Assessment of the geological and geomorphological values of the Central Highlands and East Gippsland Immediate Protection Areas and adjacent state forests

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Request:	Provide an assessment of the geological and geomorphological values of areas specified as Immediate Protection Areas in the Central Highlands and East Gippsland and in adjacent state forests in eastern Victoria.

Executive Summary

The Geological Survey of Victoria (GSV) was requested by the Victorian Environmental Assessment Council (the Council) to provide an assessment of the geological and geomorphological values of areas specified as Immediate Protection Areas (IPAs) in the Central Highlands and East Gippsland and in adjacent state forests in eastern Victoria, as outlined in the VEAC Terms of Reference, June 18th, 2023 (VEAC, 2023). Subsequently, the Council requested GSV to extend their assessment and estimate geological values for state forests within the Central Highlands and East Gippsland Regional Forest Agreement (RFA) areas, a southern portion of the North East RFA, and a north-western portion of the Gippsland RFA (Figure 1).

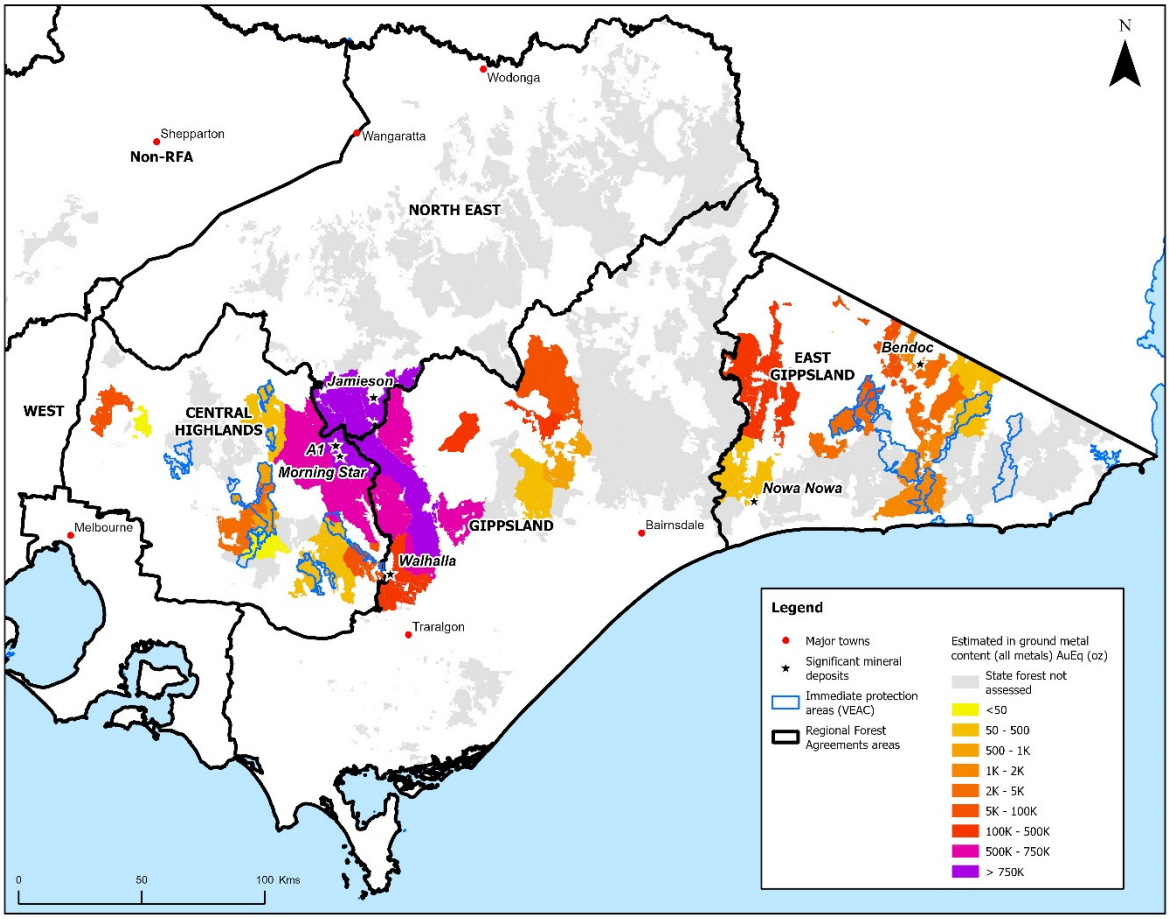

Figure 1 Estimated geological value of the state forests and IPAs included in analysis, as per guidelines from the Council.

The GSV assessed the minerals and extractives potential and the geological and geomorphological value of the IPAs and state forests utilising publicly available datasets and de-identified data provided by the Earth Resources Regulator (ERR). Geological value was determined using defined resources, exploration and mining expenditure,

historical exploration expenditure, and the estimated quantity of gold and critical minerals in-ground across the state forests. Geomorphological value was defined by the number of geologically significant sites within the state forests.

The range in geological value of the **IPA**s, based on exploration and mining expenditure from current licences and expired licences over the last 50 years, is shown in Table 1.

Table 1 Total estimated geological value range for the IPAs.

	Low geological value estimate	High geological value estimate
All IPAs	$5.8 million	$47.7 million

Historic mining and mineral occurrences, surface geochemistry and magnetic data were used to assess the minerals and extractives potential for each **IPA**. Rawson, Armstrong Creek, Murrungowar, Serpentine, 32 Mile North and Yalmy exhibit very high potential for critical minerals (including copper, nickel, tin, tungsten, antimony, zinc, rare earth elements, platinum group elements and cobalt), gold and extractives (including limestone and sedimentary hard rock) (Appendix 1).

Rawson, Armstrong Creek and McMahon's Creek in the Central Highlands and Serpentine, Murrungowar, Bemm River and Goongerah in East Gippsland have high potential for hosting gold deposits. The potential value of gold occurrences cannot be determined without further work, however the nearby A1 and Morningstar operating gold mines, and defined gold resources at Walhalla in the nearby Woods Point – Walhalla Goldfield, currently estimated at $4.2 billion combined, are examples of the potential value of these types of gold deposits.

The GSV also assessed state forests in the Central Highlands, East Gippsland, and select areas of the Gippsland and North East **RFA**s, as guided by the Council. These areas have deposits and occurrences of gold and critical minerals that are not available in economic quantities in other parts of the state, and the potential for further discovery.

Geological value, based on defined resources and estimated in-ground metals (gold and other metals, including critical minerals) in each state forest, within each **RFA** is presented in Table 2. Individual geological value estimates for each state forest are presented in Appendix 2 and shown in Figure 1. The Upper Goulburn State Forest has the highest potential for gold and critical minerals with a total contained metal estimate of 4,480,370 AuEq oz (gold ounces equivalent) across the Central Highlands, Gippsland and North East RFAs. The potential contained metal estimate for the Gippsland RFA reflects the very high potential for further discovery within the RFA.

Table 2 Estimated geological value for the RFAs. Individual values for each state forest are presented in Appendix 2.

RFA	Minimum geological value estimate	Potential contained metal estimate (AuEq oz)
Central Highlands	$3.4 billion	2,505,112 gold ounces equivalent
East Gippsland	$1.4 billion	638,397 gold ounces equivalent
Gippsland*	$277.4 million	7,358,666 gold ounces equivalent
North East*	$150.6 million	2,249,721 gold ounces equivalent

*Only part of the RFA, as per Council guidelines, has been assessed.

The potential quantity of gold in-ground was calculated for each state forest using historical mining and goldfields production data. The potential dollar value of the estimated gold in-ground was calculated using the average gold

price from the first week of July 2023. A conceptual estimate for gold was also calculated for each state forest using the market capitalisation of the currently operating A1 gold mine.

The potential quantity of critical minerals in-ground was based on known prospectivity of geology that extended into the state forests. The potential dollar value of the estimated critical minerals in-ground was calculated using the relevant commodity prices on July 26th, 2023.

The GSV recommends not limiting extraction of earth resources in the IPAs and state forests examined in this analysis. The implications of land use changes on mining, quarrying and exploration are not fully understood, and it cannot be assumed that land use changes will not impact current or imminent mining, quarrying or exploration proposals.

Although current approved licences might be honoured, any economic investment relating to licences currently under application in IPAs and surrounds would likely be foregone. For current approved Mining Licences, restricting future Exploration Licences will impact resource pipelines that enable continuous utilisation of processing facilities and the ability to continue operating. Preventing future Exploration Licences in parts of the state prospective for critical minerals also presents an opportunity loss to Victoria in developing critical minerals assets that are not found in economic quantities elsewhere in the state.

Land use changes could also impact potential future extractives supply of construction and road material for regional towns if development of future quarries is limited, as the market for construction materials is generally required to be close to the supply of extractive source rock.

1 Background

On May 17th, 2023 the Geological Survey of Victoria (GSV) was requested by the Victorian Environmental Assessment Council (the Council) to provide an assessment of the geological values of areas specified as Immediate Protection Areas (IPAs) in the Central Highlands and East Gippsland and in adjacent state forests in eastern Victoria, as outlined in the Terms of Reference, originally requested on March 20th, 2023 by the Minister for Environment Ingrid Stitt MP, and amended on June 18th, 2023 (VEAC, 2023). The Council provided GSV with the IPA boundaries on May 19th, 2023.

To account for adjacent state forests in the Terms of Reference, the Council subsequently requested GSV to extended the assessment of the geological values to state forests within the Central Highlands and East Gippsland Regional Forest Agreement (RFA) areas, a southern portion of the North East RFA, and a north-western portion of the Gippsland RFA. RFA boundaries were provided to GSV by the Council on May 23rd, 2023. Boundaries for the portions of the North East and Gippsland RFAs were also provided to the GSV by the Council on July 5th, 2023 (pers comm VEAC, July 5th, 2023).

The GSV has previously been requested to provide, and has provided, similar assessments of geological values of IPAs in the Strathbogie Ranges and Mirboo North (VEAC, 2022).

2 Defining value

There are numerous ways to estimate the value of an earth resource that exists sub-surface and is not currently under extraction. Geological value can change spatially depending on the quality and extent of sub-surface geology, and it also changes temporally as new data, technologies, requirements for global supply of raw materials, and new societal values emerge. For example, the need for a global transition to net zero emissions, and the requirement for the critical minerals that will enable this.

Critical minerals are the metals required to build renewable energy infrastructure such as wind turbines, batteries and electric motors. The Australian Federal Government's Critical Minerals Strategy 2023 – 2030 recognises that Australian critical minerals will be fundamental enablers in the global transition to net zero emissions and that securing domestic supply chains of these minerals will be vital to long term strategic interests and building sovereign capability in critical minerals processing and value extraction, including for Victoria (Australian Government, 2023). The Victorian State Government also recognises the importance of critical minerals, allocating $7.4M in the 2022 State Budget to help develop the state's critical mineral resources (State of Victoria, 2022).

The relevance of these recent National and State earth resources strategies on defining the geological value of areas of Victorian geology are profound as:

1. Previous 'geological values' definitions based on historical mineral production and/or minerals exploration and understanding exclude many critical minerals and rare earth elements as there was no economic market or strategic requirement for them, and:
2. Precompetitive geoscience datasets for the State, including datasets maintained by the GSV are resourced to prioritise the geology of commodities of commercial or strategic interest which, prior to 2022, did not include many critical minerals, including rare earth elements. Consequently, Victorian precompetitive geoscience datasets are currently deficient in a range of critical minerals and rare earth element fundamental data, including baseline geochemistry by region and relevant geological and mineral systems analyses by region. Geoscience Australia and the Geological Survey of Victoria both recognise that eastern Victoria is one of the key regions where relevant geoscience data is significantly lacking, and:
3. The known data deficiencies place Victoria at risk of incurring significant opportunity costs associated with the inadvertent sterilisation of currently unidentified or underexplored strategic earth resources, including critical minerals resources, due to land reclassifications or developments made in the absence of the fundamental Earth-science baseline data and knowledge required for data-informed assessments.

Accordingly, this assessment defines geological value in terms of resource value, strategic geological value, local economic value, and geomorphological value, for both the IPAs and state forests of interest, as per guidance from the Council, utilising methodologies to overcome current data limitations in central and eastern Victoria.

2.1 Resource value

Geological value can be expressed as the metal content and associated dollar value of an earth resource, either in-ground or under extraction. Defining a sub-surface earth resource to the point where there is enough certainty to invest in the extraction of the resource requires substantial time and investment into exploration, usually drilling, by mining and exploration companies. Publicly available government data can play a large role in attracting investment, however this data does not usually exist at the levels of coverage required to adequately define a resource for extraction. In Australia, the Joint Ore Reserves Committee (JORC) guidelines are commonly used as best practice for definition of a resource, where upon the value of the in-ground resource can be estimated (JORC, 2012). Beyond this, economic factors can be applied to assess the cost of extraction and provide a Net Present Value (NPV) for the Resource.

Once an earth resource is undergoing extraction, the geological value can be defined by the royalties the operation contributes to the State or the market capitalisation of the operating mining company.

Defined resources and the estimated value of these is used as a key indicator of geological value in the analysis of IPAs and state forests presented in this report.

2.2 Value to the local economy

Geological value can be expressed in terms of exploration and mining expenditure, which will add economic value directly into local communities, via spending on locally supplied goods and services or local employment (Lawrence Consulting, 2022; ACIL Allen, 2021). Expenditure and employment occurs at the exploration, construction and operations phases of earth resources development, and the contribution of royalties to the state during the operations phase.

An example of this is the modelling of economic benefits presented in the Fingerboards Environmental Effects Statement (EES), which estimated a net economic benefit from the project as $392.4 million in net present value terms (at the time of the study), which included $158.9 million in direct benefits to the state of Victoria and $234.4 million in indirect benefits associated with wages and benefits to local Victorian suppliers (Victoria State Government, 2021).

Exploration and mining expenditure is used as a key indicator of geological value in the analysis of the IPAs presented in this report.

2.3 Strategic geological value

The International Energy Agency (IEA) has highlighted the need for significant quantities of critical minerals required for renewable energy technologies (Figure 2), many of which are present in Victoria (Colclough & Pheeney, 2022). The Federal Government's Critical Minerals Strategy 2023-2030 recognises the fundamental strategic role that critical minerals will play in the global transition to net zero emissions, the need for a diversified supply chain and ethical minerals supply, and the dependence on a secure domestic supply of critical minerals to build Australia's capability in critical minerals processing and downstream manufacturing (Australian Government, 2023).

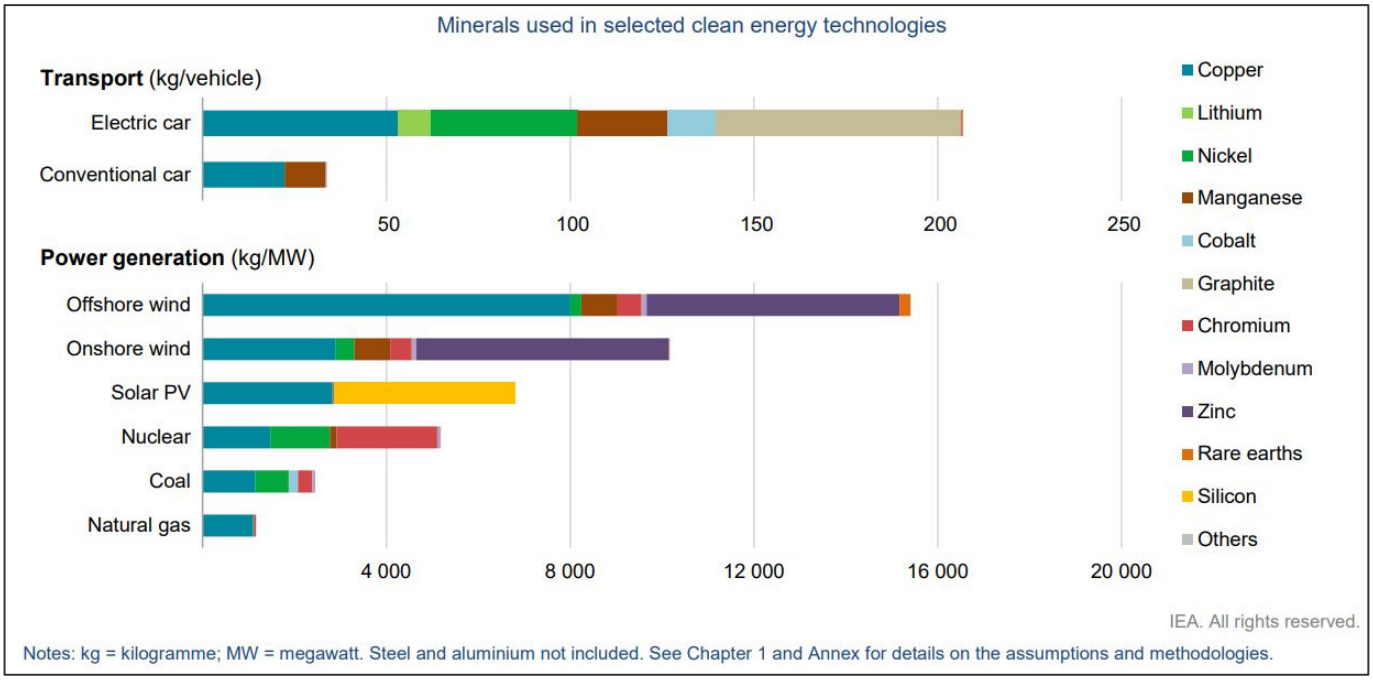

Figure 2 The estimated demand for commodities required for selected clean energy technologies, to enable a clean energy transition **(International Energy Agency, 2022)**.

Such ambitions lie well beyond Australia's current critical minerals resource portfolio, however, the Strategy notes that Geoscience Australia (GA) estimate that up to 80% of the Australian continent remains underexplored with

significant potential to discover new deposits, including in parts of Victoria, and this is a key reason for present and ongoing research collaborations between GA, the GSV, and research organisations including the CSIRO (Geological Survey of Victoria, 2022).

