Pilbara Minerals

Discovery and geology of the Pilgangoora Li-Ta pegmatite deposit, Western Australia

CET Members Day

28 November 2022. UWA

John Holmes, Exploration Manager

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Information in this presentation regarding the relevant proportions of proven Ore Reserves and probable Ore Reserves are 13% proven Ore Reserves and 87% probable Ore Reserves. The Company confirms it is not aware of any new information or data that materially affects the information included in that release or report and that all material assumptions and technical parameters underpinning the Ore Reserves estimates continue to apply and have not materially changed.

Information in this presentation relating to Mineral Resource and Ore Reserve estimates is extracted from the ASX release of the Company Annual Report dated 13 October 2022. Pilbara Minerals confirms that it is not aware of any new information or data that materially affects the information included in these announcements and that all material assumptions and technical parameters underpinning the Mineral Resource and Ore Reserve estimates continue to apply and have not materially changed. Pilbara Minerals confirms that the form and context in which the competent persons' findings are presented in this presentation have not been materially modified from the original market announcements.

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References to Australian dollars

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Authorisation of release

Release of this market announcement is authorised by Dale Henderson, Managing Director & CEO

Contents

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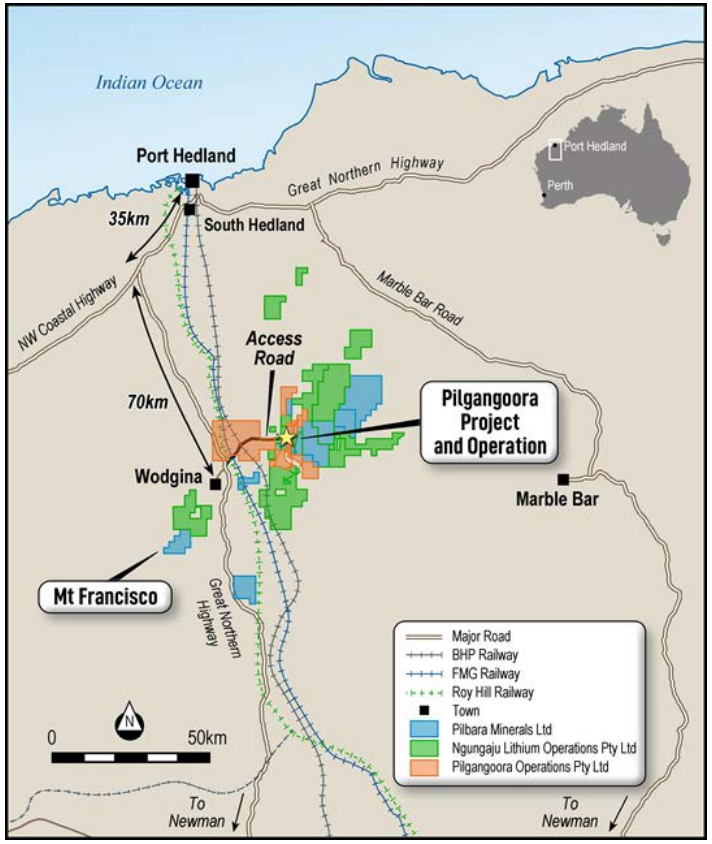
Introduction

Pilgangoora Lithium-Tantalum Project

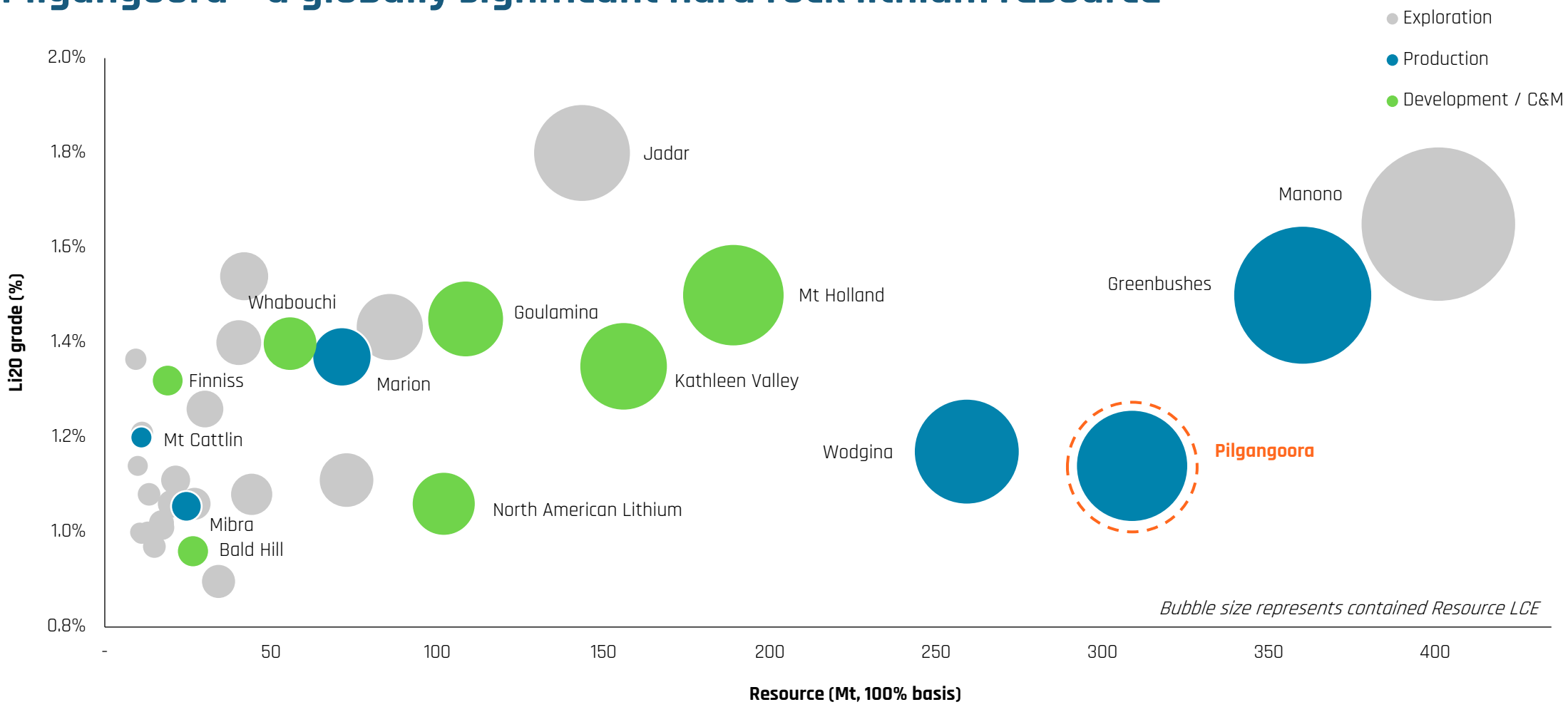
One of the few major hard-rock lithium projects in production globally

- Pilgangoora is one of the largest spodumene-tantalite resources in the world with a JORC Mineral Resource Estimate of 305M tonnes grading 1.1% Li2O, 105 ppm Ta2O5 and 0.6% Fe2O3*
- Pilgangoora is one of three major Western Australian hard-rock lithium deposits in production, together contributing to 42% of the world's lithium supply
- The Project area comprises 34 granted tenements spanning 1086 sq km in the highly prospective Turner River rare-metal pegmatite province in the East Pilbara.



* Mineral Resource as at June 30, 2022, containing 3.5 M tonnes of Li2O and 71 M pounds of Ta2O5. A cut-off grade of 0.2% Li2O has been applied.

Pilgangoora – a globally significant hard rock lithium resource



Source: Public ASX Announcements (refer to Appendix [x] for further information). Excludes Cinovec (European Metal Holdings), Falchani (American Lithium), San Jose (Infinity Lithium), Zinnwald (Zinnwald Lithium) and Karibib (Lepidico) as outliers (grade below 0.80%); 1. Final Investment Decision announced.

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Exploration History

...A brief historical overview

1905-1947 : Tantalite field first discovered in 1905 with small scale alluvial operations continuing through to 1947.

1978-1982 : Pilgan Mining alluvial operations

1992-1996 : Pilgangoora Mining Venture

2003-2008 : Exploration undertaken by Sons of Gwalia concluded the project had low potential for stand-alone Ta_2O_5 operation.

2008-2014 : Talison/Global Advanced Metals undertook several phases of drilling with very few samples assayed for lithium

Pilbara Minerals – Tabba Tabba

2007 – Company originally listed on the ASX with projects in the goldfields and later acquired tenure in the west Pilbara

2012 – Change of Management with merger of Sturt Resources managed by PLS founding Directors John Young and Neil Biddle

2013 - Pilbara entered a 50/50 joint venture with Global Advanced Metals to develop and mine the high-grade tantalum Tabba-Tabba pegmatite project located 70km from Port Hedland

2014 - Declaration of maiden JORC Ore reserve of 133,000 tonnes at 1,290ppm Ta_2O_5 and decision to commence production

Commissioning of the process plant in November 2014

2015 – Tabba Tabba put on care and maintenance in early 2015 due to fall in tantalum concentrate price

Pilbara Minerals – Pilgangoora

First drill hole to production in less than 4 years

2014 - Pilbara Minerals purchases 100% interest in the Pilgangoora tenement package from Global Advanced Metals Limited for $250,000.

Reconnaissance exploration and extensive rock chip sampling campaign soon unlocked the potential of the Pilgangoora lithium-tantalum project.

Bulk sample sent to ANZAPLAN in Germany demonstrated spodumene concentrate suitable for the glass and ceramics industry.

Inaugural RC drilling program – November 2014

2015 - Drilling campaigns undertaken on 100 x 50m centres at Central and Eastern prospects as part of scoping study.

2016 - Expanded drilling programs on nominal 50m x 50m spacings for PFS and infilled 25 x 25m spacings for 2Mtpa DFS

2018 – First spodumene concentrates produced at Pilgangoora

Over 200,000 metres of resource definition drilling since November 2014

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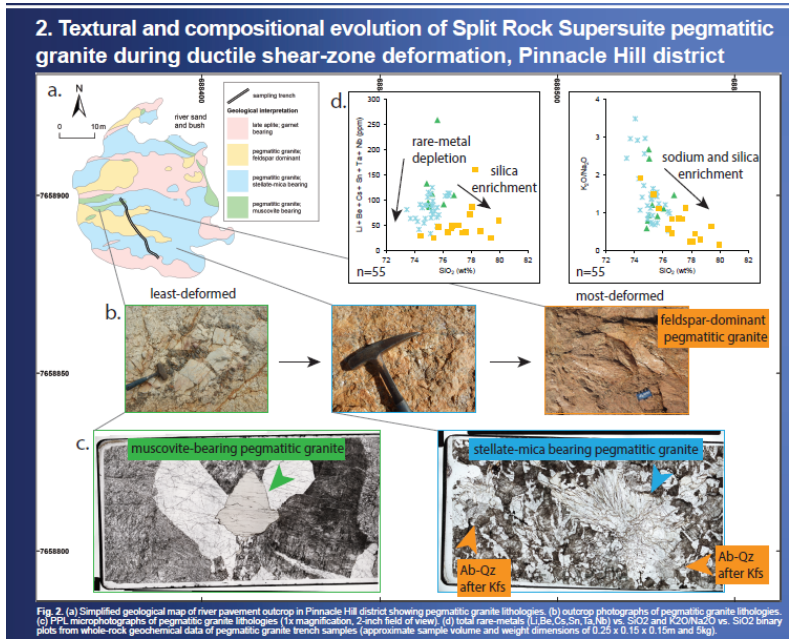
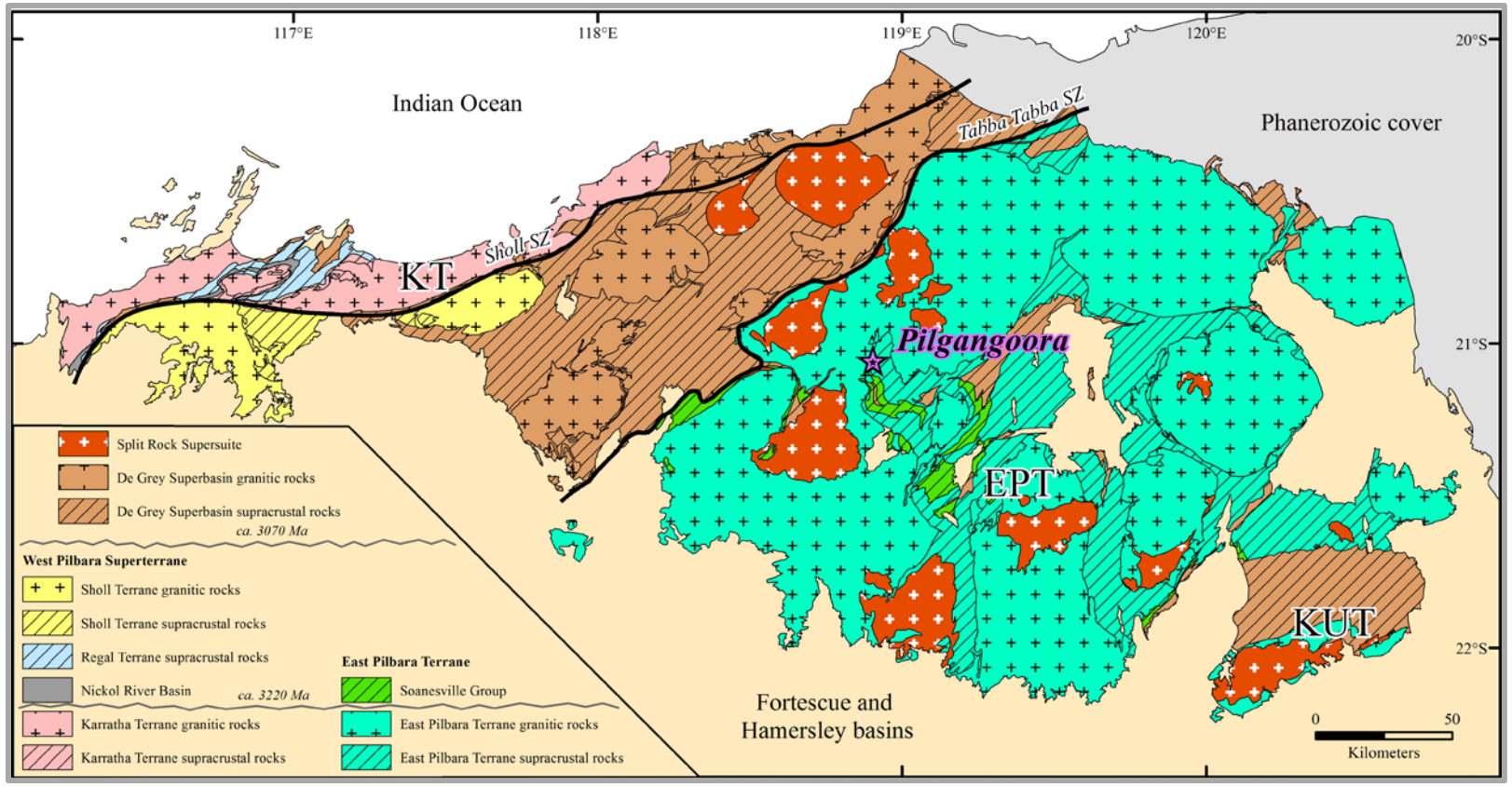
Geology

Geological Mapping and Sponsored Research - Acknowledgement

- Geological mapping programs and research undertaken by Dr Mike Grigson and PhD student John Grigson from 2016 to 2022 have resulted in the development of a new model for the multi-stage evolution of the Pilgangoora rare-metal pegmatites
- Pilbara Minerals continues to support and sponsor UWA post graduate studies including;
  - Evidence for multi-stage phase evolution and metallogenesis in the Pilgangoora Li-Ta pegmatite district, East Pilbara Terrane, Western Australia. (UWA Honours Project : J Grigson 2018);
  - Influence of Fluxing Components on Rare Metal Pegmatite Genesis using Apatite Geochemical Analysis. (UWA Honours Project : E Dowling 2021);
  - Regional setting and controls on lithium-bearing pegmatites in the northern Pilbara Craton, Western Australia. (UWA PhD Project: J Grigson 2023)
- Ore characterisation studies by John Grigson and the Pilbara Minerals geological teams have led to improved process plant performance, revised mining strategies and geometallurgical understanding.

