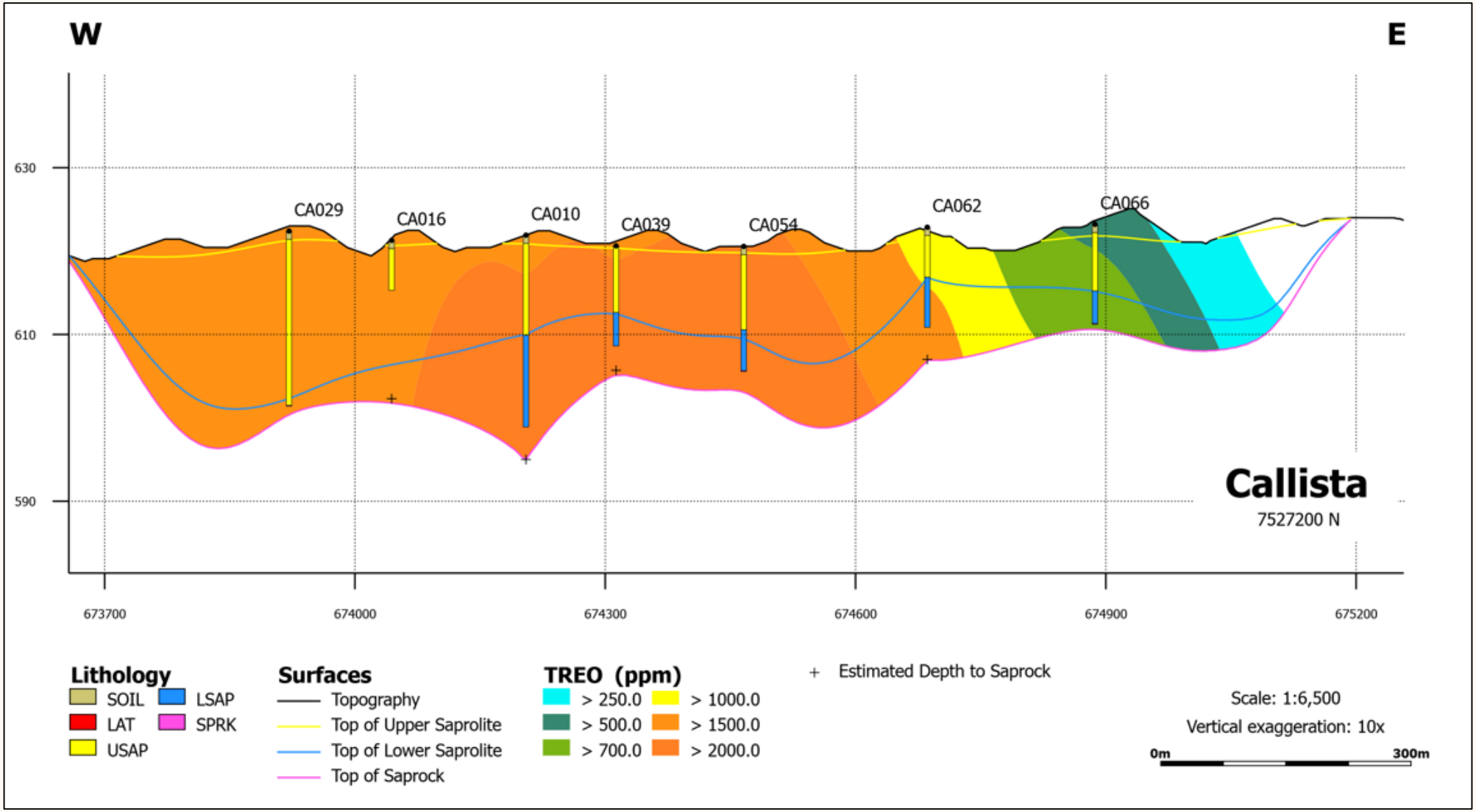
Callista Drill Cross-section

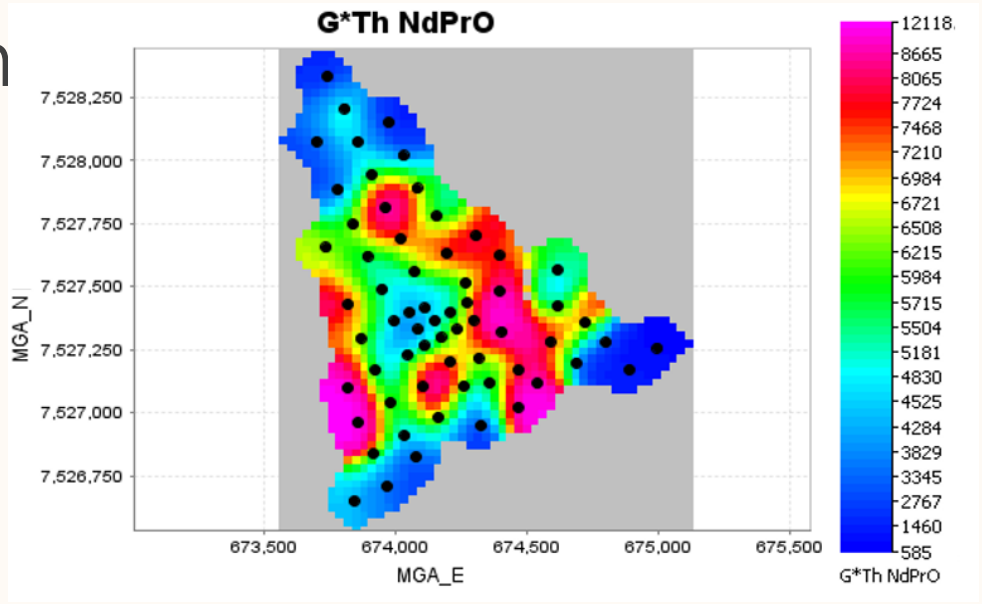


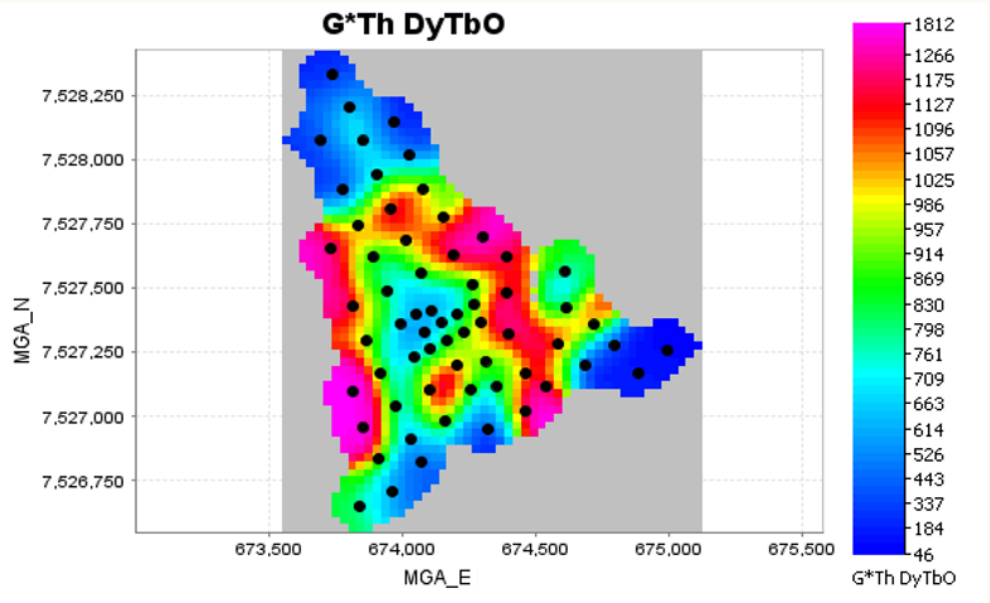
Callista Project Mineralisation

Characterised by higher levels of valuable DyTb oxides, average 47 ppm for Callista, 43 ppm for Callista North than comparable REE-in-clay deposits. Some zones richer in the HREE.

Best hole 18m at 0.45% TREO, 747ppm NdPr oxides and 98 ppm DyTb oxides from surface

