

WESTERN AUSTRALIA

Selected exploration and mining highlights



EXPLORATION INCENTIVE SCHEME

The project has received a co-funded drilling grant under the Western Australia Government Exploration Incentive Scheme (EIS)

- Battery metal
- Critical mineral

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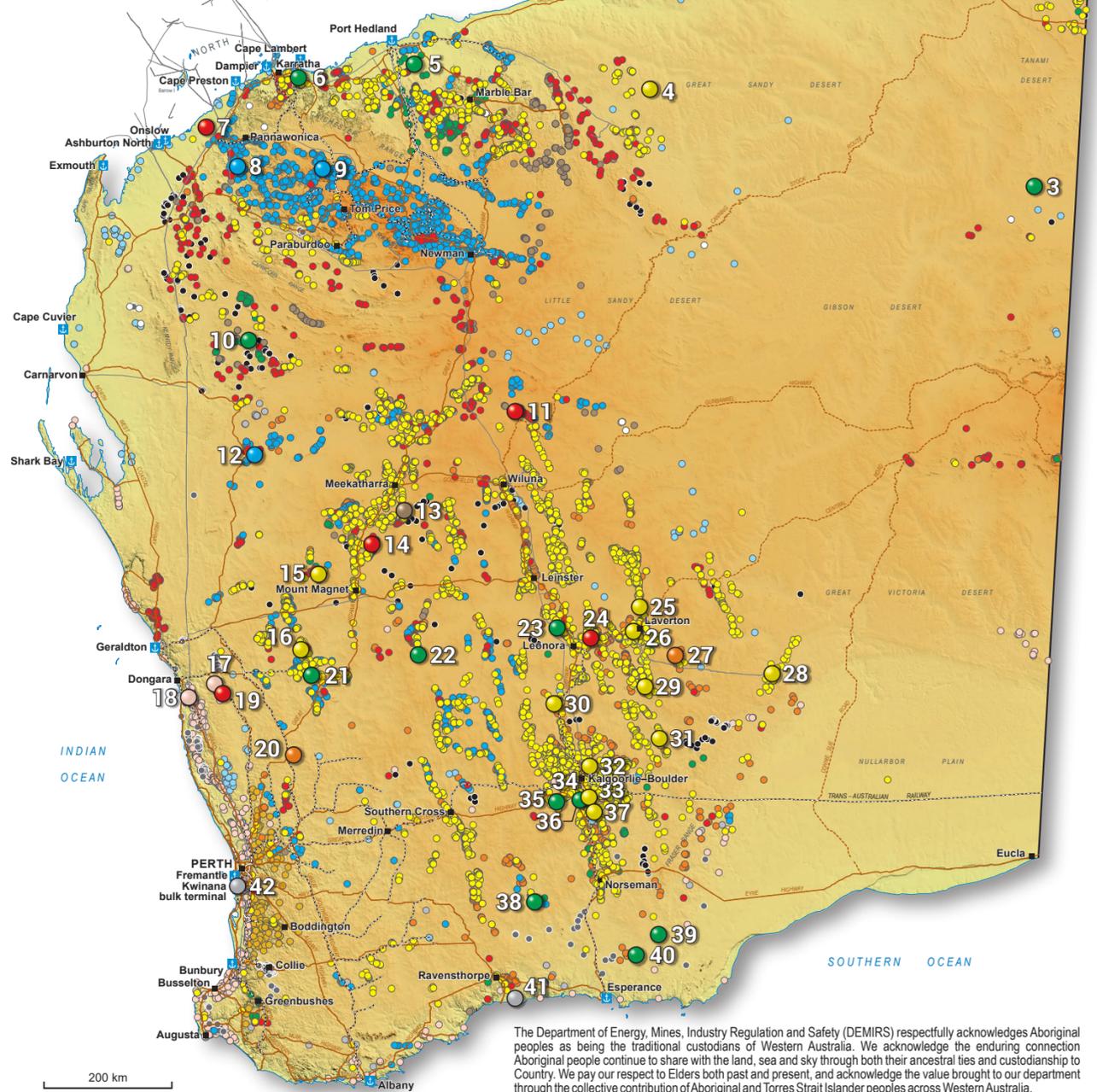
Mines, deposits and prospects

