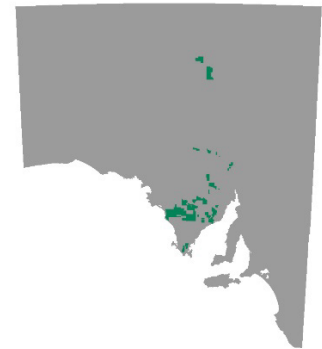




Exploration release areas Batch 4 – Eastern Gawler and Eyre Peninsula

This ERA release includes the prospective Gawler Craton (Eyre Peninsula, Peake and Denison and Gawler Range Volcanics domains) overlain by basins hosting a wide range of commodities.



Geological setting

Basement:

- **Archaean to early Mesoproterozoic Gawler Craton**
 - **Eyre Peninsula** – Partly exposed Archean to Mesoproterozoic basement of the southern Gawler Craton, subject to multiple orogenic, magmatic and mineralising events.
 - **Gawler Range Volcanics Domain** – Mesoproterozoic silicic large igneous province forming a major volcanic–intrusive system across the central Gawler Craton.
 - **Peake and Denison Domain** – Paleoproterozoic metamorphic basement forming the northeastern margin of the Gawler Craton, overlain in part by the Adelaide Rift Complex, Eromanga and Lake Eyre basins.

Basins:

- **Eyre Peninsula and Gawler Range Volcanics Domain** – Local Neoproterozoic to Phanerozoic cover, including Cenozoic basins and coastal sediments.
 - **Polda Basin** – Fault-bound trough on the Eyre Peninsula containing sediments which range in age from Neoproterozoic to Jurassic. Overlies the Mesoproterozoic Itiledoo Basin and is overlain by a thin veneer of Cenozoic sediments.
- **Peake and Denison Domain** – Locally overlain by the Adelaide Rift Complex, Eromanga and Lake Eyre basins.

Gawler Craton

The Gawler Craton is the oldest and largest geological province in South Australia, preserving a complex tectonic history spanning from ~3250 Ma to 1450 Ma. The craton comprises a Mesoarchean–Paleoproterozoic core that is intruded and overlain by Paleoproterozoic to Mesoproterozoic rocks. The Mesoarchean history of the Gawler Craton is dominated by felsic magmatism, the Neoarchean to Paleoproterozoic history by sedimentation and bimodal magmatism, and the Mesoproterozoic history by bimodal magmatism.



The Gawler Craton comprises Late Archean to Mesoproterozoic crystalline basement rocks. The oldest basement is the c. 3150 Ma Cooyerdoo Granite, a small body that crops out in the southeastern part of the craton. The oldest geologically coherent crust includes the c. 2520–2440 Ma Sleaford and Mulgathing complexes, found in the southern Eyre Peninsula and central Gawler Craton respectively. The complexes comprise meta-igneous, metavolcanic and metasedimentary packages that have been multiply metamorphosed and deformed. These rocks originated during a period of basin development and formed as a once contiguous basin, which was subsequently separated by Paleoproterozoic tectonism. The basin developed in a back-arc or rift setting which accommodated the eruption of the c. 2560 Ma Devils Playground Volcanics and c. 2520 Ma mafic to ultramafic magmas of the Lake Harris Komatiite in the north, and the c. 2520 Ma Hall Bay Volcanics in the south. Deposition of sediments occurred contemporaneously with the volcanism, including protoliths to the Christie Gneiss, and continued until c. 2440 Ma. Bimodal magmatism continued in the northern portion of the basin from c. 2490–2460 Ma. Basin development was terminated by deformation and metamorphism of the c. 2470–2410 Ma Sleaford Event. Sedimentation recommenced during the Paleoproterozoic from c. 2000–1650 Ma, covering much of the Gawler Craton. The sedimentation was disrupted by the local-scale Cornian orogenic event at c. 1850 Ma and the widespread Kimban Orogeny at c. 1730–1690 Ma. Late Paleoproterozoic bimodal intrusive magmatism of the Peter Pan Supersuite occurred pre-, syn and post- Kimban Event deformation (i.e. at c. 1745–1700 Ma and c. 1690 Ma) across the Gawler Craton.

