



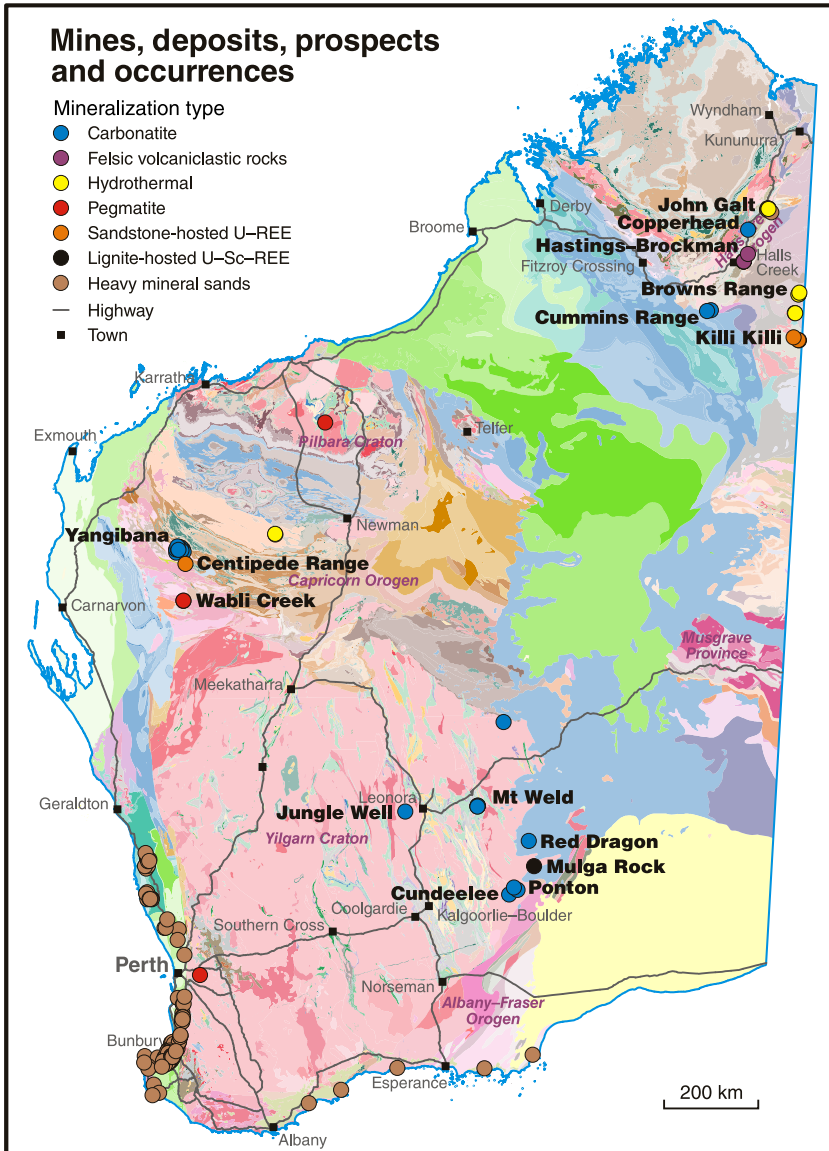
# RARE EARTHS LANTHANIDES AND YTTRIUM

# REE

## Mines, deposits, prospects and occurrences

### Mineralization type

- Carbonatite
- Felsic volcanoclastic rocks
- Hydrothermal
- Pegmatite
- Sandstone-hosted U-REE
- Lignite-hosted U-Sc-REE
- Heavy mineral sands
- Highway
- Town



## REE mines in Western Australia

- **Mt Weld** — Annual production (2015–16) from **Central Lanthanide Deposit (CLD)** increased 30% to 12 630 tonnes REO. **CLD** is the world's highest grade operating REE mine (10.6% REO). **Duncan** deposit is the world's largest high-grade dysprosium resource (1.27%  $Dy_2O_5$ ).
- **Browns Range** — Proposed opencut mining and processing of REE from xenotime ore from **Wolverine** and **Gambit** to produce rare earth carbonate (including dysprosium). New style of heavy REE mineralization recognized — xenotime infill in hydrothermal siliceous breccia and veins.
- **Yangibana** — Pre-feasibility study supports mining from **Bald Hill South**, **Fraser's**, **Yangibana West** and **Yangibana North** deposits.

## Western Australia has great exploration potential for REE in:

- carbonatite and alkaline to peralkaline ring complexes
- alluvial placers and heavy mineral sands
- ash-flow tuffs erupted from the volatile-rich roof zone of magma chambers
- Olympic Dam style deposits of iron oxide–copper–gold (IOCG)
- hydrothermal quartz veins
- sandstone-hosted detrital monazite
- sandstone-hosted and lignite-hosted U-REE
- ion absorption clays associated with laterite
- phosphate deposits in Phanerozoic sediments.

