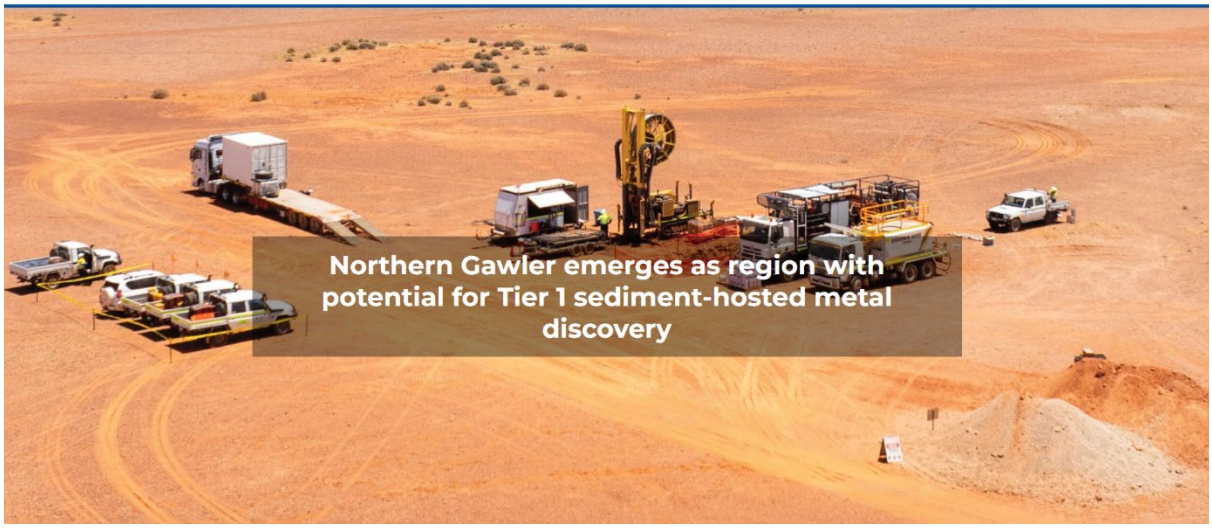
Precompetitive Review

A unique and dedicated source of news and insights on Australian precompetitive geoscience for mineral exploration



March 26, 2026

It wasn't so long ago exploration in the northern Gawler Craton was all about targeting geophysical anomalies for Olympic Dam lookalikes. After all, hematite-rich IOCGs seemed to track along the eastern margin of the Gawler Craton, so why wouldn't they keep going around to the north?

Things began to change in 2022 with a PhD by Mitchell Bockmann on the Peake and Denison Domain, which is just outboard of what is interpreted to be the northeastern margin of the Gawler Craton.

Mitchell, who is now with the Geological Survey of South Australia, found strong similarities between the hydrothermal history of the Peake and Denison Domain and the Cloncurry region. Geochronology on titanite in calc-silicate alteration recorded events at 1565 Ma, 1530–1515 Ma, c 1500 Ma, c 1465 Ma and c 490 Ma. This timing lines up with the Mount Isa Province, where the 1550–1490 Ma period was an intense phase of tectonothermal activity and includes the 1523 Ma age of the copper ore body at Mt Isa.

At about the same time, a MinEx CRC-funded PhD study by Jie Lu inside the northern Gawler Craton uncovered a c 1490 Ma copper mineralising event at the Cairn Hill magnetite IOCG deposit. That's at least 100 million years after the Olympic Dam event. Furthermore, Jie concluded the later event had likely introduced new metal, not redistributed OD-age copper.

Clearly, there was much more to the hugely under-explored northern Gawler than we understood, especially in regard to its copper potential. The Geological Survey of South Australia teamed up with MinEx CRC to find answers with the Northern Gawler National Drilling Initiative as part of a wider program of precompetitive activity.

GSSA this week released its first major report on the results. There is plenty to excite explorers, but the headline news is we have a much stronger case for Mt Isa and Broken Hill-style sediment-hosted base metals. We also have carbonatites, which is part of a separate study of state-wide potential released by GSSA last week.

Olympic Dam-style, hematite-rich IOCGs do not look as good because the northern Gawler as we know it today appears to have been formed deeper in the crust. However, this interpretation of where we are in the crustal column has enhanced the potential for Cloncurry-style, magnetite-rich IOCGs and ISCGs.

GSSA Senior Geologist Claire Wade, who led analysis for the 204-page report, said the breadth of the work and the impact on prospectivity turned out to be much bigger than she expected.