The Peake and Denison Domain in the northeastern Gawler Craton is mostly covered by younger sedimentary rocks, with Proterozoic basement exposed in several inliers. Aeromagnetic data and existing drilling indicate large areas of relatively shallow basement (<300 m depth) to the east of these inliers.

Beneath the Neoproterozoic cover are the Peake Metamorphics, dated to roughly 1800–1740 Ma. These rocks consist mainly of quartzite (Baltucodna Quartzite), calc silicate units, and metapelites, interlayered with c. 1790–1770 Ma bimodal volcanic rocks (Tidnamurkuna Volcanics) and intruded by the Wirricurrie Granite. A younger volcanic episode around 1740 Ma produced felsic volcanics associated with iron-rich sediments, and this period may coincide with tonalite intrusion in the region.

Early Mesoproterozoic magmatism is also recorded, including granitic and aplitic intrusions dated between 1555 and 1530 Ma. Metamorphism in the domain ranges from greenschist to upper amphibolite facies, with occurrences of sillimanite gneiss and local migmatites. Folding and foliation are present in both the metamorphic rocks and associated granites, though their timing is uncertain. The latest Paleoproterozoic and Mesoproterozoic were dominated by magmatism, however, sedimentation occurred in the eastern Fowler Domain c. 1610 Ma and small depositional basins developed during the early stages of magmatism associated with the Gawler Range Volcanics c. 1594–1590 Ma. Intrusion of the bimodal c. 1650–1610 Ma St Peter Suite occurred largely in the Nuyts Domain, and these, together with Hiltaba Suite magmas, also intruded the pre-1610 Ma metasedimentary rocks in the eastern Fowler Domain. Extrusion of the c. 1594–1587 Gawler Range Volcanics in the central Gawler Craton was accompanied by widespread intrusion of the c. 1595–1575 Ma bimodal



Hiltaba Suite magmas. The magmatism was followed by high-grade metamorphism and shear zone development and reactivation across the western and central Gawler Craton at c. 1570–1540 Ma whilst sedimentation occurred in the eastern Gawler Craton. The youngest tectonic event recorded in the Gawler Craton consists of the reactivation of shear zones between c. 1470 and 1450 Ma at greenschist to amphibolite facies in the western Gawler Craton, and magmatism and granulite facies metamorphism in the northern Gawler Craton at c. 1450 Ma.

Deposition into the Cariewerloo Basin began in the Mesoproterozoic in response to north-east-, south-west-directed crustal extension and subsidence following the emplacement of the Hiltaba Suite and Gawler Range Volcanics (c. 1600–1560 Ma). The basin is structurally and temporally distinct from older Gawler Craton basement rocks and younger Beda Basalt of the Adelaide Superbasin.

The Cariewerloo Basin is infilled by sediments of the Pandurra Formation, composed of dominantly continental, fluvial, red bed sediments which consist of poorly sorted, medium- to coarse-grained, immature sandstones, together with interbedded pebbly sandstones, siltstones and shales.

During the Neoproterozoic, extensional tectonism across the eastern Gawler Craton led to the eruption of the Beda Basalt, intrusion of the Gairdner Dolerite, and subsequent deposition of platform sequences. The Beda Basalt consists of variably altered, amygdaloidal basalt and is preserved within a north–south-trending sub-basin near Port Augusta. Although the Beda Basalt itself is relatively restricted in extent, mafic magmatism of similar age is far more widespread, as demonstrated by the extensive dyke swarms that form the c. 820 Ma Gairdner Dolerite, and contemporaneous volcanism in the Polda Basin. Localised clastic sedimentation associated with the Beda Basalt produced the Backy Point Beds.

Neoproterozoic sedimentation was extensive across much of southern and central Australia. Deposition was concentrated within the Adelaide Rift Complex, where at least 14 km of sediment accumulated through multiple phases of rift development. Along its western margin, the Adelaide Rift Complex onlap the Gawler Craton to form the Stuart Shelf. The principal stratigraphic units of the Stuart Shelf are dominated by the Umberatana Group, including the Tapley Hill Formation, the Whyalla Sandstone, and the lower Wilpena Group. In the northern part of the Stuart Shelf, around Olympic Dam, a succession of Cambrian limestones belonging to the Hawker Group is also preserved.

