



Australian Government
Geoscience Australia

Exploring for
the Future

Realising New Opportunities from Old Waste

How the Atlas of Australian Mine Waste Supports in the
Recovery of Mineral Wealth

Jane Thorne | Project Leader - National Mine Waste Assessment, Geoscience Australia



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Earth sciences for Australia's future | ga.gov.au

Geoscience Australia

Mission: to be the trusted source of information on Australia's geology and geography for government, industry and community decision making



Building Australia's
resources wealth ▼



Supporting Australia's
community safety ▼



Securing Australia's water
resources ▼



Managing Australia's marine
jurisdictions ▼



Creating a location-enabled
Australia ▼



Enabling an informed
Australia ▼

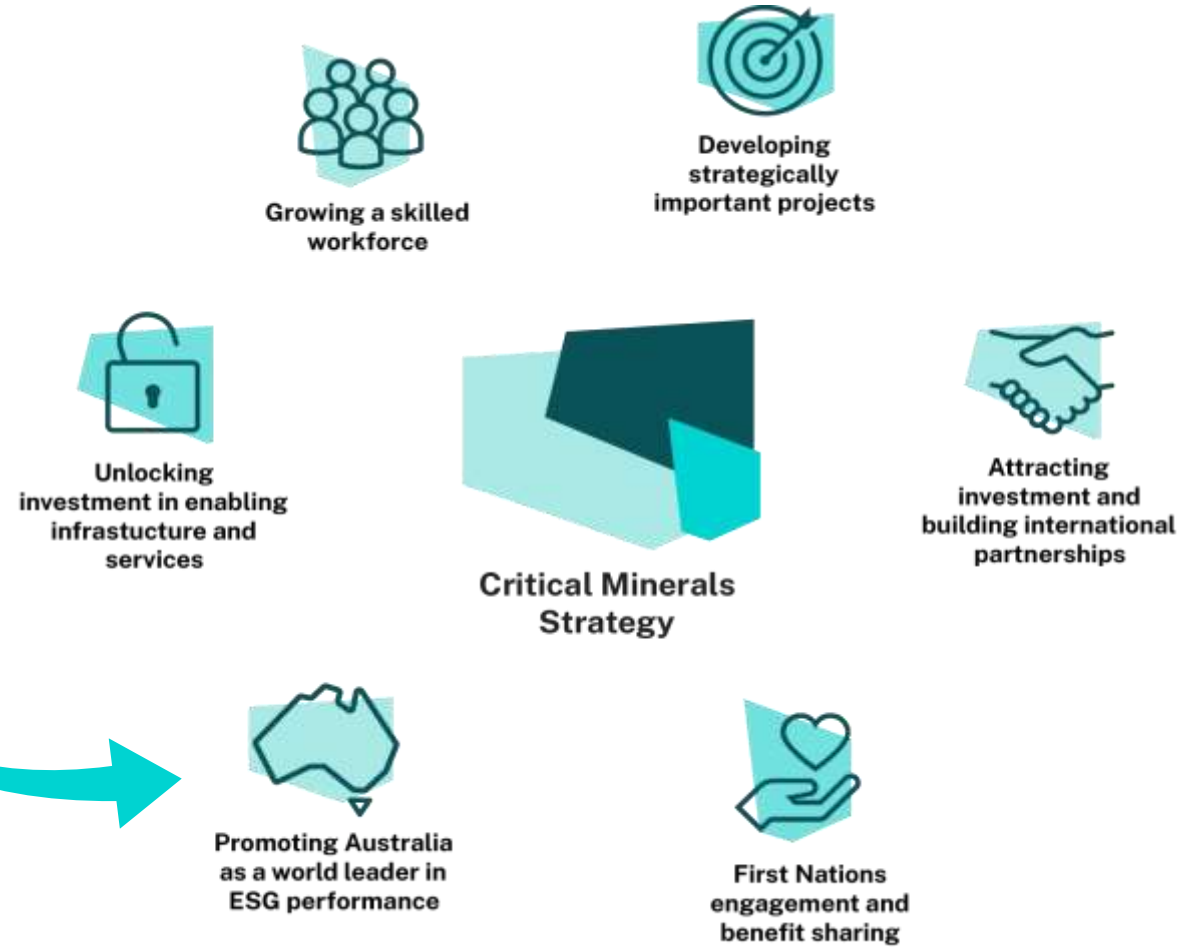


Ensuring a high performing
organisation ▼

Australia's Critical Minerals Strategy – A whole-of-government plan to 2030

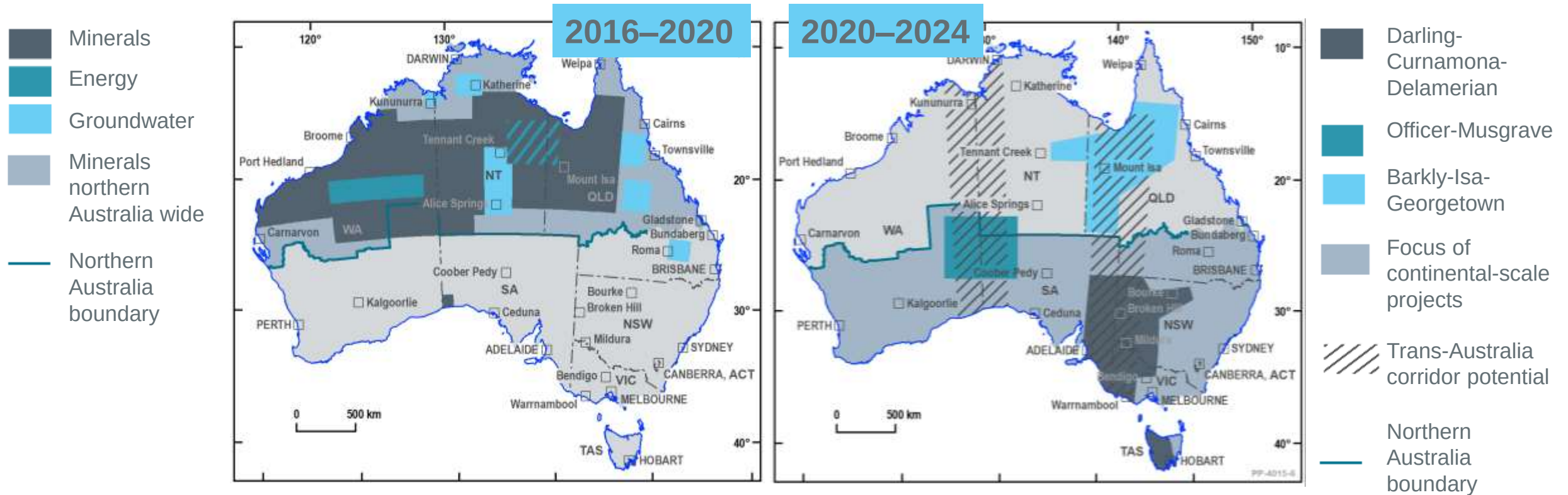


Atlas of
Australian Mine
Waste included in
the Strategy



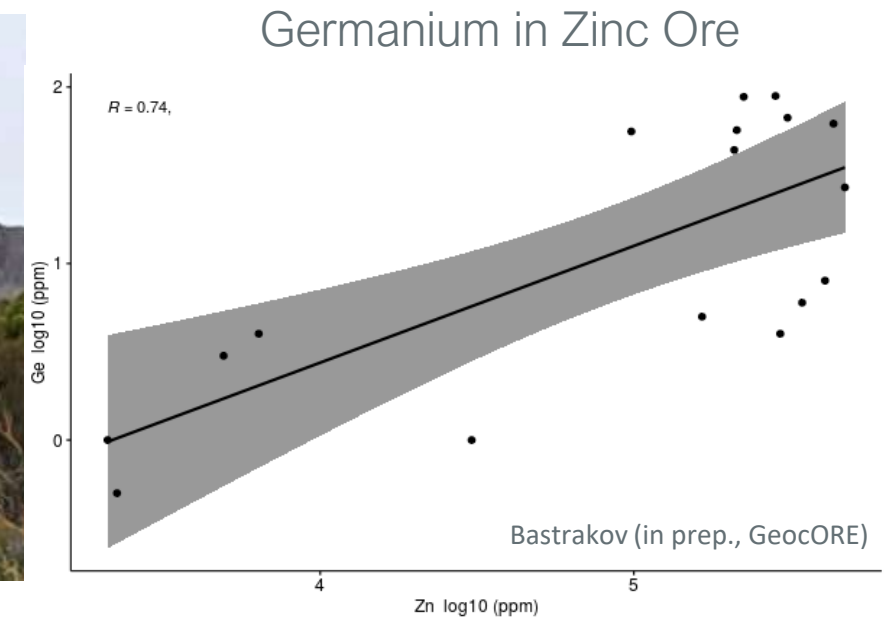
Australia's Exploring for the Future program—\$225m investment