Acknowledgement of the vital role that domestic critical minerals supplies must play in the Australian Government's international ambitions highlights that critical minerals in Australia, including in Victoria, now have a strategic value that far outweighs their market value, and will maintain this premium for the foreseeable future. This is particularly pertinent for central and eastern Victoria as it hosts mineral systems that are understood to be highly prospective for many of the critical minerals included in the current Australian Critical Minerals list (Critical Minerals Office, 2023; VandenBerg, et al., 2000; Maher & Radoikovic, 1999; Cochrane & Bowen, 1971; Cochrane, 1982; Resources and Geoscience New South Wales, 2018; Hoatson, et al., 2011; Huston, et al., 2015). Many of the critical minerals found in eastern Victoria do not occur elsewhere in the state in economic quantities, including lithium, tungsten, cobalt, indium, zinc, nickel, and platinum group elements (PGEs).

Not only can strategic geological value be described in terms of the potential future supply of resources critical to global decarbonisation efforts, but also in terms of supply of traditional commodities such as extractives and gold. Table 3 presents common uses for a number of critical minerals that are present in Victoria, as well as gold, which is used in electronic devices and will continue to be required in an increasingly electrified society, and extractives which provide the raw materials for infrastructure projects such as roads, and construction cement (also required for renewables technologies, such as wind turbine construction).

An estimate of the potential in-ground quantity of critical minerals and gold that can provide the future supply of required resources, has been used as an indicator of geological value in the analysis of IPAs and state forests presented in this report.

Table 3 Critical minerals present in Victoria and their common usage.

Commodity Group	Commodity	Potential usage
Precious Metals	Gold	Used in most electronic devices, medicine, dentistry, aerospace engineering, jewellery and gold bullion
Critical Minerals	Antimony	Solar panel glass, flame retardants, as an alloying material for lead and tin, in micro-capacitors, lead-acid batteries and various defence applications e.g. night vision goggles
	Tin	Protective coatings and alloys for steel
	Tungsten	Electronics, lighting, construction, steel and alloys
	Titanium	Medical, aerospace, wind turbines
	Zirconium	Hydrogen electrolysers
	High Purity Alumina	Solar panels
	Copper	Used in most electrical generation, transmission and electrical devices
	Lithium	Batteries, ceramics and glass
	Nickel	Stainless steel, superalloys, and rechargeable batteries
	Cobalt	Superalloys, steel and pigments, and emerging technologies such as lithium batteries and synthetic fuels

	Zinc	Galvanized steel and batteries
	Indium	Flat-panel screens (ie. smart phone and tablet devices), electrical components, semiconductors
	Rare Earth Elements	Magnets (ie. wind turbines), energy storage, electronic components, medical technology, alloys, and superconductors
	Platinum Group Elements	Catalytic converters, hydrogen production, electronic applications and seawater desalinsation
Extractives	Hard rock (e.g. basalt, granite, sedimentary hard rock, hornfels)	Aggregate for asphalt, sprayed road surfaces, road base, and other engineering and construction purposes
	Sand and gravel	Concrete and other engineering and construction purposes

2.4 Geomorphological value

There is also a geomorphological value that can be attributed to significant surface and near-surface geological formations that are sites of cultural importance to people, including Traditional Owners, sites that reflect geological history, and sites that drive geotourism. Extraction of earth resources does not always come into conflict with geomorphological value, as extraction can often expose or create sites of geological significance, or in the case of historical mining and geotourism, be a direct driver, however it is important that sites of geological significance are carefully managed. The Australian Government Critical Minerals Strategy 2023-2030 outlines ambitions to encourage best-practice engagement between resources companies and First Nations communities for the development of strategically important critical minerals projects and creation of opportunities for First Nations communities (Australian Government, 2023).

3 GSV approach to assessment of geological values

Previous assessments of geological value conducted by GSV for VEAC have utilised a descriptive approach, with a detailed assessment of the surface and sub-surface geology within an IPA, including descriptions of mineral deposits, trends in mineral deposit occurrence, the potential in-ground value of these, and mineral occurrences of interest that require further investigation (VEAC, 2022).

For this assessment, given the large scope and short time frame involved, a different approach was used by GSV, relying primarily on intersectional analysis utilising large-scale public datasets and de-identified industry data. A combination of available surface data and sub-surface data can give a robust indication of the geological make-up of an area. The most complete geological data sets often exist at surface level (ie. surface mapping or soil sampling), with only sporadic data points to give an indication of sub-surface geology (ie. drill holes). Geophysical surveys like airborne magnetic, ground gravity surveys, or seismic data are excellent for assessment of sub-surface geology and geological structures, and often cover large areas. All data was considered within the context of GSV mineral systems mapping developed in conjunction with analysis of the tectonic evolution of Eastern Australia (Geological Survey of Victoria, 2015). Datasets used in this assessment were selected on the basis of being able to demonstrate geological value as defined in Section 2, and these are shown in Table 4.

Table 4 Datasets and data sources used in the GSV assessment of geological value of IPAs and state forests.

Dataset	Data Source
Current minerals and extractives licences (approved and under application)	GeoVic - Current minerals and extractives tenements
Current expenditure (previous 5 years)	ERR de-identified data
Proposed expenditure (next 5 years)	ERR de-identified data
Defined Resources	Public company reporting (cited throughout report), S&P Global Market Intelligence
Past exploration expenditure	GeoVic - Expired tenements and associated reports
Significant geological features	GeoVic - Geologically significant features
Mining and mineral occurrences	GeoVic – Mining and mineral occurrences
Historical production	GeoVic – Mining and mineral occurrences layer, GSV Map Reports and academic publications (cited throughout report)
Surface geology and geological structural zones	GeoVic - Seamless Geology (1:250k)
Surface geochemical anomalies	GeoVic - Legacy geochemistry
Sub-surface magnetic data	Statewide airborne magnetic data, compiled by GSV, available on Earth Resources Publications website
Victorian goldfields	GeoVic - Mining regions – gold
GSV mineral systems	Victoria's Mineral Exploration Fairways on the Earth Resources website

3.1 Historical production as an indicator of geological value

A resource estimate based on JORC guidelines (JORC, 2012) is a robust measure of geological value. However, there are few earth resources within the area defined in the scope of the assessment that have been explored to

this level of confidence. In this assessment, given the lack of defined resource data, historical production data has been used as an indicator of geological value, specifically for gold.

Historical (pre-1960's) mineral production in Victoria for gold and other metals was necessarily focussed on deposits that could be mined with the limited geoscientific knowledge that existed at that time. Without a modern systemic understanding of how the mineral deposits were formed or what processes controlled their emplacement, only gold deposits exposed to surface were discovered and mined.

Modern geoscience has made enormous technical advances so that exploration for, and detection of, mineral deposits at depth has become feasible. The Fosterville Goldmine in Central Victoria with a historical production of approximately 28 thousand ounces of gold, utilising modern geoscience, identified a deep high-grade gold resource that became a defined mineral reserve of 2.72 million ounces at 31.0 g/t by 2018 (Agnico Eagle, n.d.). This led to the mine becoming one of the highest-grade and most profitable operating gold mines in the world from 2019 to 2021 (S&P Global Market Intelligence). Similar stories can be found at other Victorian mines, where recent production and current resources are at least equal to historically mined production (Table 5). This points to the future potential for all other historic Victorian goldfields and adjacent areas where modern technical geoscience advances have not yet been fully applied.

As such, the GSV considers that a very conservative estimate of the current in-ground gold, including from historic production fields, is at least equivalent to the historical gold production, with additional opportunities for discovery in adjacent geology that lay beyond the technical reach of historic miners, and this represents potential future value for the State.

Table 5 Comparison of historical gold production and production since modern reopening of several Victorian gold mines (data source S&P Global Mining Intelligence).

Mine	Historical production	Production since modern reopening	Current Resources and Reserves
Fosterville	28,000 oz Gold (1894-1903)	3.8 million oz Gold (since 2003)	4.6 million oz Gold
Costerfield	130,000 oz Gold (1850-1952)	405,000 oz Gold (since 2006)	588,000 oz Gold 46,000 tonnes Antimony
Stawell	2.1 million oz Gold (1853-1926)	2 million oz Gold (1988-2016)	351,000 oz Gold

Many other commodities were extracted in historical Victorian mines, and these included copper, tin, tungsten, antimony, silver, nickel and zinc. Historical base metals discoveries and mining operations in the state for tin, copper, lead and zinc, were often incidental to gold discovery, but did mostly occur in eastern Victoria. With the exception of tin, which was mined in significant amounts at Toora and Beechworth, production of base metals remained low in Victoria due to a combination of poor understanding of very complex geology, the logistical difficulties of access and expense of development in the Victorian Alps, and the persistent allure of world-class gold in central and western Victoria. Hence, although the presence of producing historical base metal mines indicates the potential for future exploration and mining of these commodities in Victoria, historical production for base metals has not been utilised in this assessment in the same manner as historical production for gold.

Disparity between historical production value and true geological value of base metals is not confined to eastern Victoria – it is now understood to be a fundamental characteristic of the wider mineral systems style of mainland south-eastern Australia. For example, the true world-class nature of the Cadia copper-gold deposits and active mining operations of central-western NSW was only fully appreciated in the 1990’s, despite the Cadia deposit being exposed at surface and being prospected by minerals explorers for over a century (Holliday, et al., 1998). With success at Cadia came the motivation to reappraise an entire region of NSW geology. Exploration from 1990 to the

present has resulted in the discovery of many additional world-class copper-gold discoveries in central-west NSW, both in historic mining areas and in never-before-explored geology under cover.

It must be noted that a lack of historical production does not indicate lack of present in-ground value. There are numerous examples in Victoria where modern geoscience has discovered mineral wealth in previously un-mined areas. The Stavely Arc in far western Victoria is a recent example of the application of modern geoscience to understanding and discovering new mineral systems (Cayley, et al., 2018; Schofield, 2018).

Additionally, significant accumulations of minerals like tungsten, antimony, molybdenum, platinum group elements and a range of rare earth elements have historically been discovered in eastern Victoria, but since many of these commodities were not required for the technologies of that time few were pursued. Some critical minerals were regarded as 'contaminants' that impeded production of the more sought-after commodities (e.g. tungsten was seen as a contaminant in tin mining (Cochrane & Bowen, 1971)).

There are other examples in Victoria, including in parts of the current assessment area, where historical mineral exploration has identified potential resources that were not considered economic with the technology of the time, but may be economic with new technologies. Red-bed copper in the Mansfield sub-basin of the Howitt Province of central-east Victoria (Cochrane, 1982; VandenBerg, et al., 2006) is an example of an historic critical minerals discovery under active reappraisal by the GSV as part of the current State Government's critical minerals program delivery (Waugh, 2023).

4 IPA assessment

The GSV was asked to provide an assessment of the geological values of the 29 IPAs across the Central Highlands and East Gippsland RFAs.

4.1 Current mining and exploration expenditure within IPAs

Minerals exploration and minerals and extractives mining currently contributes significant investment into regional areas of the State, as well as providing a large number of regional jobs (Lawrence Consulting, 2022). The current geological value of the IPAs has been measured using recent expenditure and proposed expenditure of current minerals tenement holders.

Current mineral licences intersecting the IPA areas were identified in GeoVic. De-identified proposed expenditure data for the next five years for current approved licences and licences under application was provided by Earth Resources Regulation (ERR). The number of current approved minerals licences, minerals licences under application, current Work Authorities (WAs), and proposed expenditure for these is shown in Table 6.

These figures indicate interest in the minerals potential of the IPAs, although as they include proposed expenditure from minerals licences under application it must be noted that this is an indicative figure only as it is not guaranteed that a licence will be granted.

Table 6 Current status of minerals and extractives licencing and expenditure in IPAs, grouped by RFA.

RFA	Number of Minerals Licences	Number of Minerals Applications	Number of current Work Authorities	Commodities	Proposed Expenditure over 5 years to EOFY 2027-2028[§]
Central Highlands	6	3	-	Gold, Antimony, Tin, Tungsten	$2,998,550
East Gippsland	4	1	1	Gold, Copper, Antimony, Tungsten, Zinc	$2,817,900
Total	**10**	**4**	**1**		**$5,816,450**

[§]Includes proposed expenditure for current minerals tenements and applications.

4.2 Current mining and exploration expenditure adjacent to IPAs

An analysis of expenditure in state forests immediately adjacent to the IPAs was also undertaken. This analysis looked at the IPAs, the broader area of state forest surrounding the IPAs (Table 7), and also included an analysis of the Woods Point-Walhalla Goldfield. The analysis did not include all state forest and mineral tenements within each RFA, and is presented in Table 8. The analysis provides a broader picture of the exponential increase in investment that has occurred around the IPAs over the last four years (Figure 3), and a view of the short-term economic investment into the IPAs and surrounding state forest over the next five years.

Table 7 State forests used in IPA regional assessment of current expenditure around the Central Highlands and East Gippsland IPA areas and the Woods Point – Walhalla Goldfield.

Regional assessment area	State Forests included in regional assessment
Central Highlands IPAs	Boola Boola State Forest, Deep Creek State Forest, Thomson River Forest Reserve, Tanjil State Forest, Noojee State Forest, Erica State Forest, Big River State Forest, Marysville State Forest, Yarra State Forest, Mount Toolebewong State Forest, Rubicon State Forest, Black Range State Forest, Toolangi State Forest, Paul Range State Forest, Mount Robertson State Forest
East Gippsland IPAs	Wingan State Forest, Merreminger State Forest, Drummer State Forest, Buldah State Forest, Combienbar State Forest, Bemm State Forest Club Terrace State Forest, Murrungower State Forest, Ellery State Forest, Coast Range State Forest, Bendoc State Forest, Cottonwood State Forest, Bonang State Forest, Yalmy State Forest, Orbost State Forest
Woods Point – Walhalla Goldfield	Glenmaggie State Forest, Aberfeldy/Nambruc State Forest, Mount Useful State Forest, Barkly River State Forest, Upper Goulburn State Forest, Big River State Forest, Thomson River Forest Reserve

Table 8 IPA regional assessment of current and proposed expenditure for minerals licences.

Regional Area	Current Minerals Tenement Expenditure*				Proposed Expenditure over 5 years to EOFY 2027-2028§
	FY 2018-2019	FY 2019-2020	FY 2020-2021	FY 2021-2022	
Central Highlands	$10,030	$60,567	$235,361	$2,177,625	$5,973,200
East Gippsland	$62,204	$61,977	$110,216	$399,617	$5,367,200
Total	**$72,234**	**$122,544**	**$345,577**	**$2,577,242**	**$11,340,400**
Woods Point – Walhalla Goldfield	$32,000,835	$19,766,423	$26,658,873	$28,637,907	$1,591,255

*FY 2022-2023 is only partially complete as June reporting is not yet lodged and has been excluded from analysis. FY 2017-2018 could not be sufficiently de-identified for public reporting and has been excluded from analysis.

§Includes proposed expenditure for current minerals tenements and applications.

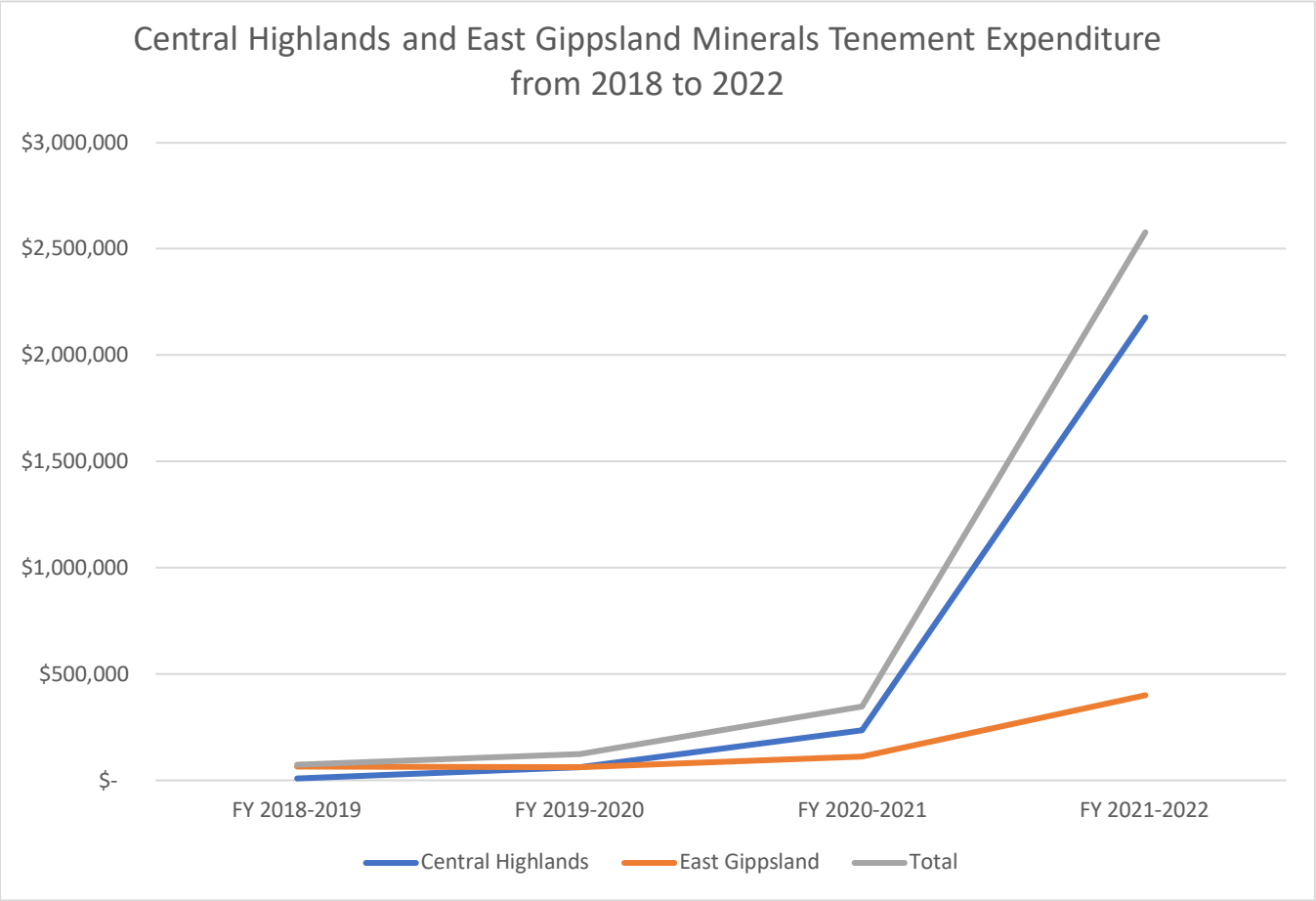

Figure 3 Central Highlands and East Gippsland IPA regional analysis minerals tenement expenditure for the previous four years.