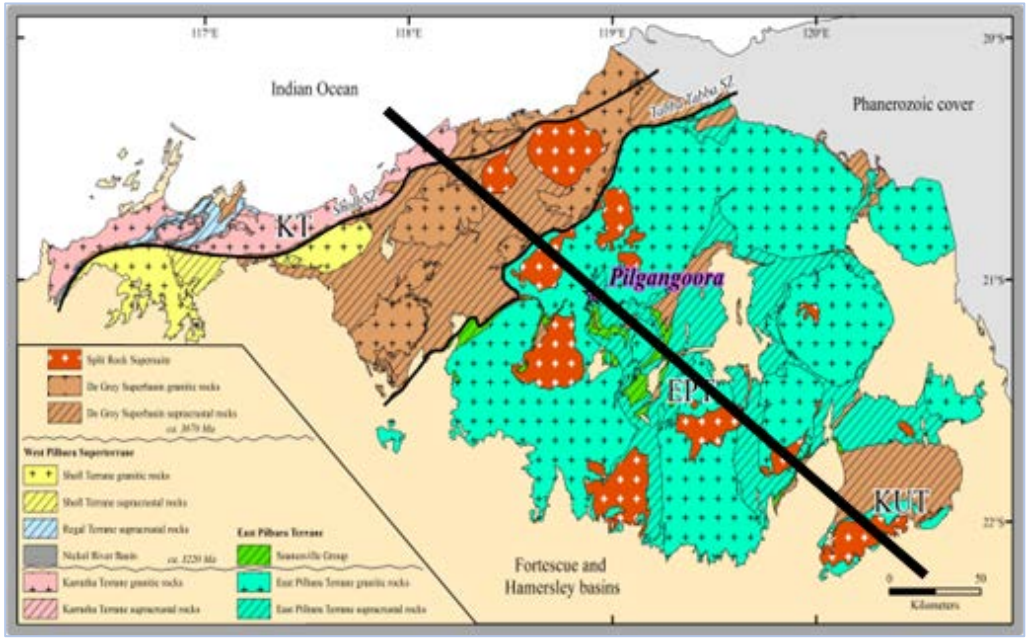


East Pilbara Granite-Greenstone Terrane



- Pilgangoora located western margin of EPT
- Majority of rare metal pegmatites hosted within the 3200Ma to 3150Ma supracrustal rocks of the Soanesville Group
- Granitic rocks comprise a large proportion of the EPT and are divided into 6 major and 3 minor supersuites

Tectonic evolution of the Pilbara Craton, Pilgangoora District



"The younger volcanosedimentary rocks of the Soanesville Group are considered to have accumulated in a continental rift setting, during the breakup of the Palaeoarchaean cratonic nuclei, and they may well represent one of the oldest preserved rift sequences on Earth." M. VanKranendonk, 2010

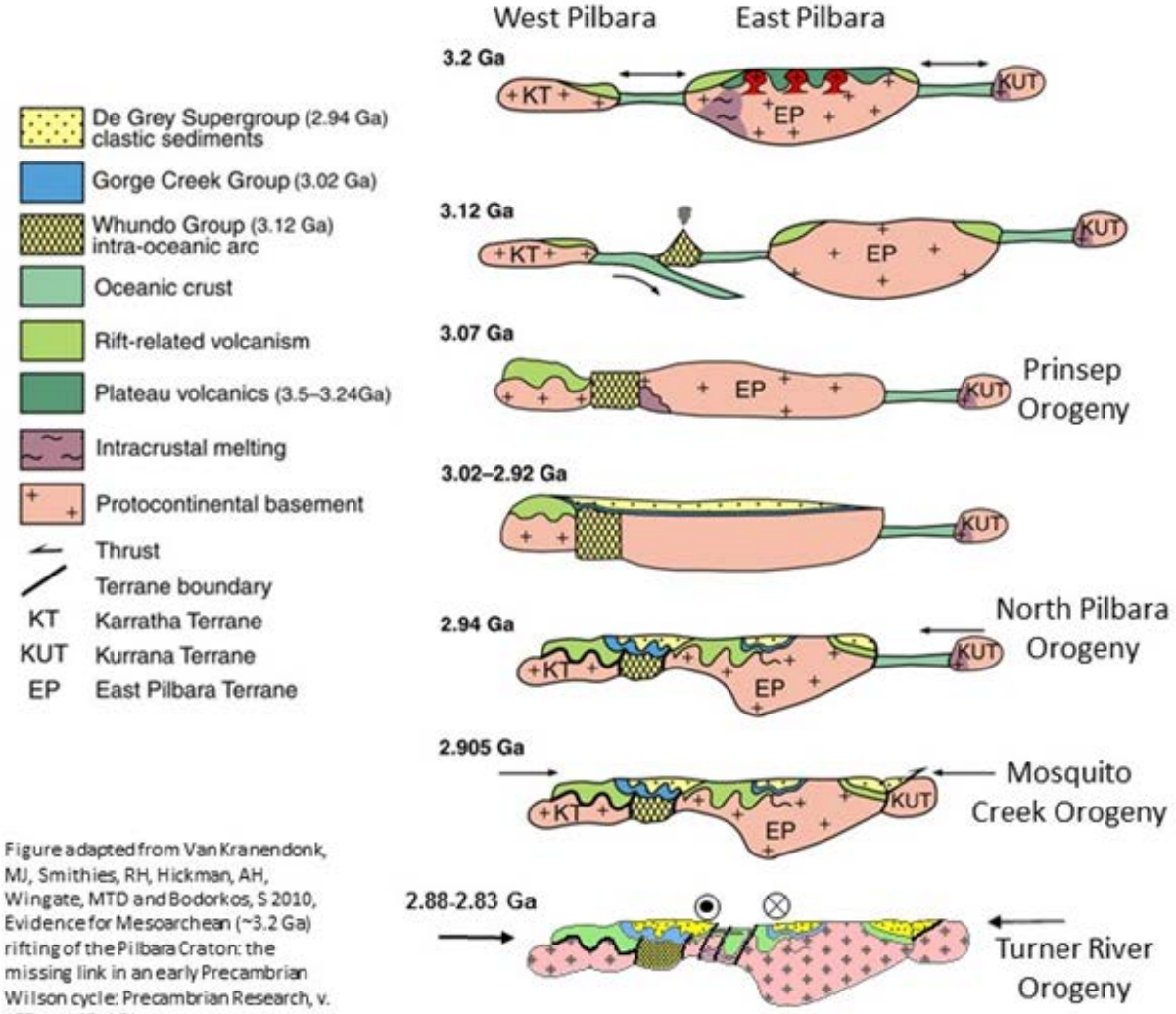
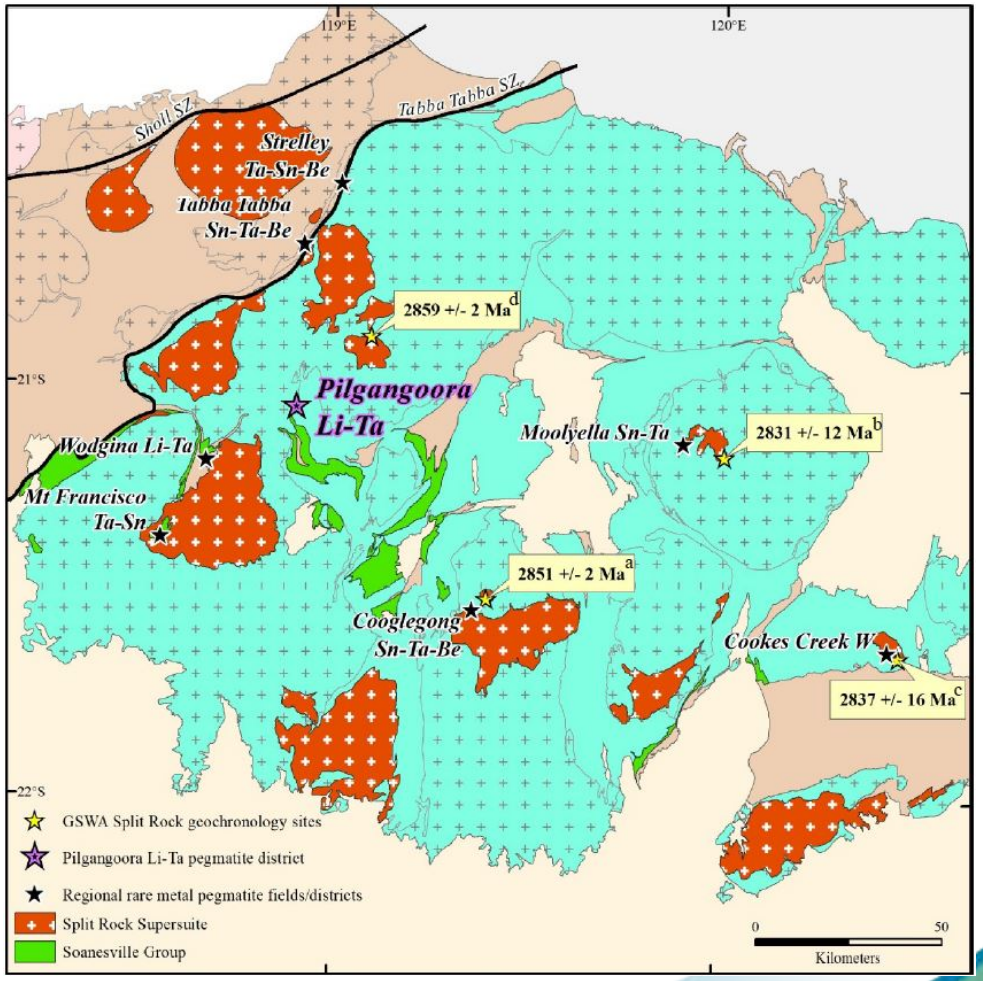


Figure adapted from Van Kranendonk, MJ, Smithies, RH, Hickman, AH, Wingate, MTD and Bodorkos, S 2010, Evidence for Mesoarchean (~3.2 Ga) rifting of the Pilbara Craton: the missing link in an early Precambrian Wilson cycle: Precambrian Research, v. 177, p. 145–161.

Distribution of the rare-metal pegmatite fields

- Pilgangoora one of several rare-metal deposits occurring in the Turner River rare-metal pegmatite province
- TRPP also includes Tabba Tabba, Strelley, Wodgina and Mt Francisco
- Strong spatial and temporal link with mapped outcrop of the 2860-2830 Ma Split Rock Supersuite
- Li-bearing pegmatite fields are focussed at the western margin of the East Pilbara Terrane
- U-Pb dating of tantalite has yielded a crystallisation age of 2845 ± 4 Ma (Grigson, 2018)



