

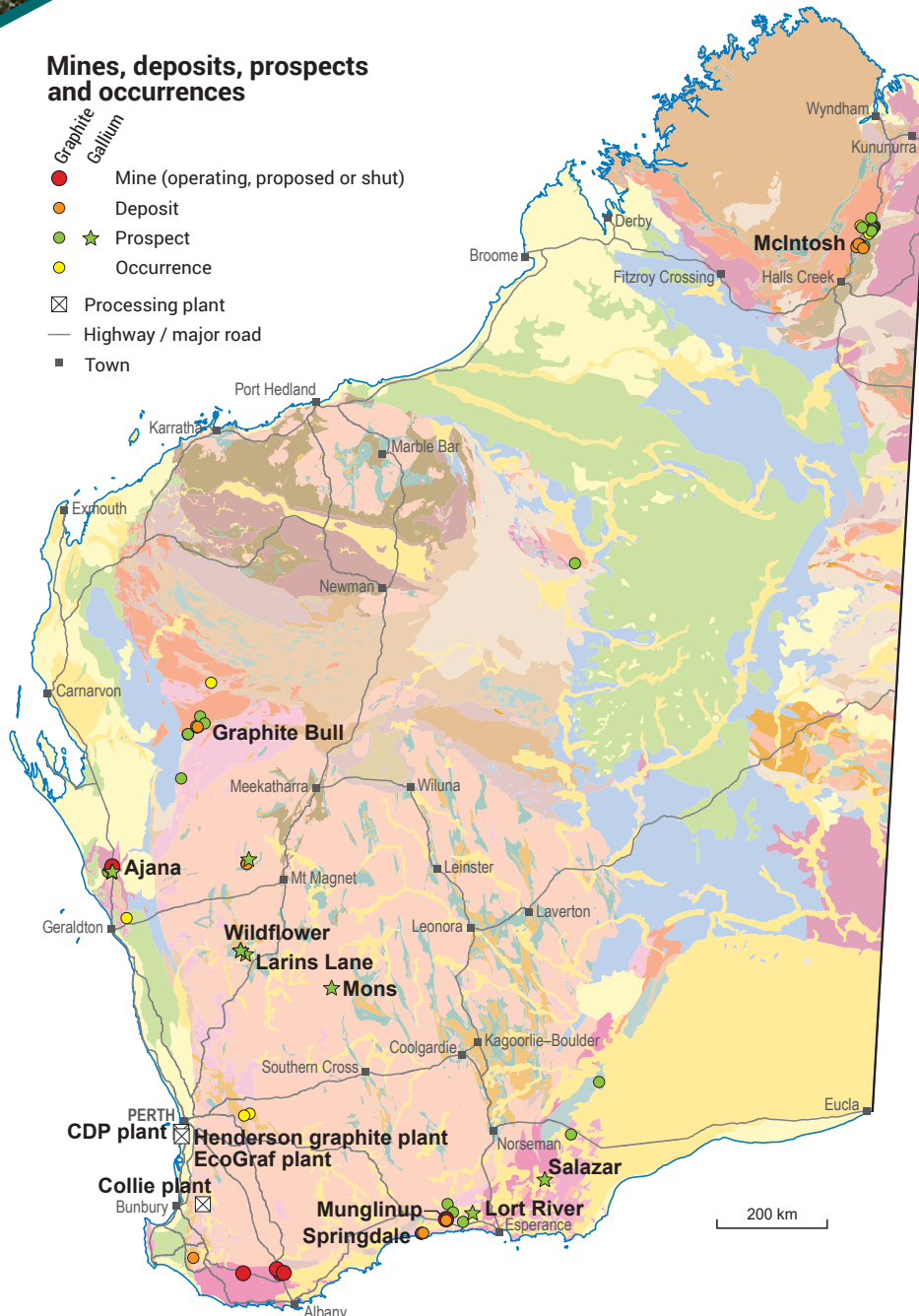
GRAPHITE–GALLIUM–GERMANIUM

INVESTMENT OPPORTUNITIES

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

Mines, deposits, prospects and occurrences

- Graphite
- Gallium
- Mine (operating, proposed or shut)
- Deposit
- Prospect
- Occurrence
- Processing plant
- Highway / major road
- Town



(Graphite statistics)

219 t
Historical
production



\$347 m*
Investment
projects



5.0%
Royalty
rate



(2023–24 financial year)

* Includes projects planned, possible, committed or under construction as of October 2024

Western Australia has world-leading development-stage graphite assets

- International Graphite released a Scoping Study on the Springdale Graphite Project and the Collie plant. The study positions the project as a world-leading development-stage graphite asset. A Definitive Feasibility Study is expected at the start of 2025. The Collie plant was successfully commissioned in February 2024 and is the largest in Australia. Concentrates from Springdale will be used at the plant instead of imported feedstock. The plant also received an additional \$6.5 million grant from the Western Australian Government
- The Kwinana EcoGraf plant was successfully commissioned in March 2024 and is jointly funded through the Commonwealth Government's Critical Minerals Development Program
- Hazer Group achieved first production of hydrogen and graphite at its Commercial Demonstration Project (CDP) plant in 2024 using the Hazer® Process, a low carbon emission hydrogen and graphite production process

