

Victoria's pre-competitive geoscience: who, where and why

Victorian Gold Mining & Exploration Forum

23 February 2022

**GEOLOGICAL
SURVEY OF VICTORIA**

Cameron.Cairns@ecodev.vic.gov.au
Manager Minerals Geoscience

About the Geological Survey of Victoria

The Geological Survey of Victoria (GSV) is the State's geoscience agency. It sits within the Department of Jobs, Precincts and Regions.

The GSV is responsible for understanding Victoria's geological framework through regional geoscientific investigations, particularly to enable the informed and integrated management of State-owned resources.

For over 169 years, GSV has studied and mapped the surface and sub-surface of Victoria. Today, it provides evidence-based knowledge and information to Government, industry, academia and the community, using the latest geoscience technologies and methods.

GSV staff come from a range of geoscientific disciplines, providing an authoritative and in-depth knowledge of our dynamic planet.

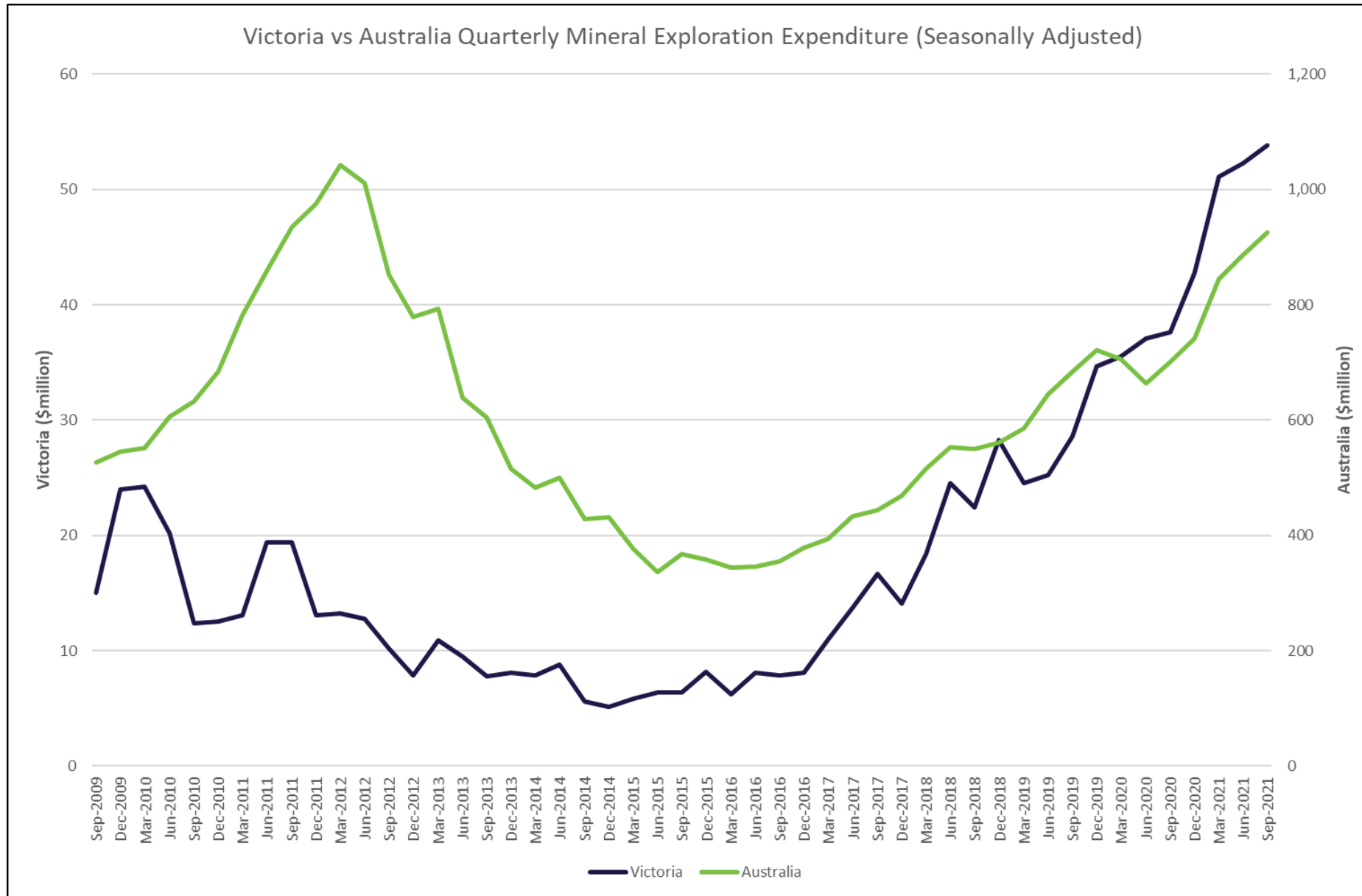
State of Discovery: Mineral Resources Strategy

Five Action Areas

1. Confident communities and responsible explorers
- 2. Advancing geoscience and encouraging mineral exploration and development**
3. Victoria as a global mining hub
4. Improve regulation practice and industry compliance
5. Deliver modern, fit-for-purpose laws