Deformation associated with the Delamerian Orogeny, active between about 520 and 490 Ma, strongly affected the Adelaide Rift Complex, the Torrens Hinge Zone and the Peake and Denison domain. In contrast, the Stuart Shelf experienced only mild syn- and post-depositional deformation, with its flat-lying sedimentary sequences remaining largely undeformed due to their position on the relatively stable Gawler Craton.



The Poldo Basin is an isolated, east-west trending Neoproterozoic to Jurassic sedimentary basin occupying the central-western Eyre Peninsula in South Australia and continuing westward into the Great Australian Bight.

Beneath the basin lies the Mesoproterozoic Itiledoo Basin, which itself rests on the crystalline basement of the Gawler Craton. Based on age relationships and lithostratigraphic similarities, particularly the presence of evaporites and mafic volcanics, the Neoproterozoic section of the Poldo Basin is likely part of the broader Centralian Superbasin. The Permian interval is interpreted as equivalent to sedimentation associated with the continent-wide glaciation that affected Australia during the Carboniferous–Permian. The Jurassic succession likely reflects deposition within an extensional setting linked to the early stages of rifting between Australia and Antarctica.

North of the Eyre Peninsula, the Eromanga Basin forms the Mesozoic cover sequence over much of eastern and northern South Australia, including parts of the Gawler Craton. In northeastern South Australia, a thick succession of Jurassic–Cretaceous fluvial to marine sediments blanket older Proterozoic and Paleozoic basins. Its southwestern margin extends over the northeastern and central-western Gawler Craton, where it forms a broad, shallow, epicratonic cover sequence.

Over the Eyre Peninsula, the Eucla Basin forms a Cenozoic marine–coastal cover sequence draped across the Gawler Craton. It consists of Eocene–Miocene limestones, extensive palaeovalley fills, and coastal barrier systems, capped by widespread aeolian dunes. Its evolution reflects repeated marine incursions, later uplift and karstification.

Mineral prospectivity

The Gawler Craton is a world-class metallogenic province, prospective for a wide range of commodities and deposit styles, with cover sequences also hosting commodities of economic significance. The eastern Gawler Craton is host to one of the most significant iron oxide Cu-Au (IOCG) provinces in the world, with mines at Olympic Dam, Prominent Hill and Carrapateena, in addition to over 100 separate occurrences of this style. Alteration and mineralisation is widespread and attributed to a magmatic-hydrothermal system associated with the c.1590 Ma Hiltaba-Gawler Range Volcanic event. While significant IOCG deposits are currently only known along the eastern Gawler Craton, the hydrothermal effects of this event are recognised across the majority of the Gawler Craton, associated with intrusion-related Au (e.g. [Baggy Green](#)), skarn (e.g. [Weednanna Au](#)), epithermal (e.g. [Paris Ag](#), [Parkinson Dam Au-Ag](#)) mineralisation and impact numerous earlier formed deposits. IOCG mineralisation (e.g. [Acropolis](#)) and common alteration and mineralisation evident within the Gawler Range Volcanics (e.g. [Churchill Dam](#), [Red Lake](#)) supports the extension of the prospective terrain into the Gawler Range Volcanics Domain. Magmatic-hydrothermal fluid interaction with carbonate-bearing sediments of the Wallaroo Group can result in intense skarn development and associated Cu-Au and base metal mineralisation (e.g. [Punt Hill](#), [Red Lake](#)).



IOCG-style alteration has also been discovered in the Peake and Denison Ranges region, although geochronological evidence suggests the timing of geological events show more similarity to northern Australia than the Olympic Domain. Geochronological data indicate that the [Wills](#) prospect experienced an early phase of magnetite–actinolite–titanite–apatite alteration around 1530 Ma, aligning with mineralising events of the same age in the Cloncurry and Mary Kathleen IOCG districts of the Mount Isa inlier. Subsequent deformation and copper mineralising events at 1500 Ma and around 1465 Ma also coincide with known ages in the Cloncurry district. The ~1465 Ma copper event corresponds to the younger phase of Cu mineralisation recently identified in the northern Olympic Cu-Au Province and may be linked to early Mesoproterozoic rifting associated with the breakup of Proto-Australia and the supercontinent Nuna.