Resources

- In July 2024, Green Critical Minerals updated the Mineral Resource Estimate for the McIntosh Graphite Project to 30.2 Mt at 4.4% TGC
- At the Graphite Bull Project, Buxton Resources intersected thick graphitic mineralisation at the Yalbra deposit, doubling the depth and strike extent of confirmed mineralisation

Gallium and germanium exploration

- Gallium has been identified at lead–zinc projects (e.g. Ajana), rare earth projects (e.g. Salazar, Lort River, Larins Lane, Mons), and gold projects (e.g. Wildflower). Results are from both recent and historical drilling in hard rock and in clay/oxide hosted prospects, as well as from soil sampling
- Anson Resources announced the discovery of extensive high-grade gallium, indium, germanium and barium mineralisation associated with high-grade zinc values at the Ajana Project
- Terrain Minerals is rapidly expanding its gallium (and germanium) focus to dovetail with the exponential growth of generative AI (and the associated demand for semiconductors)
- Gallium has been recovered by MTM Critical Metals Limited from e-scrap using their Flash Joule Heating technology at their demonstration plant in the USA



Department of Energy, Mines,
Industry Regulation and Safety

demirs.wa.gov.au

Geological Survey of
Western Australia



Graphite resources ranked by contained TGC (kt)

Mineral Resource Estimates reported in accordance with JORC (2012) unless otherwise stated

Project	Status	Owner	Resources TGC (Mt)	Av. grade TGC (%)	Contained TGC (kt)	Resource date
Springdale	Exploration	International Graphite	49.3	6.43	3 168	12/09/2023
McIntosh	Feasibility	Green Critical Minerals / NH3 Clean Energy	30.1	4.40	1 324	01/07/2024
Munglinup	Feasibility	Mineral Commodities / Gold Terrace	8.0	12.18	973	08/01/2020
Graphite Bull	Exploration	Buxton Resources	4.0	16.17	650	24/10/2014
TOTAL			91.4		6 115	

Resource estimates have been rounded

Abbreviation: TGC, total graphitic carbon

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

Graphite prospectivity of Western Australia

- Flake and amorphous graphite is hosted in regionally metamorphosed, metasedimentary rocks of Archean and Proterozoic terranes (e.g. the majority of Western Australia's graphite deposits, including Graphite Bull, McIntosh and Munglinup)
- Flake graphite deposits are hosted in veins associated with pegmatites and paragneisses in Proterozoic terranes (e.g. Ajana region, Northampton Inlier)
- Disseminated flake graphite is hosted in weathered pegmatites (e.g. Katanning)

Graphite properties and uses

- Graphite is a naturally occurring crystalline form of carbon
- It does not react with other materials and is an excellent conductor of electricity and heat
- Applications and uses include pencils, lubricants, brake linings and clutches, lithium-ion batteries, fuel cells, vanadium redox-flow batteries, and in the aerospace industry
- Medium- to coarse-grained graphite is particularly useful in batteries, when >150 microns long

Gallium properties and uses

- Gallium is a soft metallic element used in semiconductors, blue ray technology light emitting diodes (LEDs), mobile phones and nuclear engineering because of its non-toxicity and resistance to neutron radiation and beta decay
- Gallium is regarded as one of the most critical elements as it is integral in the production of modern integrated circuits/semiconductors
- Gallium is not an abundant element and does not exist in elemental form in nature. It is mainly present in the ores of aluminum (bauxite) and zinc. Commercially, gallium is produced through smelting of various ores, including bauxite and some ores of zinc sulfide

Germanium properties and uses

- Germanium is not present in its pure elemental form and is mostly extracted from zinc ore (sphalerite) and from ores of copper, silver and lead. Alongside recovery from zinc deposits, germanium can also be recovered from fly ash from coal fired powerplants
- Germanium possesses semiconductor properties making it important in modern electronics like transistors and solar cells
- There has been a significant increase in demand for germanium for its use in: 1) Fibre optics, infra-red optics, high brightness LEDs and in semiconductors, and photovoltaic cells for renewable energy infrastructure, 2) Night vision and night targeting, and 3) Solar panels as the most efficient energy generator
- Germanium compounds are also used for polymerisation catalysts and have most recently found use in the production of nanowires. Germanium is used in applications involving infrared (IR) imaging and vision-based automatic emergency braking (AEB) systems in cars due to its unique geochemical properties. In vision-based AEB systems, germanium is used in sensors and cameras to detect obstacles and potential collisions. Its ability to transmit IR radiation and provide clear images helps the system accurately identify objects and trigger braking mechanisms to prevent accidents

For more information

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

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

GeoVIEW.WA is a free GIS-based spatial viewer

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

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



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