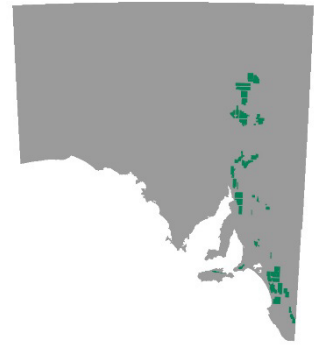




Exploration release areas Batch 2 – Adelaide Rift Complex and South-East (Murray Basin)



This ERA release includes the prospective Neoproterozoic Adelaide Rift Complex and Cambrian Kanmantoo Province and the Murray Basin hosting a wide range of commodities.

Geological setting

Basement: Cambrian-Ordovician Delamerian Orogen

Basins (Neoproterozoic): Adelaide Rift Complex

Basins (Cambrian): Kanmantoo Province, Arrowie Basin

Basins (Ordovician-Cenozoic): Eromanga Basin, Otway Basin, Murray Basin, Gambier Basin, Torrens Basin

Adelaide Rift Complex and Kanmantoo Province

The Adelaide Rift Complex is part of the Adelaide Superbasin, which comprises Neoproterozoic to Cambrian sedimentary and volcanic units deposited in a rift basin developed between the Gawler Craton and Curnamona Province. It is a series of rift troughs and passive margin basins with protracted development from c. 840 Ma to c. 550 Ma with the top of the sedimentary sequence marked by a major basin-wide disconformity separating it from the Cambrian Arrowie and Stansbury basins.

The Kanmantoo Province (also Kanmantoo Trough) is a deeply subsident rift formed in the early Cambrian. It forms the eastern and southern portion of the Stansbury Basin. Most rocks were highly deformed and experienced moderate- to high-grade metamorphism during the 520–490 Ma Delamerian Orogeny.

The sedimentary sequences of the Adelaide Superbasin have been separated into three supergroups. The Warrina Supergroup encompasses the Tonian early rift sequences, the Heysen Supergroup comprising the Cryogenian and Ediacaran glacial, interglacial and post-glacial sedimentary rocks, and the Moralana Supergroup that encompasses all the Cambrian sedimentary rocks.

The Adelaide Rift Complex is the oldest and most central part of the Adelaide Superbasin and hosts numerous metallic mineral deposits, both stratabound and structurally controlled, and many of South Australia's industrial and extractive minerals. Copper mineralisation is widespread and predominantly of the stratabound sedimentary copper model, with local



structural controls commonly key in localising mineralisation. South Australia's principal deposits of magnesite occur in the northern Flinders Ranges and are hosted by the Skillogalee Dolomite of the Burra Group over 10's of kilometres strike (e.g. [Myrtle Springs](#), [Witchellina](#), [Screechowl Creek](#)). Numerous gold deposits have been identified, with historic mining centred around reefs and alluvial fields such as the Waukaringa, Teetulpa and Mannahill goldfields of the Nackara Arc.

High-grade zinc mineralisation occurs in Early Cambrian carbonate rocks of the Arrowie Basin in the Leigh Creek area, northern Flinders Ranges. Mineralisation is focused on the margins of the Arrowie Basin adjacent to Neoproterozoic basement highs. Considerable potential exists for additional deposits to be located below thin sedimentary cover. The potential for significant manganese is also demonstrated at a similar stratigraphic position, with manganese (\pm Zn, Cu) workings known throughout the northern Flinders Ranges, such as at [Mount Arden](#), [Harris](#) and [Watts Sugarloaf](#).

