VANADIUM

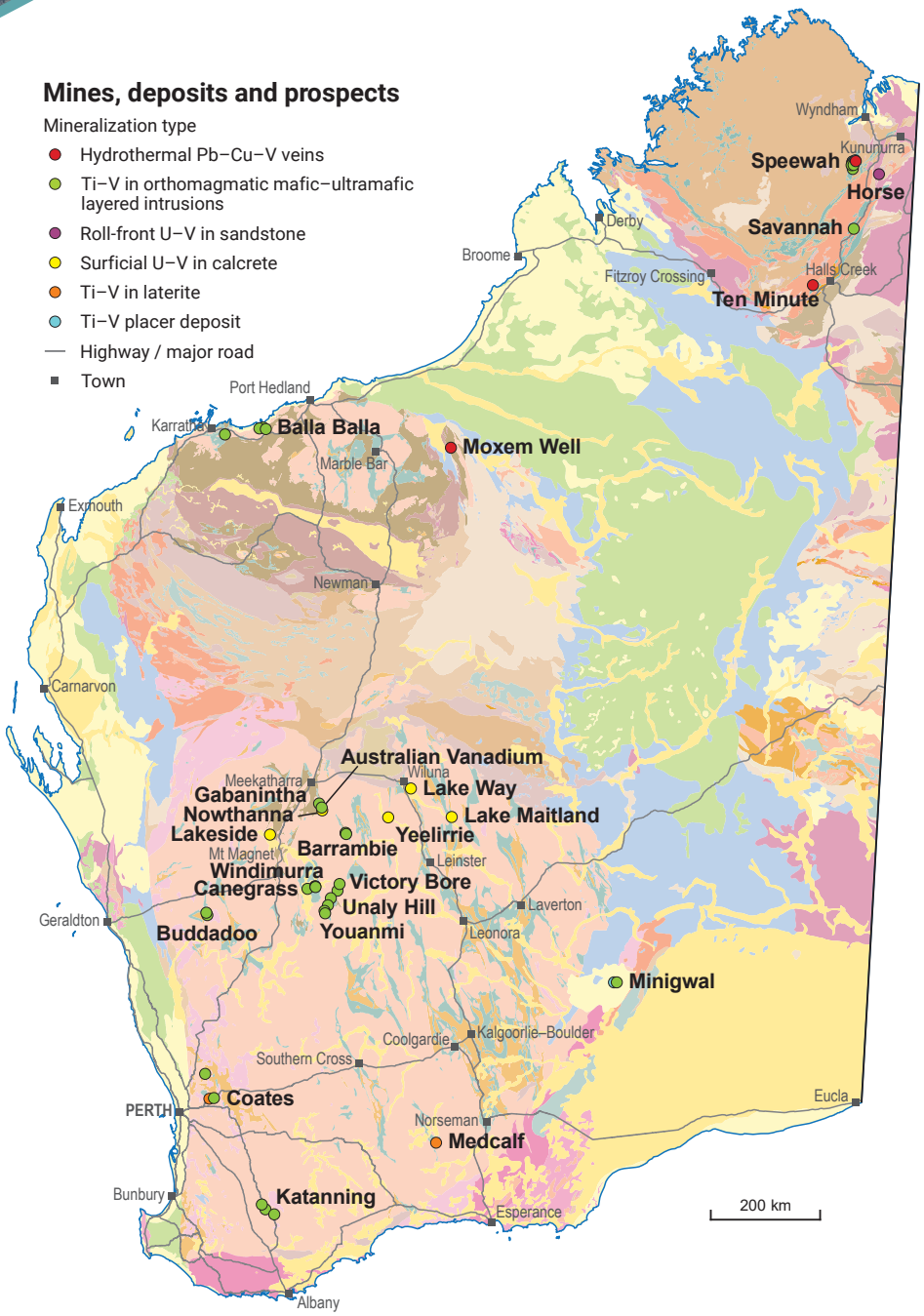
INVESTMENT OPPORTUNITIES

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

Mines, deposits and prospects

Mineralization type

- Hydrothermal Pb–Cu–V veins
- Ti–V in orthomagmatic mafic–ultramafic layered intrusions
- Roll-front U–V in sandstone
- Surficial U–V in calcrete
- Ti–V in laterite
- Ti–V placer deposit
- Highway / major road
- Town