- Iron (Fe)
- Gold (Au), silver (Ag), stibnite (Sbn)
- Alumina (Al), kaolin
- Heavy mineral sands (HMS), silica
- Nickel (Ni), cobalt (Co), platinum (Pt), chromium (Cr)
- Copper (Cu), lead (Pb), zinc (Zn)
- Cesium (Cs), lithium (Li), rare earth elements (REE), scandium (Sc), tin (Sn), tantalum (Ta), yttrium (Y)
- Vanadium (V), manganese (Mn), titanium (Ti), tungsten (W), molybdenum (Mo)
- Phosphate, potash and salt
- Graphite
- Lithium oxide
- LOM Life of mine
- m Metre
- Moz Million ounces
- MRE Mineral Resource estimate
- Mt Million tonnes

Compound elements and other abbreviations

- | | |
|--|---|
| BFS Bankable feasibility study | Mtpa Million tonnes per annum |
| Cs ₂ O Caesium monoxide | Nb ₂ O ₅ Niobium pentoxide |
| DSO Direct shipping ore | ORE Ore Reserve estimate |
| EIS Exploration Incentive Scheme | PFS Pre-Feasibility Study |
| Dy Dysprosium | ppm Parts per million |
| g/t Grams per tonne | REE Rare earth elements |
| Ga ₂ O ₃ Gallium oxide | Sc ₂ O ₃ Scandium oxide |
| HM Heavy minerals | SiO ₂ Silicon dioxide |
| HMC Heavy mineral concentrate | t Tonnes |
| HMS Heavy mineral sands | Ta ₂ O ₅ Tantalum pentoxide |
| JORC Joint Ore Reserves Committee | TGC Total graphitic carbon |
| km Kilometre | TiO ₂ Titanium dioxide |
| kt Thousand tonnes | Tpa Tonnes per annum |
| LiO Lithium oxide | TREO Total rare earth oxides |
| LOM Life of mine | V ₂ O ₅ Vanadium pentoxide |
| m Metre | VFB Vanadium flow batteries |
| Moz Million ounces | VMS Volcanogenic massive sulfide |
| MRE Mineral Resource estimate | WO ₃ Tungsten trioxide |
| Mt Million tonnes | |

- Highway / major road
- Unsealed road
- Railway
- Oil/gas pipeline
- Townsite
- Port



The Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) respectfully acknowledges Aboriginal peoples as being the traditional custodians of Western Australia. We acknowledge the enduring connection Aboriginal people continue to share with the land, sea and sky through both their ancestral ties and custodianship to Country. We pay our respect to Elders both past and present, and acknowledge the value brought to our department through the collective contribution of Aboriginal and Torres Strait Islander peoples across Western Australia.