Local Geology – East Strelley Greenstone Belt

East Strelley Greenstone Belt

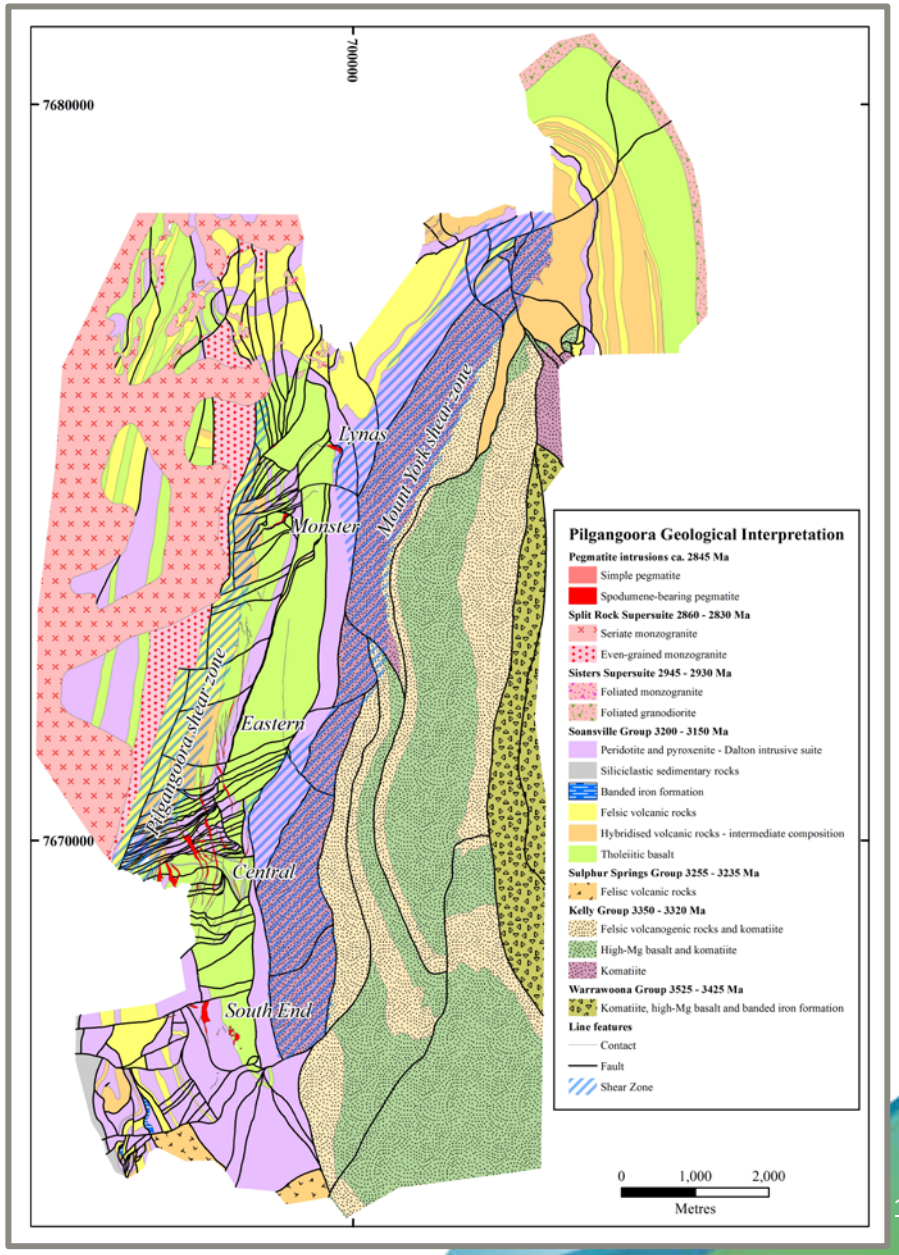
- ESGB at western margin of East Pilbara Terrane
- N-S trending, multiply-deformed synclinal belt of sub-vertically layered, amphibolite to upper greenschist facies Archaean supracrustal rocks

Carlindi Batholith

- Composite batholith comprised of Callina, Sisters and Split Rock Supersuites bounding the western and northern margins of the ESGB

Pilgangoora Li-Ta pegmatite district

- >100 rare-metal-bearing pegmatite (and aplite) intrusions hosted within a 8km x 1.5km shear zone corridor at the western margin of the ESGB



Supracrustal rocks

3525-3425 Ma Warrawoona Group

- Komatiite and banded iron formation dominate at north-eastern part of ESGB

3350-3320 Ma Kelly Group

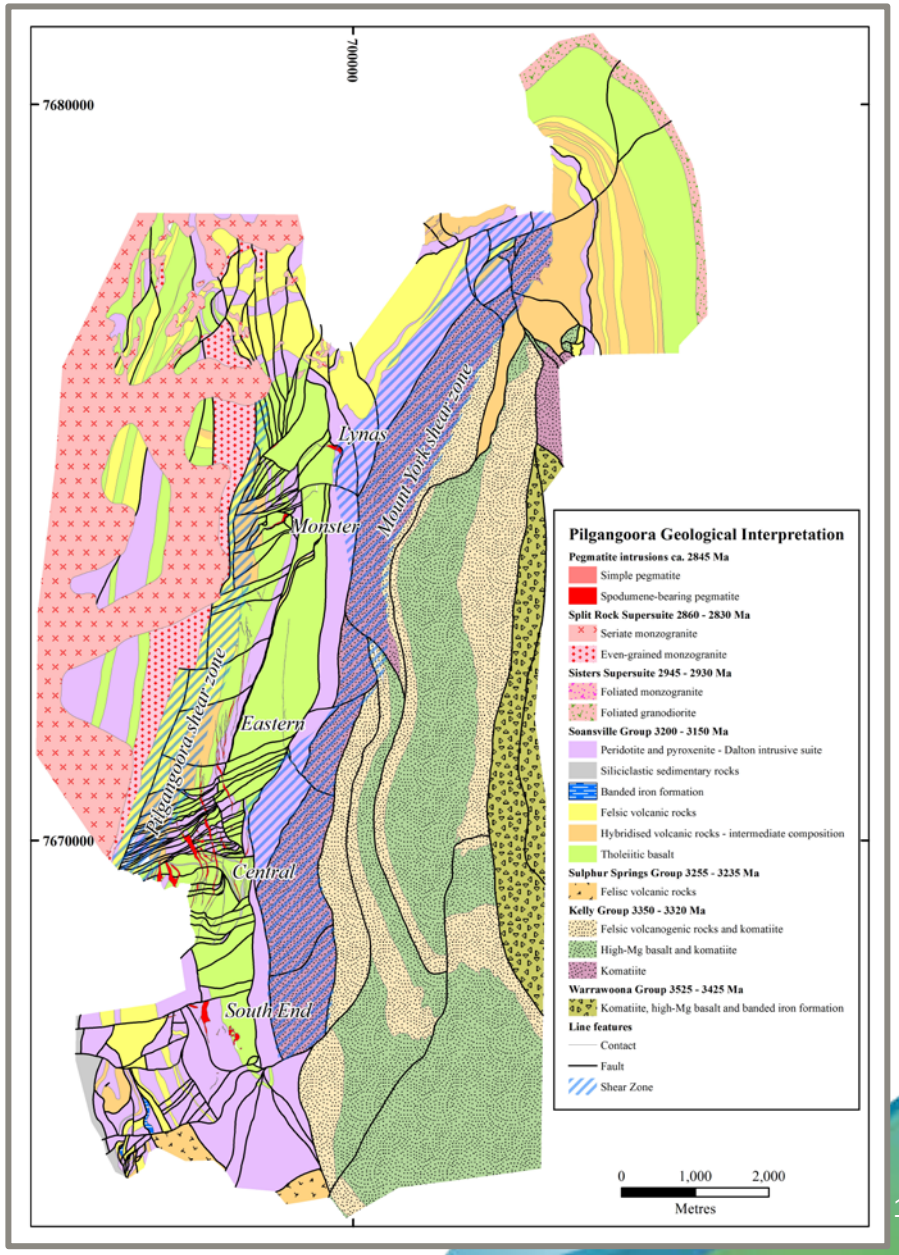
- Komatiite, siliceous high-Mg basalt and massive to bedded water-lain dacitic tuff

3255-3235 Ma Sulphur Springs Group

- Lavas, breccias and volcanogenic sedimentary rocks restricted to southeast of ESGB

3200-3150 Ma Soanseville Group

- 700m-thick western-association of interlayered rhyolitic lava and tuff, and basaltic andesite
- 1500m-thick eastern-association of interlayered tholeiitic basalt, tholeiitic dolerite sills, and layered mafic-ultramafic sills (of the Dalton Suite)



Granitic rocks

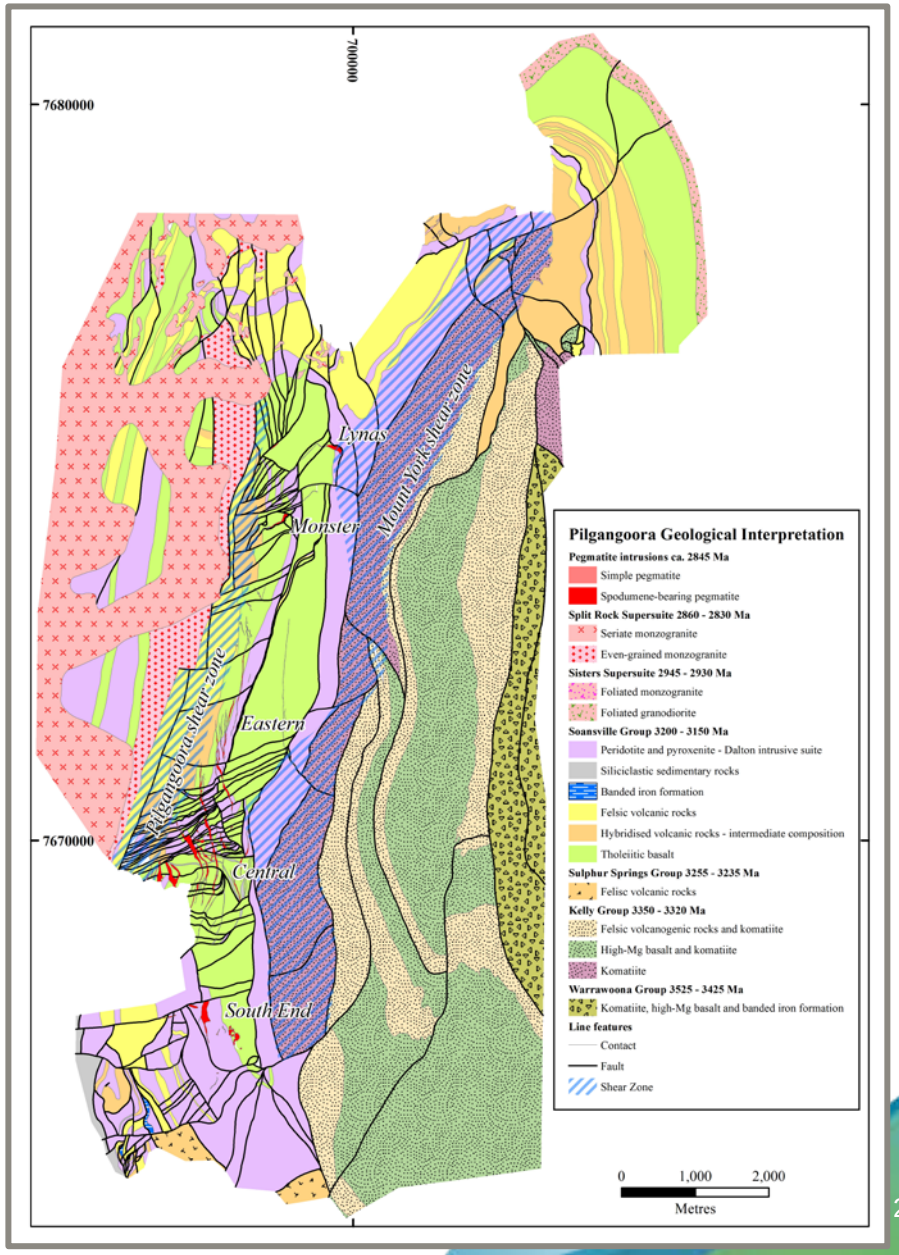
2945-2930 Ma Sisters Supersuite

- Foliated even-grained granodiorite to mylonitised seriate monzogranite
- Occurs adjacent to the northern margin of the ESGB as a part of the Carlindi Batholith

2860-2830 Ma Split Rock Supersuite

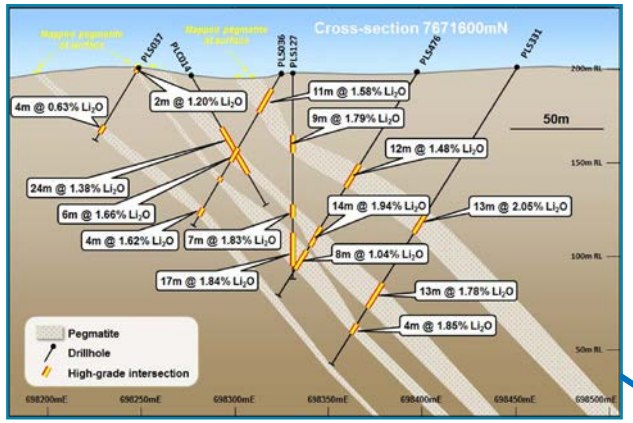
Granitic and pegmatitic phases

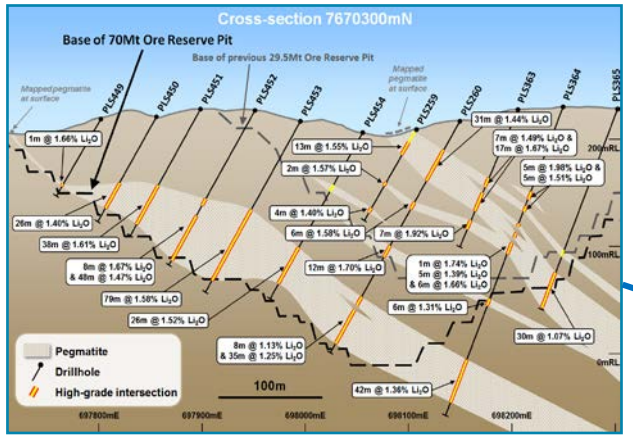
- Weakly-foliated, even-grained biotite monzogranite
- Seriate to pegmatitic muscovite syenogranite with K-feldspar megacrysts displaying graphic quartz intergrowth texture
- Rare metal bearing pegmatites
- Occur adjacent to the western margin of the ESGB as part of the Carlindi Batholith