Mineralisation in the Kanmantoo Trough is largely restricted to the Tapanappa Formation and is associated with two principal mineralisation models. The first is syngenetic, hydrothermal 'exhalative' Pb–Zn–Ag mineralisation, exemplified by the Broken Hill–type mineralisation at the [Angas](#) Zinc deposit. The second is epigenetic, structurally controlled Cu–Au mineralisation, typified by the [Kanmantoo](#) Mine. Both styles of mineralisation occur within a thick turbiditic sedimentary sequence that contains a distinctive assemblage of lithologies produced by metamorphism of syngenetically or epigenetically altered sediments. Mineralisation is spatially associated with, and commonly hosted by, these lithologies, which include garnet quartzite, banded iron formation (BIF), quartz–biotite–garnet \pm gahnite schist, and quartz–biotite–andalusite \pm garnet \pm chlorite schist. Gold has been mined from quartz veins within Backstairs Passage Formation at [The Horse](#), demonstrating potential for further discovery.

Cambro-Ordovician intrusive rocks produce a range of intrusion-related mineral systems, known mostly along the margins of the Mount Painter Inlier and Murray Basin down to the State's South-East. Commodities include Cu–Au \pm Mo (e.g. [Blue Rose](#)), Au and W (e.g. [Giants Head](#) and [Tourmaline Hill](#)) within the Adelaide Superbasin metasedimentary units. [Recent work](#) by the Geological Survey of South Australia has refined the geological evolution, tectonic setting and mineral potential for mineral systems within the Delamerian Orogen, particularly in areas below the Murray Basin. Opportunities exist for concealed basement mineral systems including volcanogenic massive sulfide and porphyry deposits.

Mineral prospectivity

Prospective commodities – Adelaide Rift Complex

- Metals: Cu, Au, Pb, Zn, Mn
- Energy: Hydrogen
- Industrial minerals: barite, magnesite, talc, kaolin, phosphate, diamonds
- Construction materials: road making material (limestone, dolomite, quartzite), carbonate aggregate



Prospective commodities – Kanmantoo Province

- Metals: Ag–Pb–Zn, Cu–Au, Au, Ni–Cu–PGE, Mo
- Industrial minerals: diamonds, construction materials, slate and dimension stone

Major exploration models – Adelaide Rift Complex

- Sediment-hosted Cu (\pm Co)
- ‘Oxide’ Cu (leachable)
- Mississippi Valley type (MVT) Pb–Zn
- ‘Non-sulphide’ Zn (willemite, smithsonite)
- Reduced-shale-hosted Pb–Zn
- Vein Au (various styles including Telfer)
- Porphyry related Cu, Mo and Au
- Skarn Cu–Au–Mo
- Placer gold (?)
- Diamonds

Major exploration models – Kanmantoo Province

- Sediment-hosted hydrothermal volcanogenic exhalative (SEDEX) Ag–Pb–Zn \pm Au
- Volcanic-hosted (VHMS) massive sulphide Ag–Pb–Zn
- Cu–Au feeder systems to SEDEX and VHMS mineralisation
- Cu–Au mineralisation associated with Delamerian Orogeny granitoids
- Fault-related Au
- Ni–Cu–PGE and PGE mineralisation within layered and zoned ultramafic–mafic intrusives
- Mo related to Delamerian granitoids.
- Diamond potential of lamprophyre and kimberlite plugs and dykes

Murray Basin

The Murray Basin is a large, intracratonic sedimentary basin extending across South Australia, Victoria, New South Wales and western Queensland. Basin development commenced in the Late Cretaceous and continued through the Cenozoic, forming a gently subsiding depocentre over Proterozoic to Palaeozoic basement of the Gawler Craton and Lachlan Orogen. The sedimentary sequence is flat lying and largely undeformed.

Sedimentation is dominated by Paleogene to Neogene siliciclastic and carbonate units deposited in fluvial, lacustrine, estuarine and shallow marine environments. Key units include the Renmark Group, Murray Group limestones and the overlying Loxton Sand, reflecting



multiple marine transgressive–regressive cycles. Widespread Cenozoic weathering has produced extensive calcrete, silcrete and lateritic profiles, particularly along paleodrainage systems.

The Murray Basin hosts significant sediment-hosted mineral systems. Heavy mineral sands represent the most established commodity, with resources of zircon, rutile and ilmenite developed within shoreline, dune and fluvial marine sand bodies. These deposits are typically shallow, laterally extensive and amenable to opencut mining.