The Woods Point – Walhalla Goldfield has regular annual investment, averaging $26.8 million each year. This is likely due to expenditure around the current operating mines and gives an indication of the consistent investment that occurs in a region when a mine comes online following successful exploration of a goldfield.

4.3 Gold resources and operations adjacent to IPAs

The economic impact of potential future mining licences and operations in IPAs can be demonstrated by the looking at the current value of nearby operating mines within the Woods Point – Walhalla Goldfield. As shown in Table 8, this area has consistent annual economic investment averaging $26.8 million, however this does not consider the significant annual royalties to the State (Earth Resources Regulation, 2022) and the value of the gold deposits themselves, which is much greater. Table 9 shows the estimated in-ground value of significant gold deposits in the Woods Point – Walhalla Goldfield. Annual royalties contributed by each of the current operating companies cannot be shown here due to confidentiality restrictions. Mining operations also contribute to the economy in the form of wages and direct spending, much of which is re-invested back into the region surrounding the operation (Lawrence Consulting, 2022).

Table 9 Resource value for gold deposits in the Woods Point – Walhalla Goldfield.

Deposit	JORC Compliant Resources	Current Estimated Value	Current Status
A1	1.3 Mt @ 6.1 g/t au*	$721 million§	Operation
Morning Star	4.7 Mt @ 6.1 g/t au*	$2.7 billion§	Operation
Walhalla	825,000 t @ 3.6 g/t au	$277.4 million§	Resource
Tubal Cain	932,000 t @ 4.1 g/t au	$360 million†	Resource
Eureka	153,000 t @ 9.9 g/t au	$145 million†	Resource

*A breakdown of resources into Measured, Indicated and Inferred categories is available if required.

§Estimates of value sourced from S&P Global Mining Intelligence.

†Calculated using the public resource (A1 Consolidated Gold, 2014) multiplied by the average gold price from the first week of July.

Although the Woods Point – Walhalla gold deposits exist outside the IPA boundaries, there are several highly prospective areas for gold and other metals within and surrounding the IPAs in both Central Highlands and East Gippsland for which the examples of A1 and Morning Star are analogous. The Rawson IPA intersecting the southern portion of the Woods Point – Walhalla Goldfield is one such highly prospective area, but goldfields around Armstrong and McMahon's Creek in the Central Highlands, and Serpentine, Murrungowar, Bemm River and Goongerah in East Gippsland also have high potential for hosting similar gold and metal deposits.

4.4 Critical minerals, gold and extractives supply

As indicated in Section 4.3, several IPAs and adjacent state forests appear highly prospective for gold and other metals, and this is indicated by the number of mineral and mining occurrences, geological anomalies, and past exploration expenditure. The combination of these gives an indication of the value of IPAs as supply areas for gold and critical minerals.

The mineral and extractives occurrences layers on GeoVic point to potential areas of future supply for critical minerals, gold and extractives, and these can be seen in Figure 4, Figure 5, Figure 6 and Figure 7. The number of historical mining and mineral occurrences within each IPA indicates a degree of minerals prospectivity, however it is notable that many more occurrences are within 100-200m of an IPA boundary. Although the mining occurrence locations marked indicate the presence of minerals at or near surface, it is probable the extents of these historic mines extend underground into nearby IPA areas. As already pointed out, the Woods Point-Walhalla Goldfield to the east of the Central Highlands IPAs is a significant historical and currently producing region of very high geological value and the Rawson IPA intersects the southern portion of this goldfield. Other concentrations of gold occurrences occur around the Blue Rock Lake, Armstrong and McMahon's Creek IPAs.

The surface geochemistry layer in GeoVic was analysed to highlight possible areas of future supply that weren't necessarily captured in the minerals and extractives occurrences layers. Anomalous surface geochemistry sample points were defined as those within the top 5% of results using the following poly-metallic combinations:

- gold and antimony
- tin and tungsten
- copper and zinc
- nickel, copper and cobalt

An analysis based on common poly-metallic combinations was considered more robust than an analysis based on individual element results. The results of the analysis were particularly relevant to the East Gippsland IPAs as it highlighted further sites of interest beyond those already known from the occurrences layers (Figure 8). In the Central Highlands the geochemical anomalies did not identify a significant number of sites of interest beyond those already highlighted in the occurrences layers.

Seamless Geology (250k) and magnetics were also used to assess the minerals potential in and around the IPAs. Broad structural trends across IPAs associated with mineralisation were noted.

All geological sites of interest for current or future supply of critical minerals, gold or extractives, in and around the IPAs, are listed Appendix 1. The IPAs range in prospectivity from high to low based on the results of the geological investigation.

Past exploration expenditure within the IPAs indicates the degree of interest in the mineral occurrences identified during this exercise. Past expenditure was calculated using reported expenditure for expired licences intersecting each IPA. Expired licence expenditure data reported post-1981 was provided by ERR. Expired licence expenditure data reported pre-1981 was captured from original expenditure report pdfs available in the GSV Catalogue (Search Assist). Where an expired exploration licence intersected multiple IPAs the total expenditure for that licence was split between IPAs based on the size of the IPA area intersected.

Past exploration expenditure (Table 10) indicates that the majority of IPAs have established precedent for minerals exploration. The most recent expired exploration licence expenditure data is from 2018, which suggests that although the data originates from expired licences, the IPA areas have generated interest for minerals exploration continuously over at least the last 50 years according to the records available to the GSV. The exception to this is the Warburton Small and Upper Hardy Ck IPAs, which have no expired licence coverage, suggesting limited perception of minerals prospectivity in these areas. It would be expected that this level of interest in the identified mineral occurrences and investment in exploration within the IPAs will continue.

It is also important to note that the expenditure reported here is in the value of the dollar at the time of reporting, and no adjustments have been made to the data to convert this value to a current dollar value. It is likely that the value of the expenditure in today's dollars would be several times greater than that reported in Table 10. The data required for a detailed assessment of historical expenditure in today's dollar value is available, however, given the time restrictions for this assessment, only the as-reported values are presented here.

Table 10 Historical mining and expired licence expenditure in the IPAs.

RFA	IPA	Number of historic mining sites*	Estimated expired exploration licence expenditure§	Commodities explored for or mined
Central Highlands	McMahons Ck	2	$466	Gold, Tin
Central Highlands	Noojee		$300,947	Gold, Antimony, Copper, Silver
Central Highlands	Baw Baw North		$73,624	Gold, Zinc, Copper
Central Highlands	Powelltown		$242,281	Gold, Copper, Feldspar
Central Highlands	Paul Range		$82,179	Gold, Antimony
Central Highlands	Royston Range		$234,926	Gold
Central Highlands	Baw Baw South		$244,415	Gold, Copper
Central Highlands	Blue Rock Lake	3	$163,052	Gold, Copper

Central Highlands	Federation Range		$416,188	Gold, Tin, Tungsten, Copper
Central Highlands	Acheron	1	- [a]	Gold
Central Highlands	Cement Ck East		- [a]	Gold
Central Highlands	Torbreck Range		$121,402	Gold
Central Highlands	Rawson		$38,425,033	Gold, Copper, Molybdenum
Central Highlands	Warburton Small		- [b]	
Central Highlands	Tanglefoot		$144,754	Gold, Antimony
Central Highlands	Upper Hardy Ck		- [b]	
Central Highlands	Armstrong Ck	1	$54,106	Gold
Central Highlands	Ada R		$18,903	Gold
Central Highlands	Lower Royston Cascades		$6,777	Gold
Total Central Highlands		**7**	**$40,529,053**	
East Gippsland	Murrungowar	4	$1,875,881	Gold, Antimony, Tin, Copper
East Gippsland	Serpentine	5	$1,683,740	Gold, Copper
East Gippsland	Buldah	5	$1,297,854	Gold, Tin, Tungsten, Copper, Molybdenum
East Gippsland	Mueller River		$343,572	Gold, Zinc, Copper, Silver
East Gippsland	Coopracambra		$302,760	Gold, Antimony, Tin, Tungsten
East Gippsland	Bemm River	14	$634,333	Gold, Copper
East Gippsland	Goongerah	7	$437,028	Gold, Copper, Molybdenum
East Gippsland	32 Mile South		$67,519	Gold, Copper
East Gippsland	32 Mile North		$57,022	Gold, Copper
East Gippsland	Yalmy		$493,284	Gold, Copper
Total East Gippsland		**35**	**$7,192,993**	

*Known historical mining sites prior to the introduction of the current tenement system.

[§]Expenditure is what was reported by licensee at the time of reporting, not the equivalent value in today's dollars.

[a]No expenditure data available for relevant expired licences.

[b]No expired licence coverage.

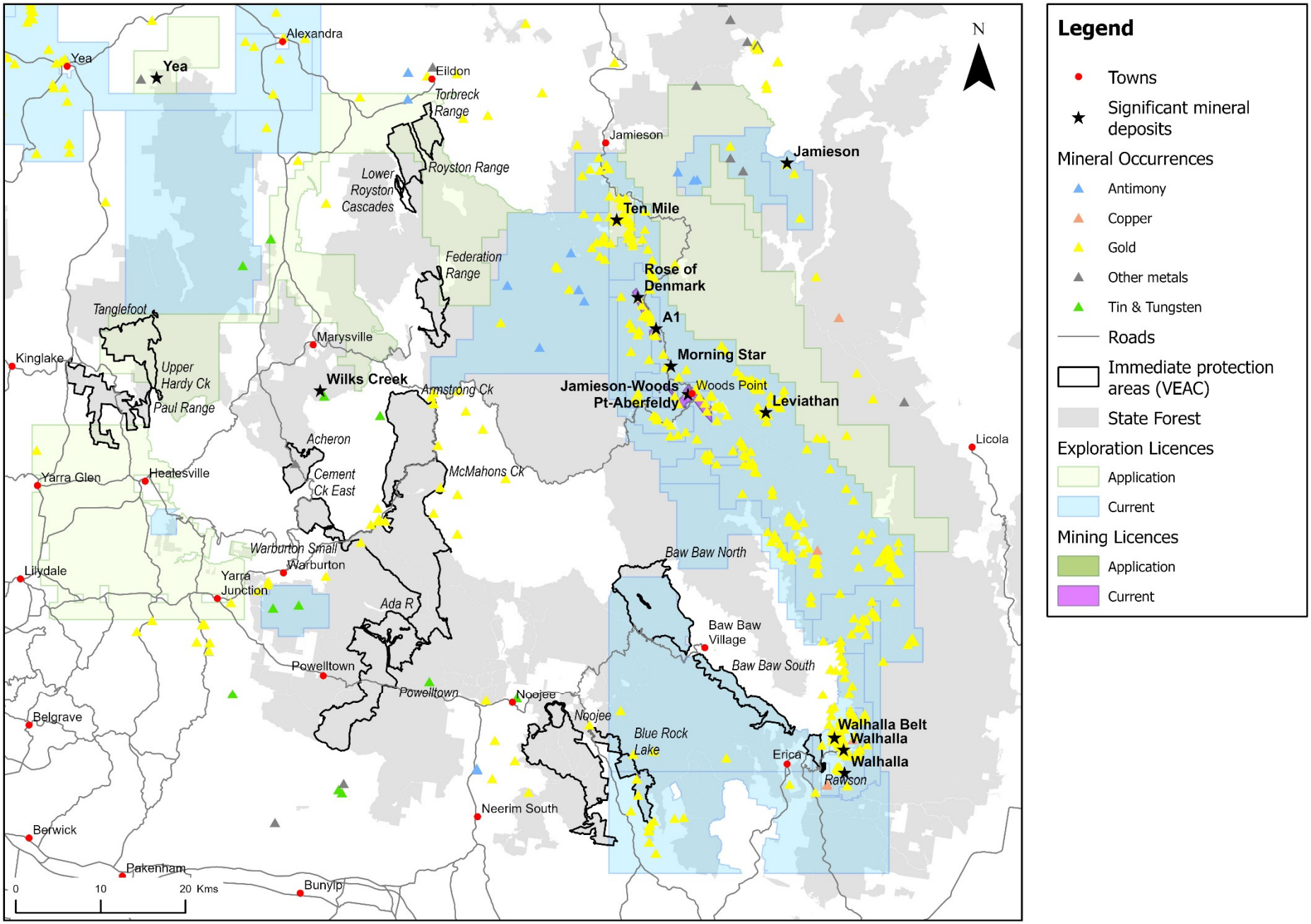

Figure 4 Central Highlands IPAs, mineral licences and mines and mineral occurrences. Significant mineral deposits sourced from S&P Global Mining Intelligence.

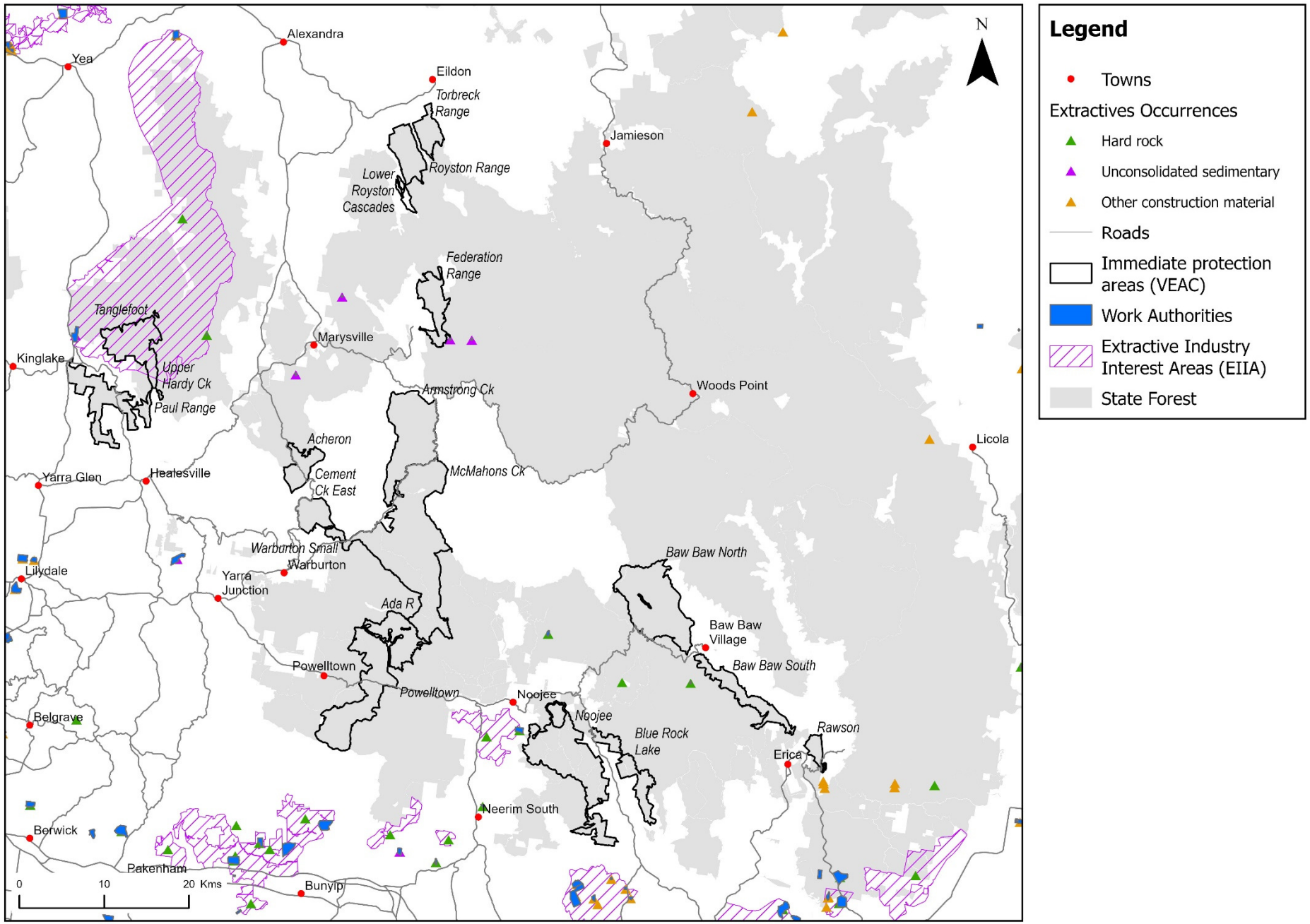

Figure 5 Central Highlands IPAs, extractives licences, occurrences and EIIAs.