Western Australia continues to grow into a global vanadium hub

- Historical vanadium production between 2000–04 and 2012–14 was 14 100 t of V_2O_5 from the Windimurra mine
- Uses for vanadium are primarily as an alloy to produce high-strength steel. Another emerging application is in redox flow batteries for energy storage uses
- Western Australia has substantial JORC-compliant resources – 25.5 Mt of contained V_2O_5

Eight projects at feasibility/pre-feasibility/scoping stages

Yilgarn Craton

- Australian Vanadium project
- Barrambie
- Gabanintha
- Medcalf
- Windimurra
- Youanmi

Kimberley Craton

- Speewah

Pilbara Craton

- Balla Balla

$2393 m*
Investment projects

3rd
Resources world ranking

5.0%
Royalty rate

(2019–20 financial year)
* Includes projects planned, possible, committed or under construction as of September 2020

Government of **Western Australia**
Department of **Mines, Industry Regulation and Safety**

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Geological Survey of Western Australia

Vanadium resources ranked by contained V_2O_5 (kt)

Resources estimated according to JORC 2012

Project	Status	Owner	Resources (Mt)	Av. grade V_2O_5 (%)	Contained V_2O_5 (kt)	Resource date
Speewah	Scoping	King River Resources	4711.0	0.30	14 180	01/04/2019
Balla Balla*	Feasibility	BBI Group	455.9	0.66	2988	31/07/2009
Australian Vanadium Project	Feasibility	Australian Vanadium	208.2	0.75	1554	04/03/2020
Barrambie	Feasibility	Neometals	280.1	0.44	1234	17/04/2018
Gabanintha	Feasibility	Technology Metals Australia	137.2	0.84	1148	29/06/2020
Youanmi	Scoping	Venus Metals Corporation, Legendre Bruce Robert	354.7	0.30	1075	18/03/2019
Windimurra	Feasibility	Atlantic	209.7	0.50	1045	30/11/2019
Victory Bore	Exploration	Surefire Resources	151.0	0.44	664	29/06/2017
Youanmi	Exploration	Diversity Resources	185.0	0.33	611	22/05/2019
Canegrass	Exploration	Flinders Mines	79.0	0.64	503	30/01/2018
Unaly Hill*	Eploration	Surefire Resources	86.2	0.42	362	21/11/2011
Medcalf – Bremer Range	Feasibility	Audalia Resources	32.0	0.47	149	31/08/2018
Lake Way	Scoping	Toro Energy	69.3	0.03	23	21/10/2019
Lake Maitland	Scoping	Toro Energy	27.0	0.03	8	21/10/2019
Nowthanna Hill	Exploration	Australian Vanadium	3.6	0.03	1	31/05/2019
		TOTAL	**6989.9**		**25 547**	

* Resource estimates are not JORC 2012 compliant
Resource estimates have been rounded

Ti–V in orthomagmatic mafic–ultramafic layered intrusions

Surficial U–V in calcrete

Summary of top vanadium resource projects

- **Windimurra** (Yilgarn): Australia's only vanadium producer 2000–04 and 2012–14. Established mine with V_2O_5 production facility; feasibility study completed for proposed production restart in 2020 (initial mine life 27 years); reserve of 87.5 Mt at 0.5% V_2O_5
- **Speewah** (Kimberley): Australia's largest vanadiferous titanomagnetite deposit. Metallurgical testwork underway for pre-feasibility study; focus on production of high-purity vanadium electrolyte and titanium dioxide over a project mine life >100 years. The viability of producing high-purity alumina is also under review
- **Balla Balla** (Pilbara): metallurgical testwork (TIVAN process) results from Balla Balla ore; reserve of 229 Mt at 0.62% V_2O_5 (initial mine life 16 years)
- **Gabanintha**/Australian Vanadium (Yilgarn): pre-feasability work included modelling of vanadium and titanium metal production (mine life >20 years). Possible vanadium–electrolyte pilot plant
- **Gabanintha**/Technology Metals (Yilgarn): pilot plant testwork for definitive feasibility study completed; reserve of 29.6 Mt at 0.88% V_2O_5 (mine life 13 years)
- **Barrambie** (Yilgarn): definitive feasibility study confirms high-purity vanadium pentoxide and ferrovanadium potential; plans for pilot-scale metallurgical testwork; reserve of 39.9 Mt at 0.78% V_2O_5 (mine life 20 years)
- **Medcalf** (Yilgarn): lateritic vandium–titanium over layered sill. Pre-feasibility study supports V_2O_5 and TiO_2 production from Vesuvius, Fuji and Egmont deposits (mine life 12 years)

For more information

Geological Survey of Western Australia www.dmirs.wa.gov.au/gswa

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

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

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