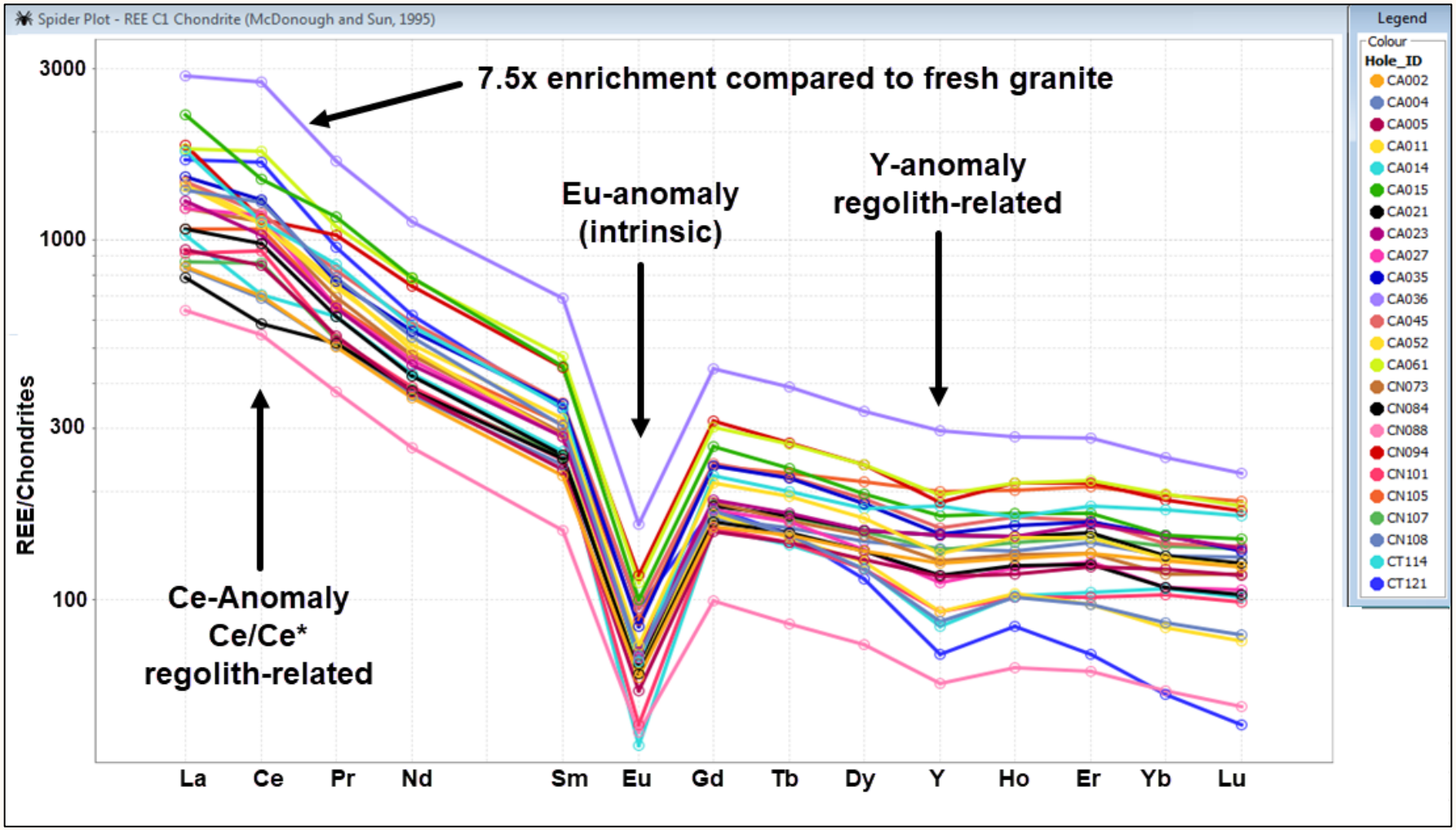
Hole ID	EoH (m)	Miner-alised Interval (m)	TREO* (ppm)	from	TREO Grade x Thickness (ppm.m)	Magnet REO (ppm)	NdPr Oxides (ppm)	DyTb Oxides (ppm)
CA004	33	33	1,983	surface	65,434	394	352	42.0
CA015	21	19	3,208	2m	60,953	675	603	71.5
CA027	33	25	2,093	8m	52,335	392	341	51.0
CA036	18	18	4,489	surface	80,802	845	747	98.2
CA037	34	34	1,941	surface	66,003	363	309	54.0
CA042	30	30	1,859	surface	55,756	373	326	46.7
CA045	27	27	2,175	surface	58,714	450	389	61.0
CA050	18	18	2,640	surface	47,513	535	456	78.8
CA052	33	33	1,721	surface	56,797	343	304	39.8
CA055	33	31	1,864	2m	57,781	394	348	46.6
CA057	24	24	2,387	10m	57,295	533	477	55.9
CA061	21	19	3,075	2m	58,418	628	548	79.2
CN071	39	31	1,745	8m	54,101	368	316	51.9
CN073	39	34	1,950	2m	66,298	376	326	49.4