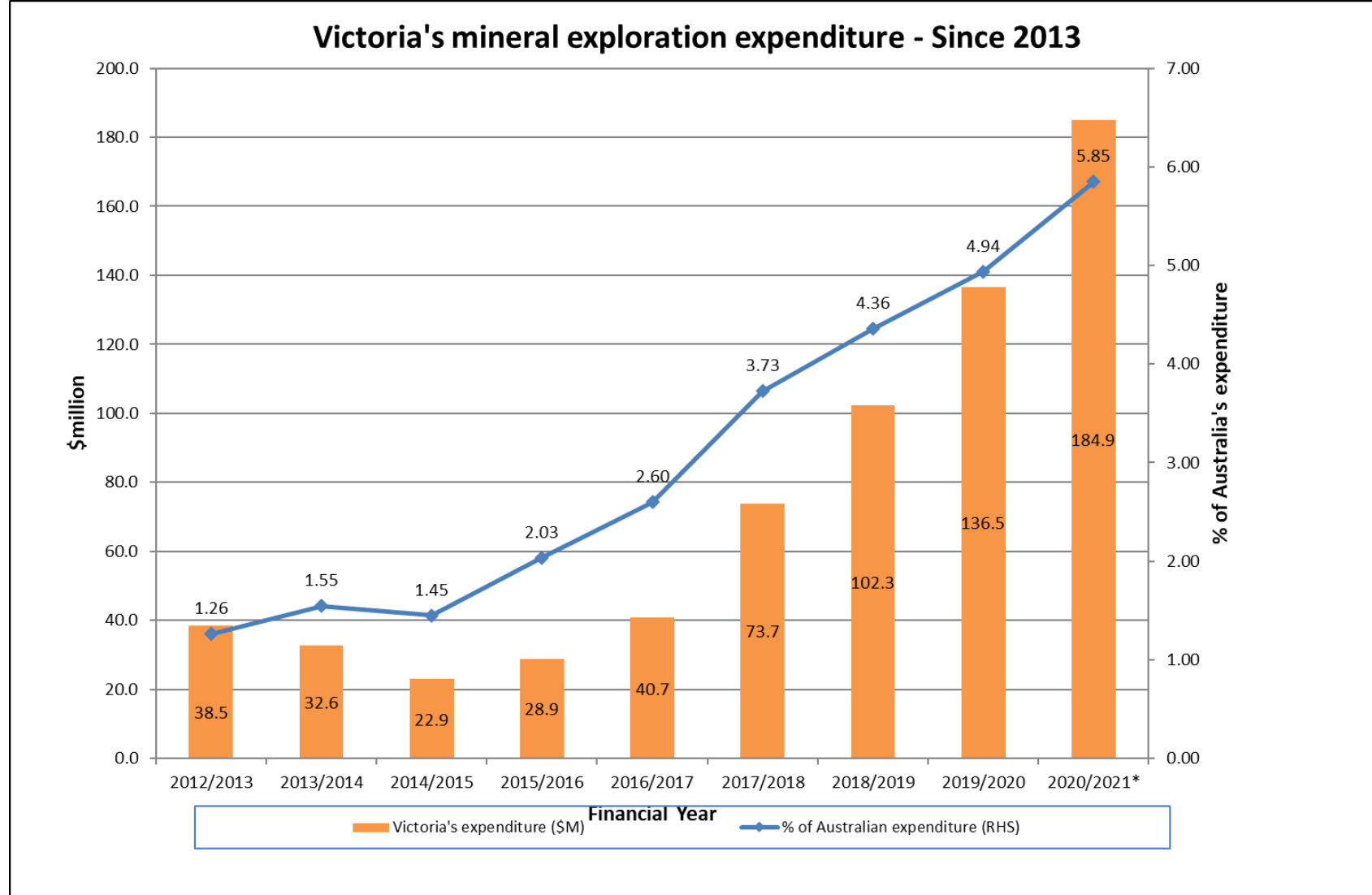


Unprecedented investment and drilling



Source: Australian Bureau of Statistics

Increasing mineral exploration activity



Expenditure data source: Australian Bureau of Statistics

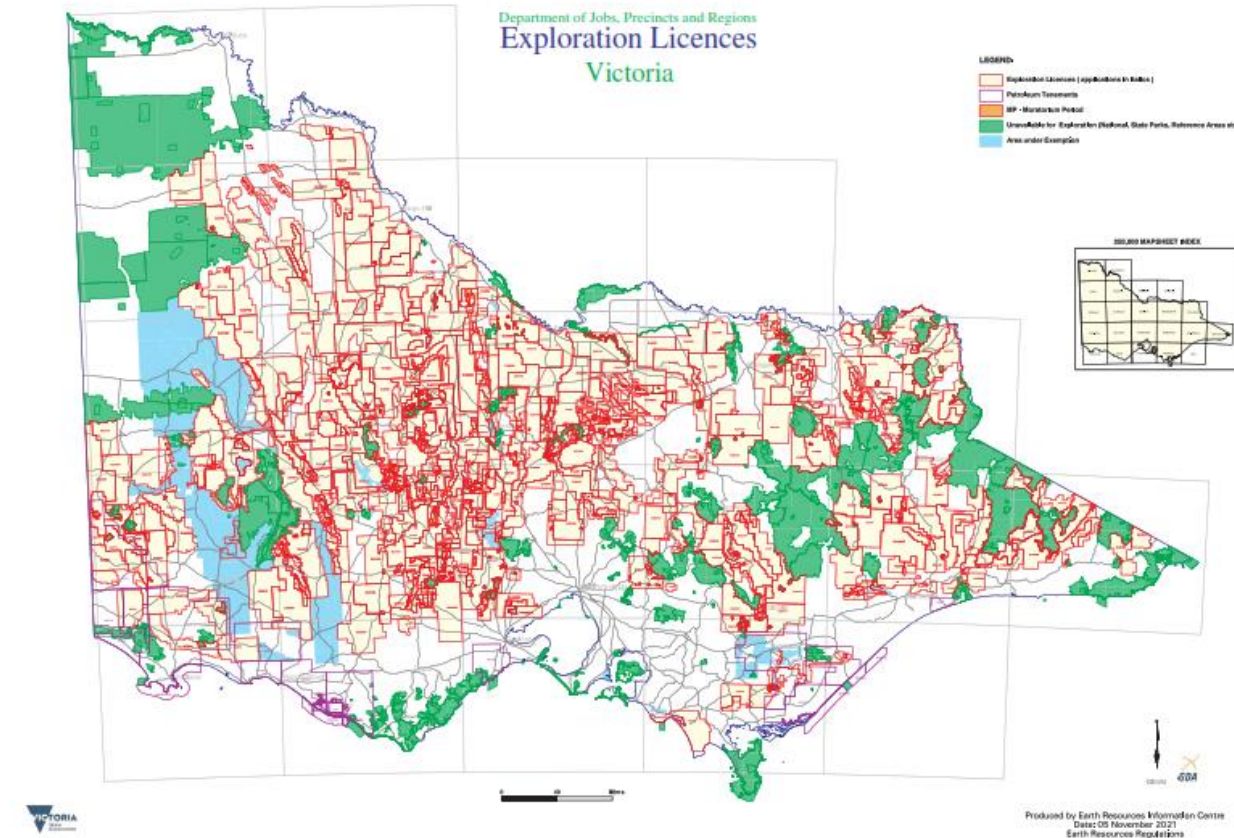
Year	Drill metres
2012/2013	177,077
2013/2014	133,596
2014/2015	87,321
2015/2016	147,164
2016/2017	191,658
2017/2018	191,229
2018/2019	348,192
2019/2020	388,662
2020/2021	~413,000

Almost 6% of Australia's spend from 3% of the continental land mass

Summary

Victoria's resources sector is going from strength to strength (FY21)

- \$183.8m mineral exploration expenditure
- ~5.8% of Australia's mineral exploration expenditure
- ~57% mineral tenement coverage
- ~413,000 meters drilled
- 101 Mineral licences granted
- 21 Mineral licences renewed
- 13,895 new Miner's Rights created



Geoscience data

Pre-competitive data and knowledge

- >250,000 free records: maps/reports/data
- [GeoVic](#): online GIS application
- [Presentations and papers](#)

Geology

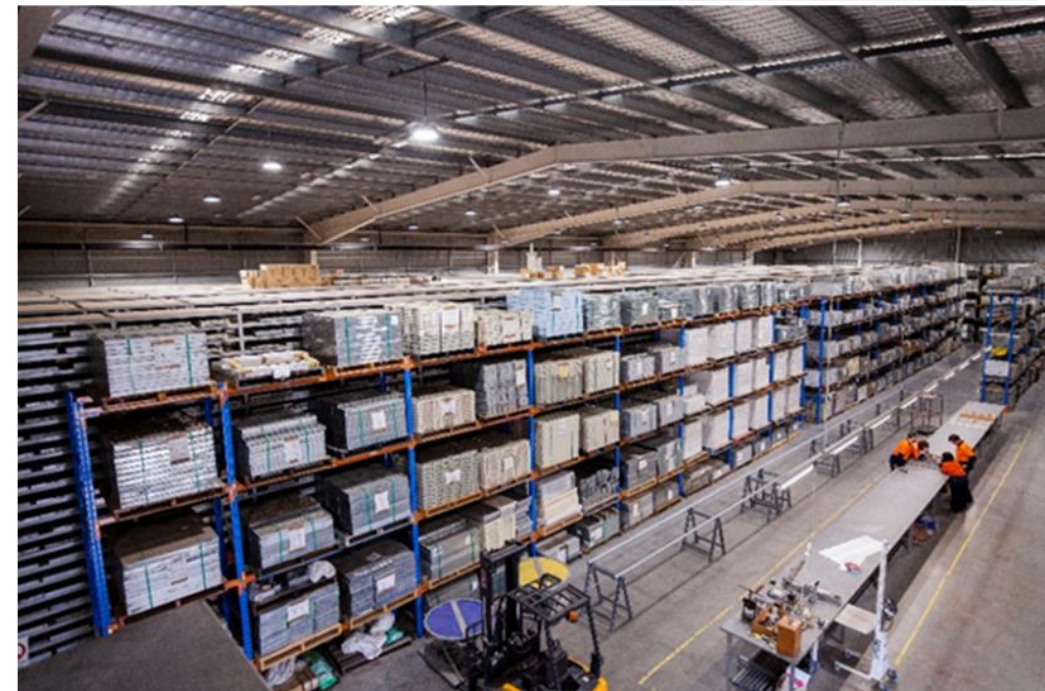
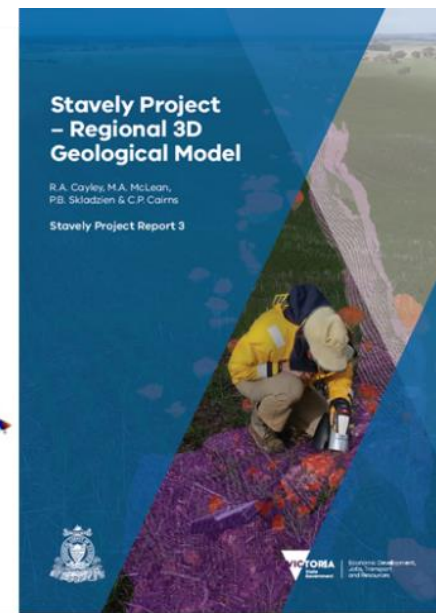
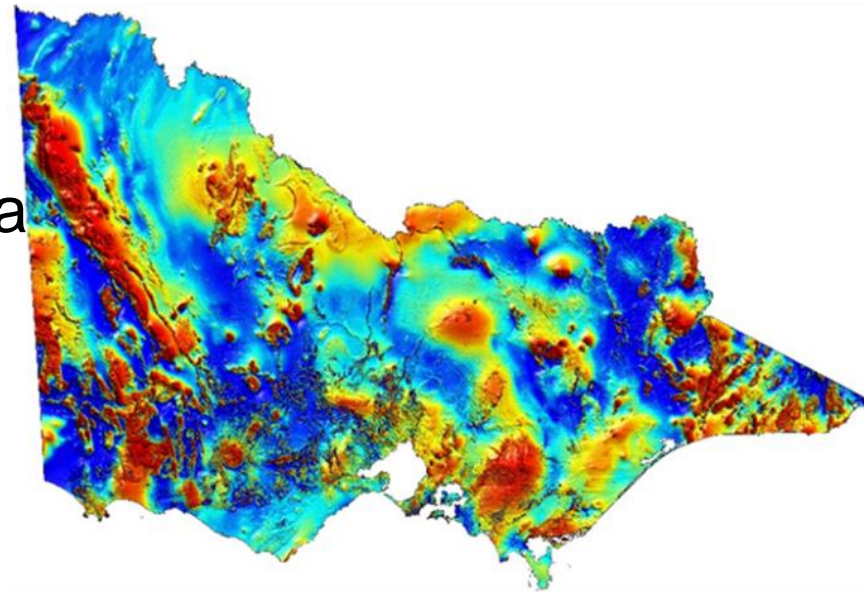
- Seamless: [1:250k](#) and [1:50k](#)
- [3D model full crust 1:250k](#)

Geophysics - Modern state-wide

- Magnetics: 200-400 m line spacing
- Ground gravity: 1.5 km nominal spacing
- Deep 2D seismic reflection transects

Drill Core Library

- ~1.5 million metres drill core/cuttings
- [>14,000 drill holes](#)