Sedimentary copper occurrences are widespread within Neoproterozoic sediments of the Adelaide Rift Complex and Stuart Shelf over the eastern Gawler Craton and Peake and Denison Inlier. On the Stuart Shelf, the Mount Gunson region has been the focus of periodic copper mining since early discover in 1875. Recent studies by the Geological Survey of South Australia have shown considerable potential for further discovery of this style of mineralisation, with the Pernatty Lagoon and southern Lake Torrens region showing encouraging indicators for Kupferschiefer-style Cu mineralisation. Neoproterozoic sediments in the Peake and Denison region represents the northern extent of the Adelaide Rift Complex and Torrens Hinge Zone and are dominated by the prospective Callanna Group. Copper occurrences found to date within the inlier (e.g. [Coominaree](#), [War Loan](#), [Last Chance](#)) are located around the margins of Curdimurka Subgroup, consistent with fluid migration from evaporite-bearing units known around the Willouran Ranges. Cambro-Ordovician intrusions in the region provide an additional driver for mineralisation (e.g. [Tarlton Springs West](#)).

On the Eyre Peninsula, base metal occurrences are predominantly associated with Archean-Paleoproterozoic metasedimentary units. The Miltalie Mine (Pb-Ag) on the eastern Eyre Peninsula that operated intermittently between 1860 and 1914 had reported ore grades up to 61.5% Pb and 118.5 g/t Ag. Several similar occurrences in the same region include [Atkinson's Find](#), [Elson](#), [Mangalo](#), [Poonana](#) and [Minbrie](#). The southern margin of the Gawler Ranges host significant Pb-Zn-Ag mineralisation at [Menninnie Dam](#) and [Telephone Dam](#) prospects. Mineralisation comprises massive pyrite–sphalerite–galena with minor chalcopyrite and pyrrhotite in serpentine-bearing carbonates, laminated graphitic units and iron formations.

The central-eastern and southern Eyre Peninsula host numerous graphite occurrences over a 200 km long zone regarded as a world-class graphite province. Significant accumulations of graphite are known through the central-eastern and southern Eyre Peninsula including resources defined at [Sivour](#), [Uley](#), [Kookaburra Gully](#), [Wilclo South](#), [Campoona](#), [Oakdale](#) and [Yeltana](#).

Hematite ores formed by supergene enrichment of magnetite-rich BIF have been mined at several major iron ore deposits (hematite and magnetite) within the [Middleback Ranges](#) of the eastern Eyre Peninsula. Archean-Proterozoic BIF have significant strike extent, with

occurrences known along the entire eastern Eyre Peninsula. In the central Eyre Peninsula, granulite facies magnetite BIF of late Paleoproterozoic age hosts deposits such as [Warrambo](#) and [Hambridge](#), with higher grades attributed to intense deformation and metamorphism.

Anomalous U has been identified at several stratigraphic levels within the Poldia Trough (e.g. [Tarlinga](#), [Tuckey](#), [Driver River](#)). Oxidised sediments of the Blue Range Beds within the Poldia Trough are considered to have potential for unconformity-U style mineralisation, similar to Alligator River in the NT. Recent exploration for hydrogen has focussed in the Poldia Trough.

The Cenozoic Eucla Basin hosts several significant strandline-hosted heavy mineral sand deposits and prospects including the Jacinth-Ambrosia mine, located in the western Gawler Craton. Prospects such as [Kolballa](#), with thick intervals of >1% HMS, indicate potential extends over the Eyre Peninsula. Extensive paleodrainage systems over the Eyre Peninsula host several uranium occurrences (e.g. Yaninee – Narlaby Paleochannel; [Cummins](#)) including the recently defined resource of [Blackbush](#) along the eastern Eyre Peninsula. Rare earth mineralisation has also been identified within paleodrainage features (e.g. Boland, Cummins) and associated with deep weathering of basement rocks (e.g. [Caralue Bluff](#)). This deep weathering has led to exceptionally pure kaolin deposits such as [Great White](#). The product's brightness, fine particle size and purity make it a premium material for ceramics and high purity alumina. In addition, recognition of the naturally occurring nanotube form of kaolin (halloysite) has potential for specialist products such as in the medical field, potentially providing additional value.