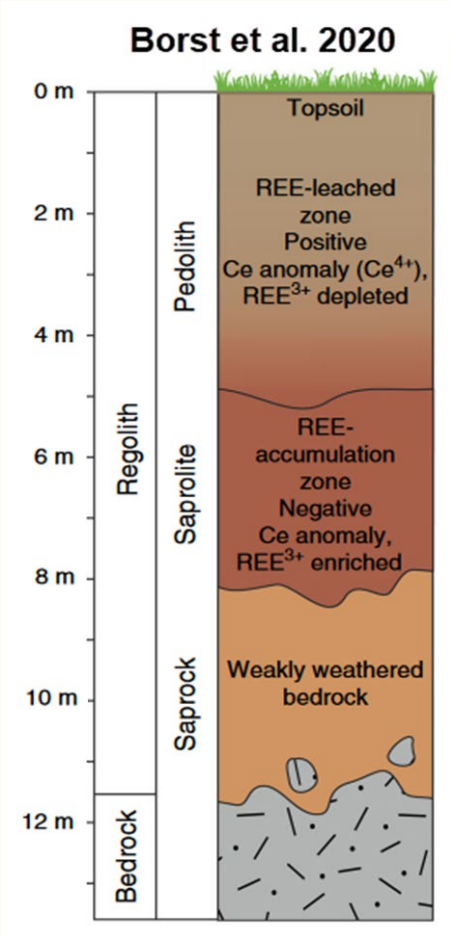


Av. REE Abundance Patterns over Mineralised Intervals

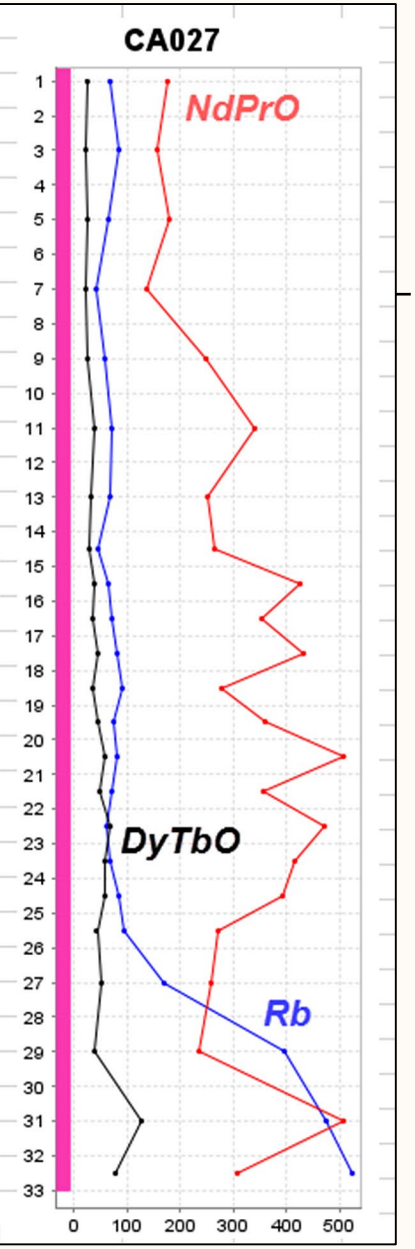
REE patterns show Ce and Y anomalies indicating REEs were at least partly mobile in the regolith column. REE enrichments up to 7.5x fresh rock.



Callista Regolith Profile



CA027								
From(m)	To (m)	Scint (cps)	Lithology	Colour	UNIT	Rb (ppm)	TREO (ppm)	Ce/Ce*
0	1	95	CYSD	pk	SOIL			
1	2	100	CGSP	pkwh	USAP	67.4	943	1.061
2	3	95	CGSP	wh	USAP			
3	4	110	CGSP	wh	USAP	84.8	879	1.033
4	5	110	CGSP	wh	USAP			
5	6	105	CGSP	wh	USAP	66.2	1011	1.140
6	7	105	CGSP	whyl	USAP			
7	8	100	CGSP	wh	USAP	41.2	804	1.079
8	9	105	CGSP	wh	USAP			
9	10	100	CGSP	wh	USAP	57.4	1408	1.403
10	11	100	CGSP	wh	USAP			
11	12	100	CGSP	wh	USAP	69.9	1938	1.237
12	13	100	CGSP	wh	USAP			
13	14	95	CGSP	wh	USAP	66.6	1537	1.348
14	15	100	CGSP	wh	USAP	46.1	1683	1.742
15	16	110	CGSP	wh	USAP	64.3	2696	1.687
16	17	110	CGSP	wh	USAP	72.2	2230	1.631
17	18	105	CGSP	wh	USAP	81.6	2716	1.648
18	19	100	CGSP	wh	USAP	90.9	1688	1.555
19	20	105	CGSP	wh	USAP	75.2	2250	1.413
20	21	105	CGSP	wh	USAP	82.3	3085	1.382
21	22	100	CGSP	wh	USAP	70.2	2182	1.368
22	23	105	CGSP	wh	USAP	62.8	3008	1.307
23	24	105	CGSP	wh	USAP	67.2	2575	1.318
24	25	110	CGSP	wh	USAP	83.8	2495	1.236
25	26	105	CGSP	wh	USAP	95.2	1610	1.284
26	27	100	CGSP	wh	USAP			
27	28	110	CGSP	ltgy	LSAP	169	1670	1.100
28	29	105	CGSP	ltgy	LSAP			
29	30	115	CGSP	ltgy	LSAP	397	1380	1.153
30	31	105	CGSP	ltgy	LSAP			
31	32	115	CGSP	gy	LSAP	476	3022	0.774
32	33	110	CGSP	gy	LSAP	524	2208	1.076



Source: Company Reports, Capital IQ, Bloomberg

Next Steps - Metallurgy is the Key to Project Economics

* Do the REEs have the potential to be Economically Extractable?
* Is there a significant Ionically Adsorbed REE Component or is Callista a higher-cost WAE-style or Refractory deposit?
* Regolith-hosted deposits are likely to have unique characteristics.