GSV Minerals Program

State of Discovery: Mineral Resources Strategy 2018-2023

Action Area 2: Advancing geoscience and encouraging exploration and development

2022 priorities



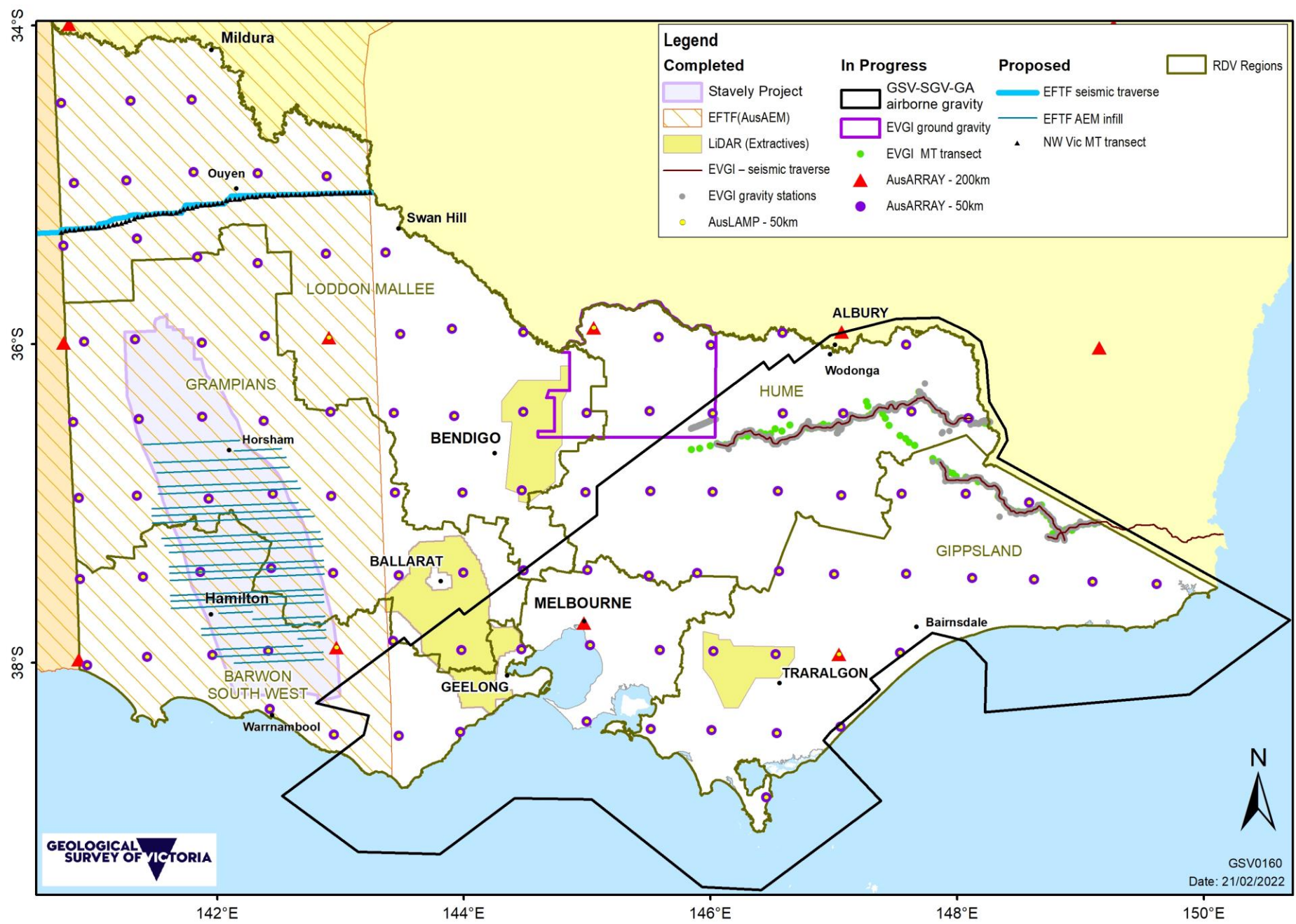
Mineral Tenements/Information

- Scoping an industry engagement session(s)
- Very early-stage planning – multiple sessions? In person?
 - Meet the team
 - [Exploration submission guidelines](#) review – support/feedback
 - Include geophysics
 - GeoVic - support/feedback

The screenshot shows the 'EARTH RESOURCES' website for the State Government of Victoria. The navigation menu includes 'Licensing & approvals', 'Geology & exploration', 'Legislation & regulations' (highlighted), 'Community & land use', 'Projects', and 'About us'. The breadcrumb trail is: Home > Legislation & regulations > Compliance and enforcement > Reporting and expenditure > Exploration reporting guidelines. The page title is 'Exploration reporting guidelines'. The main content area includes a sub-header 'Exploration reporting guidelines', a paragraph stating the page contains information for exploration, retention and mining licence holders, a link to 'Download the complete reporting guide' (WORD_455.7 KB), a paragraph detailing the guidelines, a paragraph about national standards developed by the GGIC, and a 'Summary of reporting requirements' section with a sub-header 'Technical report of exploration – Annual and final (Regulation 57)'. A numbered list of three requirements is provided.

The screenshot shows the 'Earth Resources - GeoVic - Explore Victoria Online' map interface. The 'Active Layer' is set to 'Current Mineral Exploration Licences'. The 'Layers' panel on the left lists various data layers, including 'Active Layer Selections', 'Towns', 'Current Mining Licences and Leases', 'Current Retention Licences', 'Current Prospecting Licences', 'Current Extractive Industry Work Authorities', 'Current Mineral Exploration Licences', 'Structural Zones (boundaries)', 'Roads', 'Victoria Boundary', 'Unavailable Crown Land (MRSDA)', 'Geological Polygons 4M', 'Commonwealth Land', 'Unavailable S7 Exempt Areas (MRSDA)', and 'Restricted Crown Land (MRSDA)'. The map displays a complex network of colored polygons representing these various land and resource areas across Victoria. Major cities like Melbourne, Geelong, and Ballarat are labeled. The interface includes a search bar, a scale bar (1:4,200,000), and a 'Quick Search' field.

Minerals Program 2022

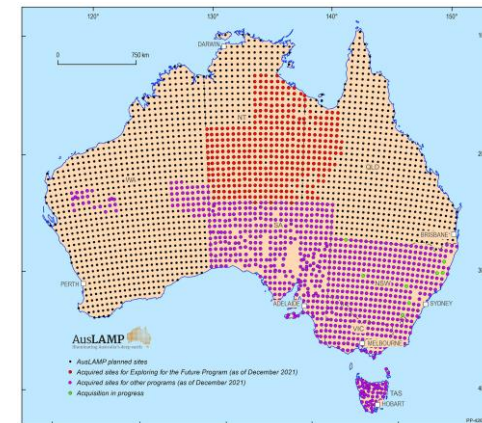
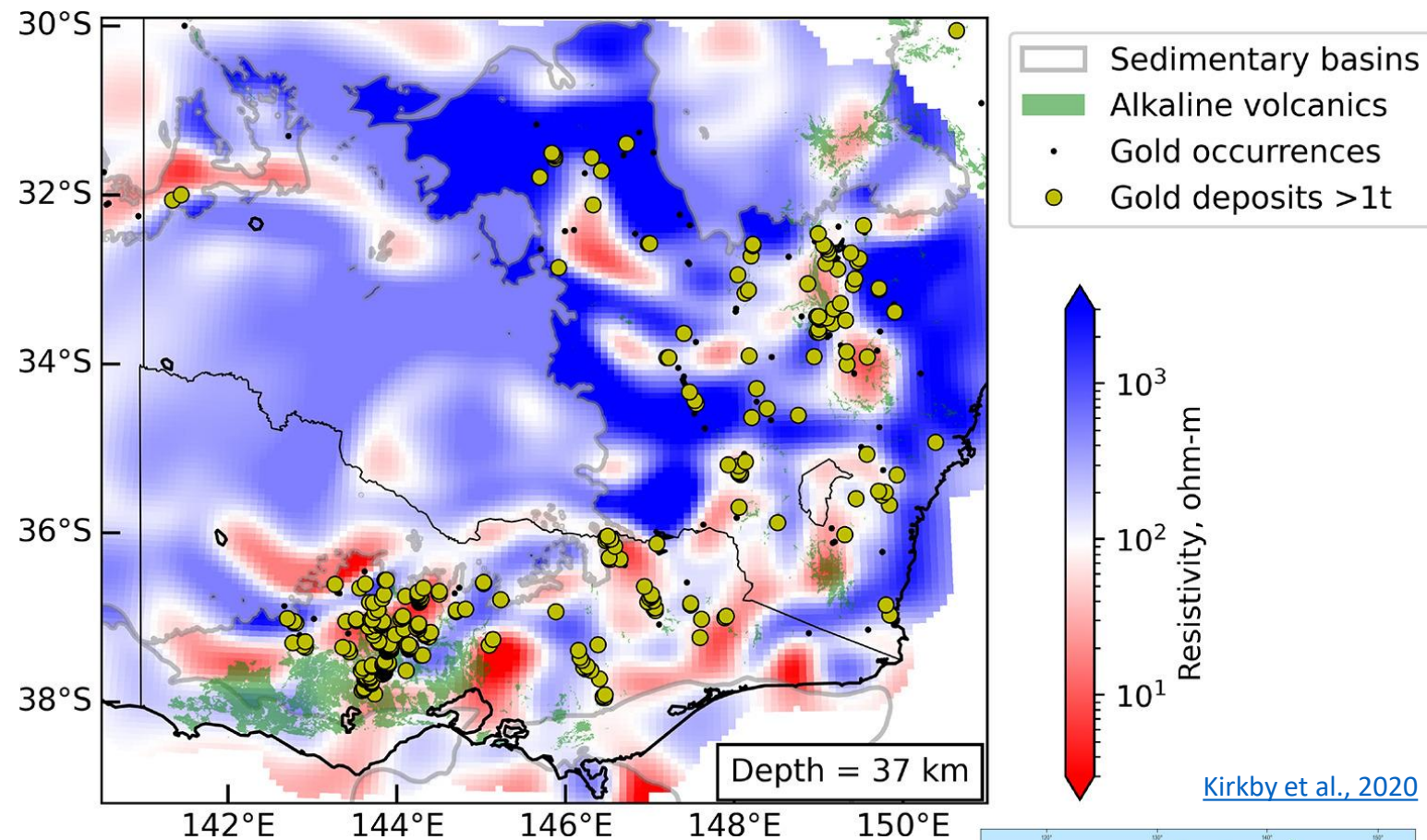


