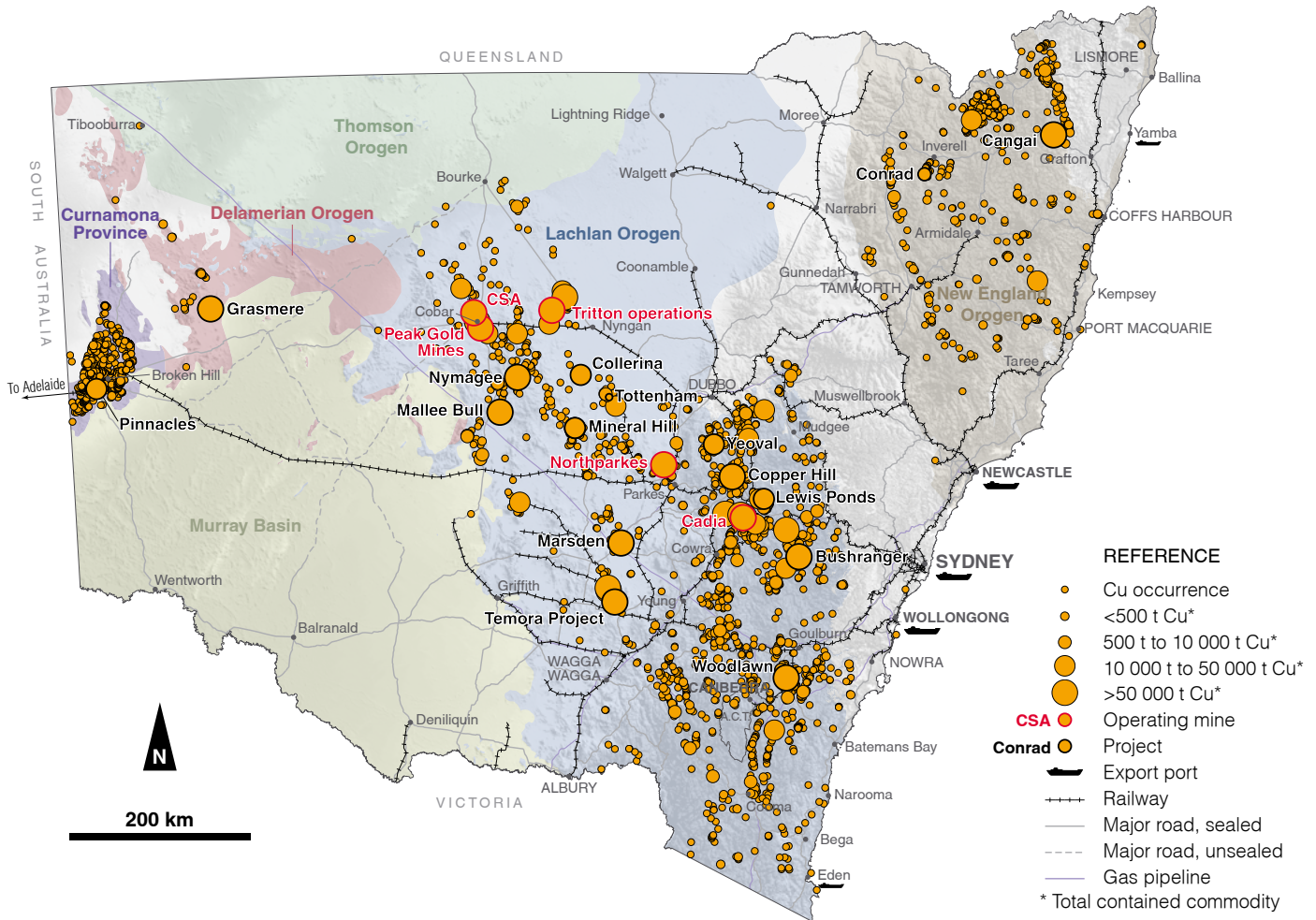


Copper

Opportunities in New South Wales, Australia



DECEMBER 2021



Overview

- New South Wales has a copper endowment (past production and identified resources) exceeding 20.2 Mt.
- Copper is either the principal commodity or a significant credit in a diverse range of deposits.
- The state remains under-explored, with a range of opportunities for new discoveries.