Prospective commodities

- Metals: Au, Cu, Fe, Ag, Pb, Zn, Co, Ni, Cr, Mn, Ti, V, platinum group elements (PGE), iron ore, W, Sn, rare earth elements (REE)
- Energy: U₃O₈, thorium
- Industrial minerals: kaolin, heavy minerals, graphite, gypsum, alunite, kaolin, talc, magnesite, limestone, dolomite, barite, vein-silica, manganese oxide
- Extractives: vast resources of road making material (sand, gravel, calcrete, limestone, dolomite, quartzite, sandstone, granite, gneiss), dimension stone (granite and gneiss) and regolith clay (brickmaking and refractory).

Major exploration models

- FeO-Cu-Au-Ag±U (hematite- and magnetite-dominated styles) (Olympic Cu-Au Province, e.g. Olympic Dam, Prominent Hill, Carapateena, Hillside)
- Iron ore as magnetite-bearing banded iron formation (e.g. Middleback Range, Bungalow Prospect, Hawks Nest, Skylark) to magnetite-rich metasediment (e.g. Warrambo)
- Iron ore as magnetite and hematite skarn/replacement styles (e.g. Peculiar Knob, Snaefell, Wilcherry Hill)
- Shear-hosted Cu, Au, U (e.g. Cairn Hill)



- Intrusion-related Au (Central Gawler Gold Province, e.g. Tarcoola, Tunkilla Prospect, Barns Prospect, Weednanna Prospect)
- Pb-Zn-Ag-Cu (e.g. [Menninnie Dam](#), [Telephone Dam](#), [Minbrie Prospect](#))
- Epithermal-style Ag-Pb-Zn (e.g. [Paris](#)) and Au-Ag-Pb-Zn (e.g. [Parkinson Dam](#))
- Unconformity and paleochannel U and Au (e.g. U-Driver River; Au-Corunna Conglomerate)
- Graphite (e.g. Siviour, Uley)
- High purity kaolin-halloysite
- Clay-hosted and paleochannel-hosted rare earths
- Heavy Mineral Sands (e.g. Jacinth-Ambrosia)

References and recent publications

- [Gold mineral systems and exploration strategies for the Gawler Craton, South Australia](#)
- [A New Cu Province in Southern Australia? Geochronological Framework of Potential Iron Oxide Copper-Gold Systems in Northeastern Gawler Craton](#)
- [Linking the Gawler Craton and Mount Isa Province through hydrothermal systems in the Peake and Denison Domain, northeastern Gawler Craton](#)
- [Stratigraphy and sequence stratigraphy of the Neoproterozoic \(Cryogenian–Ediacaran\) Stuart Shelf, South Australia](#)
- [Sedimentary Cu mineral systems, Stuart Shelf, South Australia. Metadata report](#)
- [Pyrite chemistry and its value as an exploration tool on the Stuart Shelf](#)
- [Quantitative Mineral Resource Assessment of undiscovered sedimentary-hosted copper in South Australia](#)
- [Stuart Shelf Sedimentary Copper 3D Model](#)
- [Halloysite mineral nanotubes – geology, properties and applied research](#)
- [Northwestern Eyre Peninsula kaolin province - New analytical technique aids resource assessment.](#)
- [Halloysite in Cenozoic sediments along the Eucla Basin margin.](#)

More information

- SARIG map <https://map.sarig.sa.gov.au/>
- SARIG catalogue: <https://catalog.sarig.sa.gov.au/>
- [South Australia major exploration models](#)
- [South Australia mineral explorer's guide](#)



SA Geology 1st Edition

<https://map.sarig.sa.gov.au/>

<https://www.energymining.sa.gov.au/industry/geological-survey/gssa-projects/south-australian-discovery-mapping>

SA Digital Explanatory Notes

<https://explanatorynotes.sarig.sa.gov.au/>

Copper

- [Copper in South Australia](#)
- [South Australian Neoproterozoic sediment-hosted copper occurrences](#)

Gold

- [Gold in South Australia](#)