VISION: To support a **strong economy, resilient society** and **sustainable environment** for the benefit of Australians via an integrated geoscience understanding of our mineral, energy and groundwater potential



National Mine Waste Assessment—secondary critical mineral prospectivity

- Accurate location of mine waste
- Model and predict critical mineral potential
- Test and refine modelling
- Economic modelling for extraction and modern management of reprocessed mine waste
- Data and decision-making tools



Reprocessing is not a new concept



Century Mine, Queensland source: New Century Resources



Hellyer Mine, Tasmania source: NQ minerals

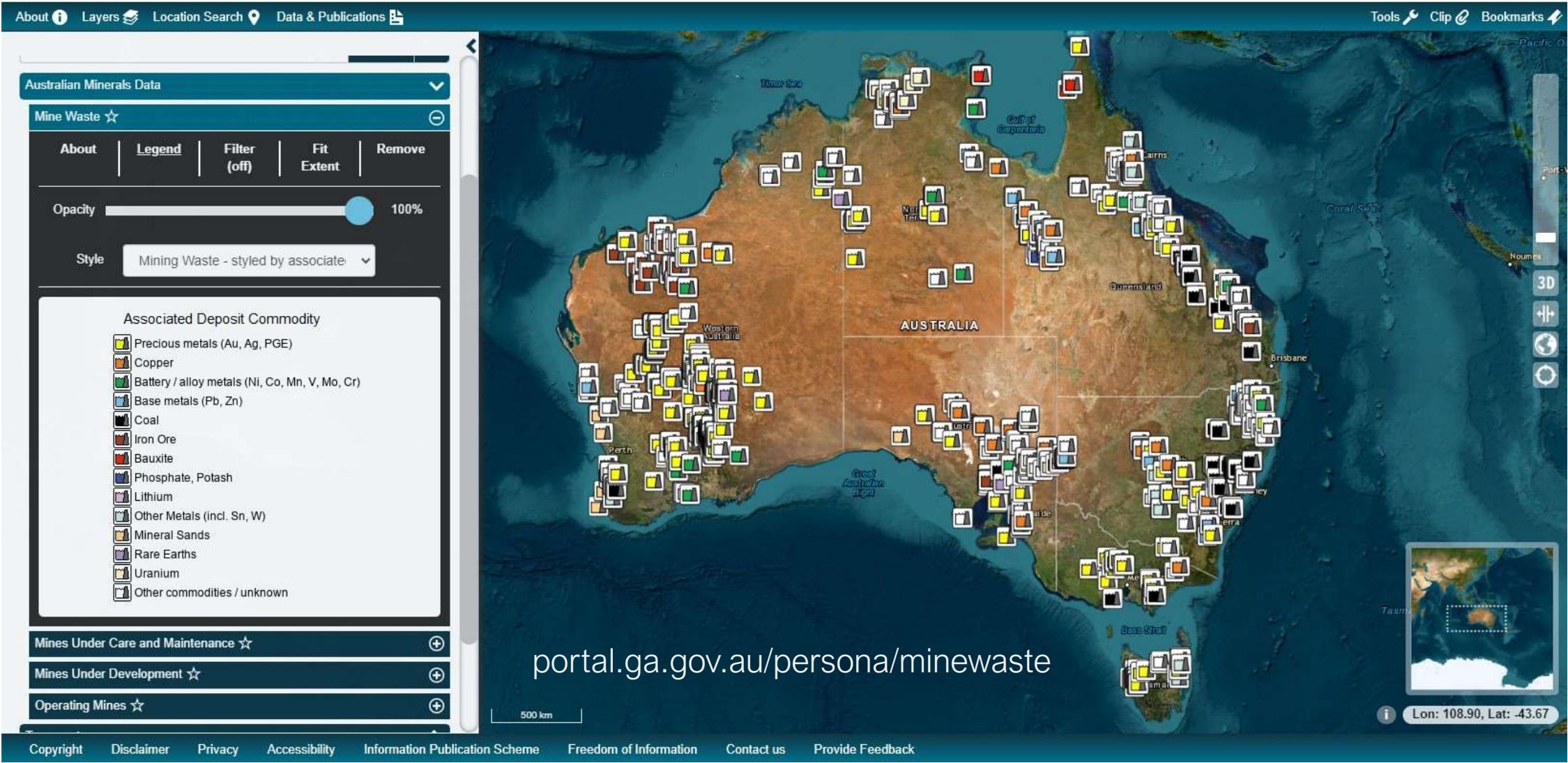
What opportunities are there for critical minerals in mine waste storage facilities?