1	Thunderbird HMS Operating	A maiden shipment of ~300 metric tonnes of bagged non-magnetic zircon from the Thunderbird mineral sands mine was exported via Port Hedland due to first production commencing ahead of schedule. An additional bulk shipment of approximately 10 000 metric tonnes of non-magnetic zircon concentrate departed from the Port of Broome. <i>Sheffield Resources Ltd</i>	
2	Browns Range Exploration	Assay results from the drilling program partially funded by grant monies from the Federal Government's Critical Minerals Development Program at the Wolverine deposit comprised intercepts of 15.6 m at 9.99% TREO and 36 m at 3.39% TREO. <i>Northern Minerals Ltd</i>	
3	West Arunta Exploration	Drilling at West Arunta's Luni prospect continued to intersect niobium mineralisation within Central and Eastern zones with intersections including 34 m at 4.8% Nb ₂ O ₅ and 72 m at 1% Nb ₂ O ₅ . A maiden Inferred MRE comprised 200 Mt at 1% Nb ₂ O ₅ , with a high-grade subset of 53 Mt at 2.1% Nb ₂ O ₅ . <i>WA1 Resources Ltd</i>	
4	Minyari Dome Gold	EIS diamond drilling at GEO-01 returned 27 m at 0.7 g/t Au, 23 m at 0.8 g/t Au and 0.02% Cu, and at Tetris target results included 6.7 m at 0.54% Zn, 0.12% Pb, and 1.0 g/t Ag. Further drilling at GEO-01 intersected thick, near-surface gold and copper intervals of up to 66 m at 1.4 g/t Au and 0.04% Cu. <i>Antipa Minerals Ltd</i>	
5	Tabba Tabba - Strelley Lithium	Drilling at the Tabba Tabba project, targeting the 2.2 km long Leia pegmatite, intersected 119.2 m at 1% Li ₂ O and 105.3 m at 1.1% Li ₂ O. Discovery of a new zone named Luke was reported returning assays of 41 m at 1% Li ₂ O. <i>Wildcat Resources Ltd</i>	
6	Andover Lithium	Drilling around the Andover lithium project's Target Area 3 intersected mineralisation, with intercepts including 102.5 m at 1% Li ₂ O (AP0004 pegmatite), 47.1 m at 1.27% Li ₂ O (AP0002 pegmatite) and 112.9 m at 1.63% Li ₂ O (AP0011 pegmatite). <i>Azure Minerals Ltd</i>	
7	Onslow Copper-Gold Pre-Feasibility	A high-grade silver result of 1 m at 1060 g/t Ag, 0.23% Cu and 0.99% WO ₃ was intersected within a broader geological zone of 6 m at 179 g/t Ag from an EIS drillhole at the CT3 prospect. <i>Terra Metals Ltd</i>	
8	West Pilbara - Red Hill Iron	Onslow iron project has delivered first ore comprising 113 000 wet metric tonnes of 58.5% Fe fines ahead of schedule, for delivery to China Baowu Steel Group. <i>Mineral Resources Ltd</i>	
9	Pilbara Iron Pre-Feasibility	A PFS was completed for the Blacksmith iron ore project (including Delta , Paragon , Blackjack and Champion deposits) demonstrating the economic viability of a 5 Mtpa DSO operation with a 23-year LOM and product grade of 60.5% Fe. At Delta , the maiden ORE comprised 46 Mt at 60.5% Fe and the MRE was updated to 86.3 Mt at 60.1% Fe with a cut-off grade of 57.5% Fe. <i>Red Hawk Mining Ltd</i>	
10	Yinnetharra Lithium	Assay results from drilling at the Yinnetharra project intersected 94 m at 0.94% Li ₂ O at the M1 deposit, 30 m at 1.9% Li ₂ O at the M36 deposit, 17 m at 1.2% Li ₂ O at the M47 deposit and 18 m at 1.5% Li ₂ O at the Jameson prospect. <i>Delta Lithium Ltd</i>	
11	Earaheedy Zinc-lead-silver	Results for high-grade Zn-Pb sulfide intersections in exploration drilling in both the updip position of, and 350 m along strike to, the northwest of the original Mato discovery were announced. Results include 12 m at 6.07% Zn + Pb and 19 m at 4.23% Zn + Pb. <i>Rumble Resources Ltd</i>	
12	Byro Magnetite Iron	A scoping study for the FE1 deposit at the Byro magnetite project was completed, the project is economically robust, underpinned by a MRE of 29.3 Mt at 24.7% Fe and a production target of 16.96 Mt at 26.1% Fe. Based on a potential 2.4 Mtpa processing rate and a 0.72 Mtpa magnetite concentrate production target, the project could support an 8-year LOM. <i>Athena Resources Ltd</i>	
13	Australian Vanadium Vanadium + titanium	Australian Vanadium Limited announced the successful commissioning of its vanadium electrolyte manufacturing facility with the production of its first high purity vanadium electrolyte, ready for use in VFBs. The capability to produce greater than 99.9% ultra-high purity V ₂ O ₅ was also demonstrated at pilot-scale using ore from the Australian Vanadium sites. <i>Australian Vanadium Ltd</i>	
14	Hollandaire-Eelya Copper-gold-zinc	A high-grade copper discovery at the Heeler prospect had assay results including 15 m at 3.26% Cu, 0.7 g/t Au, 7.4 g/t Ag and 151 ppm Co. <i>Cyprum Metals Ltd</i>	
