Overview

- New South Wales (NSW) is a major producer of silver and home of the iconic silver-rich Broken Hill Line of Lode. Other major deposits with significant silver include the world-class Woodlawn and Endeavor deposits.
- The total metal endowment (total production + total resources) for NSW exceeds 35,790 t (1,151 Moz) of silver.
- Excellent opportunities exist for the discovery of new deposits and for the development of existing resources.

Geological setting

New South Wales hosts a wide range of silver-rich deposits in a range of tectonic settings. In some deposits silver is produced as one of the primary commodities (e.g. Broken Hill, Endeavor). In many others it is a significant credit along with gold, copper, lead and zinc.

Deposit types

**Broken Hill Type (BHT)** — these include the iconic Broken Hill lead–zinc–silver Line of Lode.

**Volcanic-Associated Massive Sulfide (VAMS)** — these include Woodlawn, Lewis Ponds and many others.

**Epithermal** — low and intermediate sulfidation epithermal systems commonly have significant silver in addition to lead–zinc and/or gold. Examples in NSW include Mineral Hill (Au–Cu–Pb–Zn–Ag) mine, Bowdens (Ag–Pb) and the Drake (Au–Ag) deposits.

**Sediment-hosted massive sulphide (SHMS)** — these systems include the world-class Endeavor base metal (Pb–Zn–Ag) mine, which is located in the northwestern Cobar Basin.

**Orogenic base-metal** — these deposits can be large, often high grade and can be vertically extensive. They include examples where silver is a primary commodity (e.g. Thackaringa-type deposits near Broken Hill) and those with significant silver credits along with gold, copper and base metals (e.g. CSA, Hera).
**Intrusion-related** — these deposits are commonly polymetallic and can include a range of precious, base metal and speciality metals (e.g. Pb, Zn, Sn, In, Au) in addition to significant silver. Examples include the Conrad and Webbs silver deposits.

**Carbonate and sandstone hosted systems (MVT)** — examples in NSW include the Manuka silver-lead and De Nardi lead-zinc-silver deposits.

### Exploration targets

**Curnamona Craton**

The Palaeoproterozoic Curnamona Craton hosts the world-famous Broken Hill Line of Lode (Broken Hill Operations, Rasp mine). Recent exploration success includes the discovery of the Henry George and 11:30 deposits to the southeast of Broken Hill. Many of the major deposits in this area are BHT deposits although there is also potential for SEDEX-type deposits under cover.

**Lachlan Orogen**

The Ordovician to Carboniferous Lachlan Orogen is highly prospective for silver. Recent exploration has largely focussed on the large copper and gold systems within the terrane however the area is host to a range of silver-rich deposit types.

Exploration opportunities exist for:

- VAMS-type deposits including Woodlawn and Lewis Ponds are associated with the Silurian to Devonian deep marine basins (Hill End Trough, Goulburn Basin).
- Epithermal systems range in age from Silurian to Permian and are associated with areas of shallow submarine to subaerial volcanism (e.g. the Canbelego–Mineral Hill Volcanic Belt) and the flanks of the Sydney Basin (Bowdons).
- SHMS (Endeavor) and orogenic base metal (Hera, CSA) deposits are associated with the Cobar Basin–Rast Trough.
- Carbonate- and sandstone-hosted base metal–silver deposits associated with the Devonian Winduck Shelf. Examples include the Manuka silver mine and De Nardi deposit — both relatively recent discoveries.

**New England Orogen**

The Devonian to Triassic New England Orogen is under-explored by Australian standards. The orogen is host to many intrusion-related systems with significant silver (e.g. Conrad) as well as intermediate sulfidation epithermal systems (e.g. Drake). There is also untested potential for a range of other deposit types.