Atlas of Australian Mine Waste



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Atlas of Australian Mine Waste



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☒Point

☐Area

☐Statistics

Longitude 139.4565457, Latitude -20.7277621

Mine Waste

General

ENO	867576
MINE_WASTE_NAME	Mount Isa - TD 5
LONGITUDE_GDA94	139.45664
LATITUDE_GDA94	-20.72758
STATE	QLD
WASTE_TYPE	tailings
STORAGE_TYPE	surface
WASTE_STATUS	currently used
BACKFILL	N
REHABILITATED	N
MINE_WASTE_HEIGHT	35
HEIGHT_UNITS	m
CURRENT_VOLUME	2100000
PLANNED_VOLUME	1500000
VOLUME_UNITS	m3
ASSOCIATED_MINES_AND_DEPOSITS	Mount Isa (Pb-Zn-Ag orebodies)
DEPOSIT_MODELS	Environment: Basin hydrothermal, Group: Sediment-hosted, Type: Siliclastic-carbonate Zn-Pb
DEPOSIT_COMMODITIES	Silver, Zinc, Lead, Copper, Cobalt, Cadmium, Antimony
GROUPED_COMMODITIES	Silver, Lead-Zinc, Copper, Cobalt, Mineral Commodity, Antimony
WASTE_STRUCTURE	downstream dam

Did you find this useful?

1000 m

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National mine waste sampling and analysis campaign

- Understanding geochemical and mineralogical characteristics of waste material
- Targeting a range of ore deposits types across Australia