Deposit types

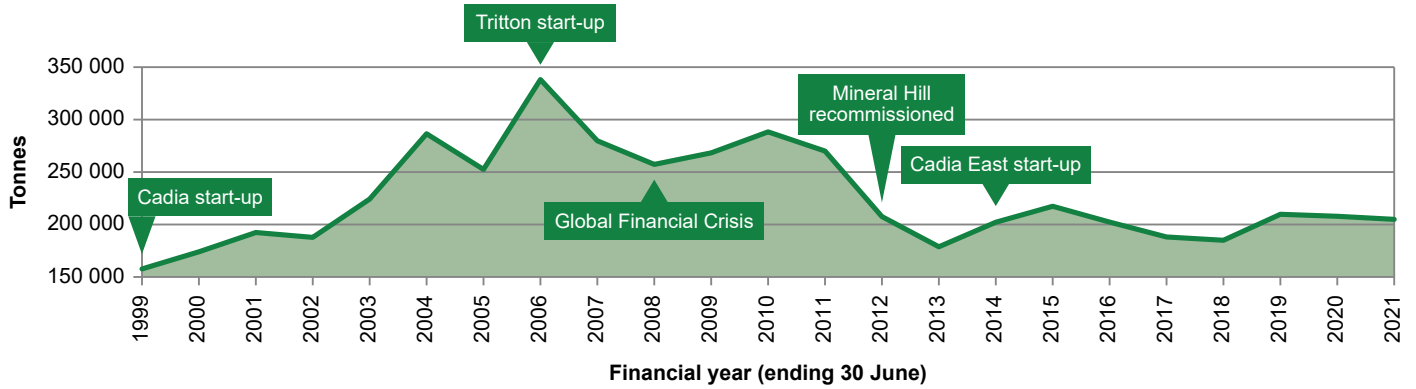
New South Wales (NSW) has a diverse range of copper-rich deposits where copper is produced as either the principal commodity (e.g. Northparkes, CSA, Tritton) or as a concentrate with significant copper credits. These copper-enriched systems include:

- Porphyry Cu-Au and related skarn deposits, including the world class Cadia district (Cadia East and Ridgeway) and the Northparkes, Copper Hill and Temora districts

- Copper-rich volcanic associated massive sulfide (VAMS) deposits hosted by deep marine basins, including the world class Woodlawn Kuroko-style deposit and the Tritton-Girilambone district (Tritton Operations)
- 'Cobar-type' distal intrusion-related Cu-Au deposits (Peak and CSA)
- High and intermediate sulfidation epithermal Au-Cu systems such as Peak Hill and Mineral Hill — some of which are associated with copper-rich porphyry systems
- Significant copper in some Broken Hill-type base metal deposits (Pinnacles) and several intrusion-related polymetallic systems (Conrad and Cangai).



Copper production in New South Wales (1999–2021)



Prospective terranes

Lachlan Orogen

The mainly Ordovician to Carboniferous Lachlan Orogen is, in general, poorly explored for copper. Recent exploration has focussed on the large to very large porphyry Cu–Au systems associated with the Macquarie Arc — several belts of volcanic-dominated rocks of Ordovician to Early Silurian age which host the world class Cadia deposits. In addition, the Lachlan Orogen contains many small to large copper-rich deposits associated with Ordovician and Silurian back-arc basins (VAMS-type) and ‘Cobar-type’ sulfide-rich Cu ± Au deposits in the late Silurian to Early Devonian Cobar-Rast Trough, most of which have recently been re-interpreted as intrusion-related (e.g. Peak, CSA). Other targets include:

- Cu-rich skarns, high and intermediate sulfidation epithermal deposits
- Sulfide-rich deposits associated with major structures — some of which have been major producers in the past and
- Devonian-age intrusion-related copper-rich systems associated with units of the Boggy Plain Supersuite (e.g. the Yeoval porphyry Cu deposit).