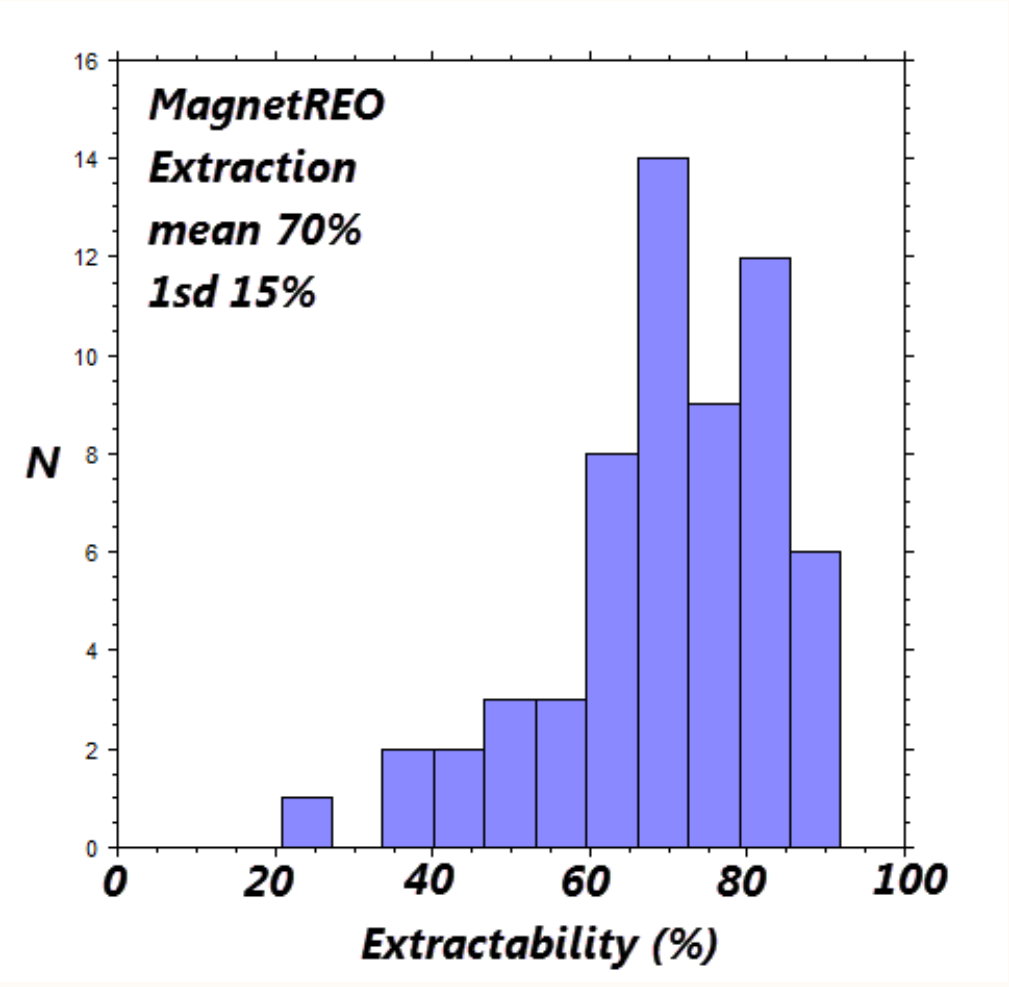
Initial Callista Metallurgy – 10% HCl Leaching Results

Staged approach to Metallurgical Testing

Sixty drill pulp samples from various holes and depths at the Callista project were selected for initial bottle roll tests with 10% HCl as leaching agent; sample weight 10g, pulp density 10%, temperature 50°C, 6hr leach time.

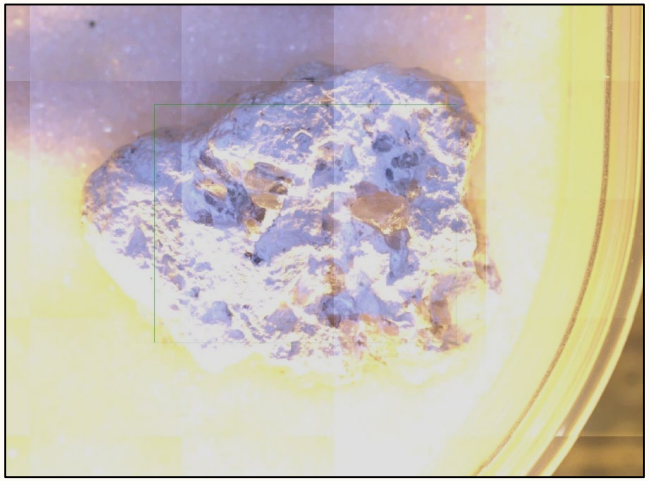
For the Magnet REOs (Nd, Pr, Dy, Tb) the **mean extractability was found to be 70%**, similar to that known from Australian WAE-style deposits such as those from the Esperance region, WA.