University and
State/NT Government
partnerships crucial

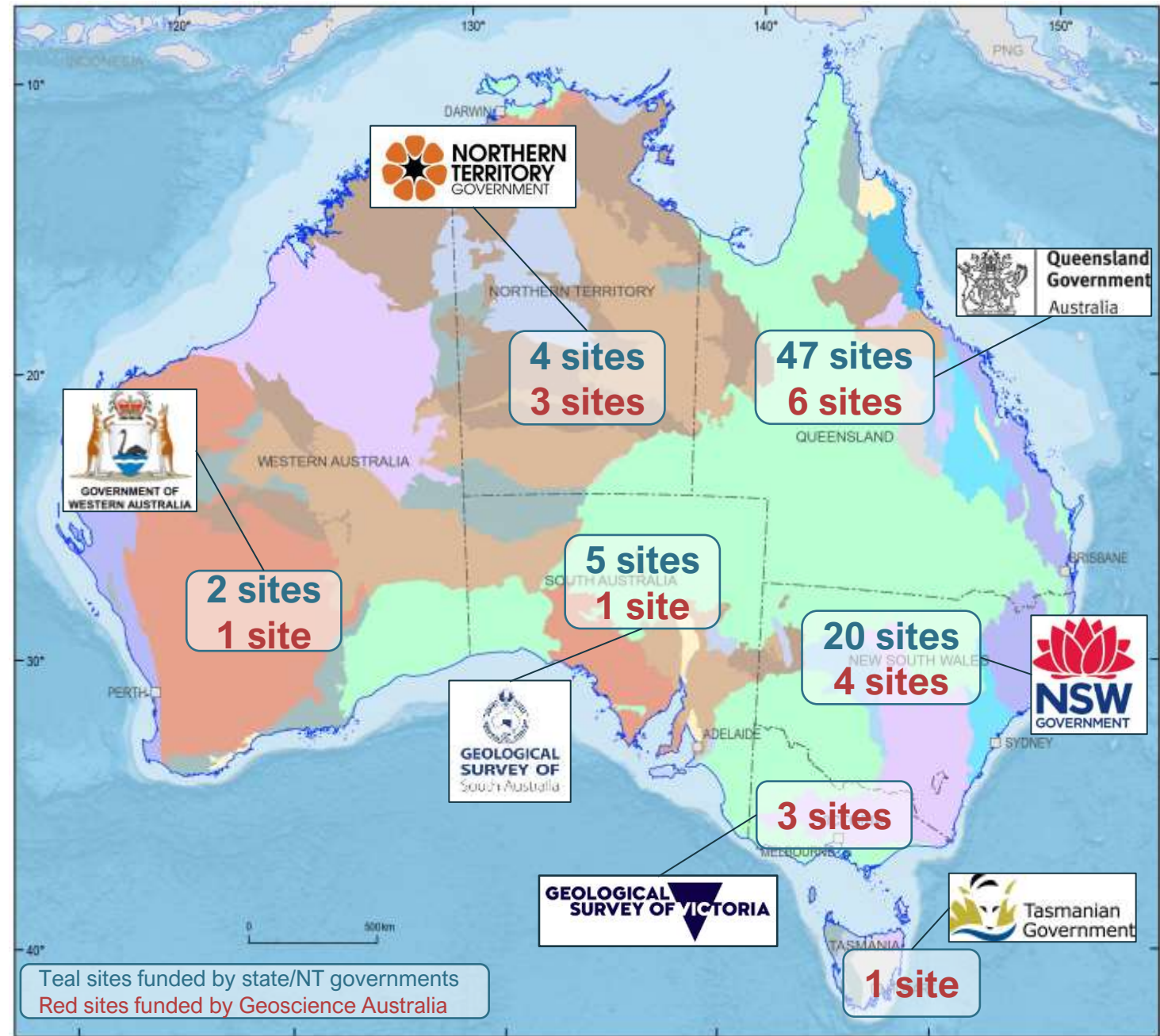


THE UNIVERSITY
OF QUEENSLAND
AUSTRALIA



RMIT
UNIVERSITY

100s more sites to go...