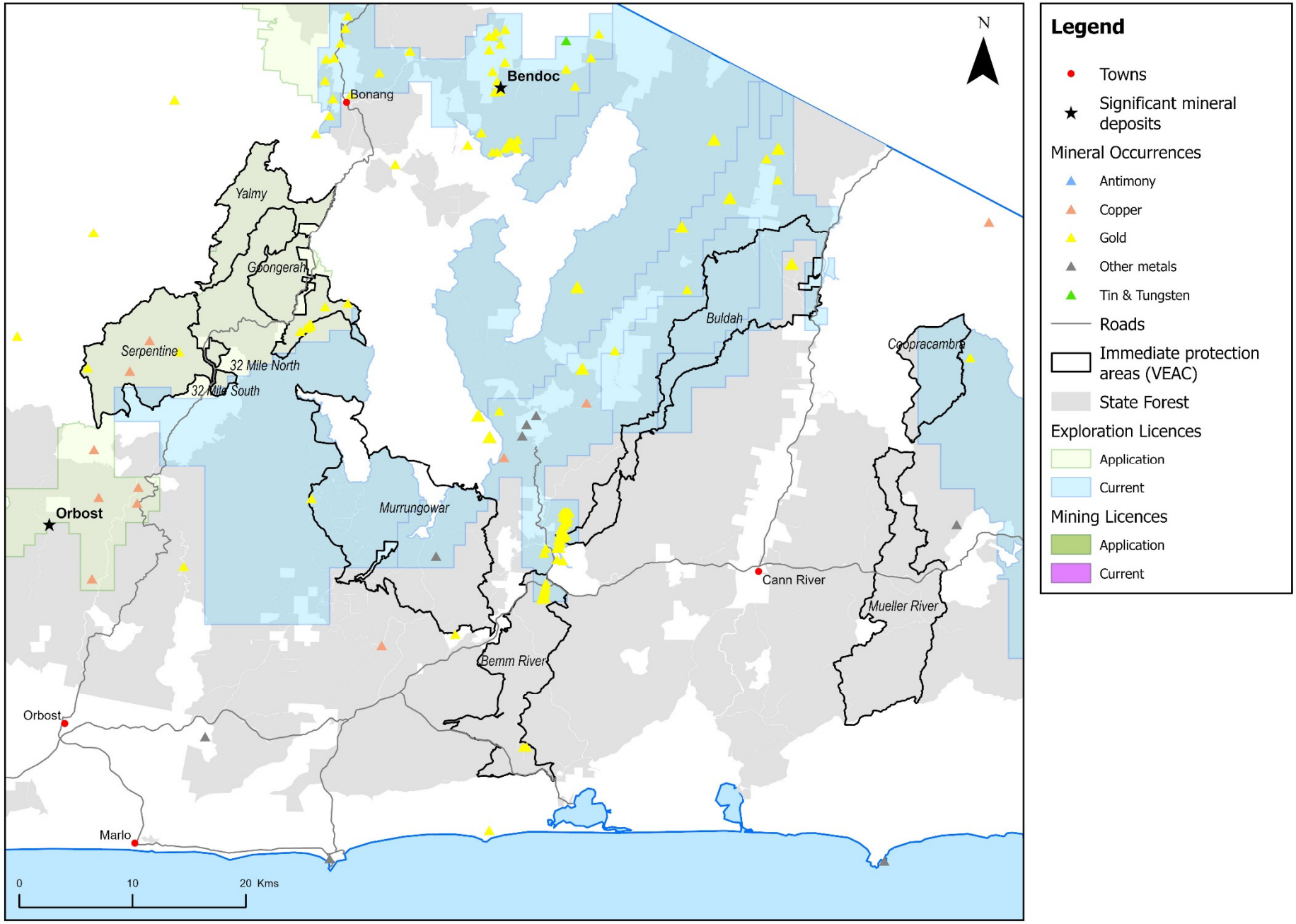

Figure 6 East Gippsland IPAs, mineral licences and mines and mineral occurrences. Significant mineral deposits sourced from S&P Global Mining Intelligence.

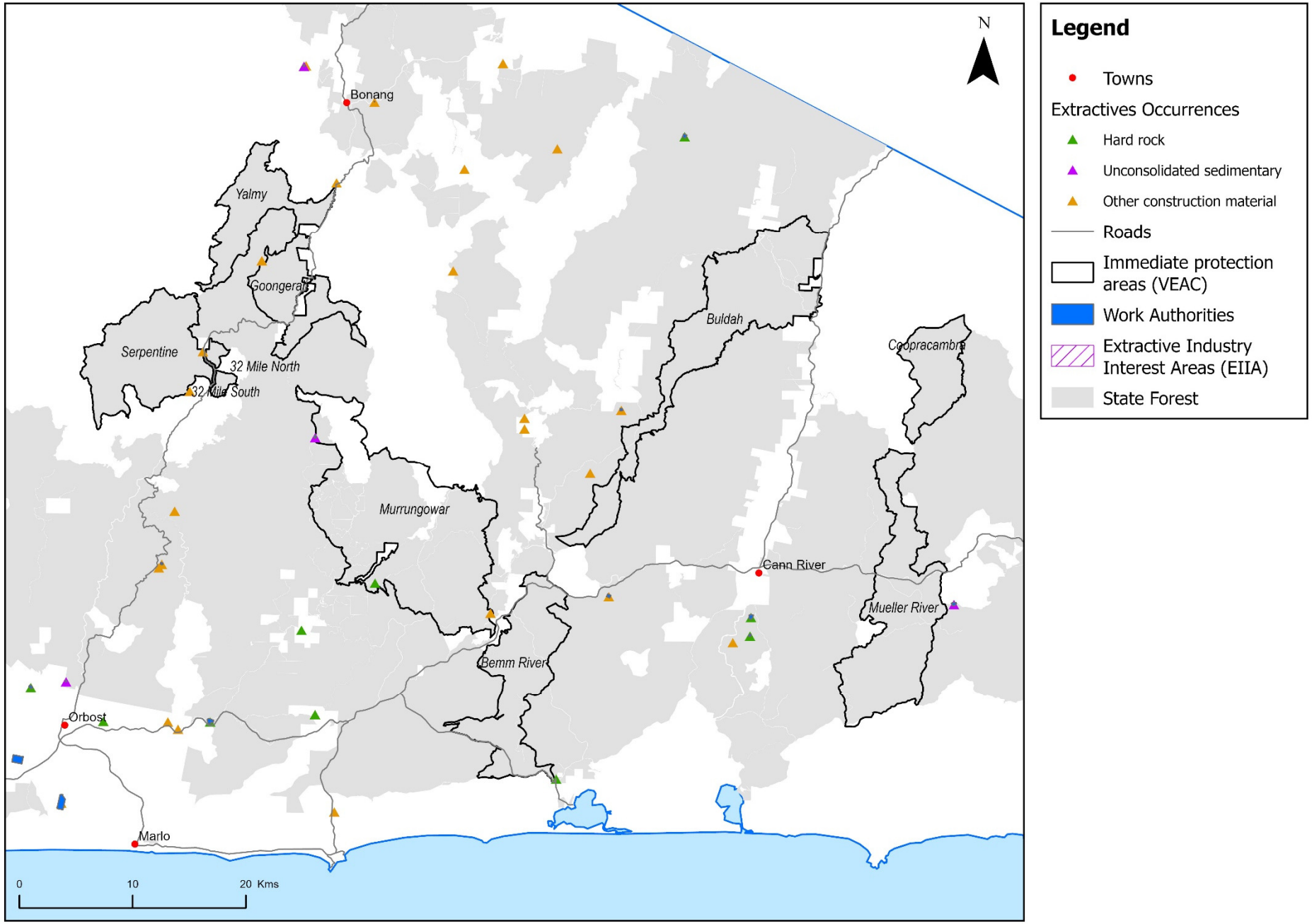

Figure 7 East Gippsland IPAs, extractives licences, occurrences and EIIAs.

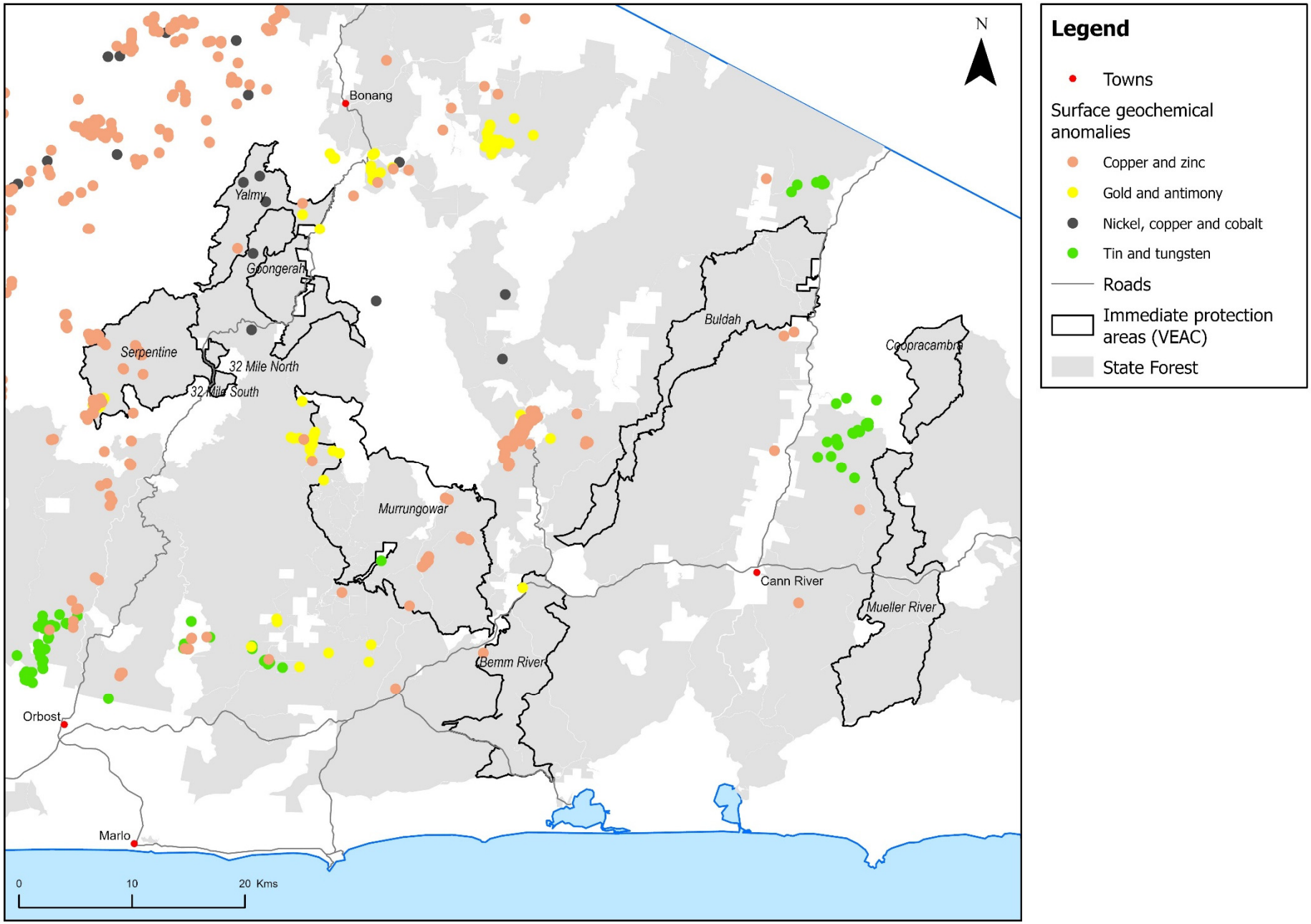

Figure 8 Surface geochemical anomalies identified in East Gippsland.

5 State forest assessment

The GSV was asked to provide an assessment of the geological and geomorphological value of state forests within the Central Highlands and East Gippsland RFAs, and select areas of the Gippsland and North East RFAs.

5.1 Defined resources in the state forests

There are six projects with defined resources across the state forests of interest (Table 11).

Table 11 Projects with resources in state forests of interest. All estimates of value are in AU$.

RFA	State Forest	Project Name	Resource	Estimated Value*
Central Highlands	Upper Goulburn	A1 Gold Mine	249,000 oz Gold	$721 million
	Upper Goulburn	Morning Star	920,000 oz Gold	$2.7 billion
East Gippsland	Bendoc	Bendoc	16,000 oz Gold	$46.1 million
	Tara	Nowa Nowa	9Mt @ 50.8% Iron Ore	$1.4 billion
Gippsland	Deep Creek/Boola Boola	Walhalla	96,300 oz Gold	$277.4 million
North East	Upper Goulburn	Jamieson (Hill 800)	52,200 oz Gold	$150.6 million†

*Sourced from S&P Global Market Intelligence

†Calculated using the S&P Global Market Intelligence resource multiplied by the average gold price from the first week of July

5.2 Gold potential of the state forests

As outlined in Section 4, there is significant potential for gold in the state forests within and surrounding the IPAs, and this is bolstered by the presence of current operating gold mines in the Woods Point – Walhalla Goldfield. The analysis of gold potential can be extended to all the state forests of interest within the Central Highlands, East Gippsland, Gippsland and North East RFAs, as determined by the Council.

GSV conducted an analysis of the gold potential in the state forests of interest, based primarily on historical production data in the mineral occurrences layer in GeoVic, and bolstering this with goldfields data from academic sources (Phillips, et al., 2003; VandenBerg, et al., 2006; Vandenberg, et al., 1992). This analysis assumed, as outlined in Section 3.1, that historical production gives an indication of the potential minimum quantity of gold still in the ground. This assumption is based on several currently operating goldmines in Victoria whose production since modern reopening has significantly dwarfed historical production. Goldfield polygons were sourced from GeoVic, and both the mineral occurrences and goldfields datasets were intersected with the state forests and RFA datasets (Figure 9). Historic production from mineral occurrences was removed where goldfield data existed to avoid duplication of production data, and production data was aggregated by state forest for each RFA.

The minimum potential quantity of gold in-ground for each state forest resulting from this exercise can be seen in Appendix 2. An estimate of the in-ground dollar value of potential gold was calculated by applying the average gold price per ounce in $AUD from the first week of July to the gold-in-ground estimate. Figure 10 shows the distribution of estimated in-ground gold content of the state forests, as well as the location of mineral occurrences with production data[1].

[1] Please note that Figure 10 displays state forests that were incidentally captured in the gold analysis that are outside of the guidance boundaries provided by the Council for the Gippsland and North East RFAs. The Appendix 2 table does not include these state forests, and only contains results for state forests that were within the guidance boundaries provided by the Council.

Although we can estimate the quantity of gold in-ground in each state forest and apply a dollar value to this figure, this does not take into account mining and other economic factors. To conceptualise this, a discount factor was also applied to the estimated in-ground ounces. The discount factor was calculated by dividing the current market capitalisation of the nearby operating A1 gold mine ($31.1 million) by the current A1 resource to get a dollar-per-ounce discount factor. The results of this exercise can be seen in Appendix 2 in the *Conceptual Estimate* column and reflect the current market views of a nearby operating gold mine with the same style of gold mineralisation that is found in the region. The term ‘conceptual’ has been used here as the estimated quantity of gold in-ground relates to the potential geological value of each state forest, and not specific prospects with defined resources.

A limitation of this exercise was the aggregation of production data based on state forest name. After the analysis it was realised that several state forests polygons had no name, and without defined names they were aggregated together and removed from the analysis. Future analysis undertaken in this manner should consider the state forest polygons with no official name by aggregating on a different identifier or by creating a new identifier that is an amalgamation of several attributes to ensure no data is accidentally removed from the analysis. As such, the current analysis is lacking in-ground value for several state forests that initially contained production data, particularly in the North East RFA.

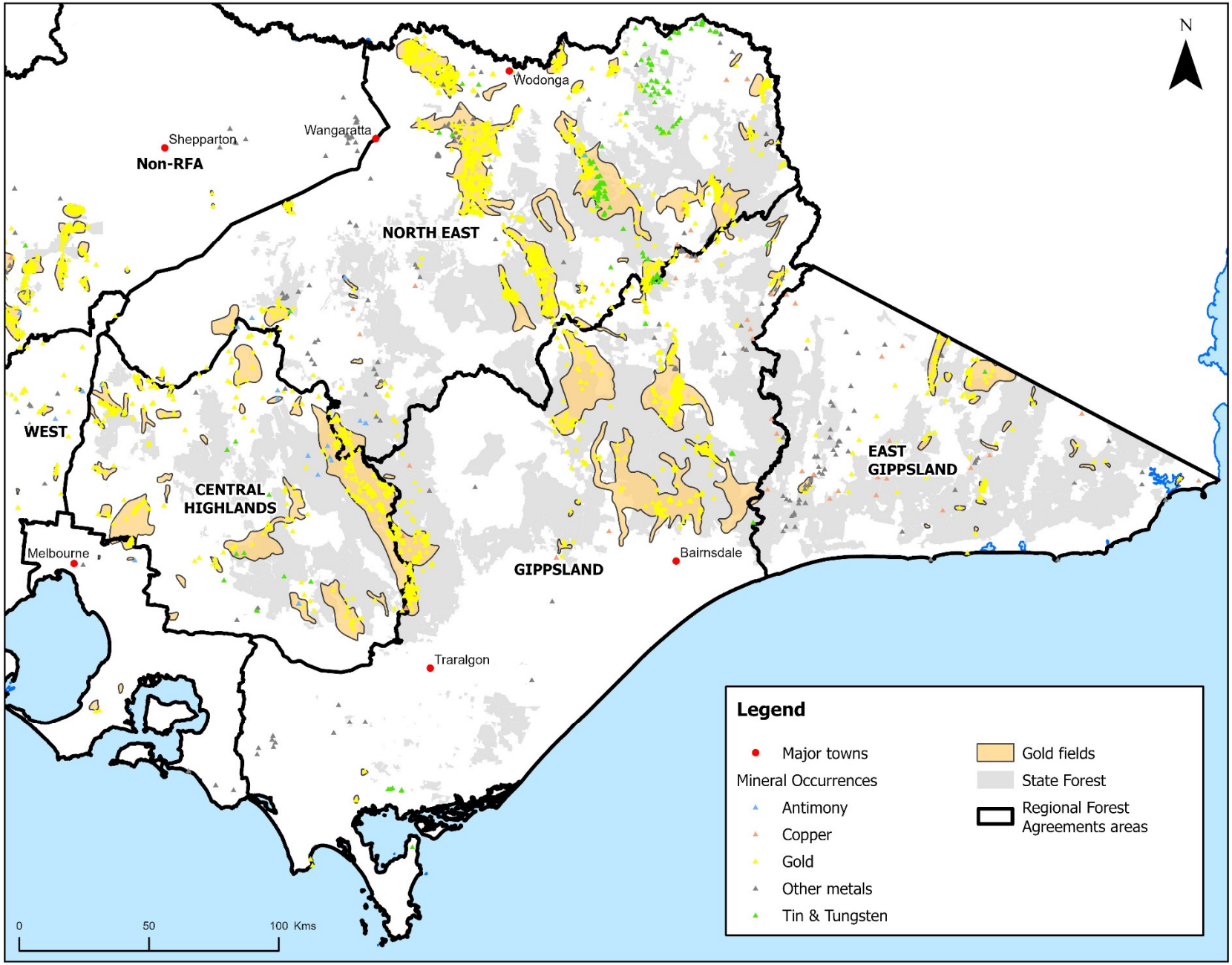

Figure 9 Goldfields and all mining and mineral occurrences across the Central Highlands, East Gippsland, Gippsland and North East RFAs.