Graphite

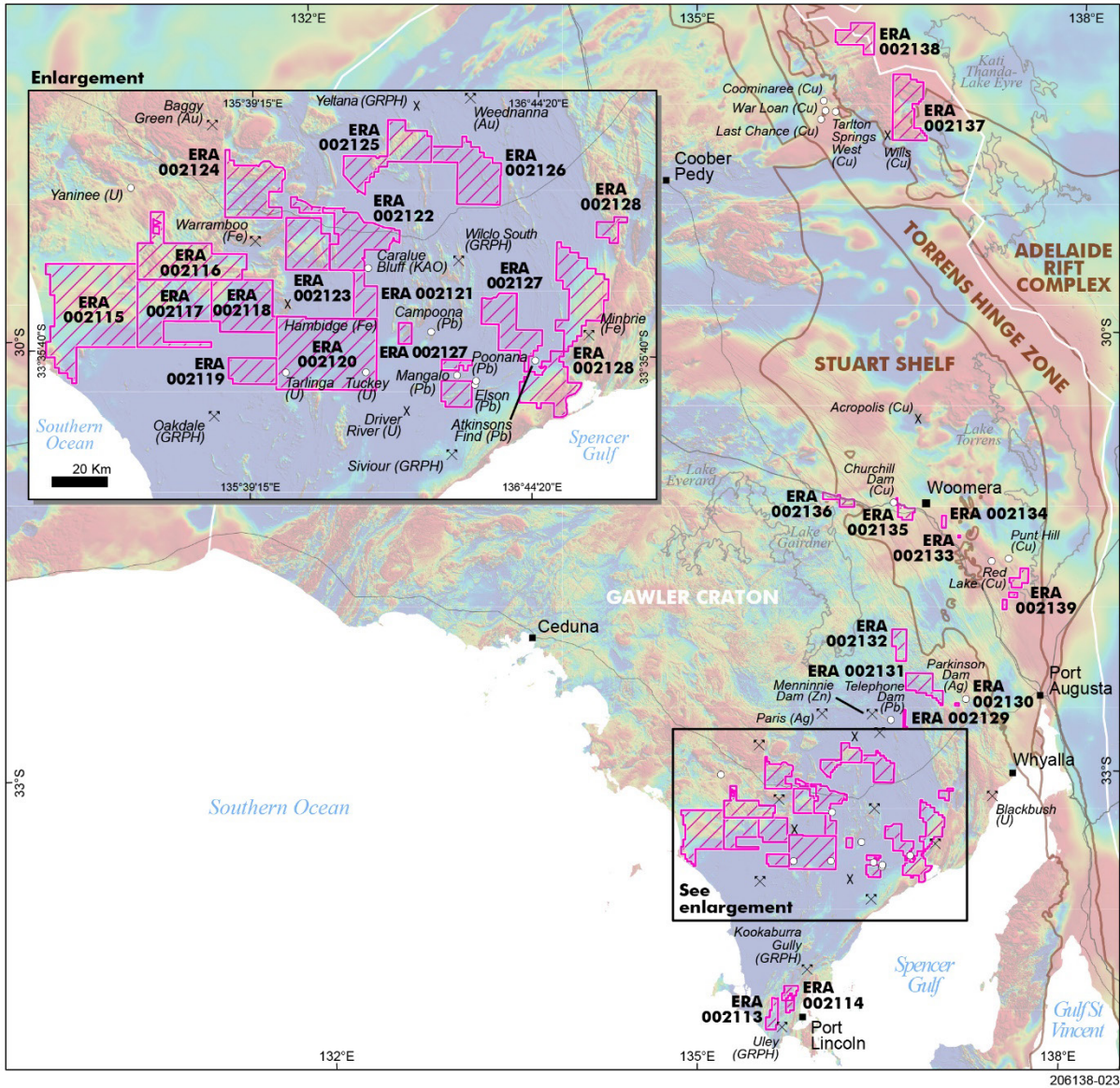
- [Graphite in South Australia](#)

Uranium

- [Uranium in South Australia](#)
- [Uranium and uranium mineral systems in South Australia](#)
- [South Australian Uranium Occurrences Map](#)

Critical minerals (REE)

- [Rare Earth Elements: Critical mineral potential of South Australia](#)
- [South Australia's Critical Minerals and Mine Waste dashboards](#)
- [Secondary prospectivity of South Australia's mine waste - review](#)