The basin is also prospective for rare earth elements (REEs). REE potential is associated with heavy mineral sands containing accessory monazite and xenotime, as well as clay-rich weathering profiles and calcrete systems developed through prolonged groundwater interaction such as [Koppamurra](#) in the State's South-East. These environments have potential to host light and heavy REE mineralisation. Additional commodities include calcrete and paleochannel-hosted uranium, evaporitic gypsum and salt, and high purity limestone suitable for cement, lime and construction materials.

Exploration is typically focused on near surface sedimentary targets, paleodrainage architecture and weathering profiles, using geophysics, drilling and sediment characterisation. Opportunities exist for undercover exploration targeting concealed basement mineral systems.

Mineral prospectivity

Prospective commodities

- Minerals: Heavy Mineral Sands (zircon, rutile, ilmenite), Rare Earth Elements (REEs - light and heavy)
- Energy: Uranium
- Industrial minerals: gypsum and salt — from evaporitic and lacustrine environments.
- Construction materials: road making material, carbonate aggregate

Major exploration models

- Strandline-hosted heavy mineral sand (HMS) and REE
- Clay-hosted REE
- Volcanogenic Massive Sulfide (VMS) Zn-Pb (Au-Ag-Cu)
- Porphyry Cu-Au-Mo

References and recent publications

- [The Adelaide Rift Complex in the Flinders Ranges: geologic history, past investigations and relevant analogues](#)
- [Adelaide Superbasin basement geology and tectonic controls on sedimentation](#)



- [Delamerian Project - Phase 1 Data Release](#)
The Geological Survey of South Australia Delamerian project aimed to characterise the geological evolution and metallogenic potential of the Delamerian basement to the Murray Basin region, including a stratigraphic drilling program as a partnership of the MinEx CRC National Drilling Initiative.
- [RB 2024/00009 Delamerian National Drilling Initiative: Basement rocks to the Murray Basin, South Australia](#)
- [Metallogenic Setting and Temporal Evolution of Porphyry Cu-Mo Mineralization and Alteration in the Delamerian Orogen, South Australia: Insights from Zircon U-Pb, Molybdenite Re-Os, and In Situ White Mica Rb-Sr Geochronology](#)
- [Evidence of analogues: a framework for exploring the Delamerian Orogen](#)

Uranium

- [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](#)
- [Secondary prospectivity of South Australia's mine waste – review](#)
- [South Australia's Critical Minerals and Mine Waste dashboards](#)

Heavy Mineral Sand

- [Provenance of zircon in heavy mineral sand deposits, western Murray Basin](#)
- [Zircon provenance and sedimentary transport processes – implications for the late Neogene evolution and heavy mineral deposits of the western Murray Basin, South Australia](#)