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![Headframe and conveyor at Endeavor mine.](image)

**Silver endowment (past production + current resources) for NSW, classified by deposit type**

Total endowment >35 790 t; current resources >21 220 t

- Epithermal: 20.8%
- Carbonate-hosted (MVT): 12.2%
- VAMS: 37.6%
- SHMS: 3.4%
- Orogenic: 6.7%
- Other incl. intrusion-related, skarn: 5.1%
- Broken Hill Type (BHT): 5.9%
- Porphyry: 8.3%

![Historical silver mining in the Drake district.](image)
## Summary of significant silver resources within NSW

### Mines

<table>
<thead>
<tr>
<th>Mine name</th>
<th>Deposit type</th>
<th>Current resources and reserves (JORC)</th>
<th>Contained silver (kg)</th>
<th>Contained silver (Koz)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Broken Hill Operations</strong></td>
<td>BHT</td>
<td>Southern Operations: (proved &amp; probable) 11.7 Mt @ 6.2% Zn, 4.8% Pb, 89 g/t Ag&lt;br&gt;Central Blocks: (inferred) 0.7 Mt @ 5% Zn, 4% Pb, 43 g/t Ag&lt;br&gt;North Mine Upper: (global resource) 1.0 Mt @ 7% Zn, 9% Pb, 140 g/t Ag&lt;br&gt;North Mine Deeps: (measured &amp; indicated) 3.3 Mt @ 11.5 Zn, 13.8 % Pb, 224.4 g/t Ag&lt;br&gt;Potosi: (inferred) 1.6 Mt @ 14% Zn, 3% Pb, 46 g/t Ag&lt;br&gt;Silver Peak: (inferred) 0.4 Mt @ 5% Zn, 9% Pb, 77 g/t Ag&lt;br&gt;Flying Doctor: (indicated &amp; inferred) 1.5 Mt @ 3% Zn, 4% Pb, 44 g/t Ag</td>
<td>1 923 420</td>
<td>61 839</td>
</tr>
<tr>
<td><strong>CSA</strong></td>
<td>Orogenic</td>
<td>(proved &amp; probable) 5.7 Mt @ 4.12% Cu, 17.5 g/t Ag&lt;br&gt;(measured &amp; indicated) 5.7 Mt @ 5.67% Cu, 24.1 g/t Ag&lt;br&gt;(inferred) 6.3 Mt @ 5.5% Cu, 21 g/t Ag</td>
<td>269 670</td>
<td>8 670</td>
</tr>
<tr>
<td><strong>Endeavor</strong></td>
<td>SHMS</td>
<td>(proved &amp; probable) 3.7 Mt @ 7.6% Zn, 4.8% Pb, 74 g/t Ag&lt;br&gt;(global resource) 26.2 Mt @ 6.7% Zn, 41% Pb, 62 g/t Ag, 0.18% Cu</td>
<td>1 624 400</td>
<td>52 226</td>
</tr>
<tr>
<td><strong>Rasp</strong></td>
<td>BHT</td>
<td>(probable) 3.17 Mt @ 6.0% Zn, 4.6% Pb, 64 g/t Ag&lt;br&gt;(indicated &amp; inferred) 16.503 Mt @ 6.6% Zn, 5.1% Pb, 89 g/t Ag</td>
<td>1 468 767</td>
<td>47 222</td>
</tr>
</tbody>
</table>