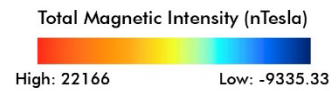


Current as at 16 June 2026

Exploration release area (ERA) - Eastern Gawler and Eyre Peninsula

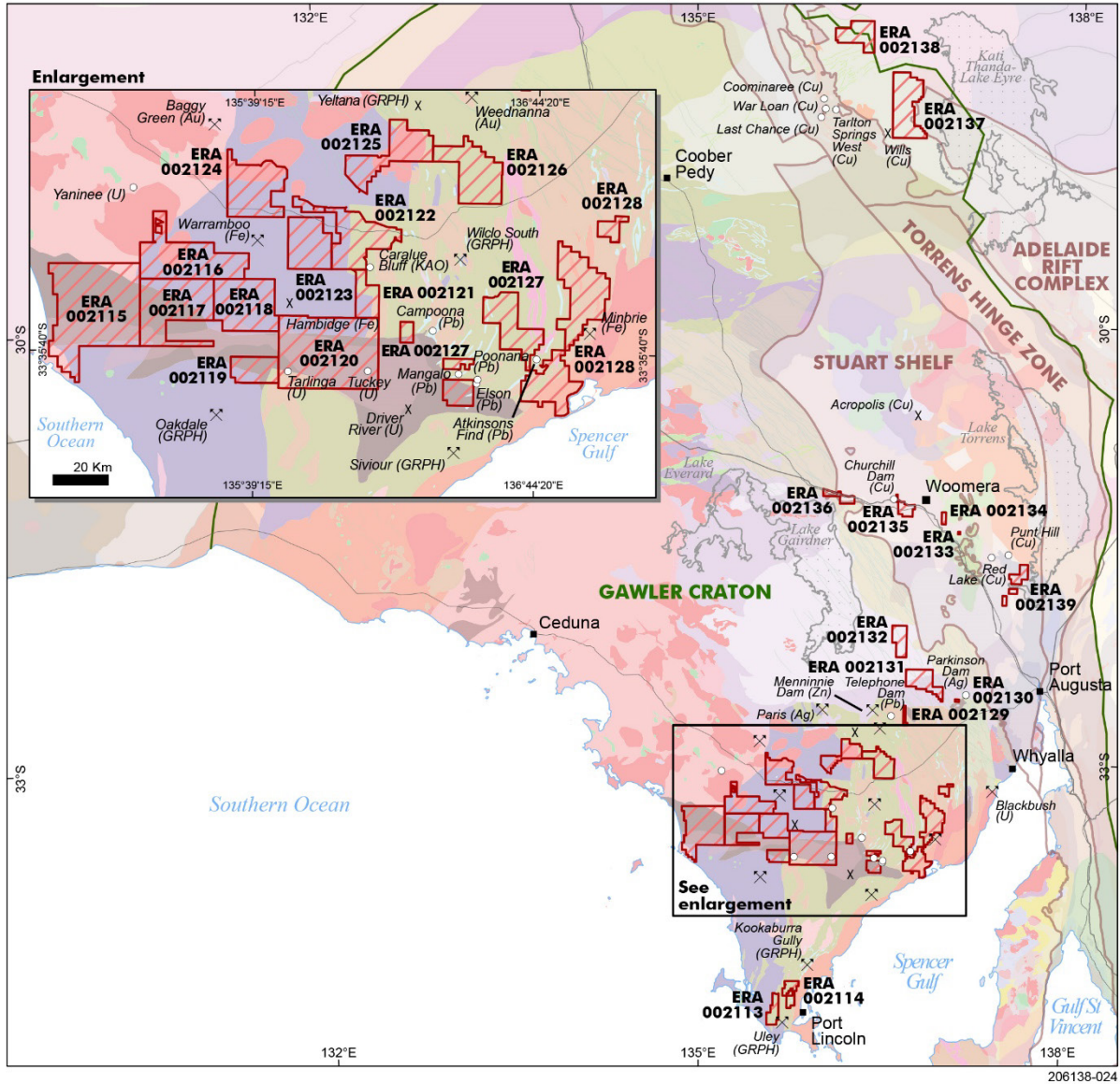
Mineral occurrences and mines

- Occurrence
- Prospect
- Deposit - no mining



GDA2020 : MGA Zone 53

Batch 4 relinquished ground on total magnetic intensity ([PDF 18 MB](#)).



Current as at 16 June 2026

Exploration release area (ERA) - Eastern Gawler and Eyre Peninsula

Mineral occurrences and mines

- Occurrence
- Prospect
- Deposit - no mining



Batch 4 relinquished ground on solid geology ([PDF 2.2 MB](#)). Refer to [SARIG](#) for specific map units.