15	Dalganga-Gilbeys Gold	Substantial high-grade results were returned from the Never Never deposit including 170 m at 4.13 g/t Au, 30.79 m at 12.12 g/t Au and 3 m at 52.02 g/t Au. Drilling intersected a new high-grade discovery, Pepper prospect, under the current Gilbeys openpit. Results include 9.22 m at 27.89 g/t Au and 30.79 m at 12.12 g/t Au. <i>Spartan Resources Ltd</i>	
16	Golden Range Gold	Gold mineralisation was intersected at the Ricciardo deposit, including the Ardmore and Silverstone pits, demonstrating the high-grade nature of the area with a current strike length of 2300 m. Results include 32 m at 3.59 g/t Au. <i>Warriedar Resources Ltd</i>	
17	Yandanooka HMS	The results of a PFS were announced along with an updated MRE and a maiden ORE for the Yandanooka HMS project. The study proposes an 8.2-year LOM with a total HMC 1.04 Mt. The maiden ORE comprised 30 Mt Probable Ore Reserves at 3.9% HM with assemblage of 14% zircon, 3.3% rutile, 27% leucocene, 46% ilmenite and 0.19% monazite. <i>Image Resources NL</i>	
18	Arrowsmith North Silica sand	Updated BFS for the Arrowsmith North silica sand project, confirmed robust project economic metrics potentially supplying up to four silica sand products with a Proved and Probable Ore Reserve of 221 Mt at 99.6% SiO ₂ , and a potential LOM in excess of 100 years. <i>VRX Silica Ltd</i>	
19	Pitfield Copper-titanium-Gold	Higher grades of TiO ₂ mineralisation were confirmed in the near-surface, highly weathered sandstone, creating a new, discreet high-grade saprolite-hosted deposit at the Cosgrove and Thomas prospects with significant intercepts including 154 m at 6.76% TiO ₂ and 142 m at 6.05% TiO ₂ . <i>Empire Metals Ltd</i>	
20	Melrose Nickel	First pass aircore drilling of magnetic and geochemical targets at the Melrose project confirmed nickel mineralisation in the weathered zone above the ultramafic assemblage. The best intercepts included 11 m at 0.7% Ni and 12 m at 1% Ni. <i>Cauldron Energy Ltd</i>	
21	Smokebush Rare earths + gallium	REE and Ga ₂ O ₃ results were reported from aircore drilling at the Larin's Lane prospect. The REE results include 9 m at 1095.23 ppm TREO and 13 m at 1069 ppm TREO, while the gallium results include 20 m at 48.33 g/t Ga ₂ O ₃ and 16 m at 53.74 ppm Ga ₂ O ₃ . The gallium sits within clay regolith layers above the REE mineralisation. <i>Terrain Minerals Ltd</i>	
22	Youanmi Lithium	Drilling at the Deep South prospect tested outcropping pegmatites at East Zone and North Zone . Drilling intersected significant zones of mineralised LCT pegmatites, with the best assays returned including 24 m at 1.71% Li ₂ O. <i>Venus Metals Corporation Ltd</i>	
23	Mount Stirling Rare earths	A maiden MRE was announced for the Yttria REE deposit at Mount Stirling . The MRE of 15 Mt at 490 ppm TREO with 67 ppm Sc ₂ O ₃ covers only the first 2 km of strike at the Yttria REE deposit. <i>Asra Minerals Ltd</i>	
24	Cardinia Base Zinc-copper-lead	High-grade VMS-type mineralisation was discovered at the Albus prospect at Cardinia East , with drill samples from the prospective VMS horizon returning results of 5.7 m at 5.3% Zn, 0.34% Cu, 0.3% Pb, 40 ppm Ag and 1 ppm Au. <i>Kin Mining NL</i>	
25	Cork Tree Well - Delta Gold	Drilling results from the Cork Tree Well deposit includes 27 m at 17.8 g/t Au with bonanza-grade gold assays of up to 1028.37 g/t Au, substantiated by numerous observations of visible gold. <i>Brightstar Resources Ltd</i>	
26	Lady Julie Gold	Results of a PFS for the Lady Julie project show a technically and financially robust project with an initial five year LOM focusing on mining of Lady Julie North 4 , Lady Julie Central and Hawks Nest 9 . The MRE for the Lady Julie and Homeward Bound deposits were updated to 24.9 Mt at 1.66 g/t Au totalling 1.33 Moz of gold. Recent drill assay results from Lady Julie North 4 includes 23 m at 6.29 g/t Au. <i>Magnetic Resources NL</i>	
27	Coglia Nickel + cobalt	The MRE for the Coglia deposit was updated to 102.8 Mt at 0.6% Ni and 370 ppm Co, containing 614 kt of nickel and 37.7 kt of cobalt. The update represents a 30% increase in total nickel tonnes with over 23 Mt now included in the indicated category. A Scoping Study based on only 32.3 Mt of the global resource, and a conservative leach recovery of 50%, indicated an initial 10-year LOM resulting in recovery of 94.7 kt nickel and 9.3 kt cobalt. <i>Panther Metals Ltd</i>	
28	Tropicana Gold	The MRE for the Tropicana project was updated to 100.5 Mt at 1.85 g/t Au for 5.9 Moz and ORE were updated to 46.3 Mt at 1.51 g/t Au for 2.3 Moz. Further, thick intersections of up to 49 m at 2.6 g/t Au were reported from the Boston Shaker underground mine. <i>AngloGold Ashanti Plc / Regis Resources Ltd</i>	