Geological Survey of Victoria Geoscience Australia

National Collaborative Framework agreements

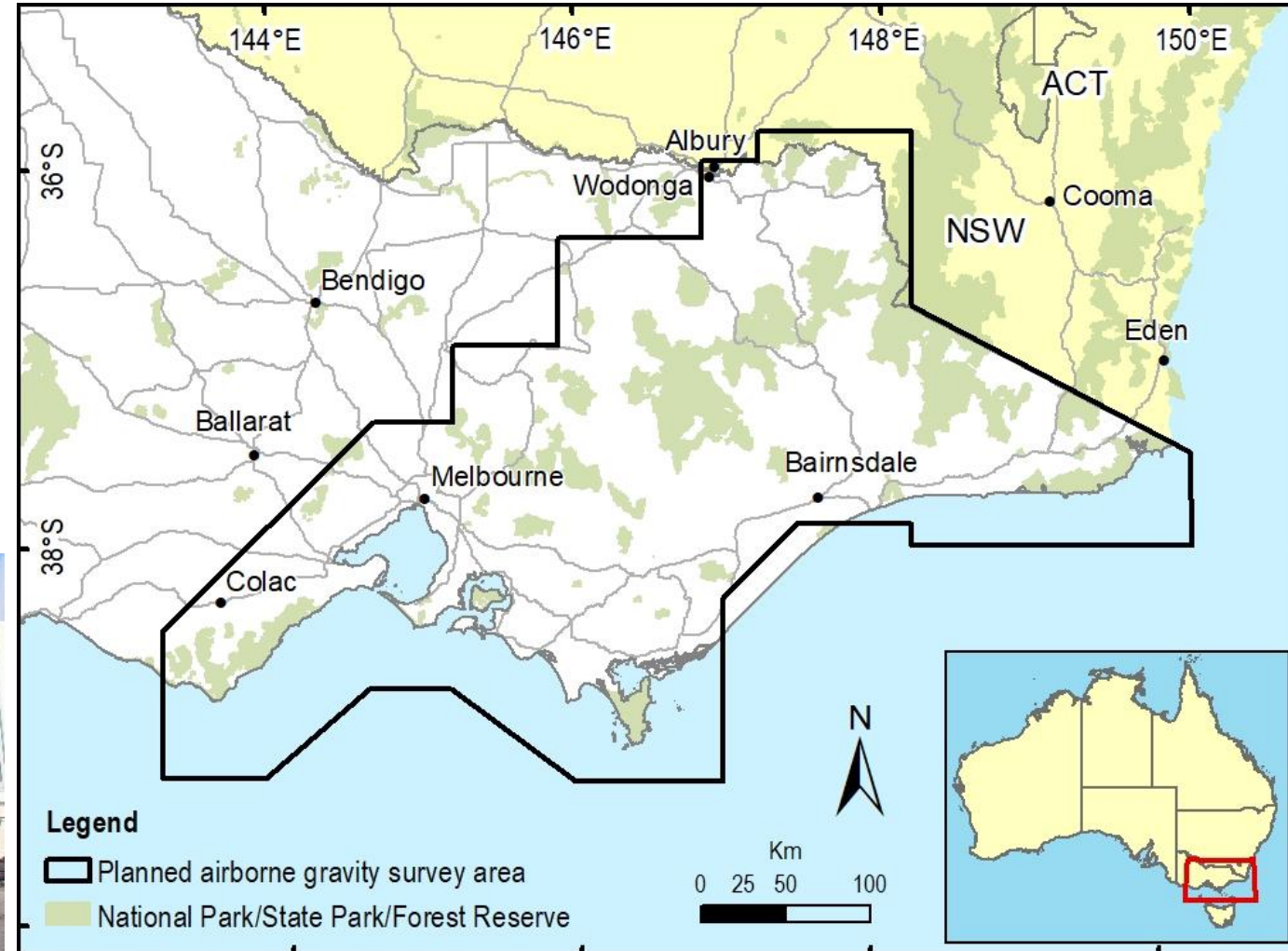
AusLAMP

- [Australian Lithospheric Architecture Magnetotelluric Project](#)
- Collaborative, national survey between government and researchers
- Long-period data to map electrical conductivity structures in the crust and upper mantle to improve the understanding of the geology and tectonic evolution of the Australian plate.
- 55km stations (co-located AusARRAY)
- Victoria completed and [published](#)



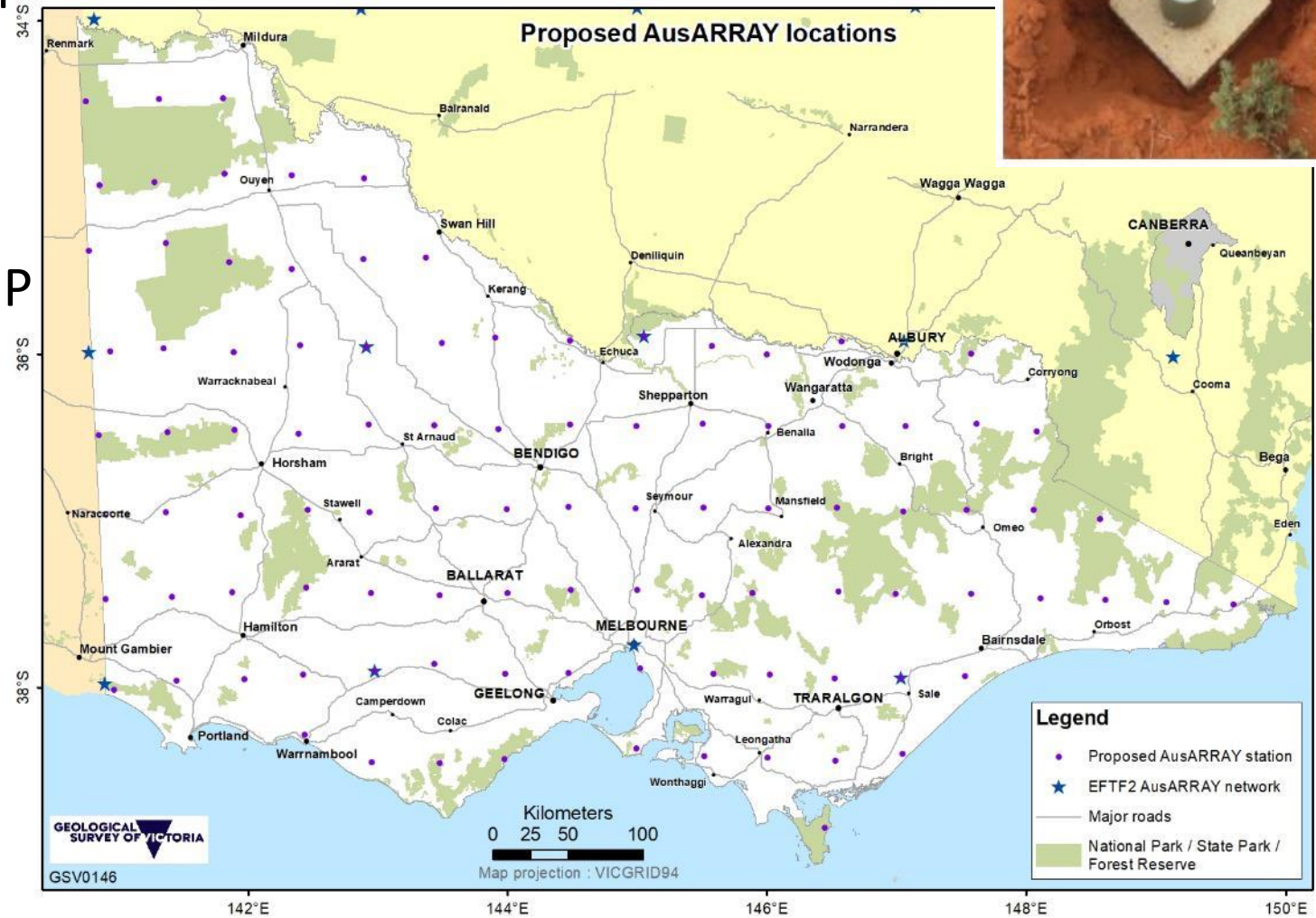
Airborne gravity

- First half 2022
- Improve mapping of Victoria's geological architecture and improve the vertical accuracy of GPS
- GSV, DELWP/Surveyor General of Victoria & Geoscience Australia
- More [information](#)



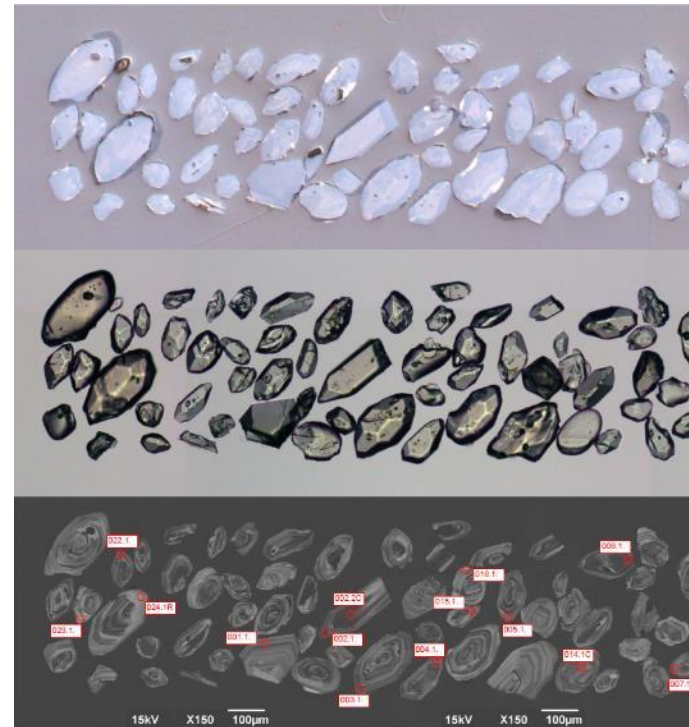
AusArray

- [Australian Passive Seismic Array](#)
- Collaborative, national survey between government and researchers
- Seismic velocity data to map the Australian lithosphere
- 55km stations co-located with AusLAMP
 - First pass 200km stations