Clay fraction (<45 microns) desorption and extraction tests currently in progress. Mineralogical work underway with a few surprises!

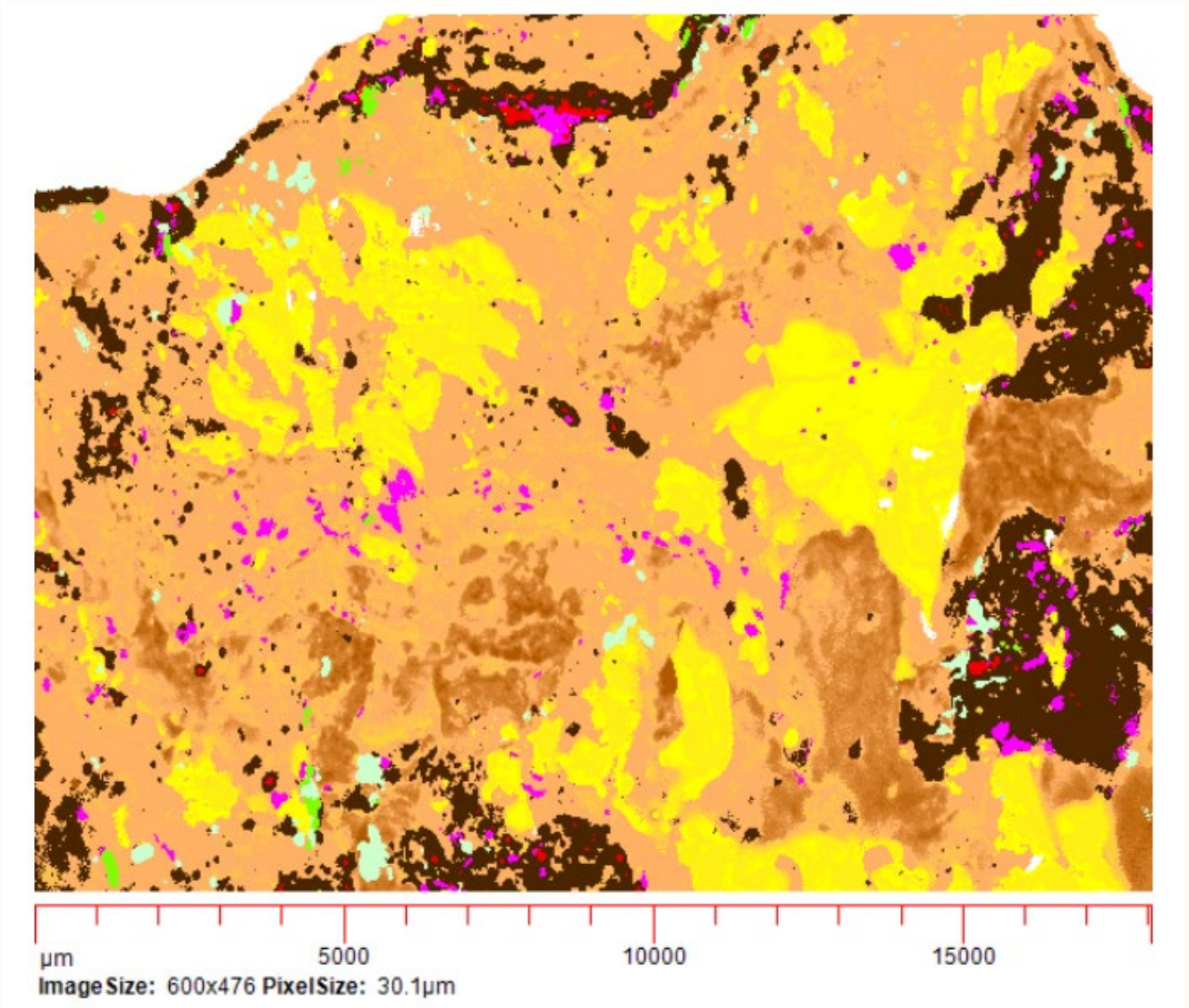


Callista Mineralogy – microXRF scanning surprises

CA026S10 Clay-rich Saprolite core chip from 9-10m depth.