New England Orogen

The Devonian to Triassic New England Orogen is under-explored by Australian standards. The orogen is host to copper-rich volcanic associated massive sulfide deposits and polymetallic intrusion-related deposits, some of which include significant resources of copper and of gold. There are also several poorly explored porphyry Cu–Au–Mo systems of Permo-Triassic age.

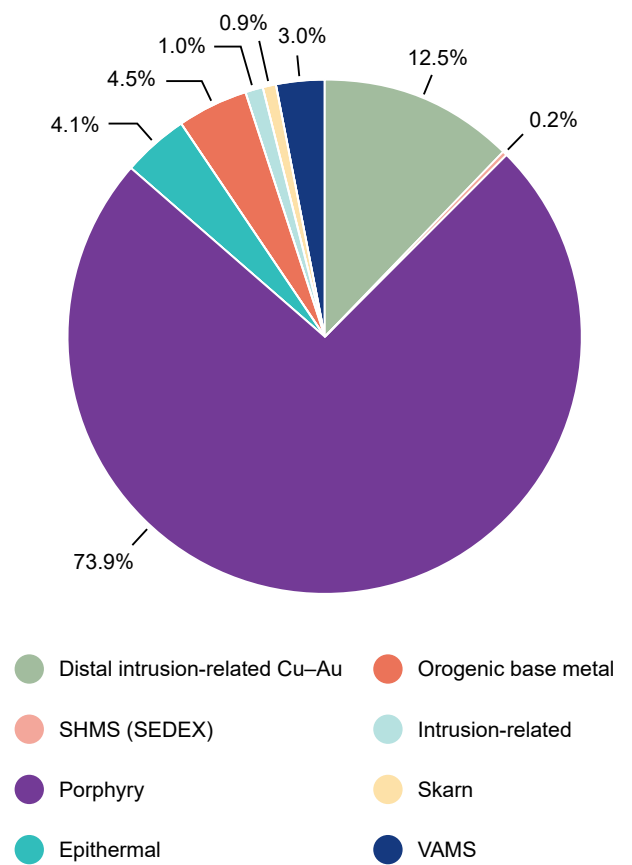
Other areas

There is further significant potential for copper-rich deposits in the following areas:

- The northern extension of the Lachlan Orogen — where it is covered by younger sequences (potential for porphyry Cu–Au and ‘Cobar-type’ sulfide-rich deposits)
- The Neoproterozoic to early Palaeozoic Koonenberry Belt (now interpreted to be a Cambrian Arc built on the rifted margin of Gondwana), which hosts VAMS-type mineralisation (Grasmere)
- Along the edge of the Palaeoproterozoic Broken Hill Block, where there is untested potential for porphyry Cu–Au mineralisation.

Copper endowment (past production + resources) for NSW, classified by deposit type

Total endowment >20.2 Mt; current resources >15.9 Mt



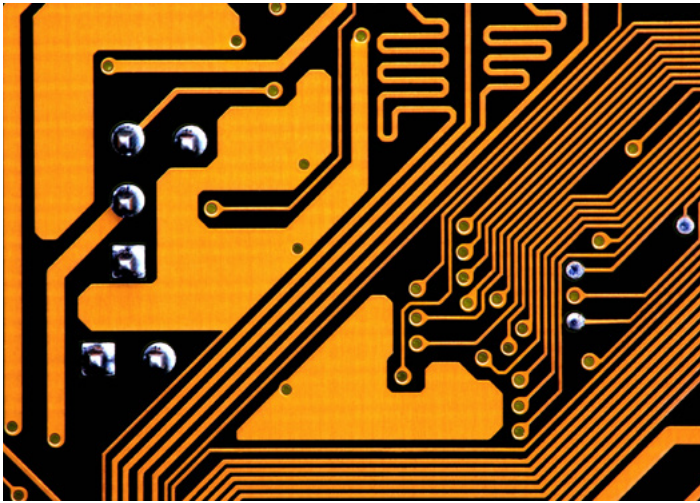
Summary of significant copper resources within NSW