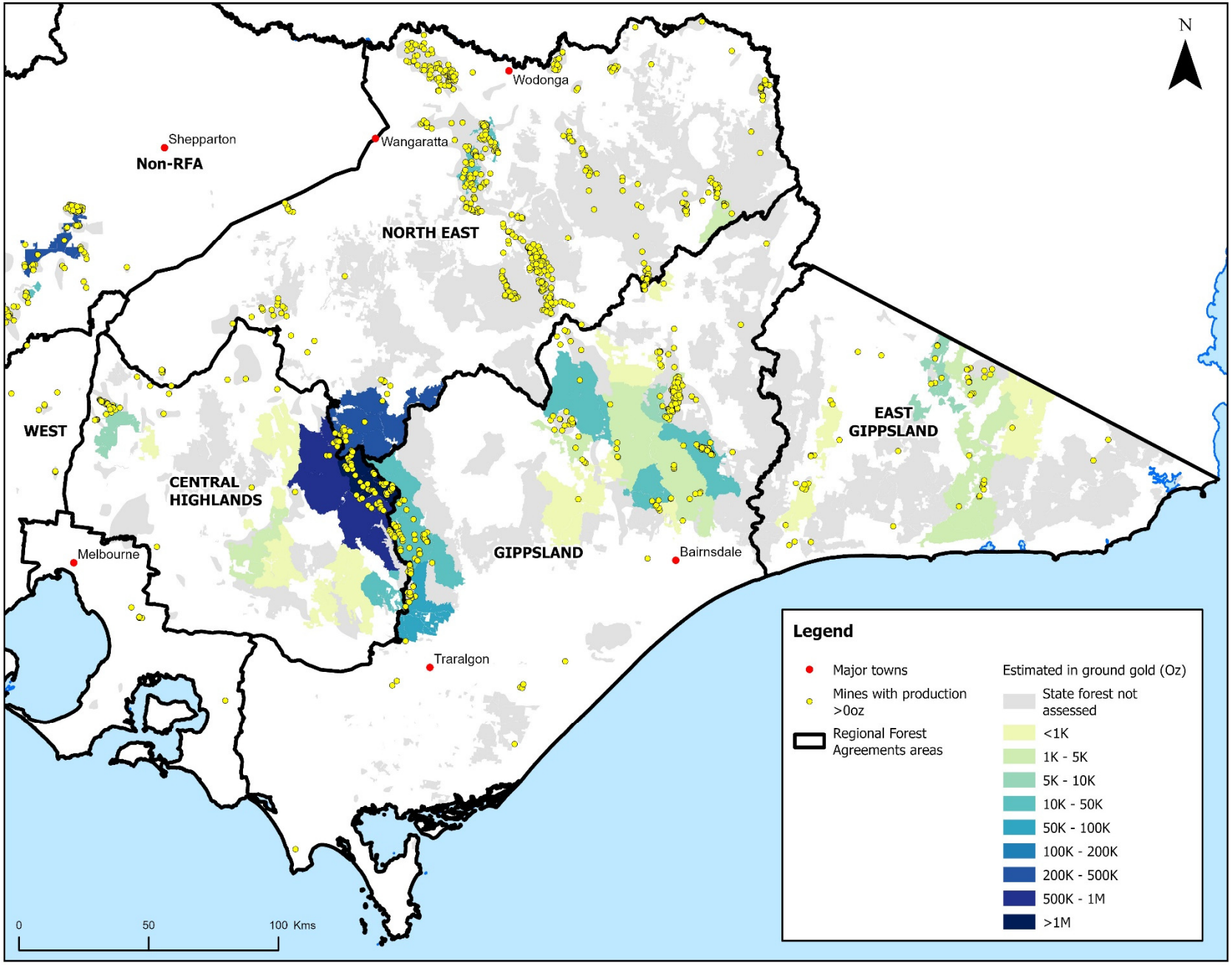

Figure 10 Mineral occurrences with production data and distribution of estimated in-ground gold content across the Central Highlands, East Gippsland, Gippsland and North East RFAs.

5.3 Critical minerals potential of the state forests

The analysis of critical minerals prospectivity within the IPAs can also be extended to the state forests of interest within the Central Highlands, East Gippsland, Gippsland and North East RFAs.

The critical minerals Fingerboards heavy mineral sands reserve contains 170 million tonnes of ore at 1.24% zircon, 1.9% titanium dioxide, and 0.11% rare earth oxides (Victoria State Government, 2021), which are required for renewables technology, at a potential value of $11.7 billion. The Fingerboards resource acts as an indicator of the minimum value of primary-hosted critical minerals deposits contained within state forests in the drainage catchments of the Tambo and Mitchell Rivers, specifically the Limpyers, Calajero, Dargo, Hibernia, Pinnacles, Carey and Boulung-Deera State Forests of the Gippsland RFA, which are within the area of interest for this study. There are also current exploration licences with active exploration for heavy mineral sands within the Waygara, Tara, Hartland, and Colquhoun/Boyanga Gidi State Forests in the East Gippsland RFA.

Additionally, as outlined in Section 3.1, in both eastern Victoria and geological terranes in other states there is a disparity between historical production value and true geological value of base metals (including critical minerals), and areas with low historical production have recently discovered the previously unrealised potential for critical minerals endowment, particularly in NSW.

The GSV, working in collaboration with the NSW Geological Survey and with Geoscience Australia, has established that the geology underpinning the NSW discoveries, the Macquarie Arc terrane, extends south into Victoria as the Deddick Zone (VandenBerg, et al., 2000; Rawling, et al., 2011; Huston, et al., 2015) (Figure 11). The Macquarie Arc is proven to host multiple world-class copper-gold deposits in NSW. Consequently, the Deddick Zone in eastern Victoria is now regarded as sharing the same fundamental mineral prospectivity – and potential geological value, adjusted by area – as the greater Macquarie Arc in NSW. The Deddick Zone lies in the heart of the Victorian Alps, within the East Gippsland RFA, and is yet to be systematically explored for the possibility of NSW-style mineral systems. In 2018 - 2021 the GSV, in collaboration with Geoscience Australia and the Geological Survey of NSW, acquired seismic reflection and gravity data across eastern Victoria and south-eastern NSW to investigate the potential of this region to host accessible Macquarie Arc geology (Cayley, 2016).

Similarly, it is now understood that western Tasmanian geology, the Dundas Trough, which contains significant copper-gold deposits, extends north beneath Bass Strait into central Victoria, an area called the Selwyn Block (Cayley, et al., 2002; Moore, et al., 2016) (Figure 11). Parts of this mineral-prospective western Tasmanian geology lie at or near surface in the Gippsland and North East RFAs (VandenBerg, et al., 2000; VandenBerg, et al., 1995), and have now been shown to contain Tasmanian-style copper-gold mineralisation (Haydon, 1991) and the potential for a range of additional minerals. The preliminary interpretation of deep seismic reflection data acquired as part of the GSV's Eastern Victoria Geoscience Initiative points to significant tracts of Dundas Trough/Selwyn Block geology raised towards surface within the 15km-wide Governor Fault Zone (Cayley, et al., 2022) (Figure 11). This enables an estimation of the critical minerals endowment in central and eastern Victorian geology, adjusted by area, and the potential for delivering critical globally and/or nationally significant mineral resources in the future.

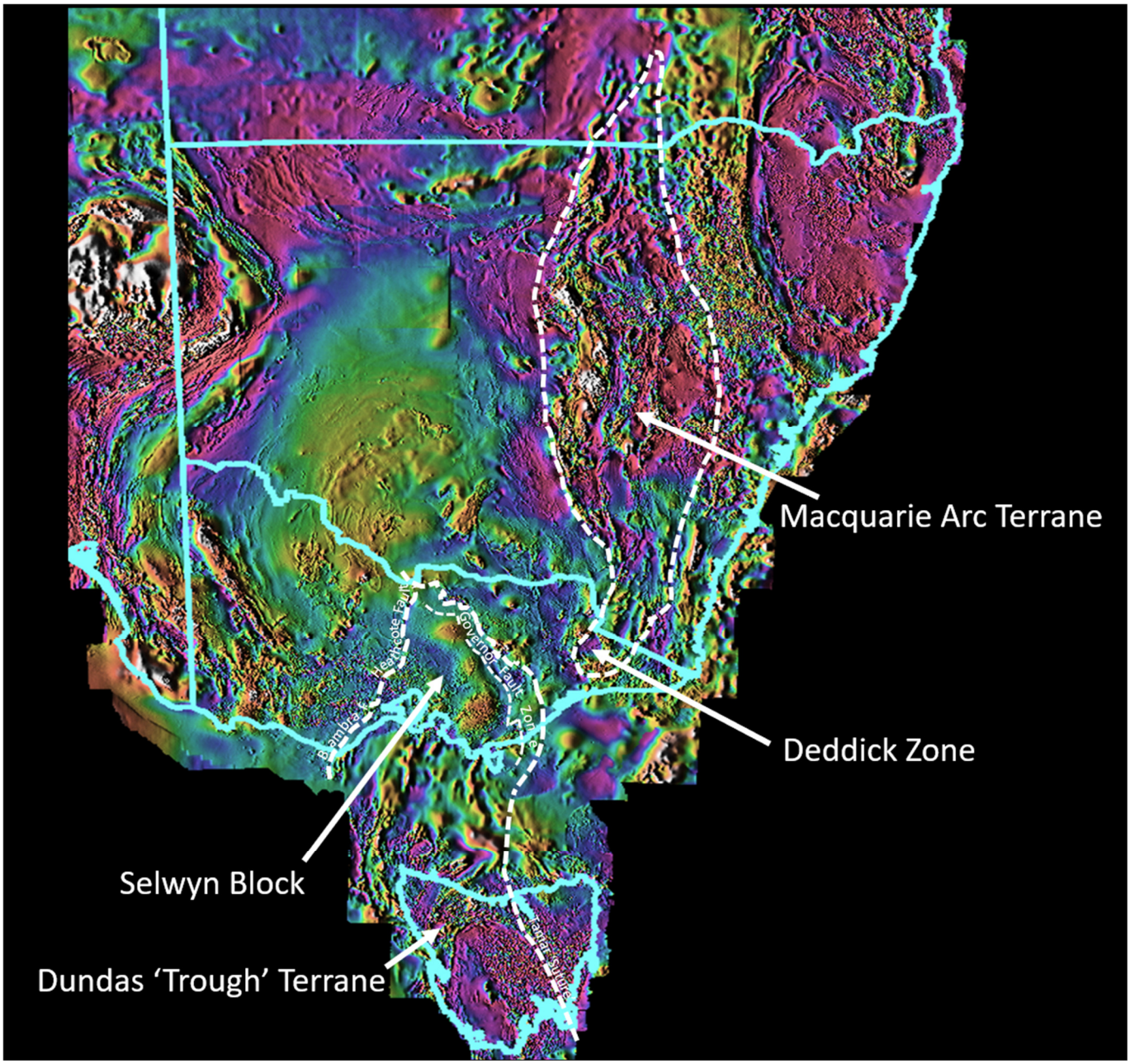

Figure 11 Shaded pseudocolour image of aeromagnetic data, Southeast Australia (data source: Geoscience Australia), showing the extension of the Macquarie Arc Terrane and Dundas Trough geology, from NSW and Tasmania respectively, into Victoria. High magnetic intensity mapped white-red, low magnetic intensity mapped purple-blue. Extension of the Macquarie Arc Terrane and Dundas Trough geology, from NSW and Tasmania respectively, into Victoria.

The direct continuity of NSW and western Tasmanian geology into Victoria was not demonstrated until 20 years ago when modern geophysics became available and modern-generation geological mapping was completed in key areas. Without this understanding there was limited historical motivation for exploration for NSW and western Tasmanian styles of mineralisation in Victoria (Cayley, et al., 2002).

GSV assessed the potential for critical minerals in the state forests of interest based on the known extension of the Macquarie Arc from NSW into the Deddick Zone in the East Gippsland RFA, and the presence of the Dundas Trough geology from Tasmania in the Governor Fault Zone across the Gippsland and North East RFAs. As outlined above, the Macquarie Arc and Dundas Trough are world-class producers of metals, including critical minerals, many of which are not found in economic quantities elsewhere in Victoria (i.e. tungsten, zinc, nickel, cobalt, zirconium).

Areas where extensions of the Macquarie Arc from NSW and the Dundas Trough from Tasmania are known to exist in Victoria were mapped using a combination of Seamless Geology and magnetic data, and these areas were intersected with state forests and RFAs. Publicly available Resource and Reserve data from well-known deposits of the Macquarie Arc and the Dundas Trough (AusIMM, 2017) were aggregated for each crustal region and applied to the Victorian state forests in areas where the equivalent geology existed using a conversion factor based on area (the area covered by the Macquarie Arc and Dundas Trough respectively was used to calculate equivalent potential contained metal based on state forest polygon areas that intersected the required geological extension in Victoria).

Appendix 2 shows the estimated contained metal values for the state forests that intersected the Deddick Zone and Governor Fault Zone in Victoria. An estimate of the in-ground dollar value of the state forests was calculated by applying the price per unit of contained metal from 25th July 2023 to the estimated quantity of metal in each state forest.

The combined geological value of gold and other metals (including critical minerals) was estimated by converting the estimated in-ground metals to a gold equivalent, using the commodity prices on 25th July 2023 (Gold - $2892.05/ounce, Nickel - $32,724.27/tonne, Zinc - $3,654.78/tonne, Lead - $3,203.37/tonne, Silver - $36.19/ounce, Copper - $12,737.20/tonne, Cobalt - $48,606.00/tonne, Source – S&P Global Market Intelligence). The combined estimated in-ground metal content (gold and other metals) of each state forest is shown in Figure 12 and Appendix 2. It should be noted that null values in this table do not represent a lack of potential earth resources, only that there is no data that currently exists that enables a calculation of geological value based on the described methodology. State forests with null values have been included in the final table as they still fall within the RFA areas prescribed by the Council and represent areas lacking in data.

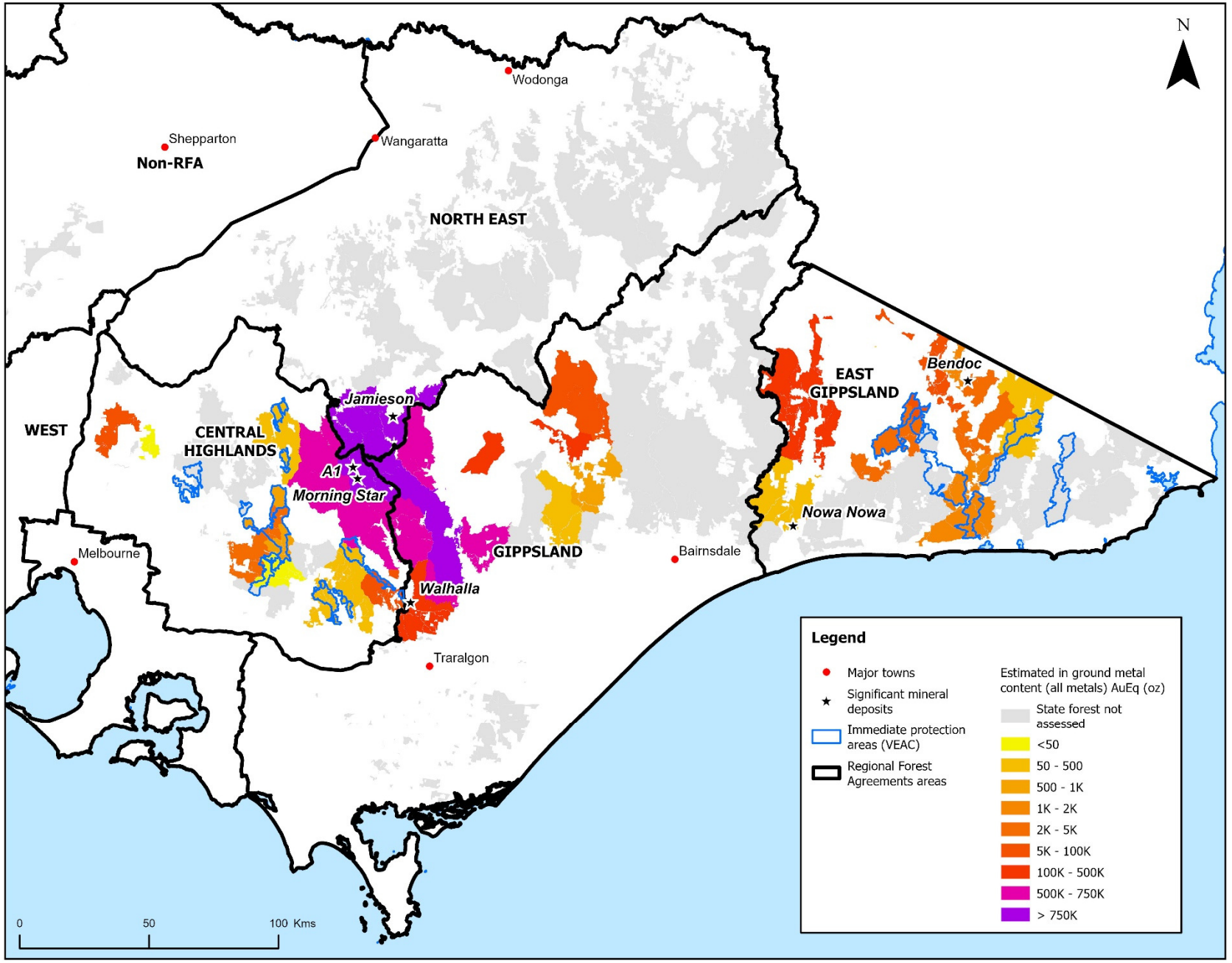

Figure 12 Estimated geological value of the state forests, using the combined in-ground gold and critical minerals estimates, across the Central Highlands, East Gippsland, Gippsland and North East RFAs.

5.4 Geomorphological value of state forests

Geomorphological value can be attributed to significant geological surface features, as discussed in Section 2.4 of this report. This can be in terms of the cultural value of a feature, geotourism or as an example of geological history.

The significant features layer in GeoVic displays points across Victoria that demonstrate geomorphological value from this perspective. Intersection of this layer with the state forests of interest to this study only shows a single significant geological feature in the Gippsland RFA, located in the Boola Boola State Forest. The location is of interest as there is an outcrop that demonstrates an unconformity between the Cretaceous age Tyers Conglomerate and Silurian age Donnellys Creek Beds.