More information

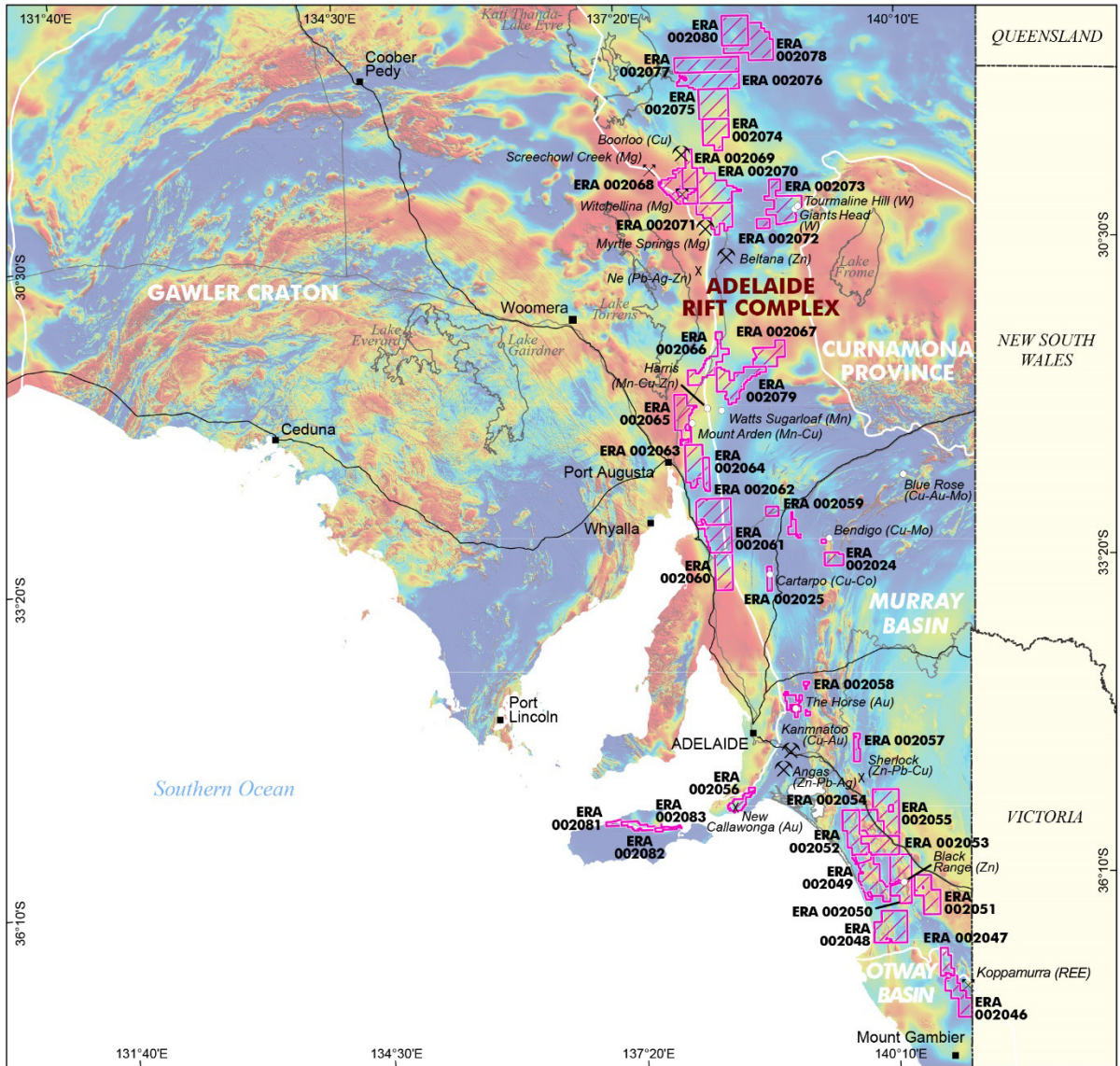
[South Australia major exploration models](#)

[South Australia mineral explorer's guide](#)

[Copper in South Australia](#)

[Uranium in South Australia](#)

[Gold in South Australia](#)

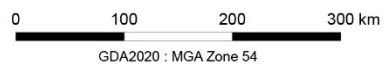
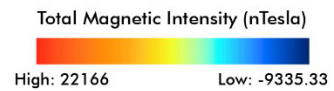