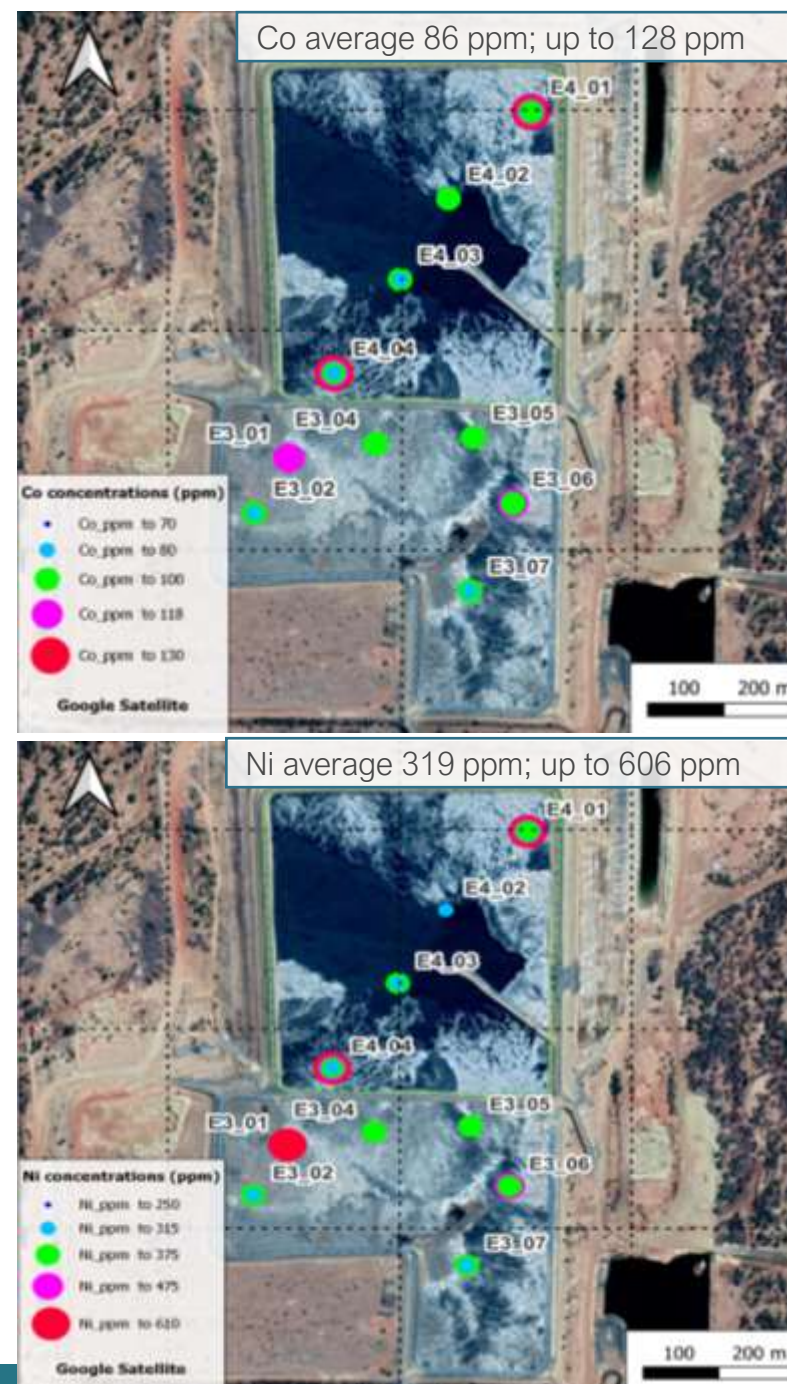
Eloise mine tailings, Queensland

- Copper, gold and silver mine
- Results highlight the importance of mineral characterisation
- Bulk geochemistry
 - low cobalt (Co)
 - low nickel (Ni)
- Pyrite geochemistry
 - high Co (average: 3,325 ppm)
 - high Ni (average: 2,100 ppm)