29	Mt Celia - Kangaroo Bore Gold	Legacy Iron Ore announced that first gold from the Blue Peter mine was produced, and the maiden ore sale completed in March 2024. <i>Legacy Iron Ore Ltd</i>	
30	Manzies Gold	Maiden gold pour marked the first gold from the Selkirk joint venture at the Manzies Gold project. High-grade results were received from the Link Zone , with up to 54.77 g/t Au intersected at the Merrilylah Deposit . <i>Brightstar Resources Ltd</i>	
31	Kirgella-Pinjin Gold	Thick gold zones were intersected at the Kirgella Gift prospect, with assay results including 35 m at 1.15 g/t Au and 45 m at 2.36 g/t Au defining three gold lodes, and at the Providence prospect, including 45 m at 0.52 g/t Au and 23 m at 1.08 g/t Au, defining two gold lodes. Thick gold intercepts of up to 28 m at 1.27 g/t Au were also intersected from initial drilling at the Wessex prospect. <i>Kalgoorlie Gold Mining Ltd</i>	
32	Kanowna - Golden Valley Gold	High-grade drilling results for the Red Hill deposit include 136 m at 1.8 g/t Au and 83 m at 2.3 g/t Au. The MRE for the deposit was updated to 49.9 Mt at 1.2 g/t Au for 1.9 Moz (up from 32.4 Mt for 1.1 Moz) while a maiden ORE of 15.9 Mt at 1.1 g/t Au for 0.6 Moz was reported. <i>Northern Star Resources Ltd</i>	
33	South Kalgoorlie Operations Gold	High-grade assay results from drilling at the Hampton-Boulder (HBJ) underground included 144 m at 3.4 g/t Au, 37.4 m at 6.1 g/t Au, and 25 m at 7.5 g/t Au. The updated MRE now totals 111.905 Mt at 2.1 g/t Au for 7.469 Moz Au, and the ORE is 24.122 Mt at 2 g/t Au for 1.546 Moz Au. <i>Northern Star Resources Ltd</i>	
34	Mt Marion Lithium	The MRE for the Mt Marion underground mine increased 111% to 19.3 Mt at 1.22% Li ₂ O. The global MRE for the openpit and underground now totals 66.1 Mt at 1.36% Li ₂ O, including 54.7 Mt at 1.4% Li ₂ O in the Inferred category. <i>Mineral Resources Ltd</i>	
35	Kangaroo Hills Lithium	Drilling at the northern extension of Big Red and additional resistivity targets intersected 31 m at 1.13% Li ₂ O and 12 m at 1.02% Li ₂ O. Additional step-out drilling 200 m north of Big Red Extension intersected a new pegmatite zone named Potoroo with intercepts of 14 m at 1.04% Li ₂ O and 8 m at 0.51% Li ₂ O. <i>Future Battery Minerals Ltd</i>	
36	Lepidolite Hill Lithium	Initial assay results from the maiden drilling at Lepidolite Hill project returned 11 m at 2.63% Li ₂ O and 401 ppm Ta ₂ O ₅ , and 13 m at 1.47% Li ₂ O and 1.23% Cs ₂ O, highlighting lithium mineralisation may extend over 1 km of strike. <i>Eastern Resources Ltd</i>	
37	Kambalda Gold Gold	Drilling results from the Beta Hunt underground gold mine within the Fletcher South zone include 33 m at 3.8 g/t Au, and the best grade x length results to date from the Fletcher Zone of 14.5 m at 17.3 g/t Au. <i>Westgold Resources Ltd</i>	
38	Lake Johnston Lithium	Drilling at the Burmeister prospect intersected mineralisation returning significant assays including 20 m at 1.38% Li ₂ O and 23.5 m at 1.52% Li ₂ O. The Burmeister prospect occurs in several lodes over a strike length of ~1500 m. <i>TG Metals Ltd</i>	
39	Salazar Rare earths	Maiden MRE for scandium was reported from the Newmont deposit in the Salazar project. The estimate is for an Inferred MRE of 12 Mt at 103 ppm Sc. Additional test work showed scandium leach recovery up to 81.2% at atmospheric pressure. <i>West Cobalt Metals Ltd</i>	
40	Mount Ridley Rare earths	A maiden Inferred MRE of 168 Mt at 1201 ppm TREO was reported for the Mia prospect in the Mount Ridley clay-hosted REE project. <i>Mount Ridley Mines Ltd</i>	
41	Springdale Graphite	Key findings from the Springdale-Collie Integrated Mine to Market Scoping Study proposes a 15-year operation, with the Springdale concentrator throughput of 500 000 tpa for an average feed grade of 9.5% TGC with an average concentrate production of 45 000 tpa and waste to ore ratio 4.3 to 1. The new micronising plant at Collie was also successfully commissioned and a AS 6.5 million grant was awarded by the Government of Western Australia for Australia's first downstream graphite plant at Collie. <i>International Graphite Ltd</i>	
42	Kwinana EcoGraf Graphite	EcoGraf Limited announced the commissioning of their product qualification facility in Kwinana , Western Australia with commencement of operations in April 2024. The facility is jointly funded through the Commonwealth Government's A\$48.9 million Critical Minerals Development Program. <i>EcoGraf Ltd</i>	

