

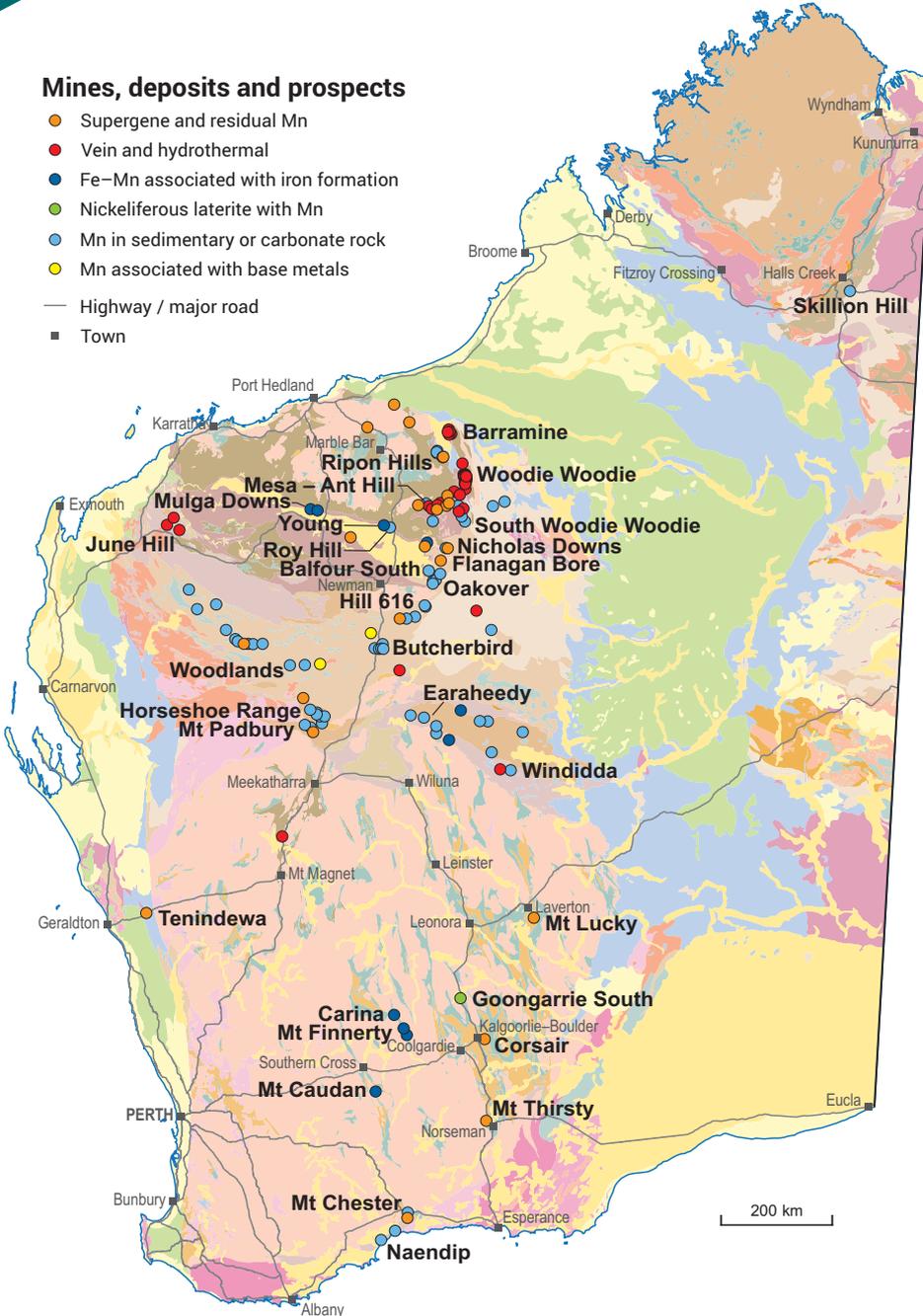
MANGANESE

INVESTMENT OPPORTUNITIES

WORLD-CLASS RESOURCE PROVINCE | SECURE INVESTMENT LOCATION
WORLD-LEADING GEOSCIENTIFIC DATA | GLOBAL MINING SERVICES INDUSTRY