## Current REE resource estimates

Project	Host rocks	Resources (Mt)	Average grade* (% TREO)	Contained TREO (kt)
Mt Weld (CLD and Duncan)	Regolith; carbonatite	23.2	7.5	1730
Yangibana	Carbonatite	12.4	1.1	133
Hastings–Brockman	Trachytic tuff	41.4	0.2	87
Browns Range	Hydrothermal	9.0	0.6	56
Cummins Range	Regolith; carbonatite	0.7	3.4	23

\* Total lanthanide rare earth oxides (TREO), including yttrium

Some historic, pre-JORC resource estimates exist for deposits at Ponton, and in the east Kimberley region



Mt Weld openpit and ore stockpiles with REO percentages

Source: Lynas Corp Ltd.



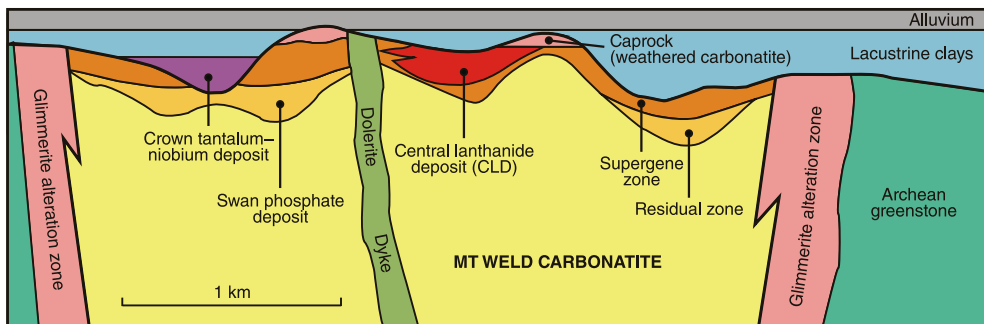
Government of Western Australia  
Department of Mines and Petroleum

[www.dmp.wa.gov.au](http://www.dmp.wa.gov.au)

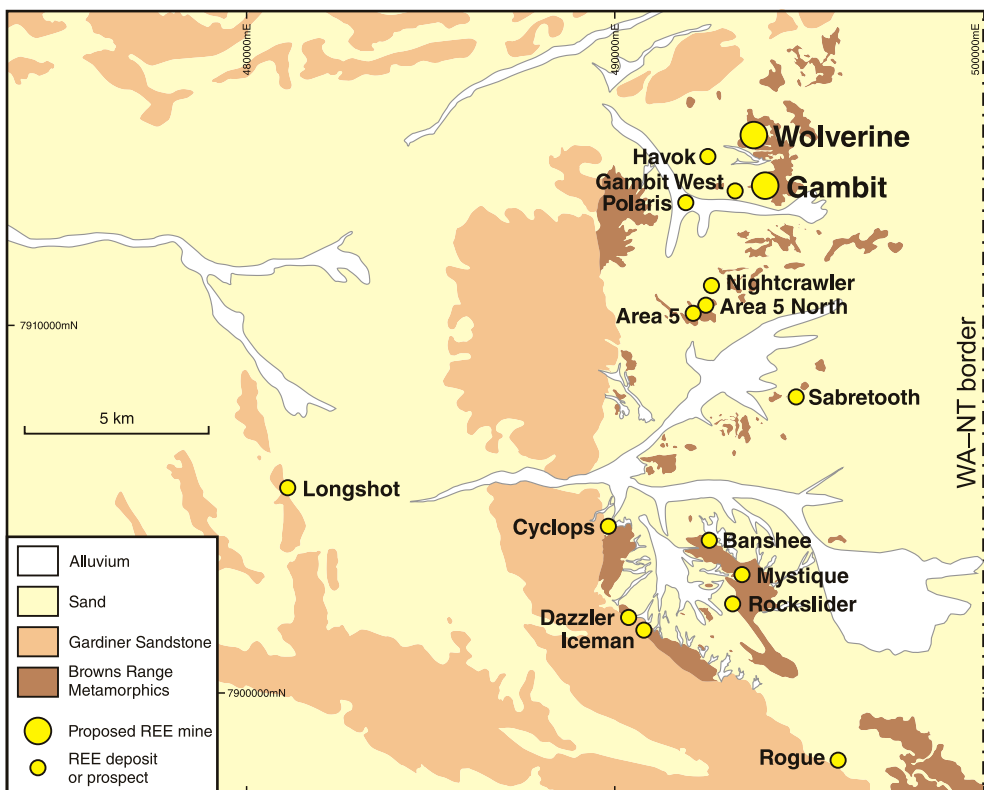
Geological Survey of  
Western Australia