The lack of significant features located within the state forests of interest to this study could be attributed to a number of causes, including the dataset not being kept up to date, or a lack of exploration in these areas which are typically difficult to access. There are also no Cultural Heritage site records in this layer as GSV is not considered a custodian of this data, and it is recommended that this data is sought from elsewhere in DEECA.

The relic layer in GeoVic displays points across Victoria where the remnants of historical mining operations exist (this is excluding historical shafts which are displayed in the shaft layer). There are several sites within the state forest of interest to this study where mining relics are clustered; primarily being in the Woods Point – Walhalla Goldfield along the border of the Central Highlands and Gippsland RFAs, and around the Bendoc and Bonang Goldfields in East Gippsland where there was a lot of historical mining activity. Geotourism based around mining relics and four-wheel driving occurs in these areas.

5.5 Current GSV work in state forests

As recently as 10 years ago there was no significant market interest in Victorian geology for critical minerals, rare earth elements or energy metals, and consequently no assessments for the prospectivity for these commodities were undertaken. Scientific research into the potential for Victorian geology to host such commodities has only just begun, including GSV research supported by the critical minerals initiative from the current Government. These investigations are already showing early promise for regions with potential to supply critical minerals and rare earth elements, including in eastern Victorian geology not previously considered prospective because of previous market demands.

It is only in the last decade that technical knowledge of the States geology has reached the point where the locations of buried geological systems with potential to host base metals, including critical minerals, and gold can be predicted. This has resulted in the opening of a new mineral field in western Victoria – the Stavely Arc – for which there is no historical exploration precedence in Victoria. There are technical indications of similar opportunities throughout eastern Victorian geology. GSV is currently undertaking studies in the Gippsland and East Gippsland RFAs, driven by the need for critical minerals to enable an effective renewables economy transition, including assessment of:

1. Potential for lithium in eastern and north-eastern Victoria in the Silurian-aged Dorchap Dyke Swarm (Omeo Zone) and potential for lithium in Silurian and Devonian highly fractionated intrusive bodies distributed across the Omeo, Tabberabbera, Melbourne, Deddick and Kuark zones;
2. Potential for tin and tungsten across eastern Victoria, including reappraisal of historic mining centres;
3. Potential for phosphate-hosted rare earth elements in Ordovician-aged phosphate-rich carbonaceous metasediments widespread across the eastern Melbourne zone, the western Tabberrabbera Zone and in the Deddick Zone;
4. Potential for economic red-bed copper in Upper Devonian-Lower Carboniferous aged sediments in the Mansfield sub-basin of the Howitt Province;

5. Rare earth element endowment in fractionated alkaline Devonian and Triassic age intrusive complexes, including in the Howitt Province (Mansfield subbasin etc), southern Omeo Zone, Deddick Zone and Kuark Zone
6. Timing and nature of antimony mineralisation in Victoria.

The preliminary results of these research programs are due in mid-2024 and will have significant implications for geological value assessments for the region.

6 Conclusions

6.1 Value of IPAs and state forests

The GSV assessed the geological and geomorphological value of the IPAs and state forests utilising publicly available datasets and de-identified data provided by the Earth Resources Regulator (ERR). Geological value was determined using defined resources, exploration and mining expenditure, historical exploration expenditure, and the estimated quantity of gold and critical minerals in-ground across the state forests. Geomorphological value was defined by the number of geologically significant sites within the state forests.

The range in geological value of the IPAs, based on exploration and mining expenditure from current licences and expired licences over the last 50 years, is shown in Table 12.

Table 12 Total estimated geological value range for the IPAs.

	Low geological value estimate	High geological value estimate
All IPAs	$5.8 million	$47.7 million

Rawson, Armstrong Creek, Murrungowar, Serpentine, 32 Mile North and Yalmy exhibit very high potential for critical minerals (including copper, nickel, tin, tungsten, antimony, zinc, rare earth elements, platinum group elements and cobalt), gold and extractives (including limestone and sedimentary hard rock).

The potential value of gold occurrences cannot be determined without further work, however the nearby A1 and Morningstar operating gold mines, and defined gold resources at Walhalla in the nearby Woods Point – Walhalla Goldfield, currently estimated at $4.2 billion combined, are examples of the potential value of these types of gold deposits.

The GSV also assessed state forests in the Central Highlands, East Gippsland, and select areas of the Gippsland and North East RFAs, as guided by the Council. These areas have deposits and occurrences of gold and critical minerals that are not available in economic quantities in other parts of the state, and the potential for further discovery.

Geological value, based on defined resources and estimated in-ground metals in each state forest, within each RFA is presented in Table 13. The Upper Goulburn State Forest has the highest potential for gold and critical minerals with a total contained metal estimate of 4,480,370 AuEq oz (gold ounces equivalent) across the Central Highlands, Gippsland and North East RFAs. The potential contained metal estimate for the Gippsland RFA reflects the very high potential for further discovery within the RFA.

Table 13 Estimated geological value for the RFAs. Individual values for each state forest are presented in Appendix 2.

RFA	Minimum geological value estimate	Potential contained metal estimate (AuEq oz)
Central Highlands	$3.4 billion	2,505,112 gold ounces equivalent
East Gippsland	$1.4 billion	638,397 gold ounces equivalent
Gippsland*	$277.4 million	7,358,666 gold ounces equivalent
North East*	$150.6 million	2,249,721 gold ounces equivalent

*Only part of the RFA, as per Council guidelines, has been assessed.

6.2 Potential impact of land use changes

The GSV recommends not limiting the extraction of earth resources in the IPAs and state forests examined in this analysis. The implications of land use changes on mining, quarrying and exploration are not fully understood, and it cannot be assumed that land use changes will not impact current or imminent mining, quarrying or exploration proposals.

Although current approved licences might be honoured, any economic investment relating to licences currently under application in IPAs and surrounds would likely be foregone.

For current approved Mining Licences, as known resources become exhausted, an operating mine will often conduct regional exploration to ensure a resource pipeline that will enable continuous utilisation of processing facilities. Any restrictions to future Exploration Licences can have serious impacts upon the ability to continue operating.

Preventing future Exploration Licences in parts of the state prospective for critical minerals also presents an opportunity loss to Victoria in developing potential critical minerals resources that are not found in economic quantities elsewhere in the state. In order to retain options to develop critical minerals to enable a renewable energy transition, access to the full diversity of geology within eastern Victoria should be maintained.

Land use changes could also impact potential future extractives supply of construction and road material for regional towns if development of future quarries is limited, as the market for construction materials is generally required to be close to the supply of extractive source rock.

It is recommended that ERR is consulted regarding clarification around the potential impacts of land use changes on minerals and extractives licences, as well as any assessment of foregone value that involves minerals and extractives licences, exploration and mining expenditure, and royalties.

References

A1 Consolidated Gold, 2014. *ASX Release - 29th August 2014. Option to acquire Walhalla tenements,* A1 Consolidated Gold.

ACIL Allen, 2021. *The impact and value of pre-competitive geoscience research. Three Geological Survey of Victoria case studies,* Geological Survey of Victoria (unpublished).

Agnico Eagle, n.d. *Fosterville.* [Online]
Available at: https://www.agnicoeagle.com/English/operations/operations/Fosterville-Gold-Mine/default.aspx

AusIMM, 2017. *Australian Ore Deposits.* Monograph 32 ed. Neil Phillips (Ed.) Australasian Institute of Mining and Metallurgy.

Australian Government, 2023. *Critical minerals strategy 2023 -2030,* Department of Industry, Science and Resources.

Cayley, R., 2016. *Revised project proposal: the eastern Victorian/central-east Lachlan deep seismic reflection transect.,* Geological Survey of Victoria Unpublished Report 2016/1. Earth Resources Policy and Programs, 19pp.

Cayley, R., Mclean, M., Skladzien, P. & Cairns, C., 2018. *Stavely project - regional 3D geological model. Stavely Project Report 3,* Geological Survey of Victoria.

Cayley, R. et al., 2022. Profiles across a fossil congested subductionzone - is the Governor Fault in Victoria a ~5km thick megathrust progressively superimposed on a probable Rodinian-age passive margin. In: S. Armistead, ed. *Specialist group in Tectonics and Structural Geology conference.* Geological Society of Australia Abstracts Number AB 134, p. 11.

Cayley, R., Taylor, D., VandenBerg, A. & Moore, D., 2002. Proterozoic - Early Proterozoic rocks and the Tyennan Orogeny in central Victoria: the Selwyn Block and its tectonic implications. *Australian Journal of Earth Sciences,* 49(2), pp. 225-254.

Cochrane, G., 1982. *Copper, lead, zinc and barium deposits of Victoria,* Geological Survey of Victoria Bulletin 61. Department of Minerals and Energy.

Cochrane, G. & Bowen, K., 1971. *Tin deposits of Victoria,* Geological Survey of Victoria Bulletin 60. Department of Mines.

Colclough, H. & Pheeney, J., 2022. *Australian critical minerals map 2022,* Geoscience Australia.

Critical Minerals Office, 2023. *Australia's critical minerals list,* Department of Industry, Science and Resources.

Earth Resources Regulation, 2022. *Annual Statistical Report FY 2021 -2022,* Department of Jobs, Precincts and Regions.

Geological Survey of Victoria, 2015. *Victorian mineral exploration fairways - new investment opportunities throughout the State,* Minerals Development Victoria.

Geological Survey of Victoria, 2022. *Eastern Victoria Geoscience Initiative.* [Online]
Available at: https://earthresources.vic.gov.au/projects/eastern-victoria-geoscience-initiative#:~:text=The%20aim%20of%20the%20project,datasets%20and%20applied%20geoscientific%20research.

Haydon, S., 1991. Recent base metal discovery at the Hill 800 Prospect. *ASEG Extended Abstracts,* Volume 1, pp. 49-66.

Hoatson, D., Jaireth, S. & Miezitis, Y., 2011. *The major rare-earth-element deposits of Australia: geological setting, exploration and resources,* Geoscience Australia 204 pp..

Holliday, J., Wood, D., McMillan, C. & Tedder, I., 1998. *Discovery of the Cadia Au-Cu deposits, Lachlan Fold Belt, Australia,* Pathways '98 Extended Abstracts Volumne p74, British Columbia & Yukon Chamber of Mines, and Society of Economic Geologists.

Huston, D. et al., 2015. Tectono-metallogenic systems - the place of mineral systems within tectonic evolution, with an emphasis on Australian examples. *Ore Geology Reviews,* p. 76.

International Energy Agency, 2022. *The role of critical minerals in clean energy transitions. World energy outlook special report,* International Energy Agency.

JORC, 2012. *Australiasian code for reporting of exploration results, mineral resources and ore reserves (the JORC Code),* Joint Ore Reserves Committee of the Australasian Institute of Mining and Metallurgy, Australian Institutue of Geoscientists and Minerals Council of Australia.

Lawrence Consulting, 2022. *Victorian minerals sector economic contribution study 2020/21,* Minerals Council of Australia.

Maher, S. & Radoikovic, A., 1999. *Victoria 1:1000000 Pre-Permian mineralisation and geology,* Geological Survey of Victoria.

Moore, D., Betts, P. & Hall, M., 2016. Constraining the VanDieland microcontinent at the edge of East Gondwana, Australia. *Tectonophysics,* Volume 687.

Phillips, G. et al., 2003. Gold: historical wealth, future potential. In: W. Birch, ed. *Geology of Victoria.* Geological Society of Australia Special Publication 23.

Rawling, T. et al., 2011. *3D Victoria final report,* Geoscience Victoria 3D Victoria Report 14. Department of Primary Industries.

Resources and Geoscience New South Wales, 2018. *Rare earth element opportunities in New South Wales, Australia,* pamphlet.

Schofield, A., 2018. *Regional geology and minerals systems of the Stavely Arc, western Victoria. Record 2018/002,* Geoscience Australia.

State of Victoria, 2022. *Victorian Budget 2022/23: Service Delivery Budget Paper No. 3,* Department of Treasury and Finance.

VandenBerg, A. et al., 2006. *Walhalla - Woods Point - Tallangalook special map area geological report. Geological Survey of Victoria Report 127,* Geological Survey of Victoria. Department of Primary Industries.

Vandenberg, A., Nott, R. & Glen, R., 1992. *Bendoc 1:100,000 map geological report. Geological Survey of Victoria Report 90,* Department of Manufacturing and Industry Development Victoria.

VandenBerg, A. et al., 1995. *The geology and prospectivity of the 1993 Mount Wellington airborne survey area. Geological Survey of Victoria VIMP Report 2,* Department of Agriculture, Energy and Minerals.

VandenBerg, A. et al., 2000. *The Tasman Fold Belt system in Victoria,* Geological Survey of Victoria Special Publication.

VEAC, 2022. *Assessment of the values of the Strathbogie Ranges and Mirboo North Immediate Protection Areas.* Victorian Environmental Assessment Council.

VEAC, 2023. *Assessment of the values of the Immediate Protection Areas in the Central Highlands and East Gippsland. Terms of Reference,* s.n.

Victoria State Government, 2018. *State of Discovery: mineral resources strategy 2028 - 2023,* Department of Economic Development, Jobs, Transport and Resources.

Victoria State Government, 2021. *Fingerboards Mineral Sands Project. Inquiry and Advisory Committee Report. Volume 1 - Main Report,* Planning Panels Victoria.

Waugh, S., 2023. *Tin and tungsten in Victoria. Geological Survey of Victoria.* [Online]
Available at: https://earthresources.vic.gov.au/__data/assets/pdf_file/0008/945611/Victorian-Critical-Minerals-Showcase-Tin-and-Tungsten-in-Victoria.pdf

Appendix 1

Geology and geological sites of interest for current or future supply of critical minerals (CM), gold and extractives, in and around the Central Highlands and East Gippsland IPAs.

RFA	IPA	Geological summary of IPA	Critical Minerals (CM), Gold and Extractives within IPA	Sites of geological interest proximal to IPA		GSV view of prospectivity
				Current supply or Resource	Potential future supply and historical mine occurrences	
Central Highlands	McMahons Ck	Melbourne Structural Zone. The area comprises an extensive tract of folded northerly-trending Early Devonian Walhalla Group - Norton Gully Sandstone and Monty's Hut Formation, which hosts quartz reefs with proven historic gold mineralisation – the McMahons Creek goldfield. The southern part of the area passes into hornfels formed from Walhalla Group, due to thermal metamorphism by the Late Devonian Tynong Granite which forms the southern part of the area.	Gold - Starvation Creek vein-hosted historical occurrence		Gold - Numerous historical gold workings in McMahons Creek Goldfield immediately north of the IPA and Brittania Goldfield immediately west. CM- Britannia Creek Tungsten Mine and intrusion-related gold occurrences southwest of the IPA.	Medium
	Noojee	Melbourne Structural Zone. The northern part of this area is dominated by northerly-trending folded Early Devonian Walhalla Group metasediments (Norton Gully Sandstone) occupying the catchment of Hawthorn Creek, a major tributary of the Latrobe River. In the southern part of the area near Rosworth, a northerly-trending anticlinal structure exposes a conformable succession of Early Devonian Wilson Creek Shale and conformably underlying Silurian Boola Formation. The Palaeozoic bedrock is unconformably overlain by erosional remnants of the former Fumina Basalt lava flow (Burdigalian age) that followed an ancient river-bed southwards along the position of Willow Grove Road. The relative resistance to erosion of the basalt has seen the former valley flow become topographically inverted to become the high ridgeline capping it is today. There are small outcrops of Haunted Hills Formation, a Pliocene fluvial sand silt and gravel. Extensive tracts of Quaternary alluvium occur along the lower reaches of the La Trobe River.	No indication of anomalies in the geophysics or geochemistry	Extractives - WA1347 - basalt	CM - Potential for phosphate-related REEs (under active research by GSV) Extractives - Extractives Industry Interest Area 884007 - basalt Extractives - Extractives Industry Interest Area 884123 - sand and gravel CM - historical tin mine north of IPA along alluvium that extends south into the IPA Gold - several historic mines west of IPA	Medium
	Baw Baw North	Melbourne Structural Zone. This area is dominated by granite geology of the Late Devonian Baw Baw Granodiorite but includes part of the southwestern and northern flanks of the granodiorite and its host rocks which, in the southwest, comprise Silurian Jordan River Group metasediments altered to hornfels by thermal metamorphism from the adjacent granite, and in the northwest comprise Devonian Walhalla Group - Norton Gully Sandstone. The area covers the Late Devonian Tanjil Granodiorite near Tanjil Bren and onlaps part of the east-west trending Tynong Granite in the northwest. The Tynong Granite is comagmatic with the Baw Baw Ganodiorite. The granites are exposed near their roofs – evidence for this includes small stocks of Baw Baw Granodiorite intruding through a hornfels roof just east of Strahan and a 'strip' of remnant roof Norton Gully Sandstone hornfels preserved on top of the Baw Baw Granite northeast of Newlands, exposed along the Thompson Valley Road.	Extractives - Baw Baw Granodiorite potentially of interest	Gold - A1 - 1.3 Mt @ 6.1 g/t au, value of resource is $721M Gold - Morningstar - 4.7 Mt @ 6.1 g/t au, value of resource is $2.7B These resources are closest to Baw Baw North, however, lie within a different geological zone.		Low
	Powelltown	Melbourne Structural Zone. Entirely occupied by the Late Devonian Tynong Granite, with granite-derived alluvium along the course of the La Trobe River. No known mineral prospectivity.	CM - potential for tin mineralisation given the nearby Upper Latrobe River Tinfield	Extractives - WA476 - sand and gravel	CM - Beenak Tin Mine CM - tin mineralisation occurrences west of IPA Potential is similar to Ada	Medium