For more information, contact: mindedx@demirs.wa.gov.au

WESTERN AUSTRALIA – THE WORLD’S PREMIER MINING STATE

Fees, securities and minimum expenditures*

Licence/ lease	Maximum area	Term	Application fee	Rent	Security	Minimum annual expenditure*
Prospecting licence	200 ha	Four years (then four-year extension)	\$455	\$4.20 per ha Min: \$38.80	\$5k each	\$40 per ha Min: \$2k
Special prospecting licence for gold	10 ha (maximum)	Min. three months (then three-month extension up to four years)	\$455	\$38	\$5k each	\$2k
Exploration licence	70 blocks normally (200 blocks in greenfields areas)	Five years (then two-year extension)	1 Block \$479 >1 Block \$1743	Per block Years 1-3: \$169 Years 4-5: \$303 Years 6-7: \$414 Years 8+: \$784	\$5k each	Years 1-3 ≤20 blocks Min: \$10-20k >20 blocks \$1k per block
Mining lease minerals dissolved in brine	Not applicable	21 years renewable	N/A	Years 1-5 \$3.30 per ha Years 6+ \$7.70 per ha	\$5k each	\$100 per ha Min: \$5k if <5 ha, otherwise \$10k
Mining lease	Not applicable	21 years renewable	\$669	\$28.60 per ha	\$5k each	\$100 per ha Min: \$5k if <5 ha, otherwise \$10k
General purpose lease	10 ha or larger with Minister's approval	21 years renewable	\$669	\$26.40 per ha	\$5k each	Covenant in lieu
Miscellaneous licence	Not applicable	21 years renewable	\$669	\$26.40 per ha	\$5k each	Covenant in lieu

* <https://www.dmp.wa.gov.au/Documents/Minerals/Minerals-Feesandcharges.pdf>

* includes rent payments

ha = hectare (100 × 100 m)
Block = approx. 3 km²

MINING TENEMENTS



as at October 2024

Geoscience and resource information

All free via (www.demirs.wa.gov.au)

- Maps and reports (www.demirs.wa.gov.au/ebookshop)
- Live databases of mineral deposits (www.demirs.wa.gov.au/minedex)
- Mineral exploration reports (www.demirs.wa.gov.au/wamex)
- Download maps and databases (<https://dasc.demirs.wa.gov.au>)
- Online GIS facility (www.demirs.wa.gov.au/geoview)
- Geophysical data and images (www.demirs.wa.gov.au/geophysics)
- Geochemical data

Exploration and mining licence information

All free via (www.demirs.wa.gov.au)

- Online map service (TENGRAPH Web — www.demirs.wa.gov.au/tengraph) continuously updated showing location of all licences and applications
- Full ownership and other data for all licences available via online system, Mineral Titles Online (MTO) (www.demirs.wa.gov.au/mineraltitlesonline)
- Transparent licence system where all licence information can be viewed by anyone
- Exploration and mining licence information

Comprehensive and well-known mining legislation

Free download of the Mining Act and Regulations from (www.legislation.wa.gov.au)

This site also has current copies of all other Western Australian legislation

- Titles are for 'all' minerals*
- First in time application system
- Security of tenure when moving from exploration to mining title
- Mining title can be granted at pre-feasibility stage
- Annual exploration expenditure commitments
- Annual 'rental' fee for licence
- Annual reporting of activities

Exploration licences

- Graticular system used based on a 'block' that is one minute of latitude × one minute of longitude
- Maximum number of blocks:
 - in greenfields areas: 200
 - in non-greenfields areas: 70
- If after five years the licence is extended, 40% of the area must be surrendered at end of sixth year

Mining lease applications

There are two ways to submit applications:

- 'Mining proposal' involving environmental assessment before grant
- Mineralisation Report and Supporting Statement, or Resource Report and Supporting Statement. Mining proposal and environmental assessment submitted for approval at later date.