Geochronology

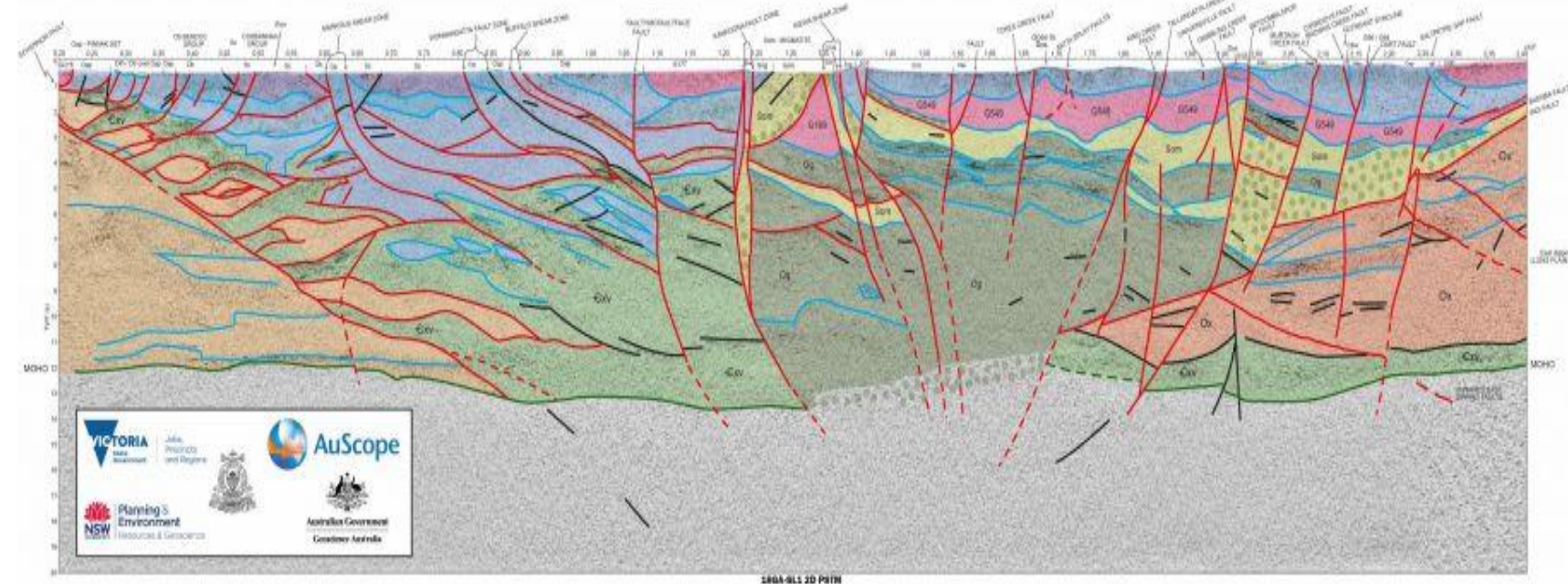
- 3 year collaboration: [Geoscience Australia](#)
 - ~60 samples – mostly U-Pb zircon
 - Geological architecture/mineralisation
- New publication: 890 results available through [national portal](#)
- [National Argon Map](#)
 - Geoscience Australia, AuScope
 - Geological architecture/mineralisation



Stavely Project – Victor Porphyry, zircon grains for U-Pb analysis (Geoscience Australia)

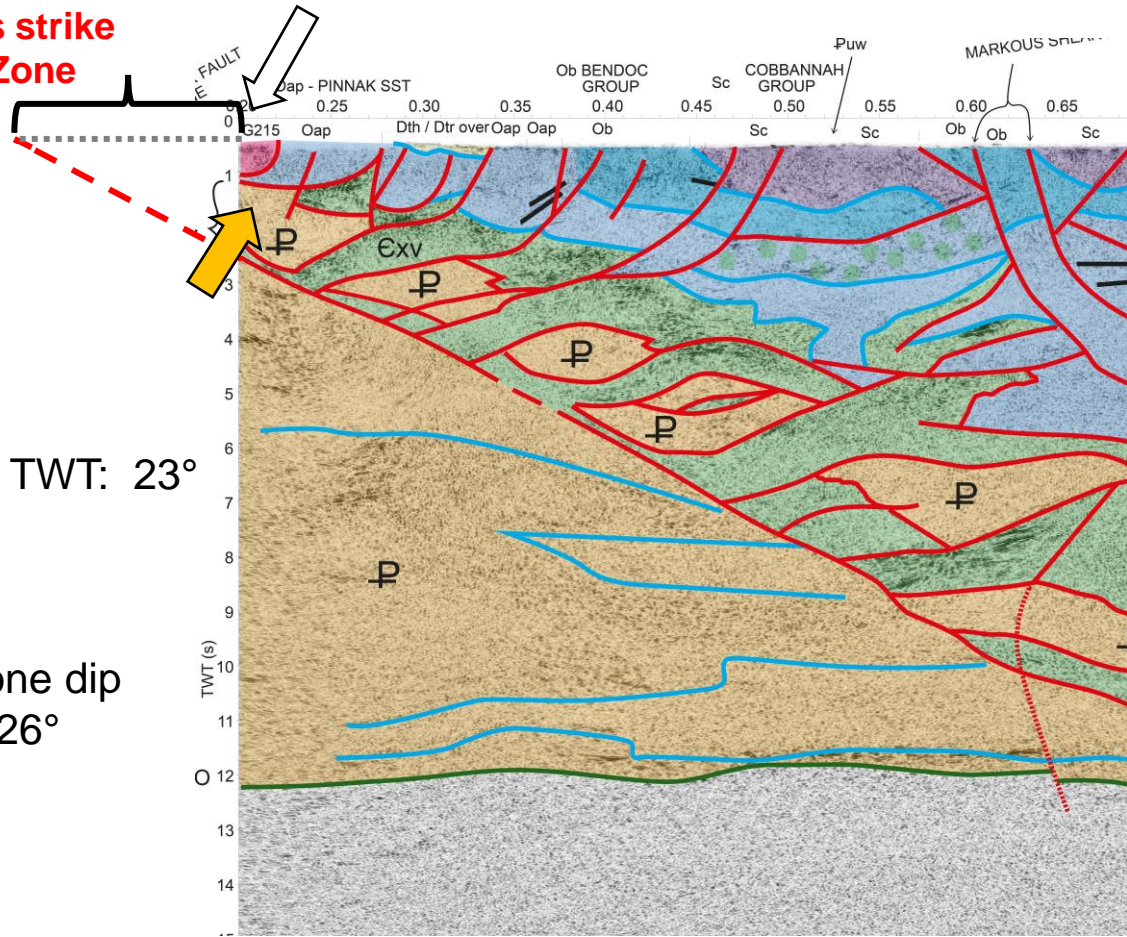
Southeast Lachlan Crustal Transect

- Geological interpretation of the Southeast Lachlan Crustal Transect (interpretation) report
- Ground gravity field operations report
- Magnetotellurics postponed (COVID)
- Film: [Beneath the Australian Alps](#)



Governor Fault Zone footwall projects to a position 12 to 15 km across strike within Melbourne Zone