Paul Range	Melbourne Structural Zone. The area contains a folded conformable succession of Silurian marine strata comprising Llandovery to Early Devonian Humevale Siltstone, with Silurian Melbourne Formation siltstone and sandstone and Llandovery to Wenlock-age Anderson Creek Formation sandstone exposed in the core of a northerly-trending antiform. The antiform is located east of Dixons Creek and is Early Devonian in age. This folded metasedimentary succession is intruded by northerly-trending dykes of Upper Devonian Black Range Granodiorite east of Chum Creek – these are likely controlled by a Late Devonian-age ring-fault structure related to the adjacent Marysville-Acheron Caldera igneous complex, which the Paul Range area touches on at its eastern edge – Taggerty Subgroup ignimbrites including Rubicon Rhyolite, Lake Mountain Rhyodacite.	CM - potential for critical minerals associated with continuation of Black Range Granodiorite ring dyke into the IPA	Extractives - WA522 - hornfels	CM - potential for antimony, gold, tin, tungsten, zinc and copper associated with ring dyke south of IPA Gold - historical gold mine occurrence southwest of IPA	Medium
Royston Range	Melbourne Structural Zone. The bedrock is comprised of volcanics of the 'Marysville-Acheron Caldera complex', a giant-sized Late Devonian intrusive collapse structure related to the emplacement of a large granitic pluton (exposed near Marysville as the Mount Stinton Granodiorite), and comagmatic eruptive material preserved extensively across the Royston Range area as the Taggerty Subgroup ignimbrites – Rubicon Rhyolite, Lake Mountain Rhyodacite. It has no known mineral prospectivity.	Gold - geochemical anomalies indicate potential for antimony and gold			Low
Baw Baw South	Melbourne Structural Zone. This area is dominated by granite geology of the Late Devonian Baw Baw Granodiorite but includes part of the southeastern flank of the granite and its Walhalla Group host rocks, which near Caringal comprise deformed northerly-trending folded Early Devonian Norton Gully Sandstone and Monty's Hut Formation, contact metamorphosed to hornfels.	Extractives - Baw Baw Granodiorite potentially of interest	Extractives - WA1042 - hornfels		Medium
Blue Rock Lake	Melbourne Structural Zone. The geology consists of a conformable westward-younging, northerly trending sequence exposed in the west limb of a broad, Early Devonian age antiform, which exposes, from east to west, Jordan River Group Silurian Whitelaw Siltstone (Tanjil River east Branch), Silurian Boola Formation, pyritic Wilson Creek Shale (a hemipelagic black shale succession with sparse plant fossils and graptolites of Pragian age). Emsian-age Norton Gully Sandstone (Walhalla Group) is exposed along Willow Grove Road. This folded Early Palaeozoic succession has prospectivity for Melbourne Zone-style gold-antimony, and dyke-related gold of the Woods Point Walhalla style nearby. The Palaeozoic bedrock is unconformably overlain by erosional remnants of the former Fumina Basalt lava flow (Burdigalian age) that followed an ancient river bed southwards along the position of Willow Grove Road. The relative resistance to erosion of the basalt has seen the former valley become topographically inverted to become the high ridgeline it is today. Modern alluvial flats in the Tanjil River West Branch valley have potential for placer metals deposits (eg gold)	Gold - several historic mining sites from the Russell's Creek Goldfield within the IPA	Extractives - WA785 - basalt	Gold - Russell's Creek Goldfield historic mining occurrences surrounding IPA. A cluster of historic occurrences from an unnamed Goldfield immediately south of IPA. CM - Potential for phosphate-related REEs (under active research by GSV)	High
Federation Range	Melbourne Structural Zone. The bedrock is comprised entirely of volcanics of the 'Acheron Caldera', a giant-sized Late Devonian intrusive collapse structure related to the emplacement of a large granitic pluton (exposed near Marysville as the Mount Stinton Granodiorite), and comagmatic eruptive material preserved extensively across the Royston Range area as the Taggerty Subgroup ignimbrites – Rubicon Rhyolite, Lake Mountain Rhyodacite. The volcanics are cut by the northwest-trending subvertical 'Farm Spur Fault', possibly related to emplacement of the complex in the Late Devonian. It has no known mineral prospectivity.	No indication of anomalies in the geophysics or geochemistry	Extractives - WA926 - sedimentary hard rock Extractives - WA1125 - sedimentary hard rock	CM and Gold - potential for antimony, gold, tin, tungsten and zinc east of the IPA along the Buxton Granodiorite	Medium
Acheron	Melbourne Structural Zone. The area is entirely occupied by Donna Buang Rhyodacite, the uppermost eruptive unit of the Marysville-Acheron Caldera complex. The Acheron River is flanked by terraces of colluvium derived from weathered Rhyodacite. No known mineral prospectivity.	CM - Acheron River Mineral Sands (rare earth elements), potentially sourced from Donna Buang volcanics	Extractives - WA928 - sedimentary hard rock	CM - Wilks Creek Wolfram Mine (tungsten) north of IPA hosted in similar volcanics to those present in IPA, and related to felsic intrusives, which are also located around the IPA area	Medium

Cement Ck East	Melbourne Structural Zone. Area straddling the southern margin of the Acheron Caldera intrusive complex, dominated by Upper Devonian Donna Buang Rhyodacite overlying other Taggerty Subgroup ignimbrites and intruded by felsic dykes of similar age. The complex is hosted in folded Walhalla Group (Wilson Creek Shale, Norton Gully Sandstone) which is locally contact metamorphosed. The catchment of Cement Creek East Branch is filled with granite-derived colluvium and drains down to extensive alluvial deposits on the Yarra River floodplain.	CM - potential for mineral sands (rare earth elements), similar to Acheron		CM - Potential for phosphate-related REEs (under active research by GSV)	Medium
Torbreck Range	Melbourne Structural Zone. The bedrock in this area is comprised of folded, northerly-trending Walhalla Group Norton Gully Sandstone which has been intruded by the Late Devonian Buxton Granodiorite which forms a ring-shaped dyke that encircles the 'Marysville-Acheron Caldera', a giant-sized Late Devonian intrusive collapse structure related to the emplacement of a group of large granitic plutons (exposed near Marysville as the Mount Stinton Granodiorite), and comagmatic eruptive material preserved extensively across the southern part of the Torbreck Range area as the Taggerty Subgroup ignimbrites – Rubicon Rhyolite, Lake Mountain Rhyodacite. The intrusive rocks have known prospectivity for Cu-Au porphyry-style mineralisation. The hillsides are locally overlain by colluvium.	CM - geochemistry anomalies indicate potential for antimony, gold, tin, tungsten, copper and zinc related to Buxton Granodiorite CM and Gold - geochemistry anomalies indicate potential for antimony and gold hosted within the Norton Gully Sandstone		CM - historic antimony mining occurrence in the Norton Gully Sandstone, which is a typical host-rock for Melbourne Zone gold-antimony deposits	High
Rawson	Melbourne Structural Zone. This region lies south along trend from the State-significant 7+ million oz Walhalla – Woods Point Goldfield and north along strike from Coopers Creek Devonian mafic dyke and associated Copper (and Platinum Group Element) deposit, which is considered of State strategic and critical mineral significance. The geology consists of a north-trending anticlinal structure, dominated by Early Devonian (Emsian) aged Norton Gully Sandstone (Walhalla Group), with an elongated core that exposes underlying Jordan River Group sediments including Pragian aged Boola Formation siltstone and polymictic conglomerate containing limestone, chert and mafic volcanic clasts. The Boola Formation conformably overlies submarine Ludlow-Pragian Whitelaw Siltstone, a deep marine bioturbated silt-dominated succession with occasional slump mass-flow deposits containing fossil material. At Amor, a cap of Aberfeldy Basalt is alkali olivine basalt of Oligocene age – these are remnants of a once much more extensive lava flow that now only capping the top of occasional hills due to topographic inversion and erosion.	Gold - historical gold occurrence on eastern margin of IPA CM and Gold - extension of southern Woods Point -Walhalla Goldfield through the IPA, which is associated with gold, critical minerals and platinum group elements further north and south of the IPA	Gold - Walhalla - 825,000 t @ 3.6 g/t au, value of resource is $277.4M Gold - Tubal Cain - 932,000 t @ 4.1 g/t au, value of resource is $360M Gold - Eureka - 153,000 t @ 9.9 g/t au, value of resource is $145M	CM, Extractives and Gold - Coopers Creek historic mining area immediately south of IPA has historically produced copper, platinum group elements, nickel, limestone and gold Gold - Walhalla Historic Area immediately east of IPA	Very High
Warburton Small	Melbourne Structural Zone. Area of Early Devonian Walhalla Group (Norton Gully Sandstone) on the southern flank of the Late Devonian Acheron Caldera intrusive complex. No significant mineral prospectivity likely.	No indication of anomalies in the geophysics or geochemistry		No indication of anomalies in the geophysics or geochemistry	Low
Tanglefoot	Melbourne Structural Zone. The geology dominated by an apophasis from the Marysville-Acheron Caldera, centred around the northerly-trending Late Devonian S-type Black Range Granodiorite. The granodiorite intrudes folded Llandovery to Early Devonian age deep marine Humevale Siltstone which was thermally metamorphosed to hornfels by the intrusion. East of Toolangi the granite and related felsic dykes intrude comagmatic Taggerty Subgroup ignimbrites, including the Rubicon Rhyolite.	Extractives - EIIA 884128 - granite, sand, hornfels CM - possibility for antimony, gold, tin, tungsten, zinc and copper associated with continuation of Black Range Granodiorite ring dyke into the IPA	Extractives - WA522 - hornfels	CM and Gold - potential for antimony, gold, tin, tungsten, zinc and copper associated with Black Range Granodiorite ring dyke CM - Tin Creek historical mine east of IPA	High
Upper Hardy Ck	Melbourne Structural Zone. Late Devonian Black Range Granodiorite, Taggerty Subgroup ignimbrites, including Lake Mountain Rhyodacite. No known mineral prospectivity.			CM - potential for tin and tungsten associated with Black Range Granodiorite ring dyke southeast of IPA	Medium

	Armstrong Ck	Melbourne Structural Zone. The headwater catchment of Armstrong Creek includes the southern flank of the Late Devonian Marysville-Acheron Caldera igneous complex. This complex disconformably overlies Emsian-age fluvial Cathedral Group red-beds which locally trend northeast. These rocks have red-bed copper prospectivity. The whole succession is intruded by the Late Devonian Mount Stinton Granodiorite which transitions outwards into a narrow, subvertical ring-dyke structure related to emplacement and collapse of the caldera. Elsewhere around the periphery of this caldera, the ring-dyke is called the Buxton Granodiorite. Southeast of the ring dyke, the bedrock comprises a folded northerly-trending succession of Early Devonian Walhalla Group - Norton Gully Sandstone and Monty's Hut formation which hosts quartz reefs with gold mineralisation – the Reefton goldfield.	CM - high prospectivity for antimony associated with the Buxton Granodiorite that extends into the IPA CM - potential for tin associated with geology hosting Ryalls Claim Tungsten Mine that extends into the IPA	Gold - historical occurrences immediately north of IPA in Reefton Goldfield CM - Ryalls Claim Tungsten Mine west of IPA, geology extends into IPA so potential for further occurrences CM - tin occurrences hosted in volcanics immediately north of IPA CM - high prospectivity for antimony associated with the ring dyke that extends into the IPA	Very High
	Ada R	Melbourne Structural Zone. Entirely occupied by the Late Devonian Tynong Granite. No known mineral prospectivity.	CM - potential for tin mineralisation given the nearby Upper Latrobe River Tinfield	CM - Upper Latrobe River Tinfield near the IPA to the southeast hosted in the same Tynong Granite that encompasses the IPA. Primary source undiscovered however possible that it is located in a catchment located within the IPA or associated with the Ada River. CM - magnetic anomalies trending southeast-northwest extending through IPA indicating a set of late, structural or intrusive features extending across granite and potentially linking areas of tin mineralisation	Medium
	Lower Royston Cascades	Melbourne Structural Zone. This area entirely comprised of Lake Mountain Rhyodacite – and ignimbrite eruptive related to the Late Devonian 'Marysville-Acheron Caldera' intrusive complex. It has no known mineral prospectivity.	No indication of anomalies in the geophysics or geochemistry		Low
East Gippsland	Murrungowar	Kuark Structural Zone – this is a region of very complex and very mineral-prospective geology. The area straddles a key part of the Silurian-aged Kuark Metamorphic Complex, which comprises a northeast-trending group of Late Silurian age structures, intrusive rocks and associated high-temperature metamorphic schist, gneiss and migmatite (up to K-feldspar-sillimanite grade). The metamorphic rocks were derived from deformed, Early Ordovician deep marine Pinnak Sandstone which were accreted to the eastern edge of Gondwana in the Late Ordovician. Deformed Pinnak Sandstone strata forms much of the bedrock to the southeast of the major Combienbar Fault / Crabhole Creek Fault system in the SE of Murrungowar (locally intruded by the Watchmaker Granodiorite). Deformed Pinnak Sandstone also dominates the Broderibb River catchment in the NW of Murrungowar. Ordovician black shale (Akuna Mudstone, Warbisco Shale) and Silurian Yalmy Group conglomerate are contained as fault slices within the Crabhole Creek Fault. Key intrusive units within the Kuark Metamorphic Complex include the Purgagoola Granite along the Crabhole Creek Fault and the Arte Gabbro and Pike Hill Granodiorite along the northeast-trending Combienbar Fault. Other elongate outcrops of intrusions within the Kuark Metamorphic Complex interior include the I-type Scrubby Flat Gabbro, and the S-type Mount Jack Granite. There is a small occurrence of Combyingbar Formation in the SE of the area, close to the Princes Hwy. This is a mountainous region subject to Recent and ongoing uplift, so that the once extensive unconformably overlying sheet of non-marine to marginal marine Miocene-Pliocene Sale Group has mostly been eroded away, with only small areas remaining in the SE.	Extractives - WA1119 - sedimentary hard rock (current supply) CM - Crabhole Creek silver, copper, lead, zinc deposit (possible VMS deposit) Gold - gold occurrences in northern portion of IPA	CM and Gold - Club Terrace (copper) northeast of IPA CM - Cabbage Tree Creek silver, copper, lead, zinc deposit. Geological structural corridor setting links to Cabbage Tree Creek, Crabhole Creek, Boulder Flat anomaly and Combienbar Fault anomalies across the region Gold and CM - gold, antimony, tin and tungsten occurrences southwest of the IPA area, possibly associated with Tarlton Granite pluton, which also occurs within the IPA area. CM - Potential for phosphate-related REEs (under active research by GSV)	Very High

Serpentine	Kuark Structural Zone. This area includes the southern end of outcrop of the northeast-trending Brodribb Granodiorite and associated cordierite and andalusite-bearing schist and phyllite envelope of the Kuark Metamorphic Complex schist. The southern end of this complex is truncated at high angle by the Sardine Creek Syncline, a narrow, fault-bounded downthrown rift with fault slices of Warbisco Shale (Bendoc Group), into which Silurian-aged sandstone and conglomerate of the Sardine Conglomerate was deposited in the Late Silurian (Pridoli). This is an area of elevated mineral prospectivity – in particular the intrusive rocks have known prospectivity for Cu-Au porphyry-style mineralisation. The subvertical Youngs Creek Fault emerges from beneath the south side of this rift and continues south to link into the complex Conbienbar Fault Zone system – this fault probably predates the Sardine Creek Syncline, related instead to emplacement of the Kuark Metamorphic Complex. Flow remnants of Leutetian-Priabonian aged Tubbut Basalt – and olivine tholeiite, hawaiite and nephelinite are dotted along the crest of Paradise Ridge Road – they reveal this northeast-trending ridge as a former valley floor which was filled with the lava flow and then, protected from erosion, has subsequently undergone topographic inversion to become a local ridgeline.	CM - historical occurrences, geochemical anomalies and magnetics indicate high potential for critical minerals CM and Gold - Serpentine Prospect (vein-hosted, intrusive-related base metal, gold and silver over a magnetic high) CM - Yalmy-Paradise Ridge, Ellery, Mallins Pit historic mines and occurrences are located over magnetic anomalies. Crust at depth is footwall of the Macquarie Arc and extends outside IPA boundaries. Extractives - Martins Creek (limestone occurrence - possible skarn)		Gold and CM - Sunday Creek (copper and gold) south of IPA CM - Booths Fancy Copper Mine in altered tonalite/granite CM - numerous copper and zinc geochemical anomalies directly north of IPA. Macquarie Arc extends outside IPA boundaries and into nearby IPAs. CM - Potential for phosphate-related REEs (under active research by GSV) Extractives - potential for construction material supply on eastern margin	Very High
Buldah	Mallacoota Structural Zone – Kuark Structural Zone interface. This region encompasses an extremely complex assemblage of Early Palaeozoic accretionary wedge geology aligned along the major, regional-scale northeast-trending and southwest dipping Combienbar Fault Zone and related southeast-dipping faults which form an anastomosing strike-slip fault array that includes, in the north: the northeast-trending Black Jack Fault, the linking northerly -trending Buldah Fault and, in the south, the Bluegum Fault. The faults display a complex movement history with some faults – particularly west-dipping faults – deforming Ordovician Pinnak Sandstone bedrock in the Late Ordovician during accretion of the Mallacoota Zone to the eastern edge of Gondwana, and other faults – particularly southeast-dipping faults – developing subsequently to facilitate and control the intrusion of Silurian and Devonian granites, and subsequently to also truncate and deform these granites. Many granites have been deformed into wide shear zones aligned along the fault traces. Both the I-type Weeragua Granodiorite, of Late Silurian-Early Devonian age, and the related Fiddlers Green Granodiorite to the north, are sheared in proximity to these major fault zones. These two intrusions are separated, at surface, by a northeast-trending screen of Pinnak Sandstone hornfels. The Fiddlers Green Granite appears to have been deformed, stretched and sheared along the eastern flank of the Buldah Fault. The Buldah Fault bounds the eastern flank of an unconformably (on Pinnak Sandstone) to disconformably (on Devonian granite) overlying sub-basin of Late Devonian Combyingbar Formation fluvial interbedded sandstone and red mudstone succession. This indicates the Buldah Fault has experienced post-Late Devonian west-side up and/or wrench reactivation. The Combyingbar Formation is intruded in places by small subvertical plugs of alkali-olivine basalt and phonolite of Paleogene age. The Late Silurian-Early Devonian age Blue Gum Tonalite is an I-type mafic intrusion that also intrudes the deformed Ordovician Pinnak Sandstone – the eastern flank of this intrusion is bound by the Blue Gum Fault, indicating that the faults are associated with the intrusion but with fault movements that outlasted the intrusion. The Blue Gum Tonalite is evidently more aerially extensive at depth as small apophyses poke up through the host Pinnak Sandstone in places, for example in tributaries of Farmer Creek.	Gold - Bemm Goldfield historical mine occurrences extending through southern portion of IPA and into Bemm River IPA Gold - gold occurrences in northern potion of IPA	Extractives - WA1095 - granite	CM - red-bed copper occurrence in Buldah Graben CM - Student's Gossan strataform silver, lead, zinc deposit (analogous site in Yass Basin in Canberra) Gold - gold occurrences and geochemical anomalies along the Combienbar Fault	High