* Legislation gives Ministerial discretion to restrict minerals or refuse in public interest. Rules of procedural fairness apply.

Taxes and mining royalties

Mining tax

- Normal company tax rate ranges between 27.5 and 30% on profit
- Goods and services tax of 10%

Royalties on production

- The Mining Act and Regulations or the various State Agreement Acts set out royalty provisions and royalty rates
- The amount of royalty paid is a deduction for income tax assessment
- The amount of royalty paid can be reduced by allowable costs involved in transporting the mineral to the purchaser

Royalties are levied on the basis of:

- Tonnage (rock, gravel, limestone)
- Sales value (most metals, gems, diamonds)

Examples of royalty rates

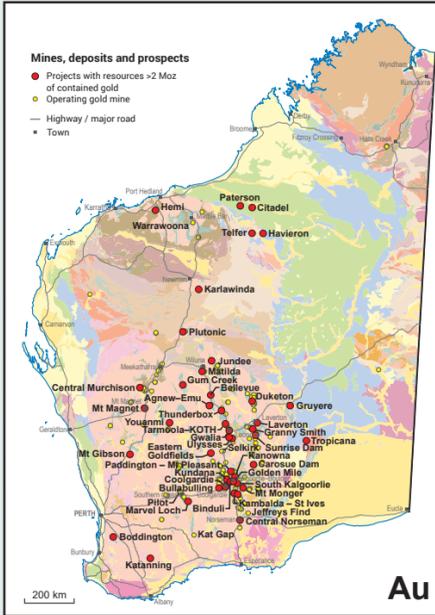
The full list of royalty rates is in Regulation 86 of the *Mining Regulations, 1981* or the relevant State Agreement

Mineral	Rate
Limestone (construction/metallurgical)	\$0.73 – \$1.17 per tonne
Coal	7.5%, if exported
Bauxite	7.5%
Copper	5% (concentrate); 2.5% (metal)
Nickel in concentrate	\$ royalty = 2.5 × D × f/100 D: percentage Ni in concentrate f: Ni metal price per tonne
Lithium minerals	5%
Iron ore (DSO) fines/lump	7.5%
Beneficiated iron ore and magnetite	5%
Gold (2500 oz exempt)	2.5% of metal value
Zircon concentrate	5% of sales value

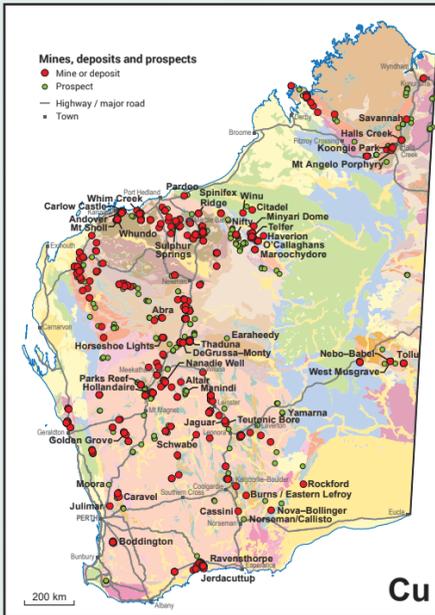
Yellow box: Tonnage-based rates Pink box: Sales value-based rates