Mines, deposits and prospects

- Supergene and residual Mn
- Vein and hydrothermal
- Fe–Mn associated with iron formation
- Nickeliferous laterite with Mn
- Mn in sedimentary or carbonate rock
- Mn associated with base metals
- Highway / major road
- Town



Plans announced to produce battery grade manganese in Western Australia

- Element 25 Ltd stage 1 beneficiation plant at the Butcherbird Manganese Project has produced a manganese sulfate solution, a first step in producing battery grade High Purity Manganese Sulfate Monohydrate (HPMSM) for the manufacture of lithium-ion batteries for electric vehicles
- The State has a long history of manganese mining. Woodie Woodie has been producing high-grade manganese since the 1950s
- Western Australian current Mineral Resources are 90 Mt of contained manganese, which is an essential alloy in the steel-making process
- There is also growing demand from the electric vehicle industry as manganese is an important stabilizing component of battery cathodes

Recent resource updates

- Upgraded Indicated Mineral Resource estimate of 170 Mt at 10.3% Mn at the Flanagan Bore Project. This represents a 580% increase in the Resource
- Maiden Inferred Mineral Resource Estimate at the Hill 616 Project of 57.5 Mt at 12.2% Mn, which includes a close-to-surface supergene manganese zone of 8.1 Mt at 17.4% Mn
- Maiden Total Inferred and Indicated Mineral Resource 1.84 Mt at 21% Mn at the Bryah Basin Manganese Joint Venture Project (comprising the Bryah Basin and Horseshoe projects)
- Significant 108 Mt increase in Oakover Mineral Resource to 172 Mt at 9.9% Mn, with ongoing hydrometallurgical testwork and a battery grade manganese sulfate scoping study now underway

539 260 t
Tonnes sold



8th
Production
world ranking



5–7.5%
Royalty
rate



\$144 m*
Investment
projects



(2021–22 financial year)

* Includes projects planned, possible, committed or under construction as of September 2022



Projects with manganese resources >9% Mn – ranked by contained manganese

Resources estimated according to JORC 2012

Project	Status	Owner	Resources (Mt)	Av. grade (% Mn)	Contained Mn (kt)	Resource date
Butcherbird	Operating	Element 25	262.8	9.94	26 130	16/04/2019
Flanagan Bore	Scoping	Carawine /Black Canyon	170.0	10.30	17 505	24/11/2022
Oakover	Exploration	Firebird Metals	172.3	9.84	16 948	10/03/2022
Woodie Woodie	Operating	Consolidated Minerals*	49.0	30.60	14 997	20/08/2019
Hill 616	Exploration	Firebird Metals	57.4	12.25	7 030	01/12/2021
Nicholas Downs [#]	Care and maintenance	Hancock Prospecting	19.5	27.17	5 298	17/07/1998
Balfour South [#]	Proposed	Consolidated Minerals*	21.6	19.40	4 190	10/12/2018
South Woodie Woodie	Proposed	Bardoc Gold / Planet Mining	14.2	13.33	1 898	14/03/2012
Ant Hill – Sunday Hill	Care and maintenance	Resource Development Group	8.1	20.60	1 668	01/06/2021
Earaheedy	Exploration	Zenith Minerals	4.0	20.04	802	01/01/2017
Bryah Basin	Exploration	Bryah Resources / OM Holdings	1.2	21.55	257	03/03/2022
Elsa Mary [#]	Proposed	Sinosteel Midwest	1.0	22.14	217	01/07/2009
Horseshoe Range	Scoping	Horseshoe Manganese	0.9	20.83	178	14/04/2011
Horseshoe	Exploration	Bryah Resources	0.6	19.96	129	03/03/2022
TOTAL			716.6		90 705	