Current as at 17 April 2026

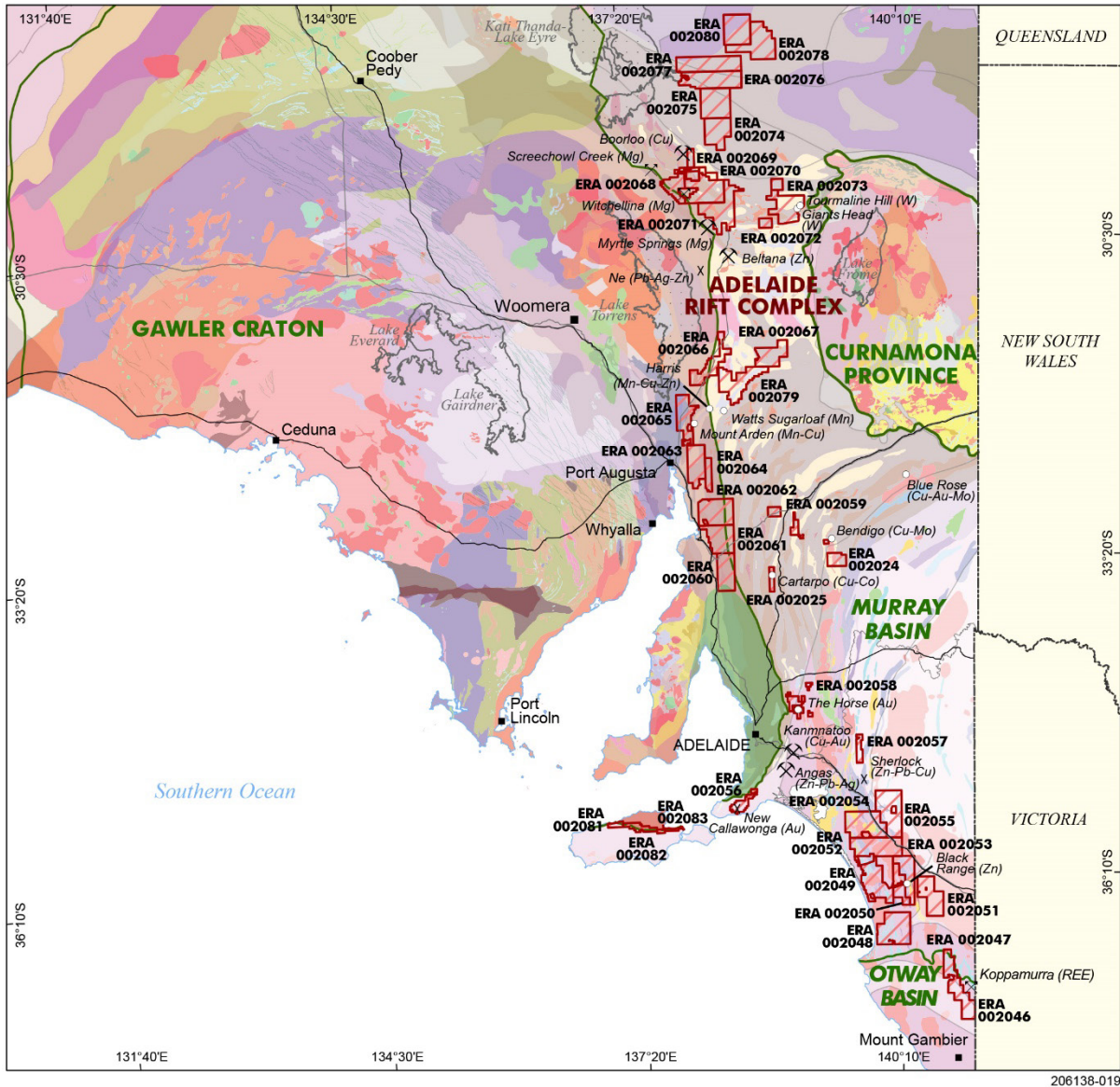
Relinquished Ground – Adelaide Rift Complex and South – East (Murray Basin)

Mineral occurrences and mines

- Occurrence
- Prospect
- Deposit - no mining
- Mine - metals and industrial minerals



Batch 2 relinquished ground on total magnetic intensity ([PDF 8 MB](#)).



Current as at 17 April 2026

Relinquished Ground – Adelaide Rift Complex and South – East (Murray Basin)

Mineral occurrences and mines

- Occurrence
- Prospect
- Deposit - no mining
- Mine - metals and industrial minerals



Batch 2 relinquished ground on solid geology ([PDF 2 MB](#)). Refer to [SARIG](#) for specific map units.