	Mine name Deposit type	Current resources and reserves (JORC)	Contained copper ('000 t)
M I N E S	Cadia Valley Operations Porphyry Cu-Au	Cadia East: (indicated) 2,900 Mt @ 0.26% Cu, 0.35 g/t Au Cadia East: (probable) 1,300 Mt @ 0.29 % Cu, 0.44 g/t Au	7,540
	CSA Distal intrusion-related Cu-Au	(measured & indicated) 7.9 Mt @ 5.5% Cu, 23 g/t Ag (inferred) 3.8 Mt @ 5.66% Cu, 22 g/t Ag (total reserves) 7.7 Mt @ 3.84% Cu, 15.8 g/t Ag	650
	Northparkes Porphyry Cu-Au	(total resources) 481.52 Mt @ 0.56% Cu, 0.18 g/t Au (proved & probable) 121.17 Mt @ 0.58% Cu, 0.22 g/t Au	2,855
	Peak Gold Mines Distal intrusion-related Cu-Au	(total resources) 14 Mt @ 1.2 g/t Au, 1.8% Cu, 0.1% Pb, 0.1% Zn, 7 g/t Ag (total reserves) 1.7 Mt @ 2.1 g/t Au, 1.2% Cu, 0.2% Pb, 0.1% Zn, 5 g/t Ag	5,352
	Tritton Operations Orogenic base metal	Tritton Underground: (total resources) 6.8 Mt @ 1.2% Cu, 0.1 g/t Au, 3.6 g/t Ag Tritton Underground: (proved) 1.8 Mt @ 1.2% Cu, 0.1 g/t Au, 3 g/t Ag Tritton Pillars: (indicated) 0.7 Mt @ 2% Cu, 0.3 g/t Au, 11.7 g/t Ag Murrawombie: (indicated & inferred) 4.5 Mt @ 1.4% Cu, 0.3 g/t Au, 4.5 g/t Ag Murrawombie Underground: (probable) 1.1 Mt @ 1.4% Cu, 0.3 g/t Au Murrawombie Open Pit: (probable) 1.6 Mt @ 0.9% Cu, 0.1 g/t Au, 2.8 g/t Ag Avoca Tank: (indicated & inferred) 0.9 Mt @ 2.6% Cu, 0.8 g/t Au, 13.8 g/t Ag Avoca Tank: (probable) 0.7 Mt @ 2.5% Cu, 0.8 g/t Au Budgery: (indicated & inferred) 2 Mt @ 1.1% Cu, 0.1 g/t Au Budgerygar: (indicated & inferred) 2.6 Mt @ 1.5% Cu, 0.2 g/t Au, 6.7 g/t Ag Stockpiles: (measured) 0.027 Mt @ 1.3% Cu Stockpiles: (proved) 0.027 Mt @ 1.3% Cu	244
P R O J E C T S	Bushranger Porphyry Cu-Au	(indicated & inferred) 52.5 Mt @ 0.4% Cu	185
	Cadia Valley Operations (care and maintenance) Porphyry Cu-Au	Ridgeway Underground: (indicated) 110 Mt @ 0.3% Cu, 0.57 g/t Au Ridgeway Underground: (inferred) 41 Mt @ 0.4% Cu, 0.38 g/t Au Cadia extended underground: (indicated) 80 Mt @ 0.19% Cu, 0.35 g/t Au Big Cadia: (inferred) 11 Mt @ 0.52% Cu, 0.7 g/t Au Cadia Hill Stockpiles: (measured) 32 Mt @ 0.13% Cu, 0.3 g/t Au Ridgeway Underground: (probable) 80 Mt @ 0.23% Cu, 0.54 g/t Au	745
	Cangai Intrusion-related	(inferred) 3.2 Mt @ 3.35% Cu, 0.8 g/t Au, 20.17 g/t Ag, 0.37% Zn, 0.005% Co	107
	Collerina Copper Orogenic base metal	(indicated & inferred) 2.02 Mt @ 2.03% Cu, 0.1 g/t Au	41
	Conrad Intrusion-related	(indicated & inferred) 3.33 Mt @ 86 g/t Ag, 0.11% Cu, 1.22% Pb, 0.62% Zn, 0.17% Sn	5
	Copper Hill Porphyry Cu-Au	(indicated & inferred) 87 Mt @ 0.36% Cu, 0.32 g/t Au	310
	Grasmere -Peeveril VAMS	(indicated & inferred) 5.75 Mt @ 1.03% Cu, 0.35% Zn, 2.3 g/t Ag, 0.05 g/t Au	59
	Lewis Ponds VAMS	(inferred) 6.2 Mt @ 2 g/t Au, 80 g/t Ag, 2.7% Zn, 1.6% Pb, 0.2% Cu	12
	Mallee Bull Orogenic base metal	(indicated & inferred) 6.76 Mt @ 1.8% Cu, 31 g/t Ag, 0.4 g/t Au, 0.6% Pb, 0.6% Zn	119
	Marsden Porphyry Cu-Au	(indicated & inferred) 122.97 Mt @ 0.27 g/t Au, 0.46% Cu (probable) 65.17 Mt @ 0.39 g/t Au, 0.57% Cu	566
	Mineral Hill (care and maintenance) Epithermal	Parkers Hill (oxide): (indicated & inferred) 1.1 Mt @ 0.9% Cu, 3.7% Pb, 0.4% Zn, 70 g/t Ag Parkers Hill (sulfide): (indicated & inferred) 1.178 Mt @ 1.8% Cu, 1.3% Pb, 38 g/t Ag, 0.3 g/t Au Southern Ore Zone: (total resources) 1.985 Mt @ 1.2% Cu, 1.4% Pb, 1.1% Zn, 1.8 g/t Au, 19 g/t Ag Red Terror: (total resources) 0.186 Mt @ 1.7% Cu, 0.1% Pb, 0.3% Zn, 2.2 g/t Ag, 2.4 g/t Au	58
	Nymagee Distal intrusion-related Cu-Au	(indicated & inferred) 1.5 Mt @ 2.3% Cu, 0.8% Pb, 1.5% Zn, 18 g/t Ag	35
	Temora Project Porphyry Cu-Au	The Dam: (indicated & inferred) 40 Mt @ 0.3% Cu, 0.41 g/t Au Cullingerai: (inferred) 24 Mt @ 0.3 % Cu, 0.31 g/t Au Estoril: (inferred) 14 Mt @ 0.21 % Cu, 0.35 g/t Au Mandamah: (inferred) 26 Mt @ 0.34 % Cu, 0.38 % Au Yiddah: (inferred) 127 Mt @ 0.32 % Cu, 0.14 g/t Au	721