### Projects

<table>
<thead>
<tr>
<th>Project name</th>
<th>Deposit type</th>
<th>Stockpile: (probable) 0.516 Mt @ 70 g/t Ag&lt;br&gt;(global resource) 38.8 Mt @ 42 g/t Ag, 0.61% Pb</th>
<th>Contained silver (kg)</th>
<th>Contained silver (Koz)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bowdens</strong></td>
<td>Epithermal</td>
<td>(proved &amp; probable) 29.9 Mt @ 69.01 g/t Ag, 0.44% Zn, 0.32% Pb&lt;br&gt;(global resource) 128 Mt @ 40 g/t Ag, 0.26% Pb, 0.38% Zn</td>
<td>5 685 000</td>
<td>182 777</td>
</tr>
<tr>
<td><strong>Browns Reef</strong></td>
<td>Orogenic</td>
<td>(inferred) 20.5 Mt at 2% Zn, 1.1% Pb, 0.1% Cu, 9 g/t Ag</td>
<td>184 500</td>
<td>59 322</td>
</tr>
<tr>
<td><strong>Drake</strong></td>
<td>Epithermal</td>
<td>Mt Carrington Lady Hampden, White Rock: (indicated) 3.54 Mt @ 0.3 g/t Au, 73 g/t Ag&lt;br&gt; Mt Carrington Lady Hampden, White Rock, White Rock North &amp; Silver King: (inferred) 8.95 Mt @ 0.1 g/t Au, 51 g/t Ag (silver-rich zones)</td>
<td>714 870</td>
<td>22 984</td>
</tr>
<tr>
<td><strong>Lewis Ponds</strong></td>
<td>VAMS</td>
<td>(indicated) 6.35 Mt @ 2.4% Zn, 0.2% Cu, 1.4% Pb, 1.5% Au, 68 g/t Ag&lt;br&gt;(inferred) 0.27 Mt @ 3% Zn, 0.1% Cu, 1.9% Pb, 1.1 g/t Au, 96 g/t Ag</td>
<td>457 720</td>
<td>14 716</td>
</tr>
<tr>
<td><strong>Manuka</strong> (formerly Wonawinta)</td>
<td>Carbonate-hosted (MVT)</td>
<td>Stockpile: (probable) 0.516 Mt @ 70 g/t Ag&lt;br&gt;(global resource) 38.8 Mt @ 42 g/t Ag, 0.61% Pb</td>
<td>1 629 600</td>
<td>52 393</td>
</tr>
<tr>
<td><strong>Nymagee</strong></td>
<td>Orogenic</td>
<td>(indicated &amp; inferred) 8.096 Mt @ 1.2% Cu, 0.3% Pb, 0.7% Zn, 9 g/t Ag</td>
<td>72 864</td>
<td>2 343</td>
</tr>
<tr>
<td><strong>Webbs</strong></td>
<td>Intrusion-related</td>
<td>(global resource) 1.49 Mt @ 245 g/t Ag, 0.27% Cu, 0.71% Pb, 1.56% Zn</td>
<td>365 050</td>
<td>11 737</td>
</tr>
<tr>
<td><strong>Woodlawn</strong></td>
<td>VAMS</td>
<td>Underground: (probable) 2.8 Mt @ 5.5% Zn, 1.6% Cu, 1.9% Pb, 0.45 g/t Au, 42 g/t Ag&lt;br&gt; Underground: (measured &amp; indicated) 4.6 Mt @ 6.7% Zn, 2.9% Cu, 2.4% Pb, 0.5 g/t Au, 52 g/t Ag&lt;br&gt; Underground: (inferred) 2.6 Mt @ 5.6% Zn, 1.8% Cu, 2.2% Pb, 0.6 g/t Au, 48 g/t Ag&lt;br&gt; Reclaimed tailings: (proved &amp; probable) 9.5 Mt @ 2.2% Zn, 0.5% Cu, 1.3% Pb, 0.31 g/t Au, 31 g/t Ag&lt;br&gt; Reclaimed tailings: (measured &amp; indicated) 9.8 Mt @ 2.3% Zn, 0.51% Cu, 1.3% Pb, 0.31 g/t Au, 32 g/t Ag&lt;br&gt; Reclaimed tailings: (inferred) 1.1 Mt @ 2.3% Zn, 0.47% Cu, 1.2% Pb, 0.25 g/t Au, 27 g/t Ag</td>
<td>707 300</td>
<td>22 740</td>
</tr>
</tbody>
</table>

(Note: Project totals for contained silver are based on combined resources.)
Silver production in New South Wales (1954–2018)

Native silver from the Endeavor mine. Specimen is 10 cm tall. Photo courtesy of John Chapman.

Chlorargyrite (AgCl) from Broken Hill.

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