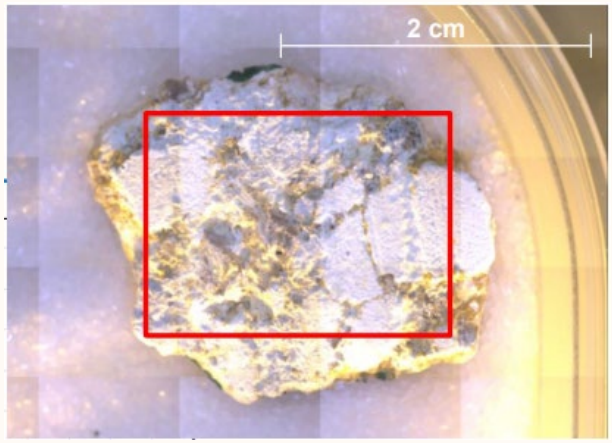


Mineral	Colour	Area%
Kaolinite		59.17
Quartz		18.68
Kaolinite (Ti-Bearing)		13.05
Illite		5.76
Allanite		1.57
Zircon		1.17
Y-Silicate		0.31
Rutile		0.28
Apatite		<0.01

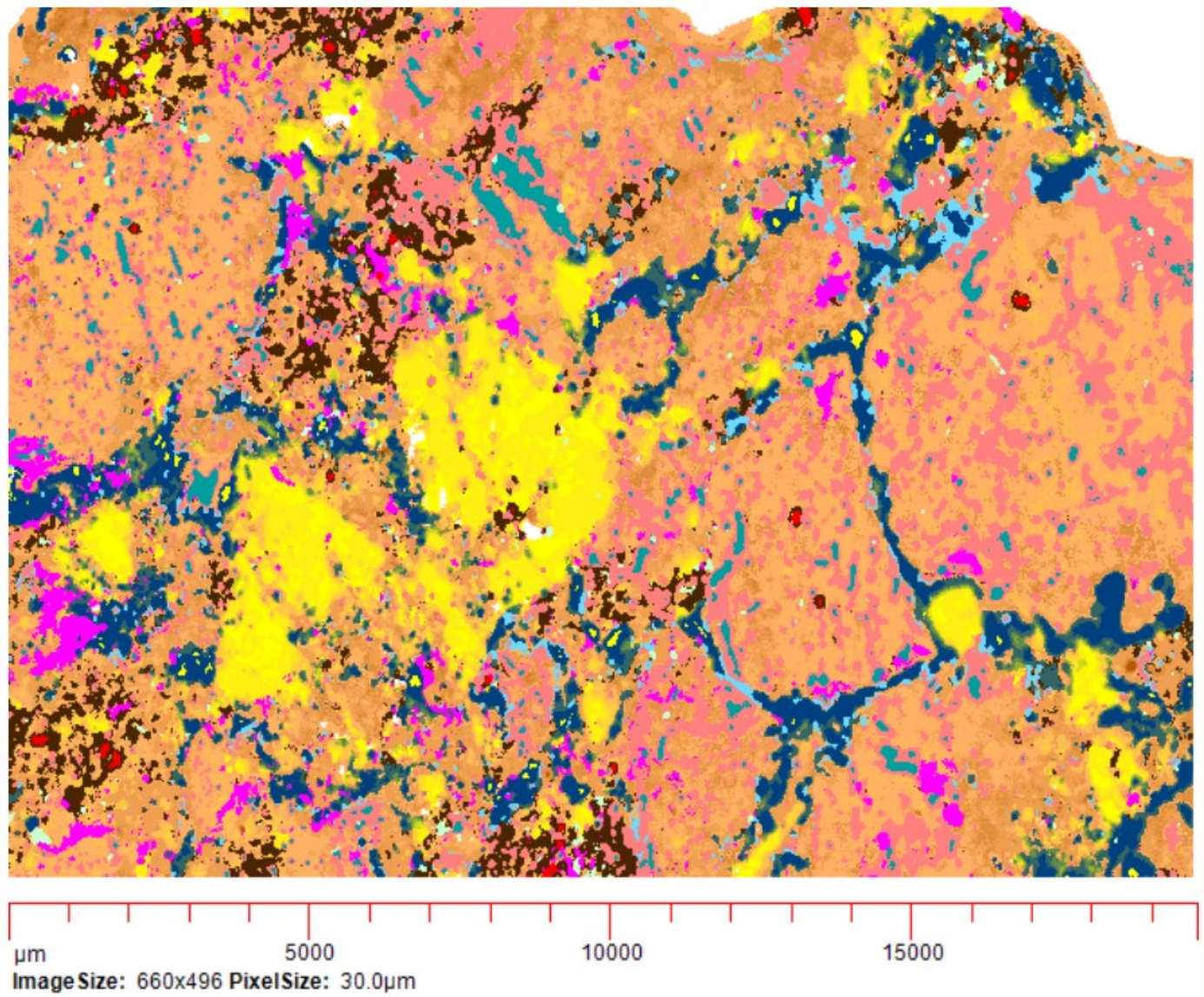


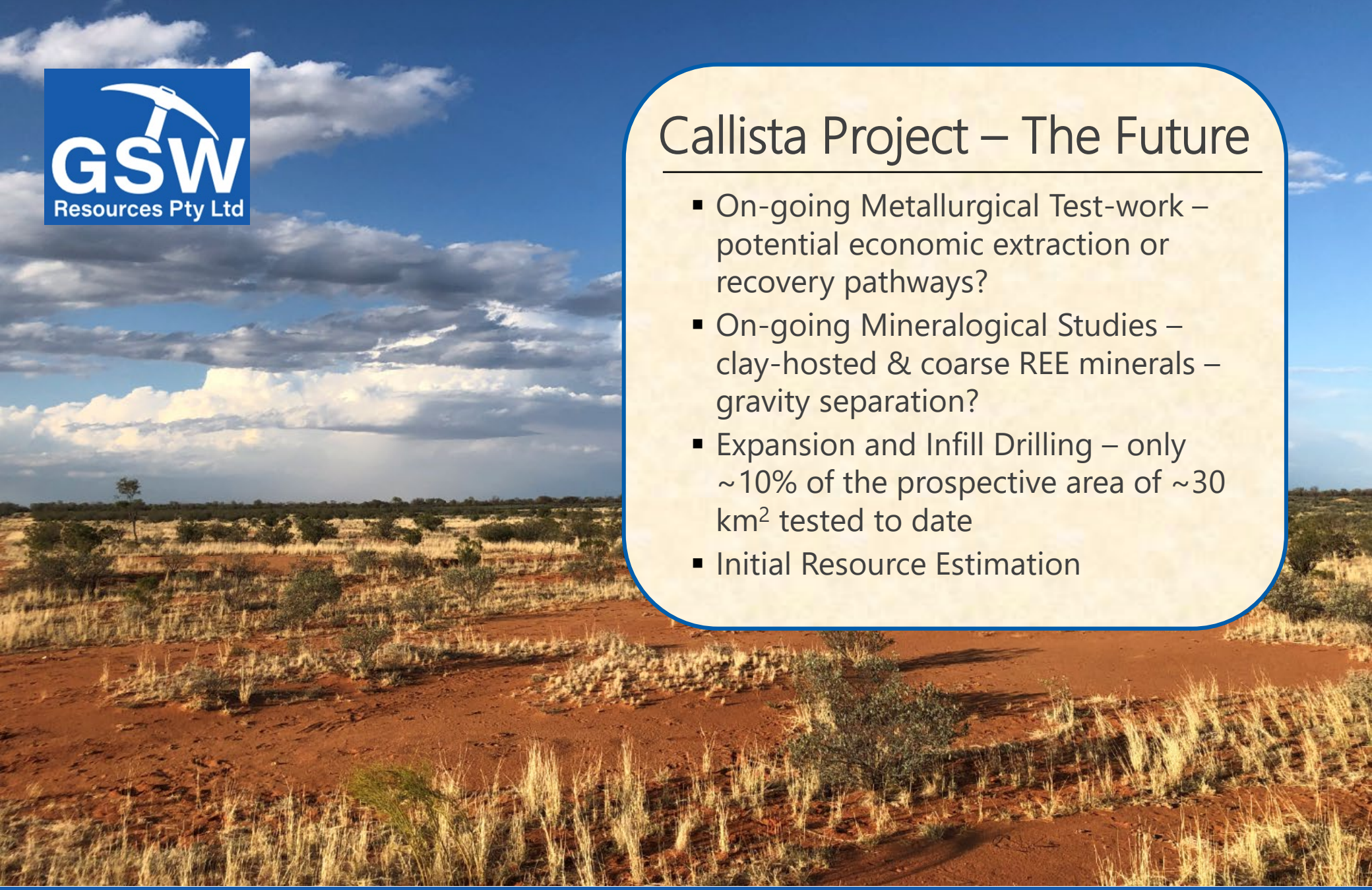
Callista Mineralogy – microXRF scanning surprises

CA036S10 – Clay-rich Saprolite core chip from 9-10m depth.



Mineral	Colour	Area%
Kaolinite		54.66
Ca-Ti Clay-Sulphate Phase		16.90
Fe-Oxide		11.37
Quartz		9.20
Allanite		2.81
Ca-Sulphate		1.99
Fe-Sulphate		1.84
Zircon		0.57
Illite		0.46
Rutile		0.20
Y-Silicate		<0.01
Apatite		<0.01





Callista Project – The Future

- On-going Metallurgical Test-work – potential economic extraction or recovery pathways?
- On-going Mineralogical Studies – clay-hosted & coarse REE minerals – gravity separation?
- Expansion and Infill Drilling – only ~10% of the prospective area of ~30 km^2 tested to date
- Initial Resource Estimation