Opportunities

- Further pyrite investigation
- Potential reprocessing

Bhowany et al., in prep



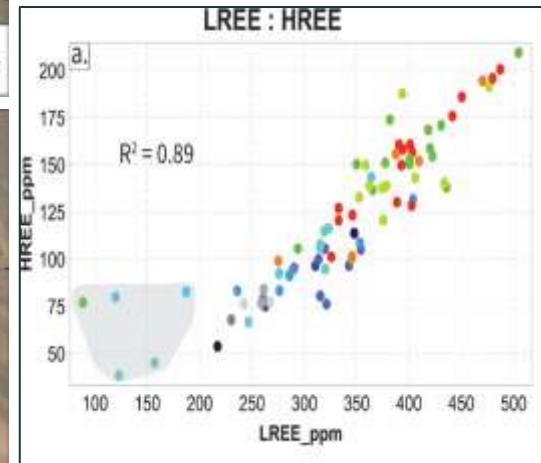
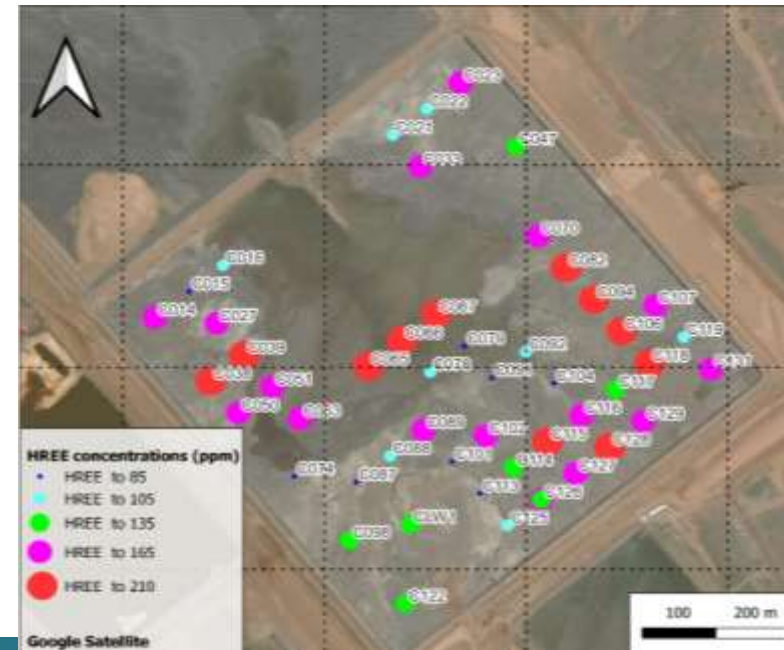
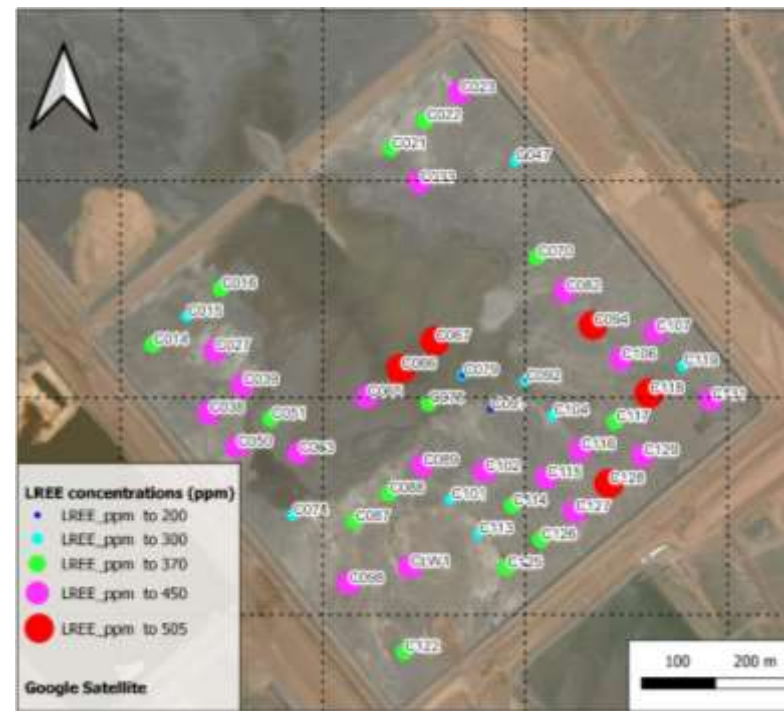
Cannington mine tailings, Queensland

- Silver and lead mine
- Bulk geochemistry shows good distribution of light rare earth element (LREE) and heavy rare earth elements (HREE) across the tailings
- Increased concentrations with depth

Opportunities

- Further mineral characterisation to determine mode of occurrence
- Targets include REEs in silicates

Bhowany et al., in prep



Zeehan smelter tailings, Tasmania

- Historic lead and silver smelter site
- Bulk geochemistry – moderate to high concentrations in most critical metals
- High in residual metals – silver, lead, zinc and copper
- Small site

Opportunities

- Pyrite investigation for recover
- Potential reprocessing of other sulfide minerals



Atlas of Australian Mine Waste

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Data & Publications

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Data Packages

Minerals
A Comprehensive dataset for Australian mine production 1799 to 2021

Documents

Exploring for the Future
Potential impacts of opportunities arising from Australia's green energy transition with emphasis on critical minerals and mining wastes

portal.ga.gov.au/persona/minewaste

500 km

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National Mine Waste Assessment