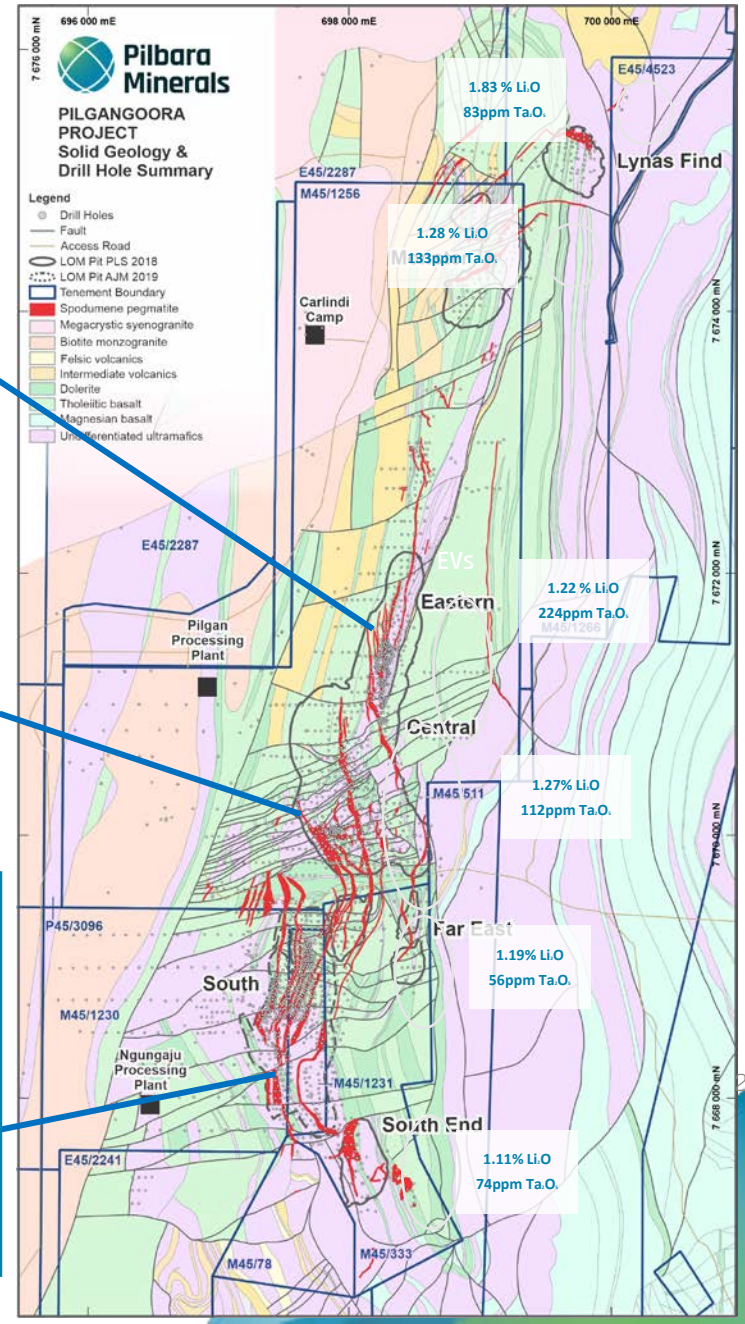


Pilgangoora Pegmatites

- Strike extent over 10km
- Lenticular sheets and dykes
- N-S striking, dipping 40-60° to the East
- 0.5-80m thickness, 50-1500m strike length, and known depth extensions of 400m
- Six main pegmatite groups recognised within the project area, distinguished by their geographic separation, mineralogy, intrusion geometry and structural controls







Key Orogenic Events

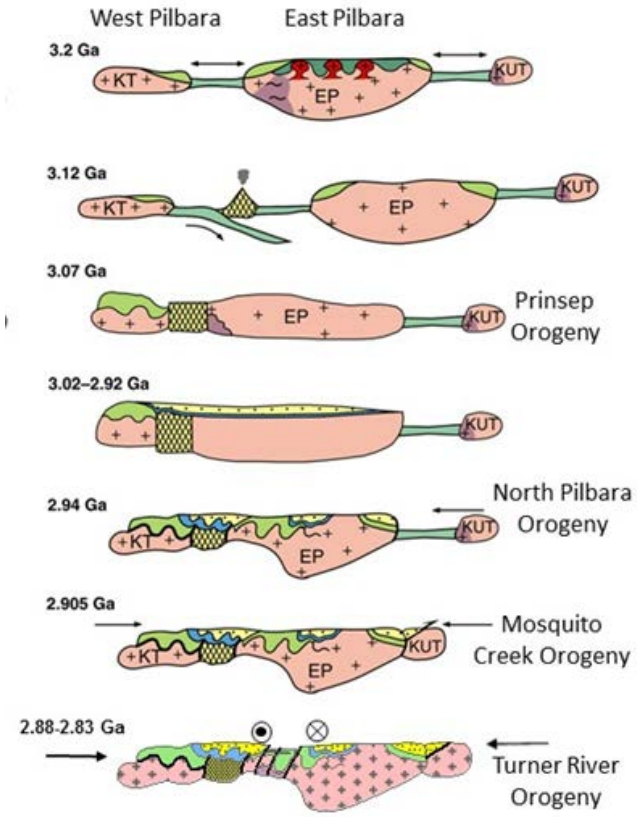
D3 Mount York shear zone – Mosquito Creek Orogeny

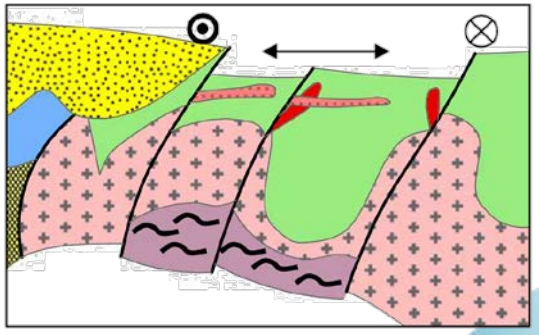
- NE-trending D3 Mount York shear zone developed at western margin of KG immediately adjacent Lynas fault
- McPhees and Lynas Find Au deposits developed within D3 brittle-ductile fault system
- Fabric asymmetry and subhorizontal L3 mineral stretching lineations in MYSZ indicate dextral strike-slip kinematics

D4 Pilgangoora shear zone and fault network – Turner River Orogeny

- N-trending D4 Pilgangoora shear zone developed at margin of SG and Carlindi Batholith, sinistral-oblique (granite-side up) kinematics
- D4 network of N-trending strike faults interlinked by steeply S-dipping cross-faults

Although rare-metal pegmatites and the gold deposits represent contrasting mineralisation systems formed at different times during different orogenies, they are both the products of episodes of intracratonic reworking focussed along a major crustal-scale fault, near the likely axis of a former rift.





Split Rock Suite – Highly fractionated monzogranite

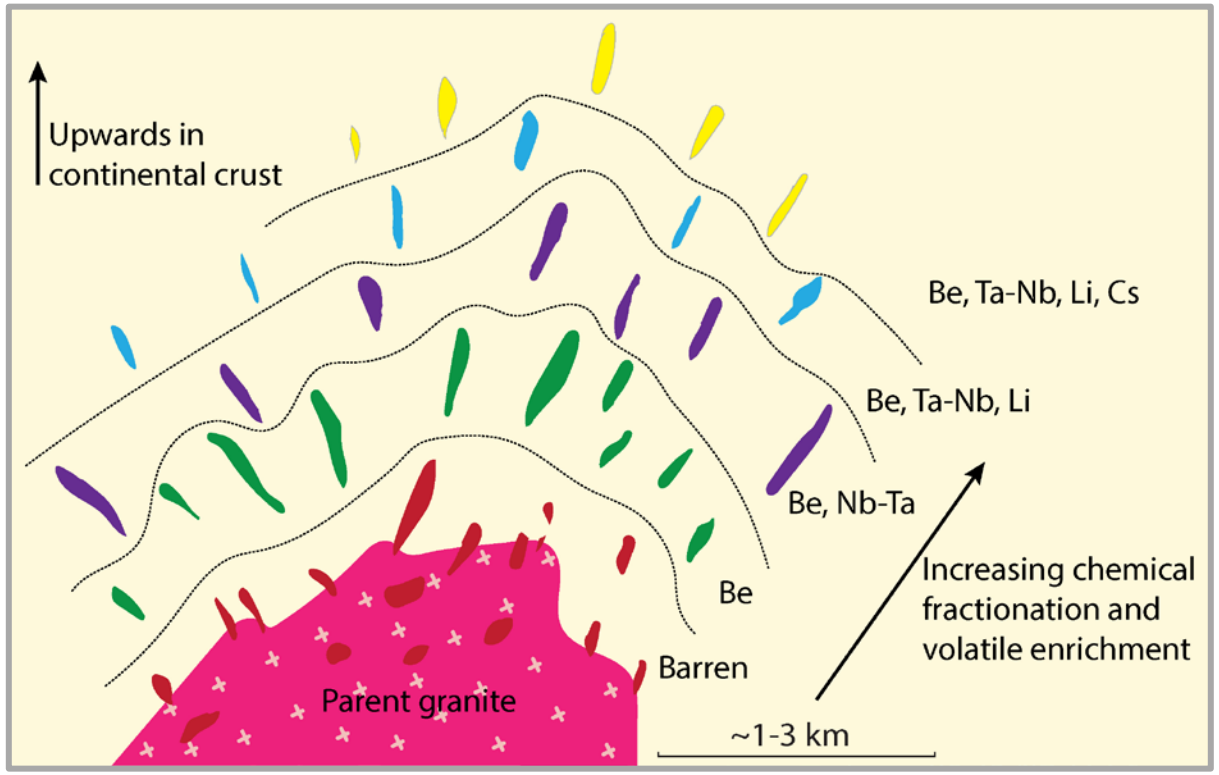
LCT-type pegmatite

Rare-metal pegmatite genesis

London model (2008, 2018)

- Late to post tectonic setting
- Discrete magmatic process
- Uni-directional fractionation
- Closed system

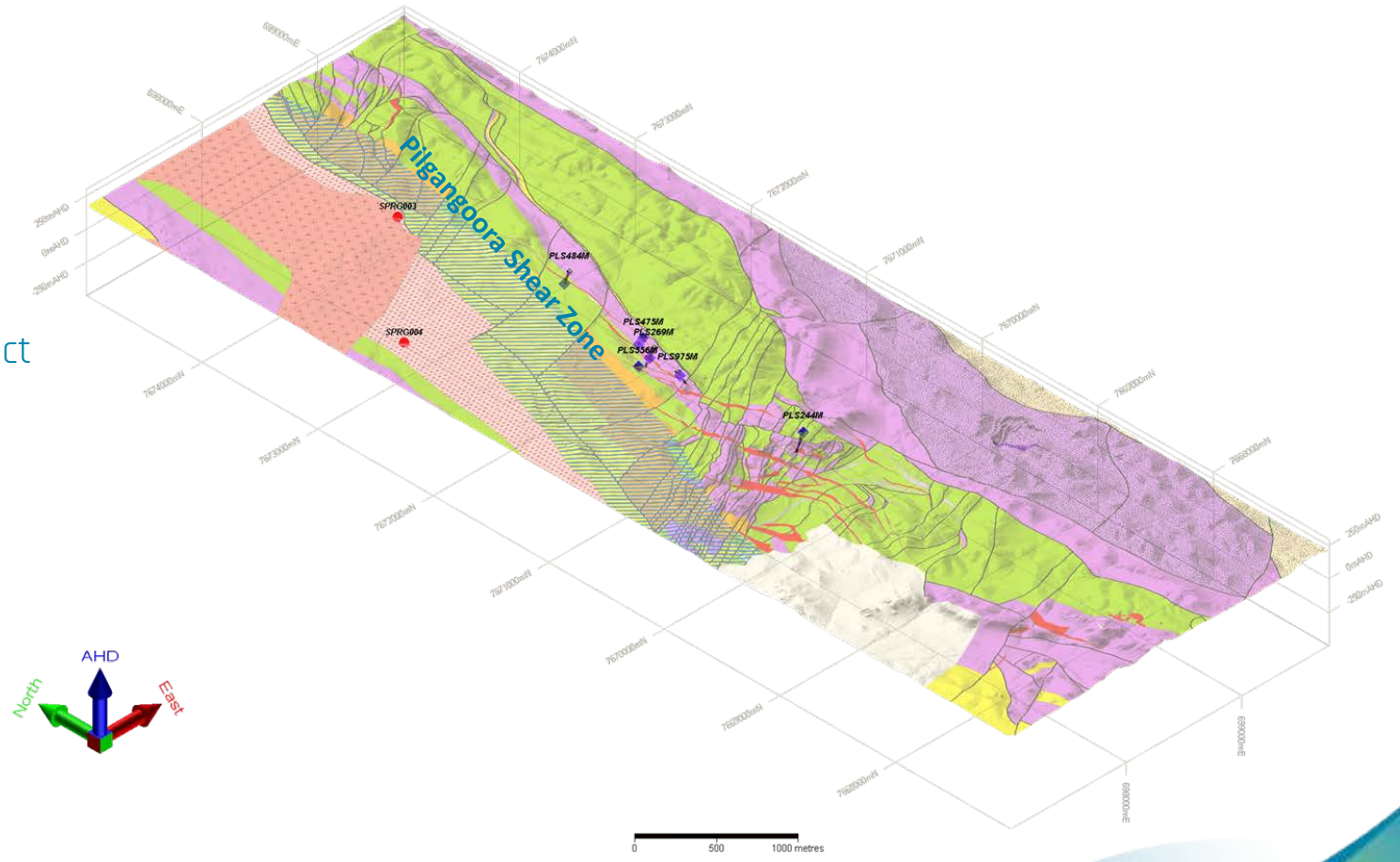
"Paradigm in which pegmatites represent the last small fraction of liquid after extensive crystallisation of granitic bodies"
– London 2008



Modified from Trueman & Černý 1982

Rare-metal pegmatite genesis
Pilgangoora model (2019)

- First order control
- Temporally and kinematically distinct feature
- Core of the shear zone located to west of pegmatite district
- Outer strain halo encompasses pegmatite district
- Syntectonic pegmatite emplacement

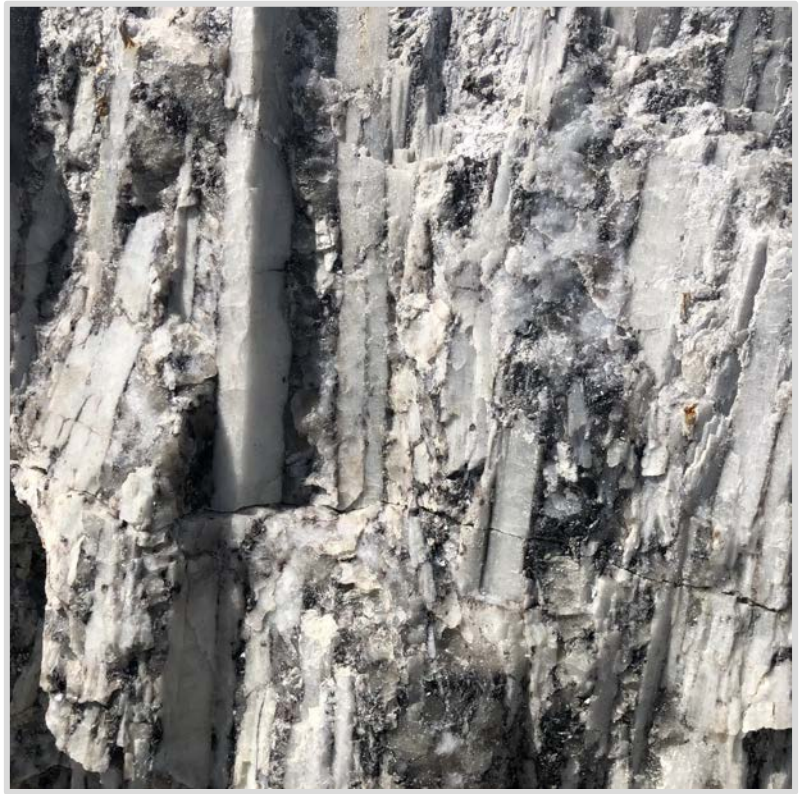


Rare-metal pegmatite genesis
Pilgangoora model (2019)