Mapped Governor Fault position at surface

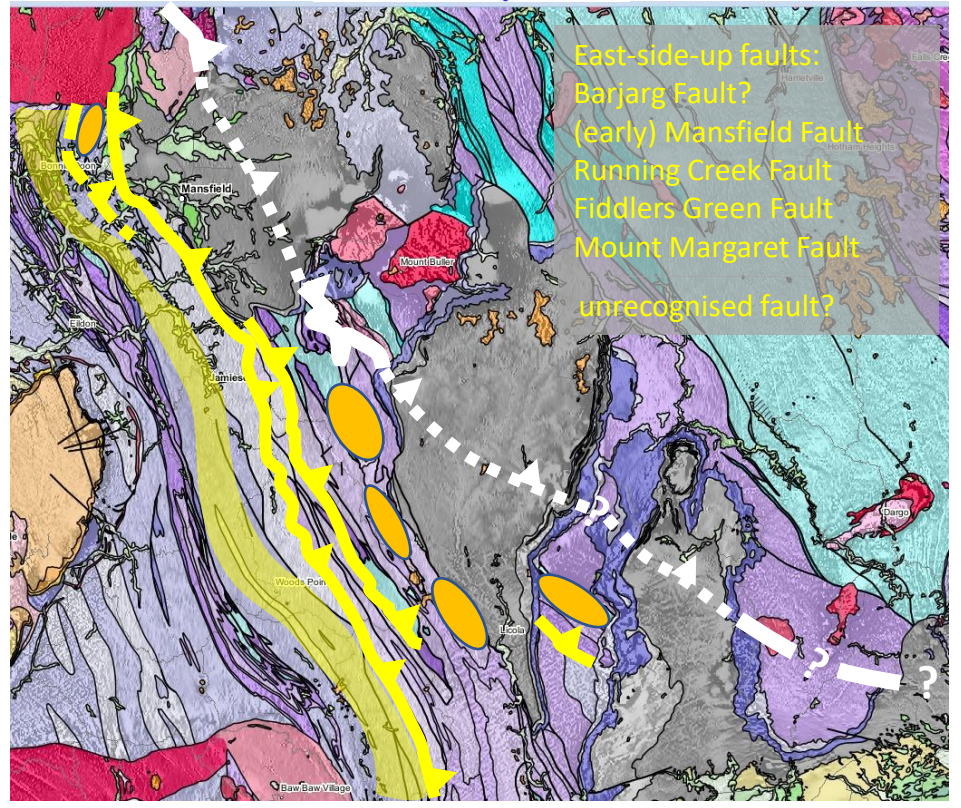


Average FZ dip from ~ 4 to 2.5 s TWT: 23°

Average Fault Zone dip to base of crust: 26°



Gov Fault

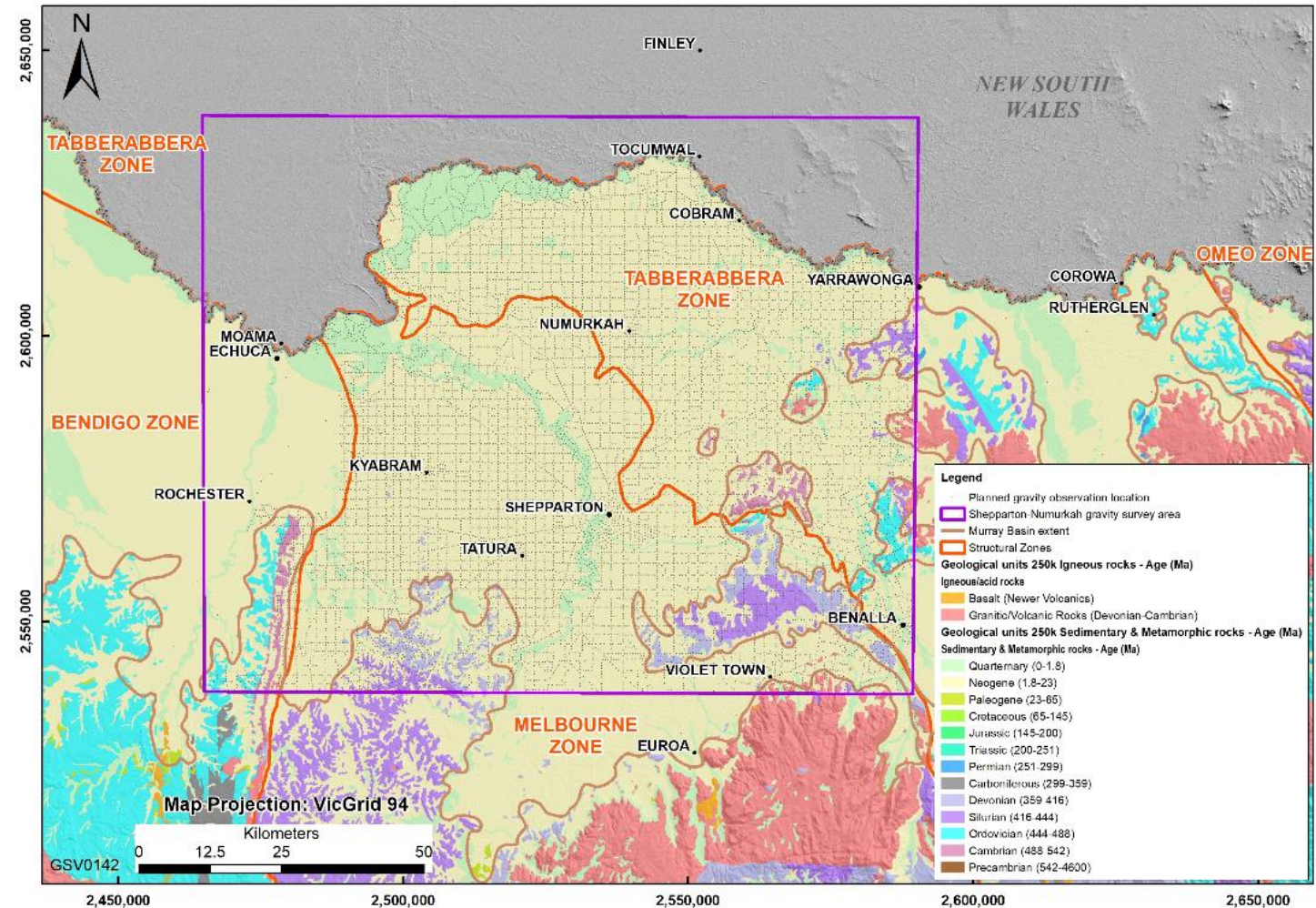


- SLaCT seismic reflection data reveals the Governor Fault Zone as a 1.5 – 2 s TWT thick (= ~4.5 - 6 km) mega-thrust.
- the complex upper part of the fault zone is exposed as the Governor Fault; the planar lower part is exposed as the Fiddlers Green Fault (and related structures) – the GSV (in prep) interprets the Fiddlers Green Fault as the potential primary control on the distribution of the Woods Point Dyke Swarm (during transtensional reactivation) and, subsequently, the Woods Point-Walhalla Goldfield (during transpressional reactivation).

• Potential for Woods Point Walhalla analogue to the north Strathbogie Granite?

Northeast Victoria ground gravity

- Semi-regional infill
 - northern Melbourne and Tabberabbera zones
 - Extend Mitiamo survey (2007)
 - north Bendigo Zone
 - gold discoveries under cover

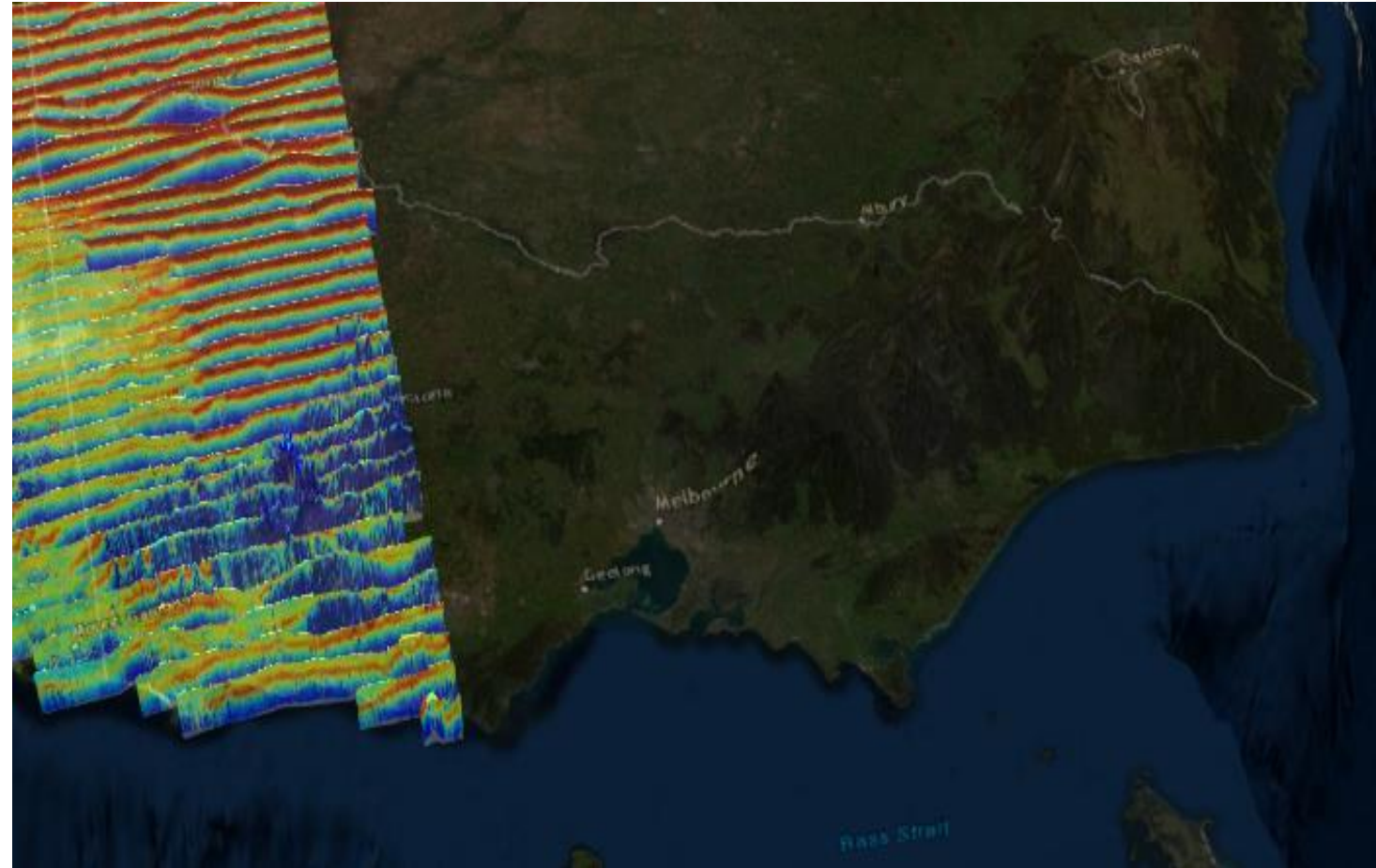
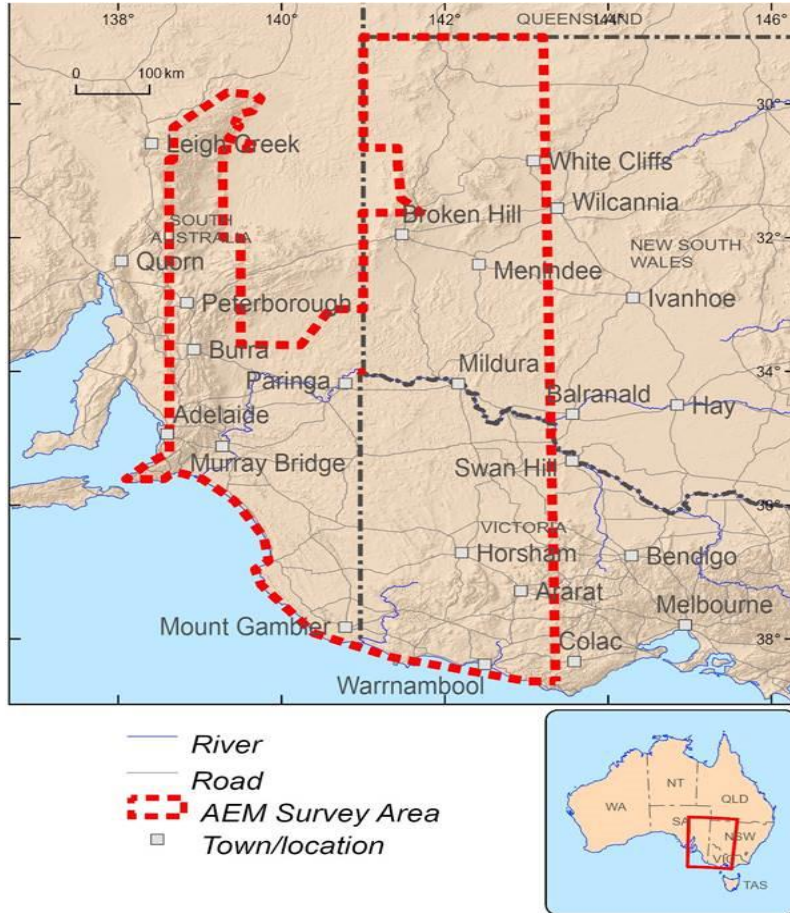