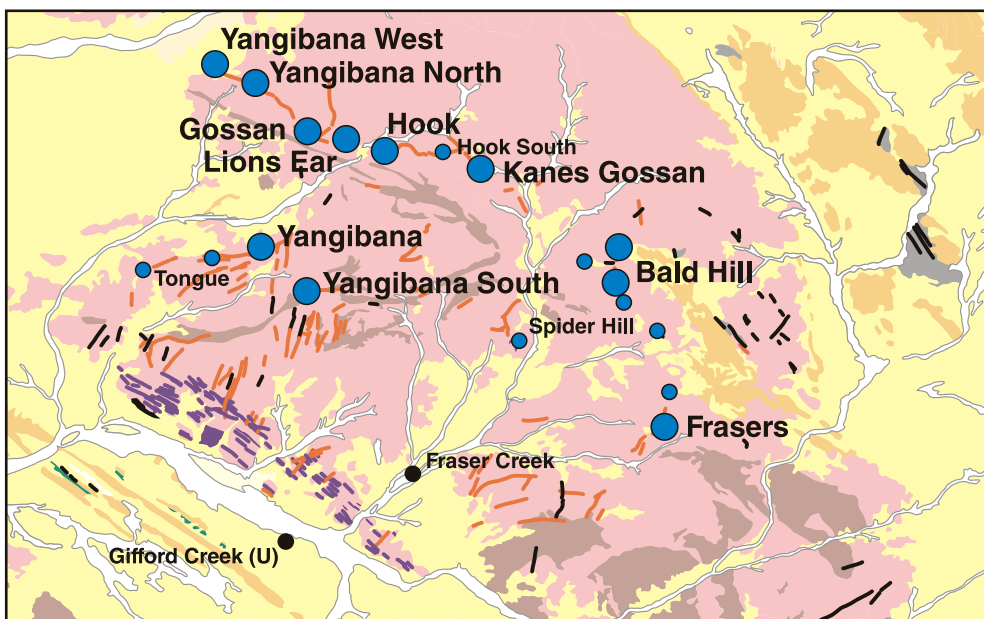




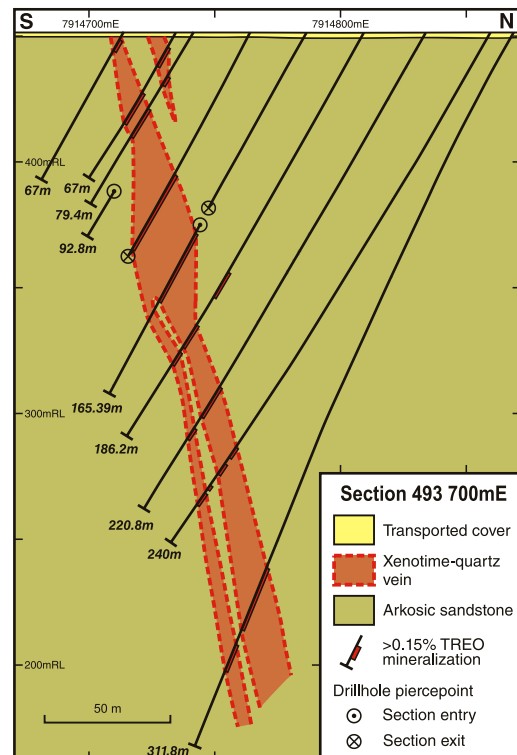
Schematic section of the Mt Weld carbonatite, showing REE and rare metal deposits



REE deposits and prospects in the Browns Range project



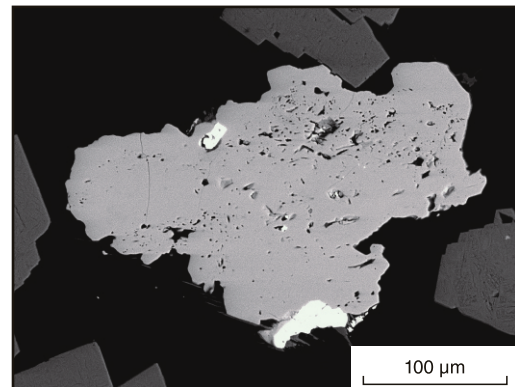
REE deposits and prospects around Gifford Creek, Yangibana



Section through the centre of the Wolverine xenotime-quartz vein, Browns Range



Outcrop of xenotime-quartz vein at Wolverine REE deposit, Browns Range



Back-scattered Electron (BSE) image showing ferrocolumbite (grey) and monazite (white) grains from the Gifford Creek Ferrocarnatite Suite, Yangibana