The Pilgangoora pegmatite intrusions record the progressive syn-tectonic emplacement of distinct rare-metal bearing magma phases;

- **Phase 1** - the crystallisation of the dominant spodumene bearing pegmatite phase
- **Phase 2** - infiltration of Ta-Sn aplite and;
- **Phase 3** - late-stage white-mica alteration seams
- Not a single event, multiple phases that allowing for solid state deformation must have had time gaps between their emplacement
- Progression of chemically different magmatic phases have not only arrived at the same point in the crust (unlike model suggests) but also represent a regression in degree of chemical fractionation over time,

Li-phase -> Ta-Sn-phase -> K-phase



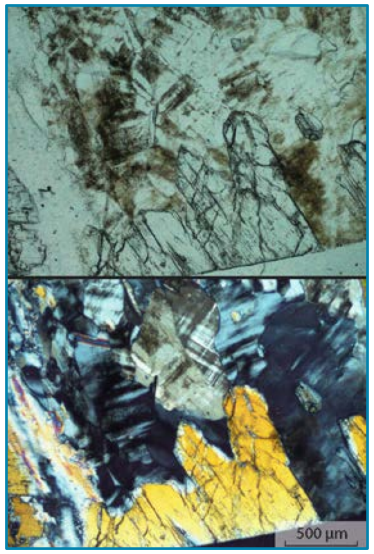
Phase 1 – Coarse grained pegmatite phase

- Li-bearing magmatic phase with abundant (25-50%) Spodumene ($LiAlSi_2O_6$)
- Primary igneous intrusions emplaced within low strain halo of Pilgangoora Shear zone and also partly controlled by related fault network
- Constitutes 75% of dyke volume

Quartz > Spodumene (+ Quartz intergrowth) - Microcline > Albite

Characteristic P1 mineralogy, PLS975M 24.50m

Spodumene-Microcline

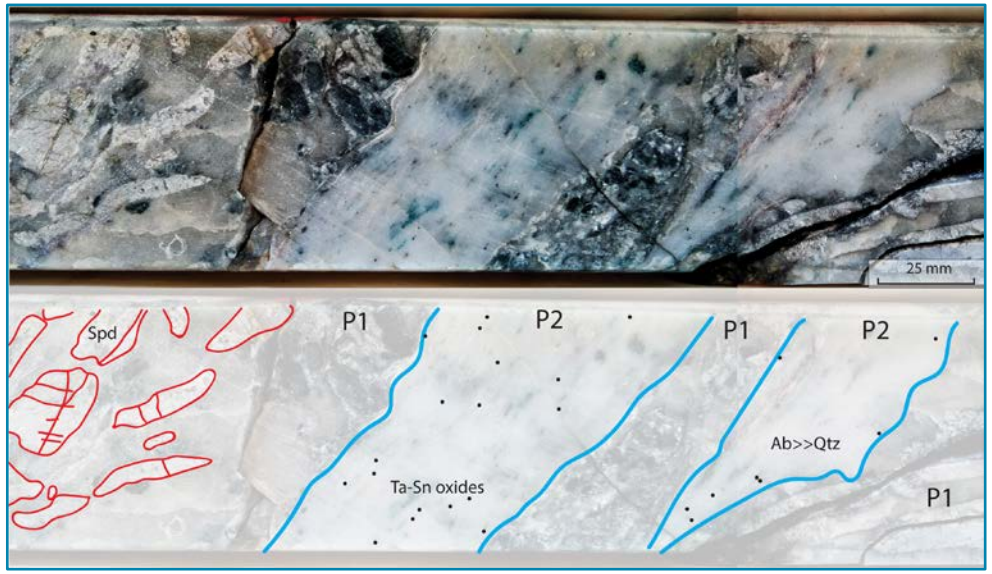


PLS484M 82.77m

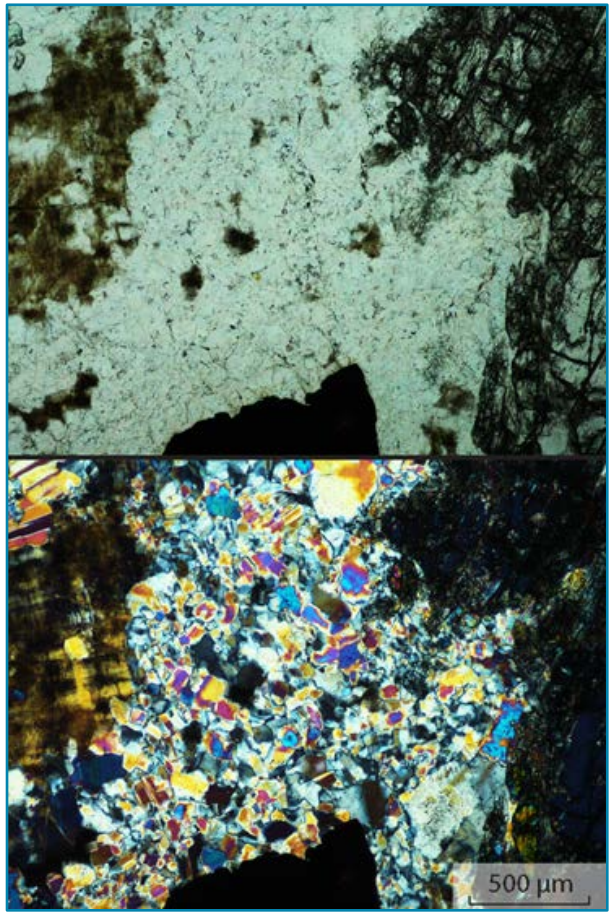
Phase 2 – Fine Grained Aplite Phase

- Ta-Sn-bearing magmatic phase with minor (≤2%) Tantalite, Wodginite and Cassiterite
- Secondary magmatic phase consistently exploits P1 dyke margins and also infiltrates previously crystallised microcline and spodumene crystals in interior of P1 dykes
- P2 also found outside of P1 dykes (100-1000m), unlikely to be a residual melt related to P1
- Constitutes 20% of dyke volume

Albite > Quartz> Apatite-Tantalite-Wodginite-Cassiterite-Zircon-Garnet



P2 superimposed upon on a cataclastically deformed P1, PLS475M 95.30m

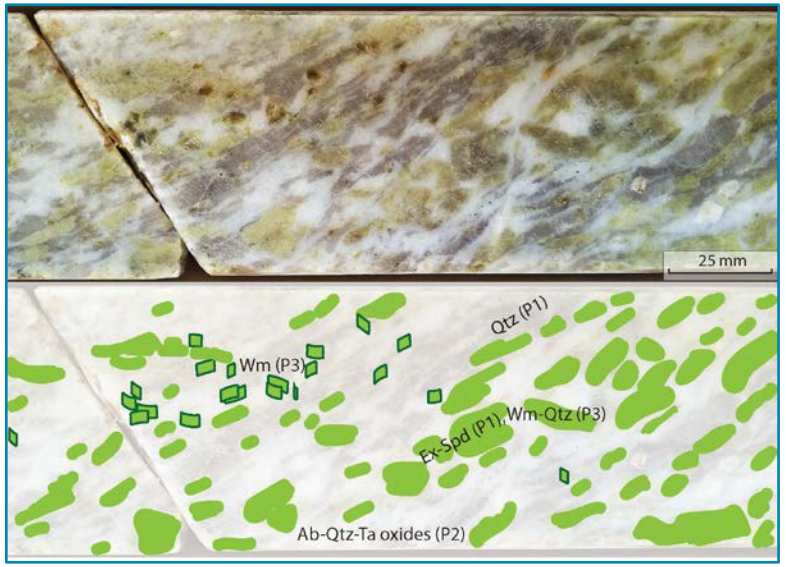


Embayment of Spd and Mc by Ab-Qtz-Wdg, PLS475M 11.60m

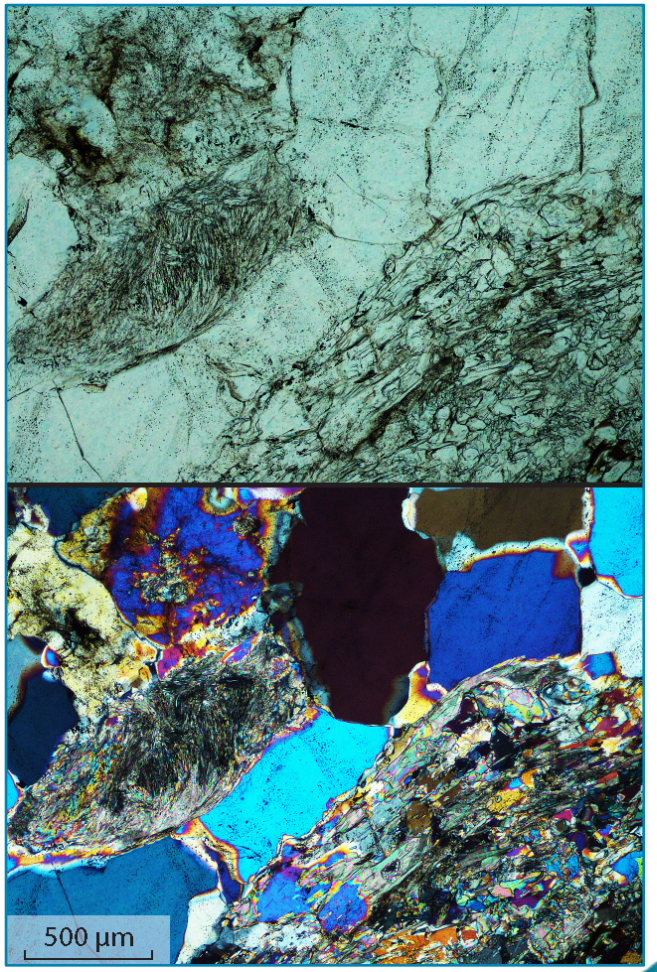
Phase 3 – Late stage network & replacement phase

- K-rich magmatic (-metasomatic?) phase with abundant (~50%) white mica
- Introduced to P1 and P2 at the grain boundary scale and along discrete microfractures in an actively deforming rock mass
- Disequilibrium with P1 and P2, (local) partial to complete replacement of Spodumene, Tantalite and Wodginite ore minerals, proximal reprecipitation of Li, Ta and Sn

Muscovite-Sericite-Lepidolite > Quartz-Apatite-Spodumene > Microlite-Cassiterite > Zinnwaldite-Chlorite-Biotite-Sphalerite-Galena



Sheared ex-Spodumene crystals and recrystallised Quartz (P1) defining an early fabric not recorded in later infiltrating P2 and P3



Wm-Qtz (P3) after Spodumene (P1)

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Ore Type Characterisation

Pilgangoora Pegmatites

Ore characterisation to enable improved recoveries

Geological Mapping vs Whole Rock Geochemistry

Objectives

- Develop methodology to consistently determine ore-type in an active mining environment.
- Discern whether ore-type variability, and most importantly the distinction between the coarse and fine spodumene bearing ore-types, is reflected in the geochemical character of the ore-types.
- Targeting improved recoveries through:
  - Consistent mass properties - Achieve consistent feed of coarse and fines minerals enabling steady and consistent product splits.
  - Flotation - Stable plant feed translates to optimized and consistent set-points yielding improved recoveries

Concept

- The ore characterization deployment would follow:
  1. Collection of over 100 internal ore type bulk samples for whole rock geochemistry, metallurgical testwork and TIMA mineralogical analysis
  2. Analysis of assay markers (through ratios of analytes) allow determination of mineralogy
  3. Re-blocking ore body based on new markers.
  4. Mining strategies adjusted to build plant feed parcels to new target criterion.
  5. Processing plant receives consistent feed of lithia and mineral proportions enabling consistent process plant set-points – particularly for flotation.
  6. Consistent process plant set points allows maximization of lithia yield due to removal/minimization of the need respond to lithia fluctuations.