Geoscience Australia Geological Survey of Victoria

Exploring for the Future (2020-2024)

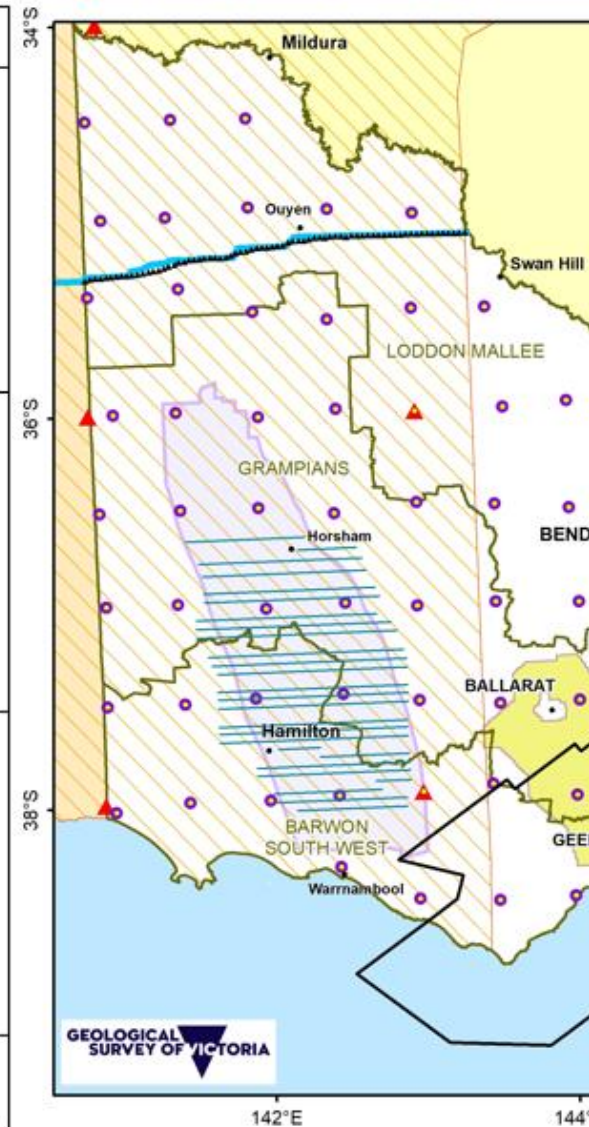
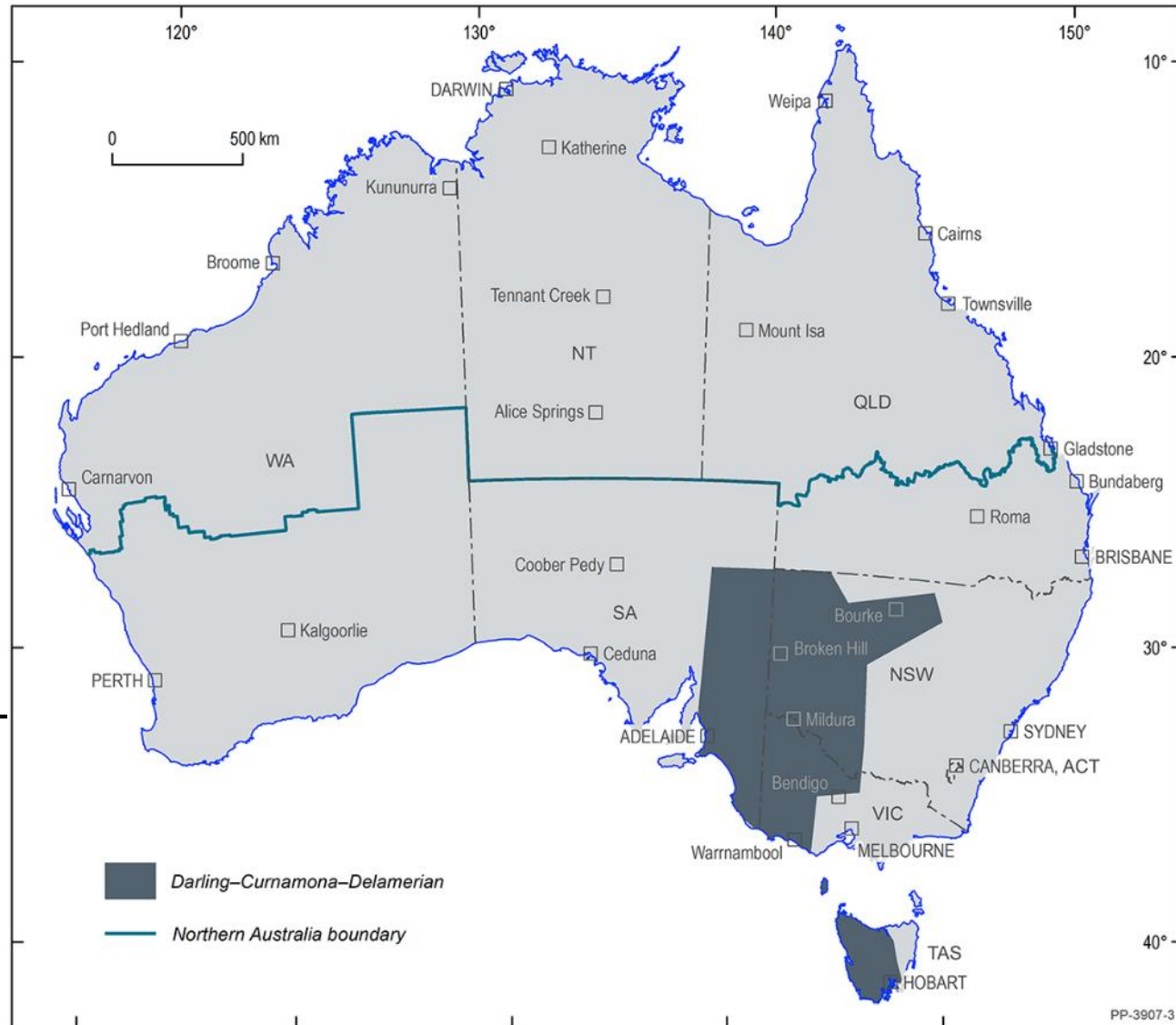
AusAEM

- [National airborne electromagnetic survey](#)
- Data available – EFTF portal
- Interpretation later in 2022



Darling-Curnamona-Delamerian

- Delamerian deep 2D (crustal-scale) seismic reflection survey
 - northwest Victoria
 - GA-GSSA-GSNSW-GSV
 - Ground gravity
- AEM infill
 - Stavely Project area and surrounds
- Broadband magnetotellurics (GSV-GSSA)



MinEx CRC Geological Survey of Victoria

2019-2029

MinEx CRC



- World's largest mineral exploration collaborative [project](#)
- Affiliate member
- National Drilling Initiative - at least one planned stratigraphic drilling program
- Orogenic gold
 - Data review and sampling commenced
 - 1 x PhD (resistate mineralogy) - underway
 - 1 x PhD (structural geophysics) – available
 - 1 x PhD (biogeochemistry) - available
 - Embedded research capability (CSIRO)
 - Phase 2 (2022-2024)
 - Align with associated work programs





Mineral Resources – Discovery Program

Ultrafine+

- Soil particle analysis, gold and other pathfinder elements (through Labwest)

Hydrogeochemistry

- Open-access [national groundwater](#) explorer: BoM, CSIRO, Geoscience Australia

Petrophysics

- [Mobile petrophysics laboratory](#): drill core scanning
- Coupling petrophysics, mineralogy and geochemistry to constrain geophysical results

Drill core and deposit characterisation

- Automated [HyLogger-3](#) drill core hyperspectral mineralogy
- Elemental μ -XRF Maia Mapper; Minalyzer XRF

Structural geology and numerical modelling

Industry collaboration programs/funding

- [Innovations Connections](#)
- [CSIRO Kick-Start](#)