Facilitating industry to develop new sources of critical minerals in Australia



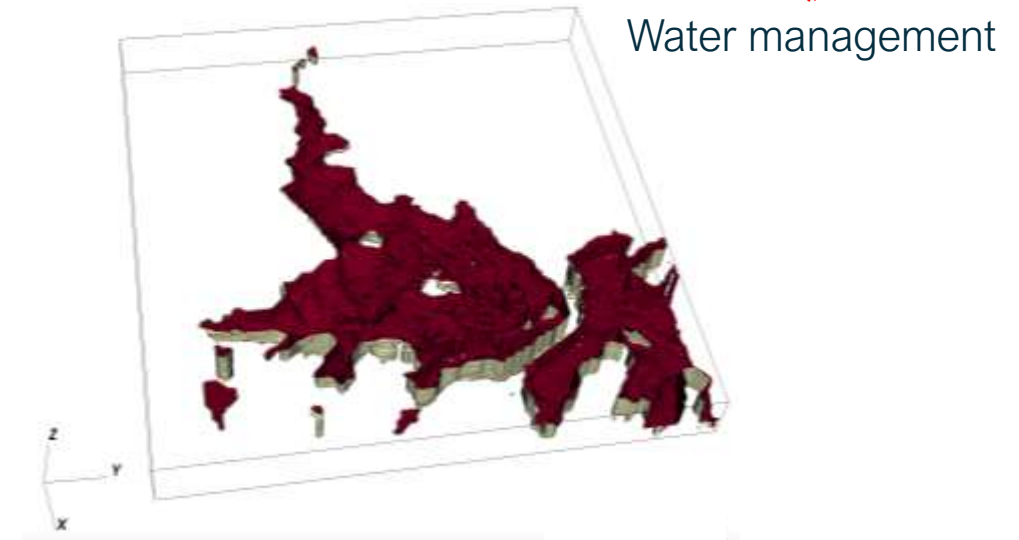
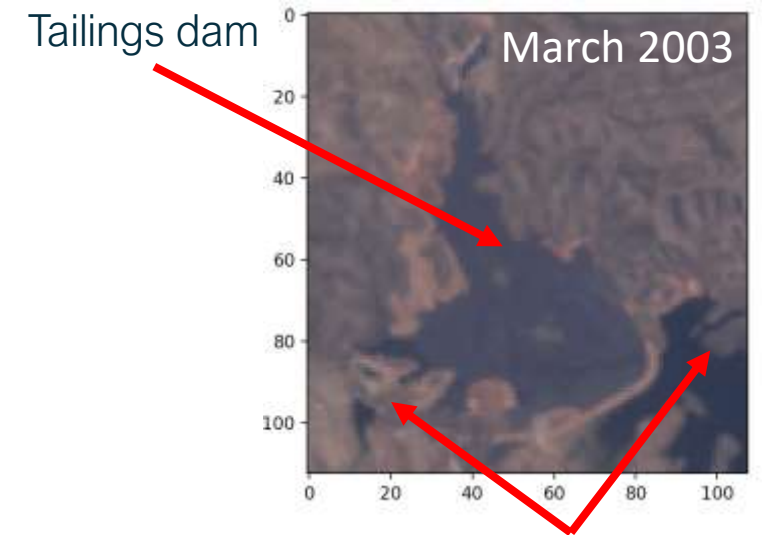
Economic assessment –mapping mine waste extent

- Satellite imagery provides a historical record of tailings dam growth
- Developing a segmentation algorithm to distinguish tailings in the landscape, supporting spatial and volumetric assessment
- Preliminary results provide a foundation for economic modelling and further prospectivity mapping

Satellite image



Segmentation



Thank you for your support

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Research partners	State collaborators	Company supporters
 THE UNIVERSITY OF QUEENSLAND AUSTRALIA  RMIT UNIVERSITY  MONASH University	 Queensland Government  NSW GOVERNMENT  GEOLOGICAL SURVEY OF VICTORIA  NORTHERN TERRITORY GOVERNMENT  GEOLOGICAL SURVEY OF South Australia  Geological Survey of Western Australia  Tasmanian Government	 SOUTH32  AIC Mines Limited  emmerson  HARVEST Group Services  MANDALAY RESOURCES  BKE RECLAIM RECYCLE REMEDiate  MMG WE MINE FOR PROGRESS  VISTA GOLD  WR WARRIEDAR RESOURCES  ELMORE  agl  NiS NickelSearch LIMITED