Table continued on back.

Project name Deposit type	Current resources and reserves (JORC)	Contained copper ('000 t)
Tottenham VAMS	Carolina: (indicated & inferred) 3.39 Mt @ 1.5% Cu, 0.5 g/t Au Mt Royal: (indicated & inferred) 3.98 Mt @ 0.9% Cu, 0.3 g/t Au	86
Woodlawn VAMS	Underground: (total resources) 7.4 Mt @ 6% Zn, 1.9% Cu, 2.2% Pb, 0.5 g/t Au, 48 g/t Ag Underground: (probable) 3.1 Mt @ 5.2% Zn, 1.6% Cu, 1.8% Pb, 0.4 g/t Au, 38 g/t Ag Reclaimed tailings: (total resources) 10.8 Mt @ 2.2% Zn, 0.5% Cu, 1.3% Pb, 0.3 g/t Au, 31 g/t Ag Reclaimed tailings: (proved & probable) 9.3 Mt @ 2.2% Zn, 0.5% Cu, 1.3% Pb, 0.3 g/t Au, 31 g/t Ag	217
Yeoval Porphyry Cu-Au	(inferred) 12.8 Mt @ 0.38% Cu, 0.14 g/t Au, 120 g/t Mo, 2.2 g/t Ag	49

Note: Project totals for contained copper are based on combined resources.



Top left: Circuit board with copper components.

Bottom left: Ore processing mill at Northparkes, near Parkes.

Right: Tightly folded copper-rich (malachite) ore from the Murrawombie pit near Nyngan.