Resource estimates have been rounded

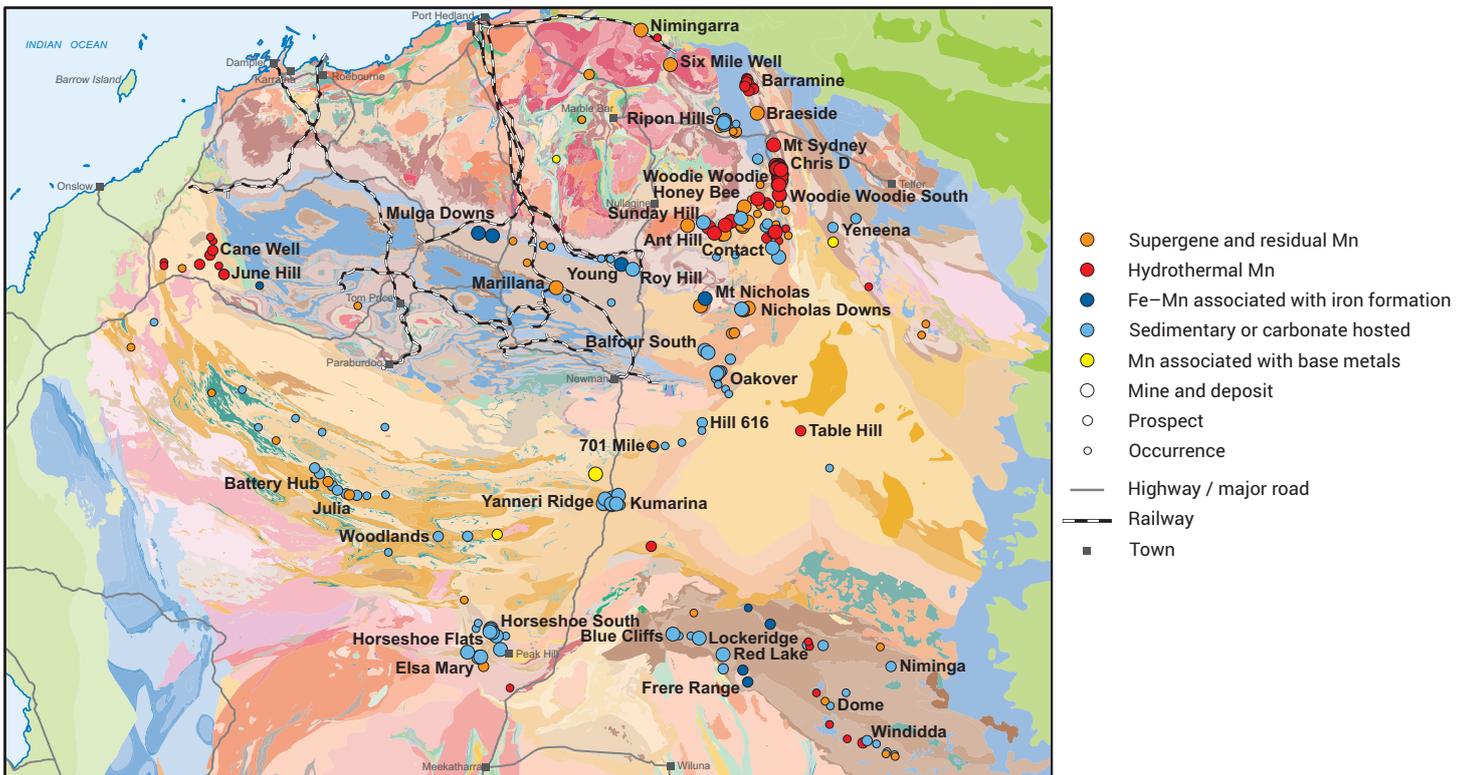
* Parent – Ningxia Tianyuan Manganese Industry Co.

[#] Resource estimates are not JORC 2012 compliant

Spatial and resource estimates data sourced from WA Mines and Mineral Deposit database (MINEDEX)

■ Supergene/residual Mn
 ■ Sedimentary or carbonate rock
 ■ Fe–Mn
 ■ Vein and hydrothermal

Manganese mineralization – Pilbara and Capricorn regions



For more information

MINEDEX is a spatial and textual database of mining and exploration activity

MINEDEX www.dmirs.wa.gov.au/minedex

GeoVIEW.WA is a free GIS-based spatial viewer

GeoVIEW.WA www.dmirs.wa.gov.au/geoview

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The DMIRS MINEDEX, Statistics, and Geoscience and Titles Information teams have contributed to the production of this flyer



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Department of Mines, Industry Regulation and Safety

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Geological Survey of Western Australia