DSO = Direct shipping ore

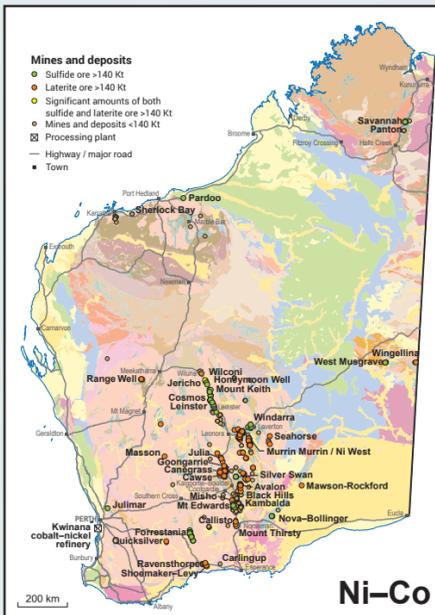
OCTOBER 2024



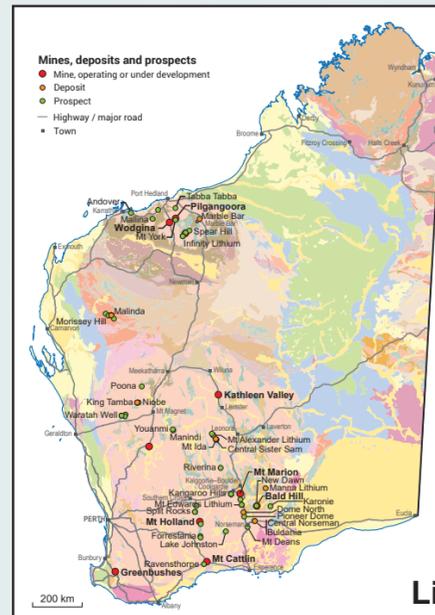
Au



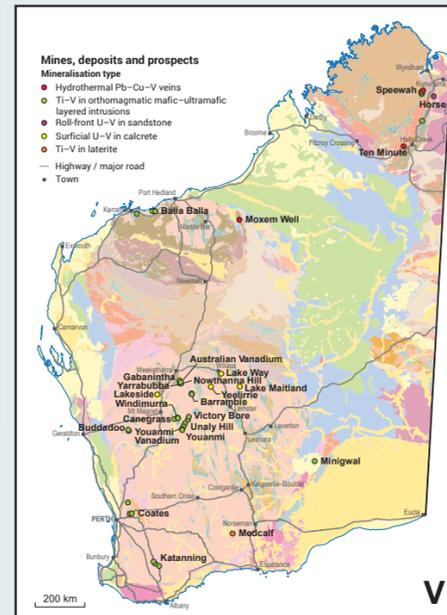
Cu



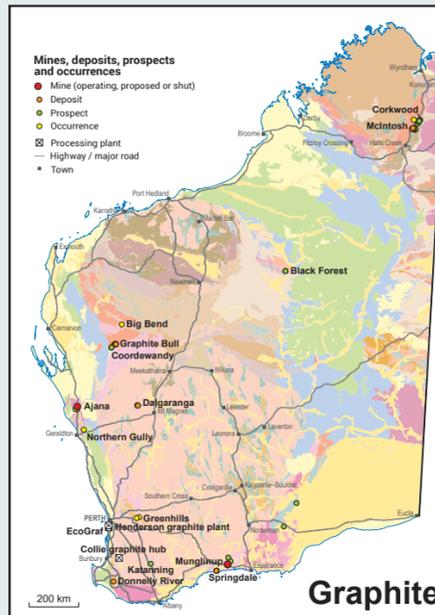
Ni-Co



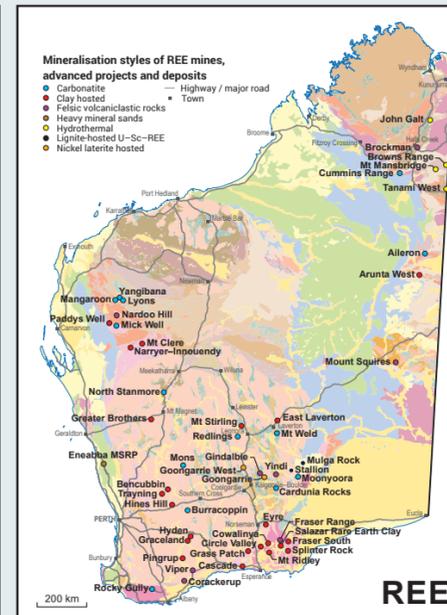
Li



V



Graphite



REE

Department of Energy, Mines, Industry Regulation and Safety (the principal mineral industry regulator)
www.demirs.wa.gov.au

Department of Jobs, Tourism, Science and Innovation (coordinates the development of major resource and infrastructure projects)
www.jtsi.wa.gov.au

Western Australian State Law Publisher (free downloads of WA legislation)
www.legislation.wa.gov.au

Department of Foreign Affairs and Trade
www.dfat.gov.au

Australian Tax Office
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Austrade (Australian Trade Commission)
www.austrade.gov.au