Internal units – ore types

Ore-type	Lith code	Timing	Texture	Mineralogy	Geochemistry
Ferriferous spodumene pegmatite	**Fgpsf**	Primary	Very coarse-grained with UST of acicular spodumene	Spodumene-quartz-microcline-muscovite (±ferrocolumbite)	Li, K, Nb, Fe-rich Na-poor
Aluminous spodumene pegmatite	**Fgpsa**	Primary	Very coarse-grained to megacrystic with interlocking texture of platy spodumene	Spodumene-quartz-microcline-muscovite (±cassiterite-manganotantalite)	Li, K, Sn, Ta-rich Na, Fe-poor
Ferriferous spodumene hybrid-unit	**Fghsf**	Secondary	Fragmentation, alteration and grainsize reduction of primary ore	Spodumene-quartz-microcline-muscovite, albite-quartz (±ferrocolumbite, tantalite, spessartine)	Nb, Fe-rich Li, Na-moderate
Aluminous spodumene hybrid-unit	**Fghsa**	Secondary	Fragmentation, alteration and grainsize reduction of primary ore	Spodumene-quartz-microcline-muscovite (±cassiterite-manganotantalite, spessartine)	Ta-rich Li, Na-moderate
Sodic albite-quartz aplite	**Fga(aq)**	Secondary	Fine-grained (saccroidal) diffuse bands and grain-scale infiltrations	Albite-quartz (±tantalite-cassiterite, spessartine)	Na-rich Ta-moderate
Sodic rare-metal aplite	**Fga(rm)**	Secondary	Fine-grained (crystalline) metre-scale dykes and plugs with micaceous alteration haloes	Cleavlandite-quartz-phengitic muscovite-lepidolite-bityite-apatite (±beryl-fluorite-manganotantalite-wodginite-zircon-microlite, spessartine)	Ta, Be, P, Na-rich

Fe spodumene pegmatite

Al spodumene pegmatite

Fe spodumene hybrid-ore

Na aplite

Study - Key Findings

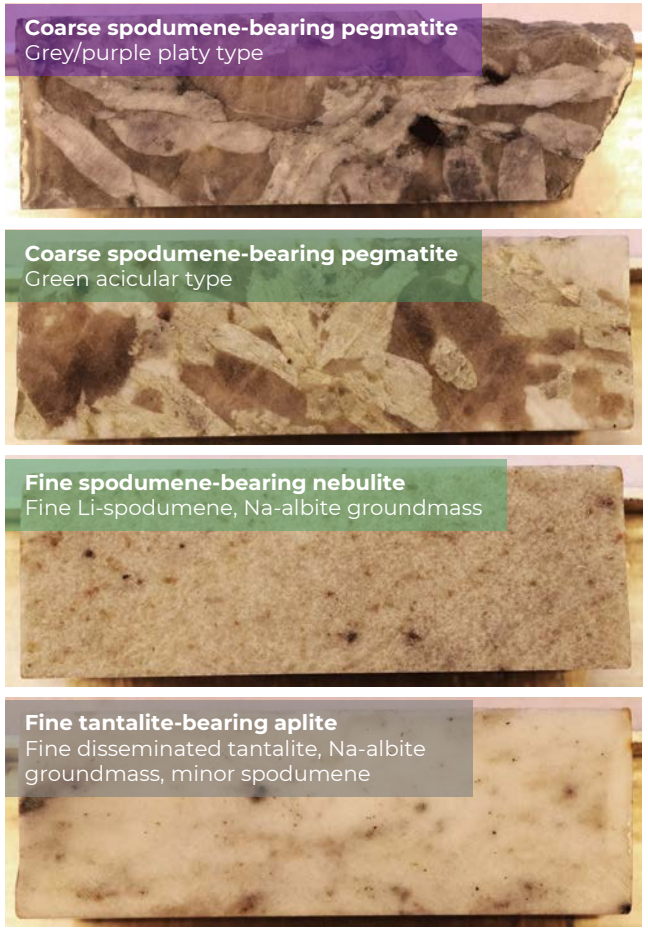
- Petrology study has determined mineral ratios, principally weight percentage of Na2O against Li2O, discern ore types. Other mineral ratios key to ore type determination.

- 4 principal ore types defined for the Pilgangoora Deposit:
  1. Coarse grey/purple spodumene-bearing pegmatite
  2. Coarse green spodumene-bearing pegmatite
  3. Fine green spodumene-bearing pegmatite
  4. Fine tantalite-bearing aplite – minor lithia

- Fingerprinting the mixing of ore-type end members indicates that it is possible to measure other spodumene properties such as mechanical fragmentation, incipient melting textures and crystal type.

- Visual assessment of current data suggests that coarse grey/purple spodumene bearing ore types are more resistive to mechanical fragmentation and hence lead to higher HMS yields.

- Potential to improve on drill and blast performance based on modelling of ore type prior to drilling.



Applications of ore type characterisation

Recovery – Ore characterisation enabling improved lithia recovery performance

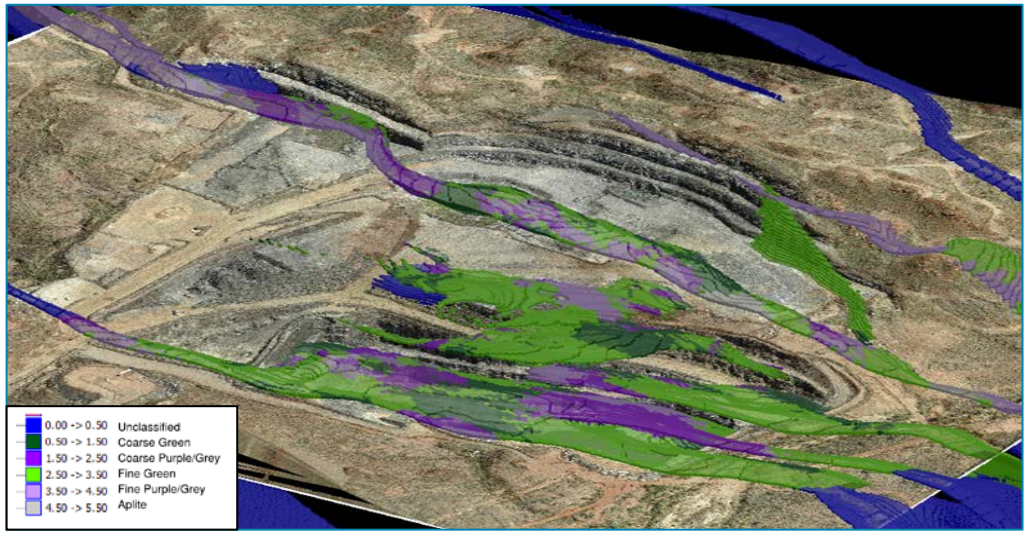
Block Model Ore Types – block model estimation via a geochemical approach to discriminating and characterising ore types

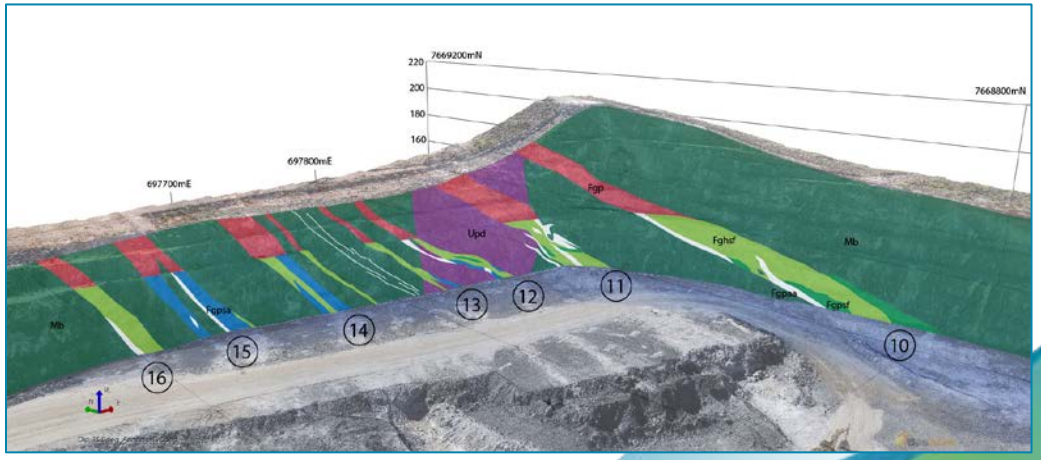
GeoMet Block Model – assign recovery and grade in above block model. Forecast performance of metallurgical domains in Block Model

Maximise value of Ore Reserves – through enabling multi deposit blending for optimal plant feed

Pit Mapping – application of ore type for pit wall mapping

Other – D&B penetration rates, blasting efficiency





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Resources & Exploration Upside

One of the largest hard rock lithium deposits in the world

Mineral Resource as at 30 June 2022

Category	Tonnes (Mdmt)	Li_2O (%)	Ta_2O_5 (ppm)	Fe_2O_3 (%)	Li_2O (Mt)	Ta_2O_5 (Mlb)
Measured	19	1.4	138	0.5	0.3	6
Indicated	187	1.2	100	0.6	2.2	41
Inferred	99	1.1	110	0.7	1.0	24
Total	**305**	**1.1**	**105**	**0.6**	3.5	71

Ore Reserves as at 30 June 2022

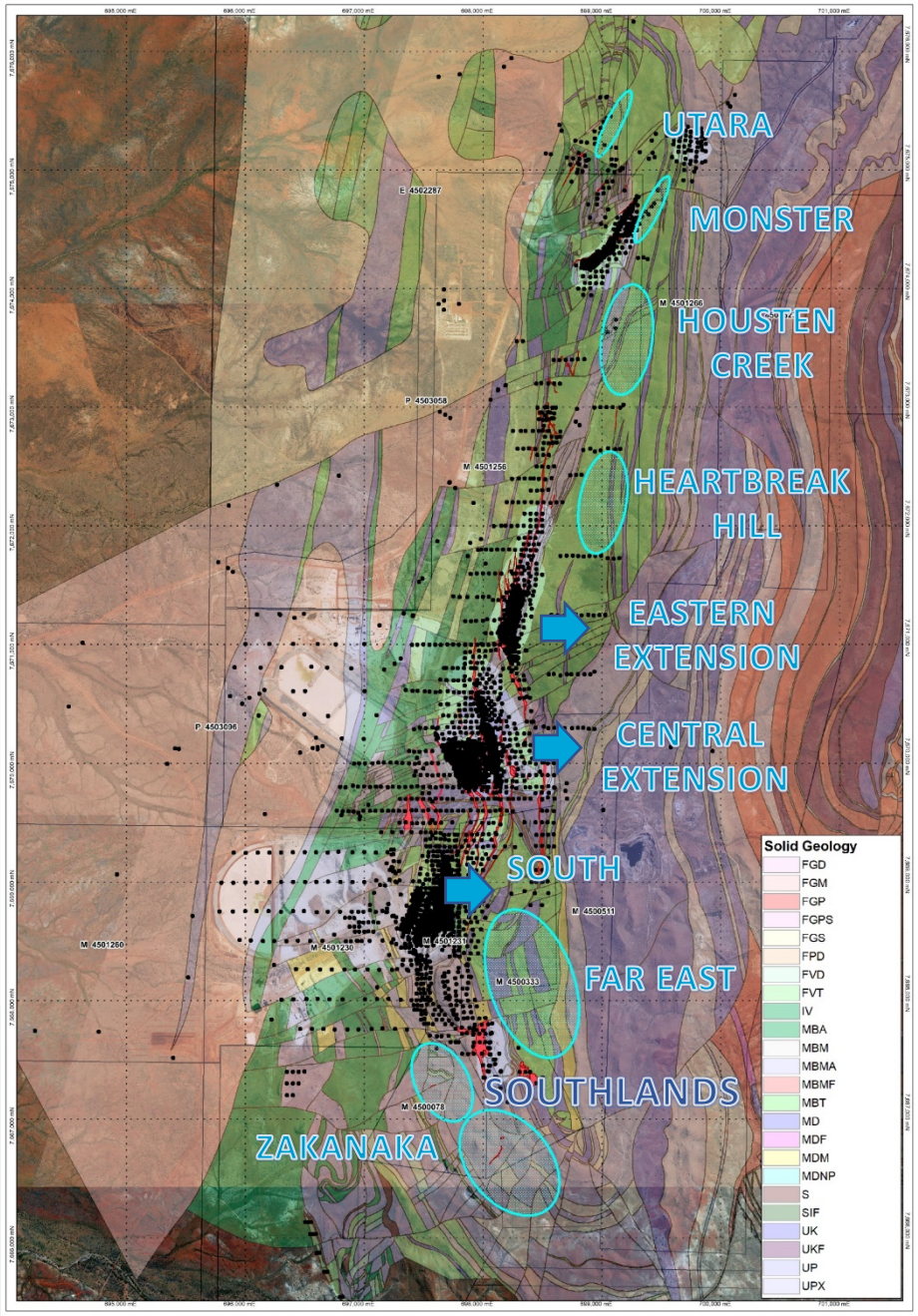
Source	Ore Reserve Classification	Tonnes (Mt)	Li_2O (%)	Ta_2O_5 (ppm)	Fe_2O_3 (%)	Li_2O (Mt)	Ta_2O_5 (Mlb)
Open-pit	Proved	17	1.3	129	1.1	0.2	5
	Probable	138	1.2	97	1	1.6	30
	Total	155	1.2	101	1	1.8	34
Stockpile lithium / tantalum ore	Proved	0	1.4	101	1.2	0.0	0
	Probable	2	1.2	108	1.2	0.0	1
	Total	2	1.2	107	1.2	0.0	1
Stockpile lithium ore	Proved	0	0.7	-	1.2	0.0	-
	Probable	1	1.3	-	0.8	0.0	-
	Total	1	1.2	-	0.9	0.0	-
Total	***Proved***	***17***	***1.3***	***129***	***1.1***	***0.2***	***5***
	Probable	***141***	***1.2***	***97***	***1.0***	***1.6***	***30***
	Total	***159***	***1.2***	***101***	***1.0***	***1.9***	***35***

* Mineral Resource as at June 30, 2022, containing 3.5 M tonnes of Li2O and 71 M pounds of Ta2O5. A cut-off grade of 0.2% Li2O has been applied.