Further details

Team Leader

Dr Helen.McFarlane@csiro.au



Team Leader

Dr James.Austin@csiro.au



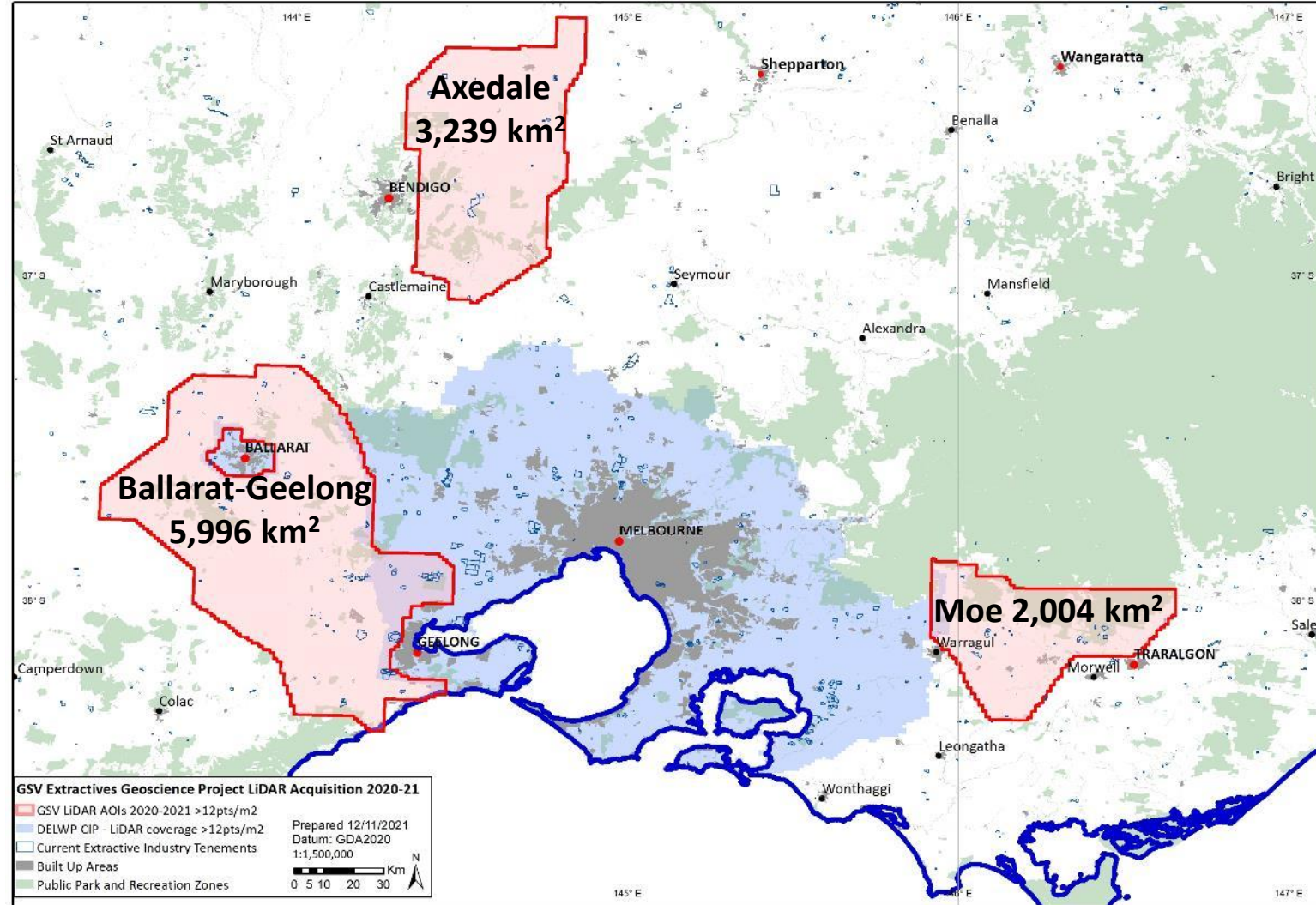
Extractives (Quarry Materials)

2020-2023

Helping Victoria Grow: Extractive Resources Strategy

Delivering Rock solid foundations: Extractives Geoscience Project

- Cutting edge tech, equaling highest resolutions and largest areas ever attempted (in Vic public sector) for geological applications
- Trial LiDAR as one tool to improve geological mapping: time and accuracy -> directly or indirectly detect extractives (quarrying) source rock distribution
- 3 x Areas of Interest surveyed: Moe, Axedale and Ballarat-Geelong. Aerial acquisition complete for all
- Areas selected due to geological features associated with extractive occurrences and to expand upon DELWP's very recent, equally high-resolution LiDAR surveys over Greater Melbourne
- **Axedale and Moe data is freely available via Geoscience Australia's ELVIS platform**
 - **Ballarat-Geelong ('Golden Plains') very soon**

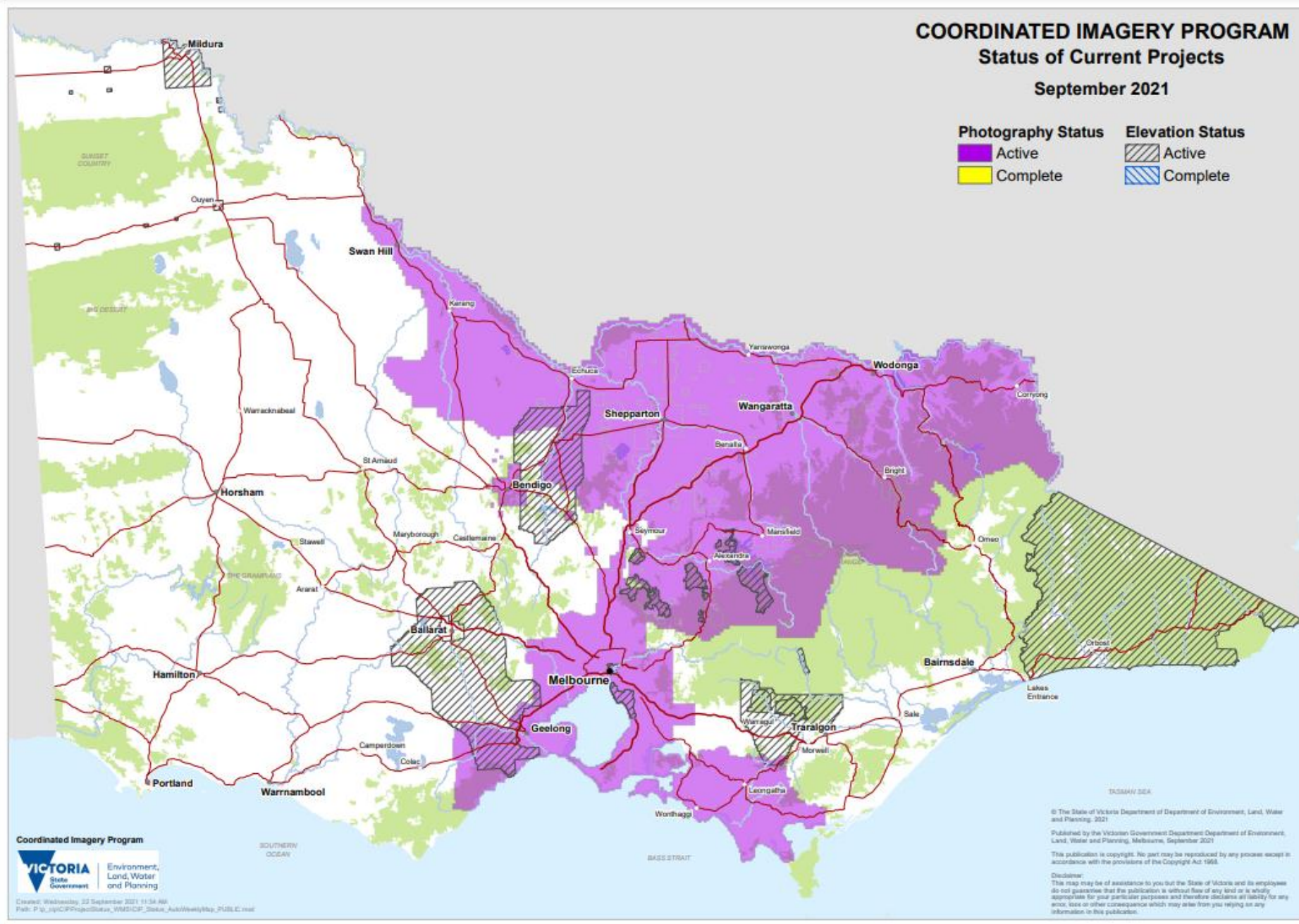


COORDINATED IMAGERY PROGRAM

Status of Current Projects

September 2021

Photography Status	Elevation Status
Active	Active
Complete	Complete



Coordinated Imagery Program



Created: Wednesday, 22 September 2021 11:34 AM
Path: P:_ip\IP\Project\Status_WMS\ICP_Status_Aus\WeeklyMap_PUBLE.mxd

TOSMAY SEA

© The State of Victoria Department of Environment, Land, Water and Planning, 2021

Published by the Victorian Government Department of Environment, Land, Water and Planning, Melbourne, September 2021

This publication is copyright. No part may be reproduced by any process except in accordance with the provisions of the Copyright Act 1968.

Disclaimer:
This map may be of assistance to you but the State of Victoria and its employees do not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for any error, loss or other consequence which may arise from you relying on any information in this publication.

GSV's new team member

Kate.Bassano@ecodev.vic.gov.au

Manager, Exploration and Development

This leadership role will:

- build on Victoria's geoscience data and knowledge to find new ways to reach senior technical personnel and key decision makers and foster professional relationships
- promote Victoria's mineral provinces, energy basins and earth resource investment opportunities.

Kate will take the lead on:

- managing promotions and events,
- undertaking ground and acreage releases (as required)
- managing grants programs
- generating investment leads
- managing client relationships
- managing resource sector comms and sponsorships
- developing resource promotional strategies and materials
- communicating with the Vic Gov international offices, as needed





Cameron.Cairns@ecodev.vic.gov.au
Manager Minerals Geoscience

gsv_info@ecodev.vic.gov.au



Jobs,
Precincts
and Regions