Mueller River	Mallacoota Structural Zone: The area is dominated by an extensive tract of Drummer Granodiorite north of Princes Highway, cut by NE-trending Early Devonian faults and disconformably overlain by a thin sheet of non-marine to marginal marine Mio-Pliocene Sale Group marine sand, silt and gravel. Young (Quaternary-aged) colluvial sand aprons are derived from erosion the granite and occur along the trace of one of the Early Devonian faults – implying this fault is undergoing modern reactivation in the current in-situ compressive stress field. Adjacent to the colluvial apron an extensive alluvial flat adjacent to the modern Thurra River contains lacustrine deposits. To the south, the Drummer Granodiorite passes into the Everard Granite of similar age, and both intrude folded Pinnak Sandstone of Ordovician accretionary wedge origin in the vicinity of the Mueller River. All Palaeozoic rock units are in places unconformably to disconformably covered by remnants of a once-extensive sheet of non-marine to marginal marine Mio-Pliocene Sale Group sand silt and gravel, mostly now eroded away on the crest of the range separating the Thurra and Mueller Rivers.		Extractives - WA1036 - sedimentary hard rock Extractives - WA768 - granite Extractives - WA1362 - granite	CM - Mt Cavell vein-hosted bismuth occurrence associated with Drummer Granodiorite CM - Tin, tungsten and molybdenum occurrence associated with geochemical and magnetic anomaly	Medium
Coopracambra	Mallacoota Structural Zone: geology dominated by the Early Devonian I-type Beehive Granite and (in the south) the co-magmatic I-type Drummer Granodiorite. These two intrusions are in contact with one another, components of a vast intrusive complex that extends north into NSW. Both granite units intrude folded and faulted Pinnak Sandstone (part of the Lachlan Supergroup) – Early Ordovician, deep marine to shallow marine metasediments deformed and 'cratonised' in a mid-late Ordovician-aged accretionary wedge setting, along the outer eastern flank of the Gondwana supercontinent. The accretionary wedge - forearc was related to subduction westwards beneath the Ordovician Macquarie volcanic Arc which lay just west of the Mallacoota Zone and was active throughout the Ordovician. Thin north-trending fault-slices of Ordovician Warbisco Shale are mapped just south of the area, likely occur in the area but have not been mapped out. Granite has been faulted against the sandstone across the Rockton Fault, a sub-vertical-steeply east-dipping fault active in the Middle Devonian. Northeast-trending south-side-up faults of similar age cut across and displace the Drummer Granodiorite and its contact with Pinnak Sandstone host-rock in the south. The mineral prospectivity for this region appears to be low to moderate, with possible mineralised (Cu, Au, Mo) porphyries of the nearby demonstrated Warangabell style.	CM - copper and zinc geochemical anomaly in northern portion of IPA		Gold - Thurra River CM - Genoa River Beds red-bed copper occurrence	Low
Bemm River	Mallacoota Structural Zone – Kuark Structural Zone interface. This is a region of complex geology with a bedrock of deformed Ordovician deep marine Pinnak Sandstone of the Mallacoota Zone, cut by the northerly-trending Club Terrace Fault and the Bemm Fault, which bounds the Silurian age Poddy Creek Metamorphics, rocks which locally reach up to cordierite-grade and were derived from the thermal metamorphism of Pinnak Sandstone, associated with intrusion of the adjacent Watchmaker Granodiorite. Small outcrops of Watchmaker Granodiorite occur along the trace of the Bemm Fault. The intrusive rocks have known prospectivity for Cu-Au porphyry-style mineralisation. The Bemm Fault bounds the eastern flank of an unconformably overlying sub-basin of Late Devonian Combyingbar Formation, which comprises a fluvial interbedded sandstone and red mudstone succession – The whole Palaeozoic succession is unconformably to disconformably overlain by Sale Group sediments which are preserved more extensively to the south but are more eroded in the north so that only scattered remnants remain. In the south of the area, Siluro-Devonian I-type Yarak Granite and Tonghi Granodiorite are disconformably overlain by non-marine to marginal marine Mio-Pliocene Sale Group sand silt and gravel.	Gold - Bemm Goldfield historical mine occurrences, which extend through the northern portion of the IPA and into the Buldah IPA Gold - Lower Bemm Goldfield historical mine occurrences CM - copper and zinc geochemical anomalies	Extractives - WA814 - sand and gravel	CM - Point Pearl heavy mineral sands deposit in older coastal dune deposits to the south of the IPA CM - heavy mineral sands potential in Sale Group south of IPA (age-equivalent to Loxton Group that hosts economically significant Murray Basin HMS deposits)	High

Goongerah	Kuark Structural Zone. An area of complex and mineral-prospective geology that includes parts of the ne-trending Kuark Metamorphic Complex (equivalent to the Cooma Complex north along strike in NSW), with andalusite-cordierite bearing phyllite and schist related to the Silurian I-type co-magmatic Brodribb, Jungle Creek and Goongerah Granodiorites cut and displaced sinistrally/ NE-site-down by the SE-trending subvertical Goongerah Fault. The intrusive rocks have known prospectivity for Cu-Au porphyry-style mineralisation. There are alluvial flats preserved along the Brodribb River and along Goongerah Creek.	Gold - B.A. Creek Goldfield historical mine occurrences in southern area of IPA, schist hosted gold	Extractives - potential for construction material supply on northwest margin	High
32 Mile South	Kuark Structural Zone. This area is dominated by deformed Ordovician Pinnak Sandstone with a northeast-trending structural grain, cut by late (Silurian) southeast trending rift faults related to the adjacent Sardine Creek Syncline.	CM - discrete magnetic anomaly within IPA, similar to Serpentine/Ellery prospects, which are copper related	Similar potential to Serpentine	High
32 Mile North	Kuark Structural Zone. This area includes the southern end of outcrop of the northeast-trending Brodribb Granodiorite and associated cordierite and andalusite-bearing schist and phyllite envelope of the Kuark Metamorphic Complex schist.		Similar potential to Serpentine	Very High
Yalmy	Kuark Structural Zone – Deddick Structural Zone transition – an area of potentially high mineral prospectivity. The area includes outcrops of Jungle Creek Granodiorite and Kuark Metamorphic Complex east of a tract of folded Pinnak Sandstone, and a major fault boundary – the southeast-dipping McLauchlan Fault. The McLauchlan Fault separates the Kuark Zone to the east from the Deddick Zone to the west. The trace of the fault is marked by fault slices of Ordovician Warbisco Shale (black graptolitic shale) interleaved with slices of Silurian-aged Yalmy Group conglomerate, quartzose sandstone and siltstone. These fault slices transition northwards into a simpler, north-dipping succession of similar rocks deformed within the Yalmy Fold and Thrust Belt. The Yalmy Fold and Thrust Belt forms much of the surface geology of the eastern Deddick Zone. The McLauchlan Fault is cut and displaced at high angle across the northerly-trending Goongerah Fault. The Deddick Zone is a highly prospective region of Eastern Victoria with exposures of Ordovician aged calc-alkaline intermediate volcanics rocks that correlate with the Macquarie Volcanic Arc succession directly north along-strike in NSW, and geophysical evidence that Macquarie Arc rocks exist at varying depth beneath the whole Deddick Zone. Directly north along strike from the Deddick Zone the Macquarie Volcanic Arc succession is famous for its World Class, tens of billions A$, intrusion-related gold-copper+ deposits – for example: Cadia-Ridgeway, Lake Cowal, Parkes, etc. These rocks, with similar mineral prospectivity, are now recognised to continue into NE Victoria and lie at shallow depth beneath the Deddick Zone. Because this is a new geological understanding, the Deddick Zone has not yet been properly assessed for mineral wealth. The GSV considers that the presence of an underlying coherent crustal foundation of strong, stable Macquarie Arc rocks at shallow depth is what has defined the shape of the Deddick Zone, the context of the Silurian Yalmy Group and local related carbonate-rich sedimentary and volcanic successions (and mineral systems – for example Benambra Copper-Zinc VHMS) that were deposited into it, and the nature of the structures that developed upon and around it subsequently. The GSV considers the Deddick Zone and areas adjacent to it to be an area of exceptional mineral prospectivity in NE Victoria.	CM - copper, cobalt, nickel geochemical anomalies Gold - gold geochemical anomalies	Gold - Bendoc, Welcome Stranger, Star of Bendoc, Victory Mine and Victoria Mine historical mine occurrences northeast of IPA. Area is prospective for intrusion-related gold. CM - Yalmy fold thrust belt to the north west is highly prospective for copper, zinc, nickel and cobalt, however this is not within State Forest CM - Potential for phosphate-related REEs (under active research by GSV)	Very High

Appendix 2

Assessment of gold and critical minerals geological value for state forests of interest.

RFA	State Forest	Resource or Reserve	Gold Potential			Metal (Other – including critical minerals) Potential								Gold and Other Metals Potential
			Estimated in-ground gold (oz)	Estimated in-ground gold (AU$)	Conceptual estimate (AU$)	Ni (t)	Zn (t)	Pb (t)	Cu (t)	Ag (oz)	ZrO2 (t)	REO (t)	Co (t)	Estimated in-ground metal (AU$)	Estimated combined in-ground gold equivalent (oz)
Central Highlands	BIG RIVER STATE FOREST		643370.17	$1,855,981,399	$80,151,056									$-	643370
	BLACK RANGE STATE FOREST		-	$-	$-									$-	-
	CARRANG CARRANG STATE FOREST		21006.40	$60,598,849	$2,616,978									$-	21006
	ERICA STATE FOREST		13189.79	$38,049,635	$1,643,184									$-	13190
	LATROBE STATE FOREST		10.74	$30,976	$1,338									$-	11
	MARYSVILLE STATE FOREST		-	$-	$-									$-	-
	MOUNT DISAPPOINTMENT STATE FOREST		6735.07	$19,429,188	$839,055									$-	6735
	MOUNT ROBERTSON STATE FOREST		2.27	$6,561	$283									$-	2
	NEERIM STATE FOREST		133.85	$386,114	$16,674									$-	134
	NOOJEE STATE FOREST		-	$-	$-									$-	-
	RUBICON STATE FOREST		100.67	$290,404	$12,541									$-	101
	TANJIL STATE FOREST		95.02	$274,102	$11,837									$-	95
	THOMSON RIVER FOREST RESERVE		731129.53	$2,109,147,855	$91,084,117									$-	731130
	UPPER GOULBURN STATE FOREST	A1 - 249,000 oz Gold	1013186.01	$2,922,818,734	$126,222,713	602.02	19109.61	5902.55	5948.84	709097.28				$209,884,145	1086281

		Morningstar - 920,000 oz Gold													
	WOODS POINT (T)		-	$-	$-									$-	-
	YARRA STATE FOREST		2483.72	$7,164,985	$309,422									$-	2483
	YARRA TRIBUTARIES FOREST RESERVE		574.09	$1,656,120	$71,520									$-	574
	Total		**2432017**	**$7,015,834,921**	**$302,980,718**	**602**	**19110**	**5903**	**5949**	**709097**	**0**	**0**	**0**	**$209,884,145**	**2505112**
East Gippsland	AMBOYNE STATE FOREST		6226.11	$17,960,953	$775,649	1.99			1111.17		132.99	50.89	0.12	$14,223,996	11242
	BEMM STATE FOREST		1661.30	$4,792,485	$206,965									$-	1661
	BENDOC STATE FOREST	Bendoc - 16,000 oz Gold	3863.99	$11,146,767	$481,376									$-	3863
	BONANG STATE FOREST		8110.56	$23,397,176	$1,010,413	1.66			930.71		111.39	42.63	0.10	$11,913,890	12311
	BULDAH STATE FOREST		119.00	$343,289	$14,825									$-	119
	CLUB TERRACE STATE FOREST		1249.53	$3,604,619	$155,666									$-	1249
	COAST RANGE STATE FOREST		467.98	$1,350,008	$58,300									$-	467
	COLQUHOUN / BOYANGA GIDI STATE FOREST		-	$-	$-									$-	-
	COMBIENBAR STATE FOREST		3961.00	$11,426,614	$493,461									$-	3961
	COTTONWOOD STATE FOREST		1500.95	$4,329,922	$186,989									$-	1500
	DEDDICK STATE FOREST		139.95	$403,736	$17,435	0.04			24.98		2.99	1.14	0.00	$319,735	252
	DRUMMER STATE FOREST		-	$-	$-									$-	-
	ELLERY STATE FOREST		-	$-	$-									$-	-
	GELANTIPY STATE FOREST		111086.05	$320,458,817	$13,839,100	35.46			19825.46		2372.86	907.98	2.12	$253,784,146	200580
	KENNY STATE FOREST		122.84	$354,380	$15,304	0.04	21.92				2.62	1.00	0.00	$81,525	151

	MURRUNGOWER STATE FOREST		-	$-	$-						$-	-
	NUNNETT STATE FOREST		156708.76	$452,070,309	$19,522,778	50.02	27967.72	3347.39	1280.89	2.99	$358,012,546	282958
	ORBOST STATE FOREST		-	$-	$-						$-	-
	TAMBOON STATE FOREST		-	$-	$-						$-	-
	TARA STATE FOREST	Nowa Nowa - 9Mt @ 50.8% Iron Ore	223.00	$643,306	$27,781						$-	223
	TUBBUT STATE FOREST		3603.44	$10,395,125	$448,916	1.15	643.10	76.97	29.45	0.07	$8,232,315	6506
	TULLOCH ARD STATE FOREST		59986.70	$173,048,439	$7,473,143	19.15	10705.79	1281.35	490.31	1.14	$137,043,975	108313
	WAYGARA STATE FOREST		-	$-	$-						$-	-
	WINGAN STATE FOREST		-	$-	$-						$-	-
	YALMY STATE FOREST		1679.89	$4,846,122	$209,281	0.54	299.81	35.88	13.73	0.03	$3,837,838	3033
	Total		**360711**	**$1,040,572,066**	**$44,937,384**	**110**	**22**	**61509**	**7364**	**2818**	**7**	**$787,449,965**	**638397**
Gippsland	ABERFELDY / NAMBRUC STATE FOREST		20384.25	$58,804,077	$2,539,470	4559.04	144714.12	44699.10	45049.63	5369882.85		$1,589,419,827	573925
	BARKLY RIVER STATE FOREST		107640.01	$310,517,740	$13,409,792	3639.99	115541.62	35688.34	35968.21	4287383.71		$1,269,013,284	549594
	BEN CRUACHAN STATE FOREST		115847.67	$334,195,041	$14,432,303	3917.55	124351.79	38409.61	38710.82	4614301.18		$1,365,776,869	591502
	BOOLA BOOLA STATE FOREST		96404.08	$278,104,549	$12,010,020	3052.09	96880.38	29924.28	30158.95	3594924.22		$1,064,053,721	466978
	BOULUNG - DEERA STATE FOREST		15861.81	$45,757,841	$1,976,065							$-	15862
	CAREY STATE FOREST		65998.07	$190,389,917	$8,222,040	2231.81	70842.84	21881.84	22053.44	2628753.60		$778,079,004	336977
	DARGO STATE FOREST		766.00	$2,209,741	$95,428							$-	766
	DEEP CREEK STATE FOREST	Walhalla - 96,300 oz Gold*	79586.76	$229,590,285	$9,914,918	264.45	8394.24	2592.80	2613.14	311483.84		$92,195,418	111695

	FREESTONE / WURRUNDYAN'GARLA STATE FOREST		66.00	$190,395	$8,222								$-	66
	GLENMAGGIE STATE FOREST		189361.33	$546,265,765	$23,590,634	6403.51	203261.91	62783.26	63275.62	7542406.24				$2,232,460,253	966852
	HIBERNIA STATE FOREST		380000.00**	$1,096,216,400	$47,340,400									$-	380000
	MOORNAPA STATE FOREST		160.21	$462,174	$19,959									$-	160
	MOUNT USEFUL STATE FOREST		291646.41	$841,335,741	$36,333,310	9862.42	313055.52	96696.16	97454.46	11616499.42				$3,438,342,143	1489105
	NARRACAN STATE FOREST		-	$-	$-									$-	-
	STONY CREEK TRIB OF THOMSON		396.47	$1,143,735	$49,393	13.41	425.58	131.45	132.48	15791.79				$4,674,178	2024
	STONY STATE FOREST		142659.82	$411,542,191	$17,772,560	4824.23	153132.15	47299.25	47670.18	5682249.54				$1,681,876,558	728401
	THOMPSON RIVER		76.61	$221,006	$9,544	2.59	82.23	25.40	25.60	3051.47				$903,198	391
	UPPER GOULBURN STATE FOREST		224128.45	$646,561,277	$27,921,923	7579.21	240581.22	74310.39	74893.15	8927207.46				$2,642,344,523	1144368
	VALENCIA STATE FOREST		-	$-	$-									$-	-
	Total		**1730984**	**$4,993,507,875**	**$215,645,980**	**46350**	**1471264**	**454442**	**458006**	**54593935**	**0**	**0**	**0**	**$16,159,138,975**	**7358666**
North East	DELATITE ARM FOREST RESERVE		-	$-	$-									$-	-
	UPPER GOULBURN STATE FOREST	Jamieson - 52,200 oz Gold	456711.85	$1,317,513,204	$56,897,162	14767.45	468752.39	144787.59	145923.04	17393917.39				$5,148,387,395	2249721
	Total		**456712**	**$1,317,513,204**	**$56,897,162**	**14767**	**468752**	**144788**	**145923**	**17393917**				**$5,148,387,395**	**2249721**
All RFAs	**Total**	**1,333,500 oz Gold** **4,572,000 t Iron Ore†**	**4980424**	**$14,367,428,066**	**$620,461,244**	**61830**	**1959148**	**605132**	**671386**	**72696950**	**7364**	**2818**	**7**	**$22,304,860,481**	**12751897**

*Partially located in Boola Boola State Forest

**Sourced from S&P Global historic production for Grant-Dargo

†The dollar value of these gold and iron ore Resources has not been included in this table

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