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“We only had six basement samples from the drilling program, but what we were able to learn from them was really exciting. It just shows that taking up the challenge to go out and do that drilling can really open up a lot opportunity. We have been working in parallel with GSSA’s Discovery Mapping program and collecting data on legacy samples as well so we do have a bigger data set to draw on, which will be coming later.”

The improved case for sediment-hosted base metals analogous to those found in the NAC and the Curnamona Province arises from multiple aspects of the results, starting with insights about the tectonic foundations of the northern Gawler.

Until now, there has been very little evidence of Archean basement. A GSSA drillhole (DDH GOMA 4) drilled in the Nawa Domain in concert with a 2008 Geoscience Australia regional seismic line, found some evidence of Archean basement but the result was ambiguous.

Claire said NDING_05 from the Northern Gawler NDI sampled a felsic mylonite with an age of c 2515 Ma.

“We’ve found more evidence for an Archean or Neoarchean magmatism or an event. Another exciting result came from a detrital zircon study. We found a very similar signature to the 3,150 Ma Cooderyoo Granite on Eyre Peninsula, which is the oldest rock in South Australia and was the first identification of Archean crust in the Gawler Craton.

“That’s something really worth looking into further because of the implications for the configuration of the Gawler and Northern Australia Craton during the Archean into the Paleoproterozoic,” Claire said.

GSSA Principal Geologist, Tom Wise, added that the analysis led by Claire had confirmed there were Archean materials at a cover-basement unconformity across a reasonably wide area.

“It’s popping up in a few places now, which is interesting and gives us a bit more of a handle on what the architecture of some of the Paleoproterozoic basins actually look like. And they’re not particularly thick in some places, which is intriguing,” Tom said.

Interestingly, the new work has found little sign of the younger components of the Mulgathing Complex, which are widespread sedimentary packages from about 2480 Ma to 2000 Ma in the central and southern Gawler.

Moving up into the Paleoproterozoic, results from the new GSSA research add to evidence that the northern Gawler has similar components of the mineral systems found in the NAC and the Curnamona Province.

» There is new evidence of magmatism from 1770 Ma to 1750 Ma, which is unrelated to the mafic and felsic Peter Pan Supersuite widespread across the Gawler Craton and associated with the Kimban Orogeny. This time period was significant in the Aileron Province, including the Jervois and Molyhill deposits. “The lithologies, the geochemistry and the isotopic signatures of these 1770 to 1750 magmatic rocks from the Northern Gawler NDI program don’t look like the Peter Pan Supersuite. They look more like the North Australia Craton,” Claire said.

» More broadly, the geochemical and isotopic data adds to evidence of back arc setting in the northern Gawler, which is consistent with important mineral systems in the NAC. Tom said the Paleoproterozoic sediments in the northern Gawler were similar to Broken Hill or Cannington “in terms of what these rift sequences actually look like and were contemporaneous with magmatism followed up by high geothermal gradient metamorphism to help stew some of those potentially metalliferous fluids and upgrade some things.”

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» More evidence to back the recent discovery of a younger metamorphic and thermal event in a window between 1520 Ma and 1460 Ma. Tom said the recent discoveries of mineralization of this age at Cairn Hill and the Peake and Denison Domain gave us snippets of a hydrothermal system. “With the Northern Gawler project, we can show that that’s probably active over a bigger scale, particularly when we integrate that with some of the recent mapping that we’ve been doing and structural reinterpretation. We can see that whole domain has been dissected by some fairly major structures. Some of those are potentially undergoing dilation at this time, which is exactly what you want to see,” Tom said.

In summary, the Northern Gawler NDI has delivered a massive uplift in our understanding of the prospectivity of a region where just a handful of industry drillholes had intersected the basement. The ability to deliver so much insight comes not just from the samples themselves but the NDI working in parallel with the new solid geology and structural mapping, which in turn leveraged the 200-metre magnetics flown over nearly all of the Gawler Craton between 2017 and 2019.

Industry will soon have the opportunity to test new exploration ideas following the release in February of 16 areas under a competitive tender process. The Delamerian NDI projects by the GSSA and MinEx CRC attracted serious new exploration activity. Judging by industry attendance at workshops held by GSSA ahead of the latest area release, there is plenty of interest again this time around.

Main image is MinEx CRC drill rig in action in the Northern Gawler Craton during the late 2024/early 2025 drilling campaign.

The following image is a cartoon cross section from the new report, showing the potential basin and structural architecture of the northern Gawler Craton.