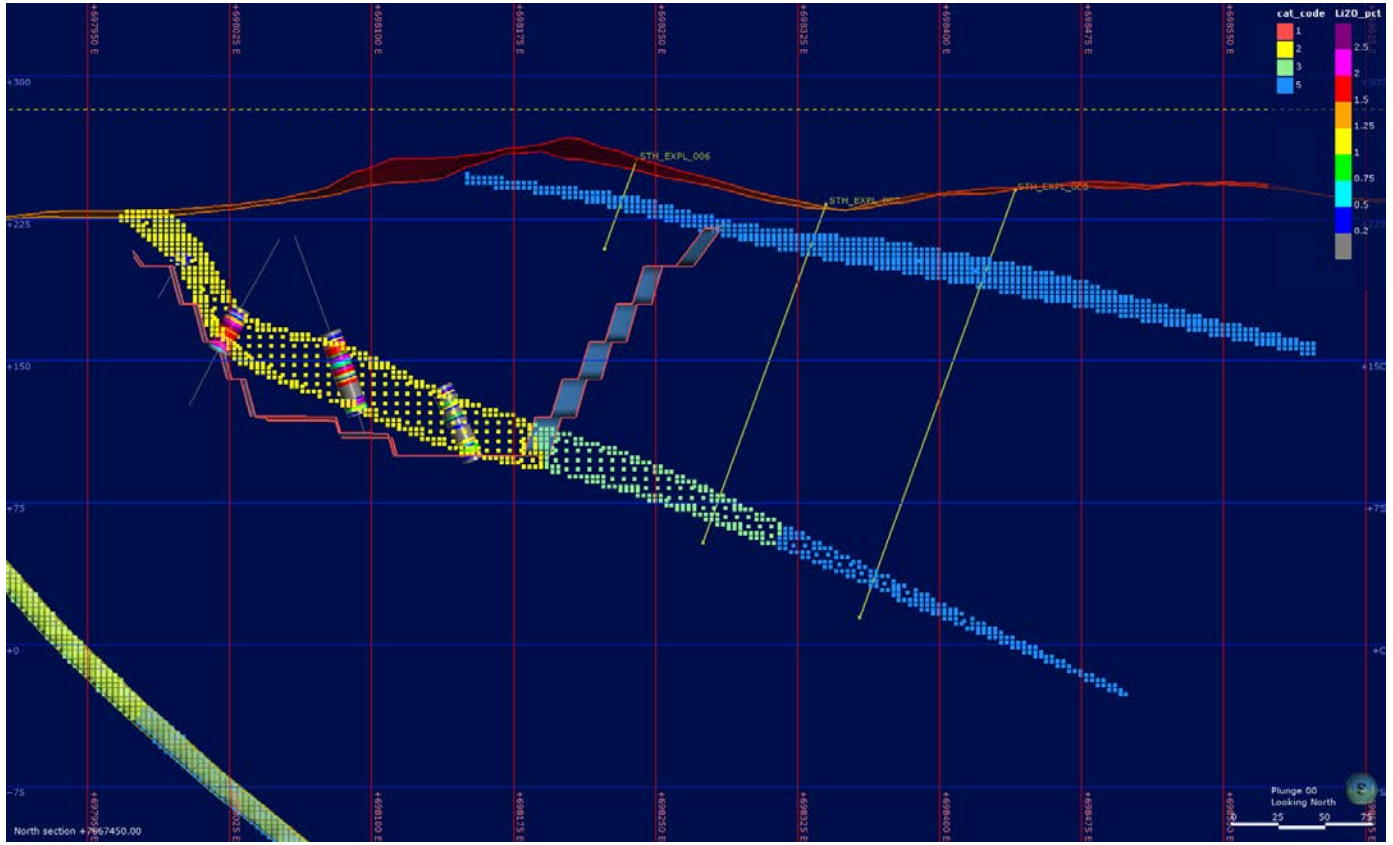
Multiple exploration targets to support future resource growth

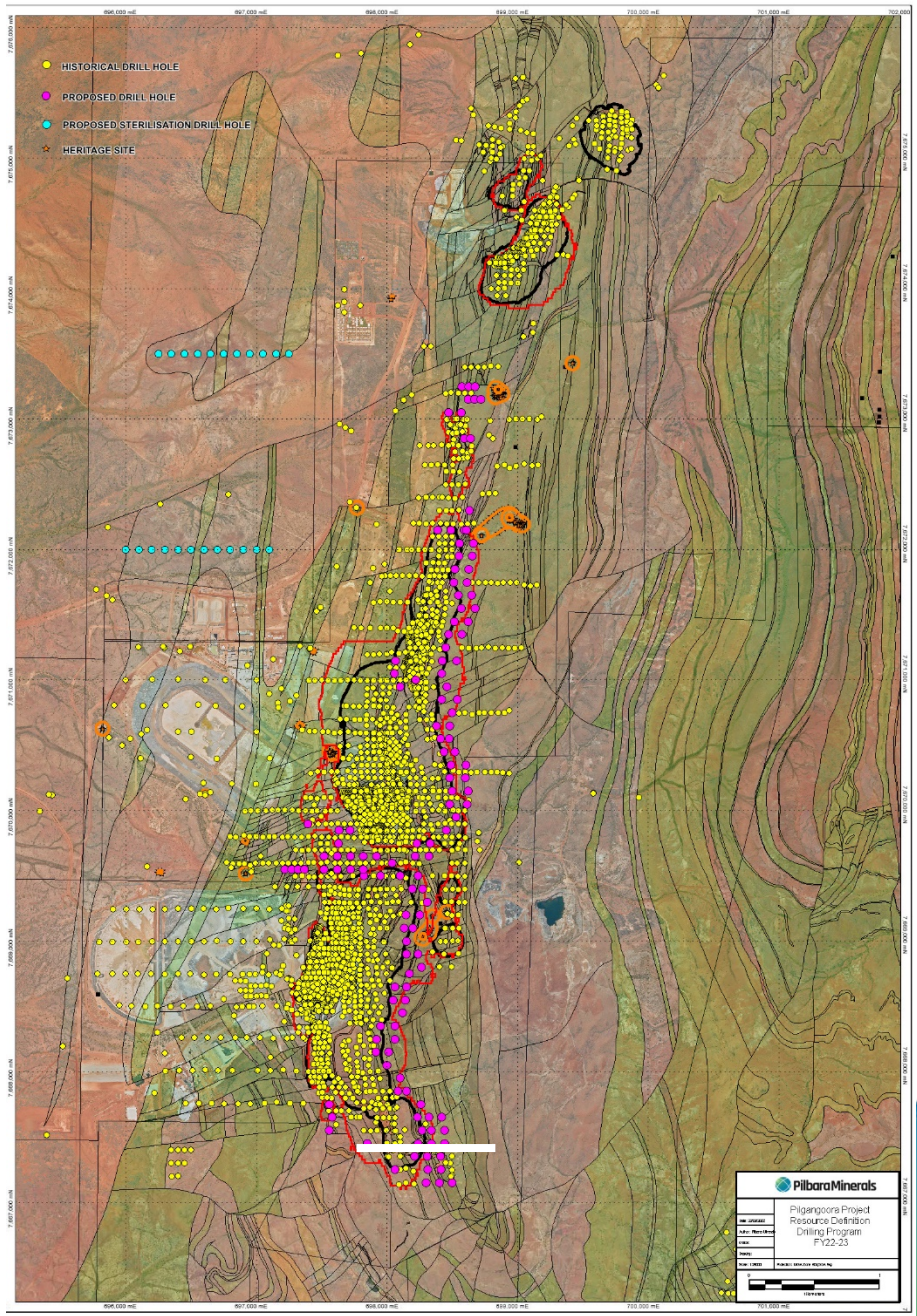
Major exploration drilling program underway

- 45,000 RC and diamond drilling program to upgrade and expand resource base for reserve consideration
- Upgrade Inferred and Unclassified resources to Indicated in the near mine area
- Test down dip extensions of the key domains in the Central and Eastern deposits
- Drill test exploration targets in the Pilgangoora project area

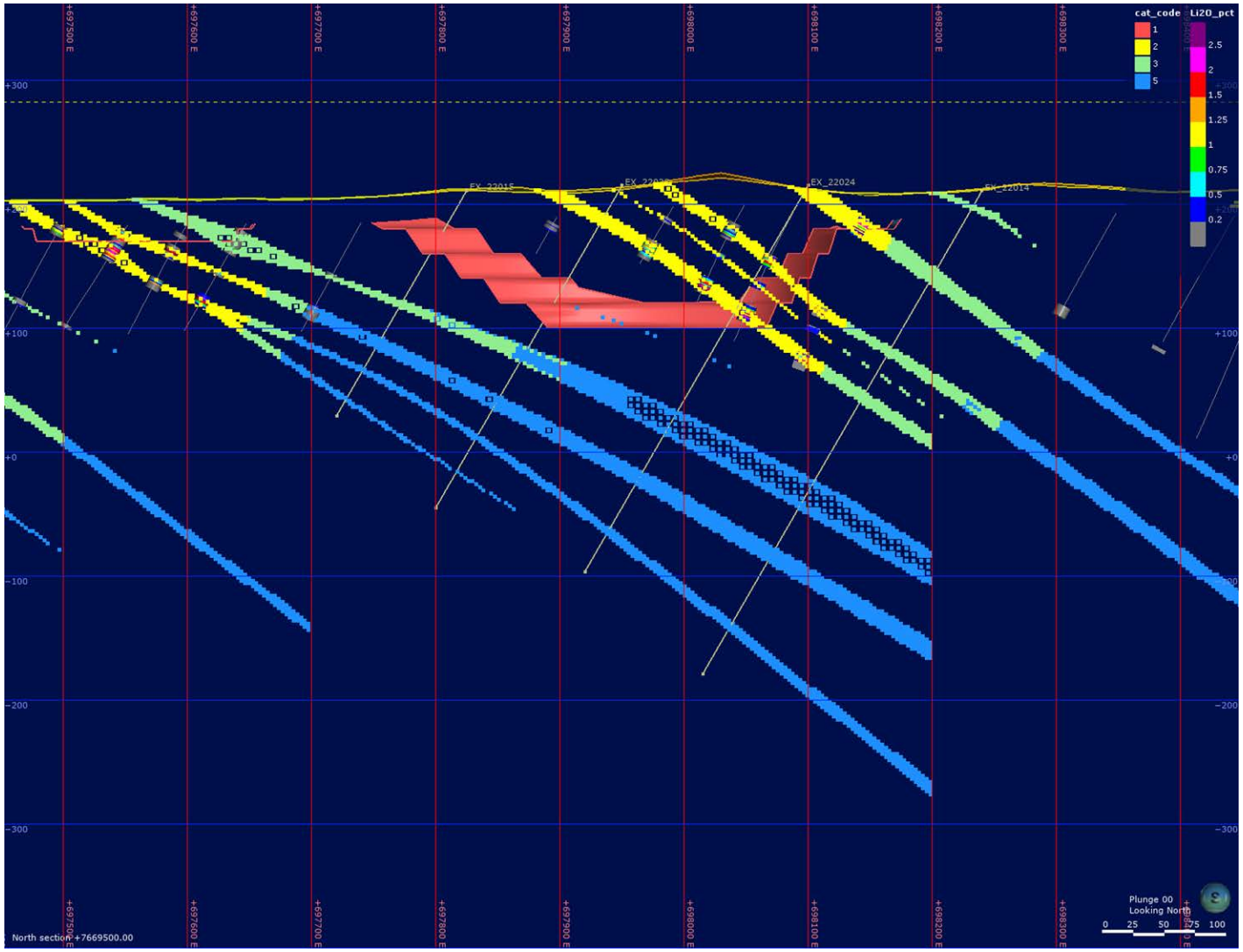


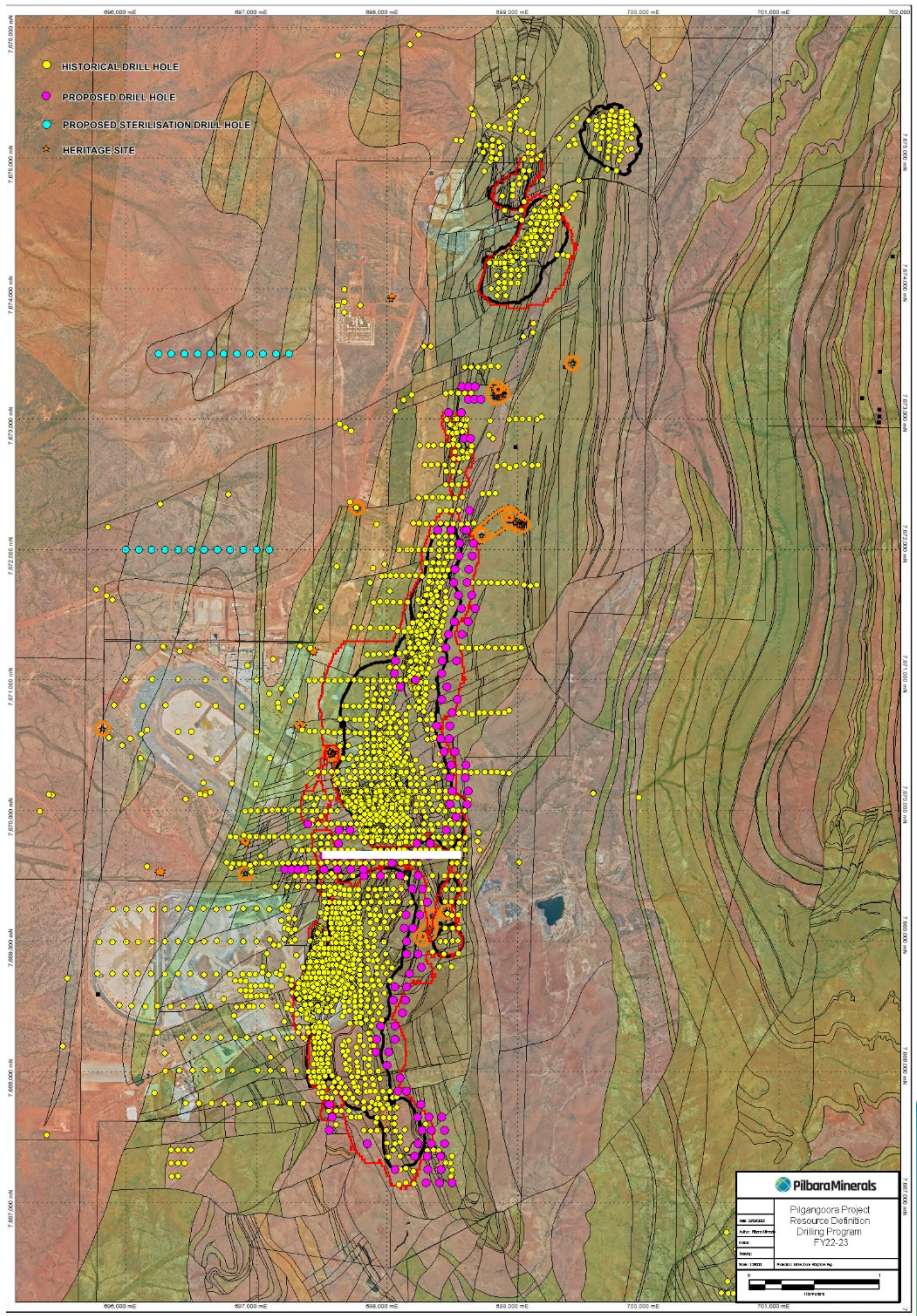
Cross Section - South End – 7667450mN



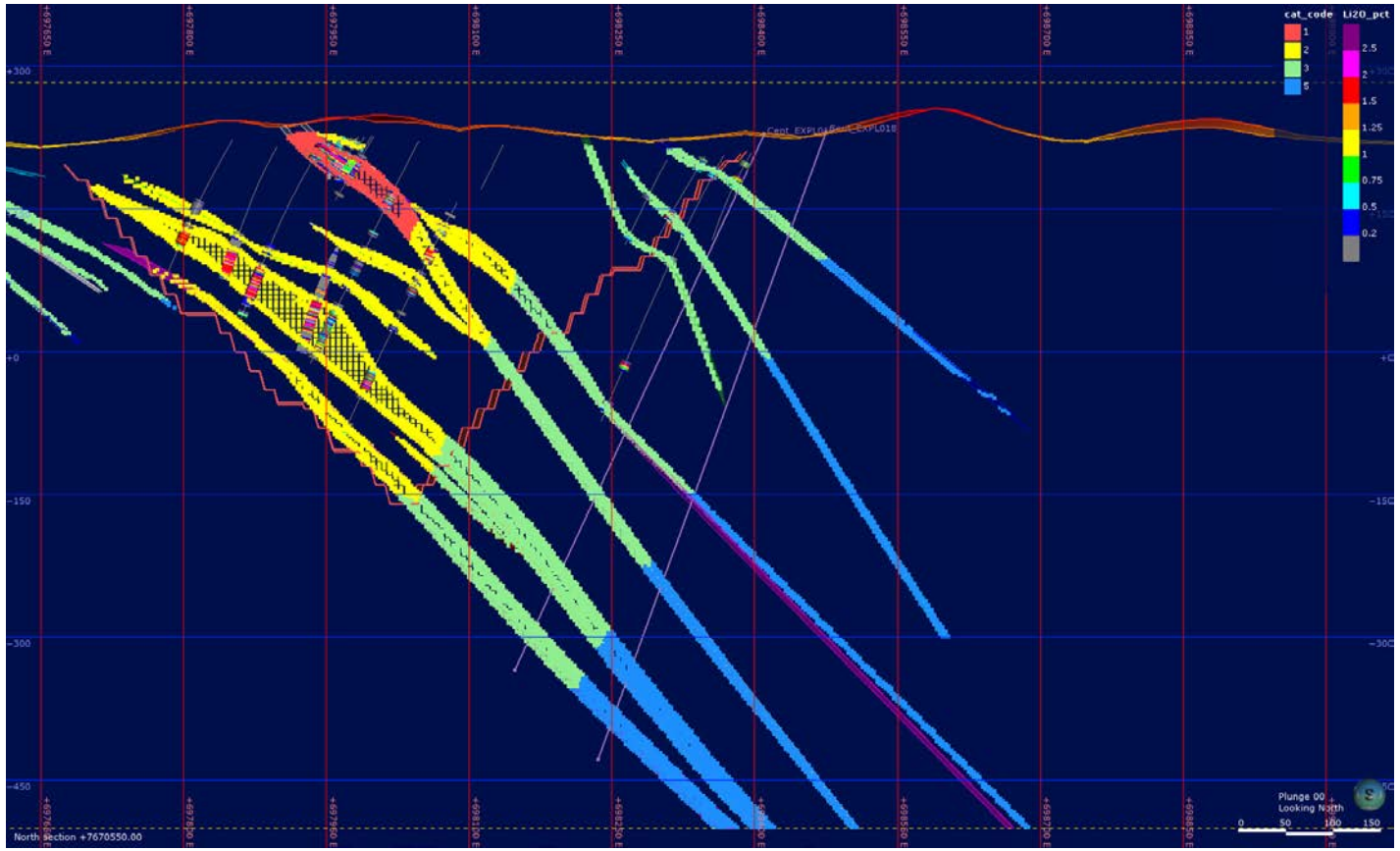


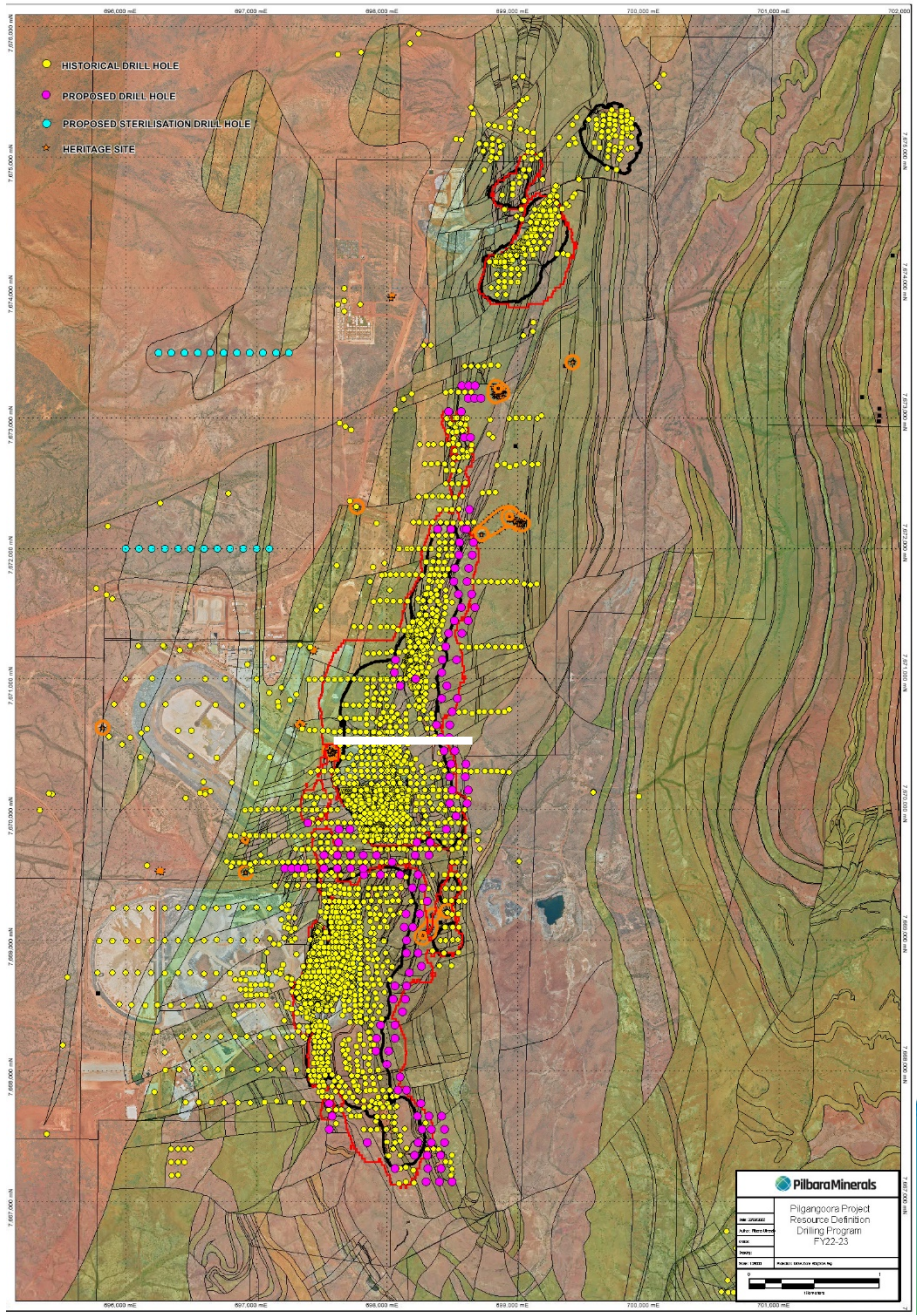
Cross Section - South-Central 7669500mN



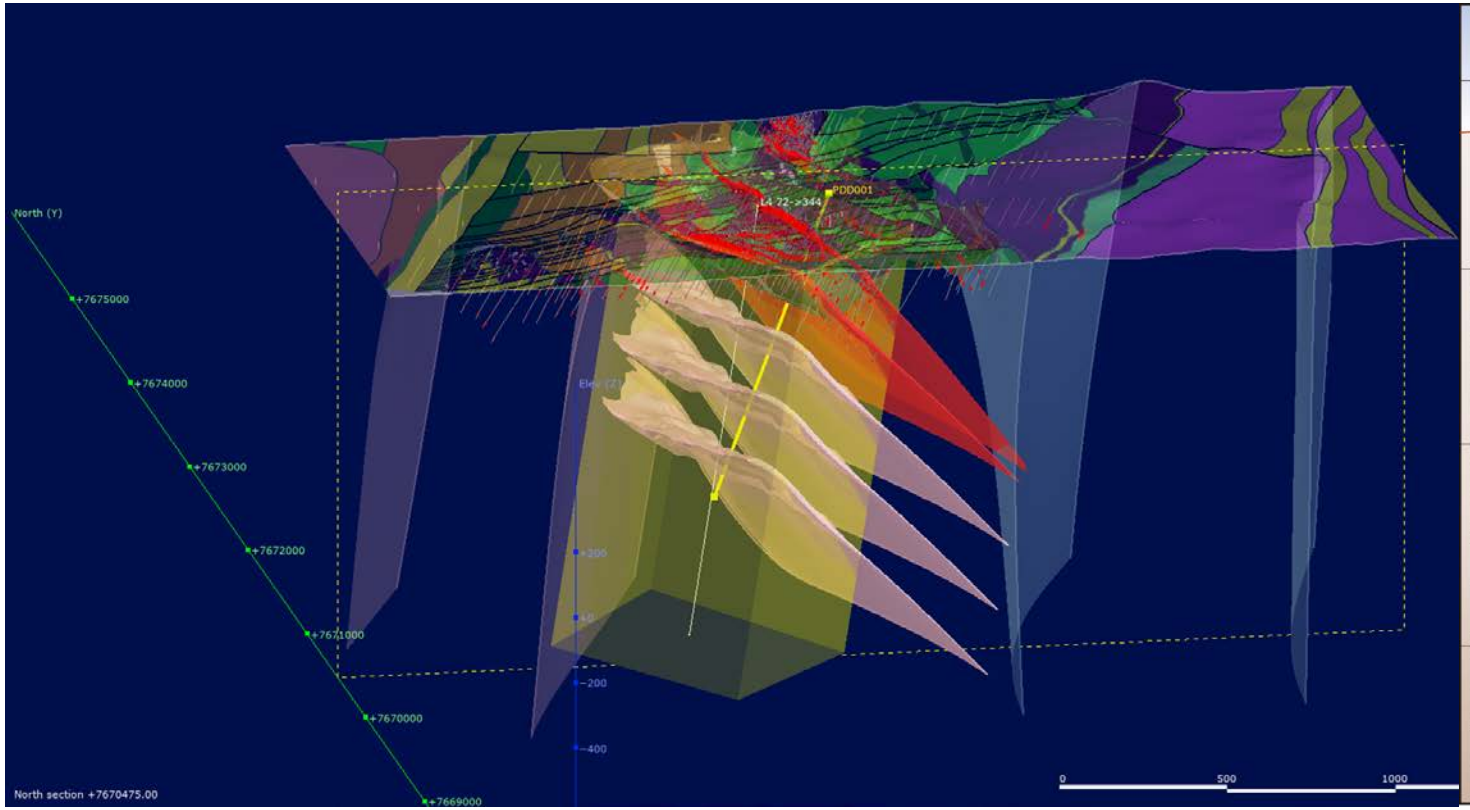


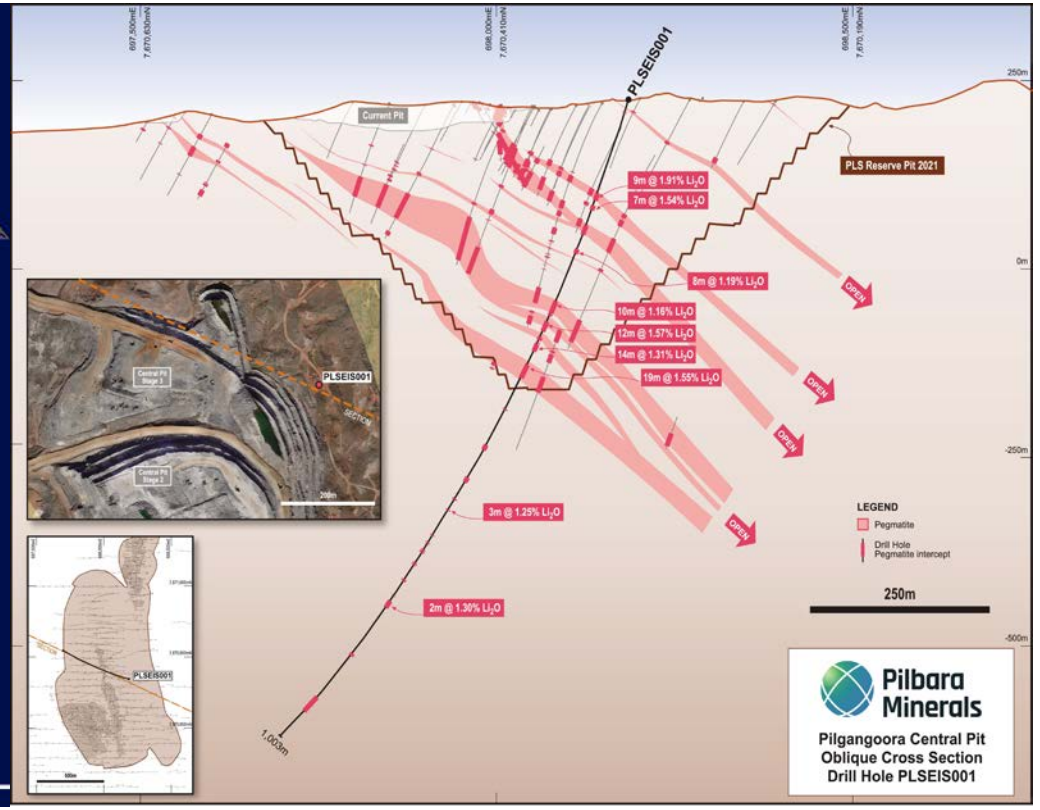
Cross Section - Central 7670550mN





Targeting depth repetition of the Pegmatite System





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Conclusions

Conclusions

- Pilgangoora is one of the largest spodumene-tantalite resources in the world with a JORC Mineral Resource Estimate Mineral Resource of 305M tonnes grading 1.1% Li2O, 105 ppm Ta_2O_5 and 0.6% Fe_2O_3
- Aggressive exploration drilling programs from 2014 led to first spodumene concentrate production in less than 4 years
- Geological mapping and sponsored research to constrain the nature and timing of Li-Ta mineralization has resulted in the development of a new paradigm for the genesis of the Pilgangoora pegmatites
- Development and application of geochemically based ore type characterisation model has led improved process plant stability and recoveries along with revised mining and ROM build strategies

Pilbara Minerals

Questions?

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