Assessment of the Economic Implications of Proposed Land Uses Changes in the State Forests of the Central Highlands Regional Forest Agreement Area

SOCIO-ECONOMIC CONTEXT

September 2024

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Alluvium recognises and acknowledges the unique relationship and deep connection to Country shared by Aboriginal and Torres Strait Islander people, as First Peoples and Traditional Owners of Australia. We pay our respects to their Cultures, Country and Elders past and present.

Artwork by Melissa Barton. This piece was commissioned by Alluvium and tells our story of caring for Country, through different forms of waterbodies, from creeklines to coastlines. The artwork depicts people linked by journey lines, sharing stories, understanding and learning to care for Country and the waterways within.

This report has been prepared by Alluvium Consulting Australia Pty Ltd for VICTORIAN ENVIRONMENTAL ASSESSMENT COUNCIL under the contract titled 'ASSESSMENT OF THE ECONOMIC IMPLICATIONS OF PROPOSED LAND USES CHANGES IN THE STATE FORESTS OF THE CENTRAL HIGHLANDS REGIONAL FOREST AGREEMENT AREA'.

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Contents

Figures

Tables

1 Introduction

The Victorian Environmental Assessment Council (VEAC) is assessing the values of all state forests within the Central Highlands Regional Forest Agreement (RFA) area. This work is informing the Eminent Panel for Community Engagement's (EPCE) recommendations on future public land uses for the region. This assessment follows the Victorian Government's announcement of a cessation of native forest logging on public land, including all state forests within the Central Highlands RFA area.

Previous work from VEAC for this assessment has identified:

- Biodiversity, ecological, geological, geomorphological values,
- Cultural heritage and socio-economic values,
- Present and future threats (e.g., climate change) to the values above; and,
- The land use categories associated with the values.

The previous work culminated in an interim report that was the basis of public consultation by EPCE to inform their recommendations to the government for future public land use in the Central Highlands RFA area. Following these recommendations, the remaining task from this assessment (this project) is – on behalf of VEAC – to conduct an economic analysis of the implications of the proposed land use changes recommended by EPCE.

1.1 Purpose of this report

This report presents an overview of the socio-economic profile for the Central Highlands RFA area. The socio-economic profile includes demographic information on the community; economic information related to the local economy and indicators related to community wellbeing and resilience. This report will also describe the economic use and non-use values associated with forests in the RFA area.

The information presented in this report aims to provide the necessary context to support understanding of the potential economic impacts (both positive and negative) of proposed land use changes. This information is intended to be used to establish the base case or 'business-as-usual' scenario that will provide a point of comparison to assess impacts on communities in the region and the values provided by forests. The base case and assessment of impact from proposed changes to land use is intended to be documented in a subsequent report.

Importantly, the base case aims to reflect the current state of the RFA area, and with no native logging on public land. However, this aim is challenged by the fact that much of the available data pertains to a time when native forest logging was permitted. There is therefore potential for a disconnect between the available data and the situation today.

1.2 Data

This report draws on the existing data and information currently available. This includes data from the most recent national Census collected in 2021. This data is expected to provide the most accurate and detailed view of the region's population and economy and will provide the main reference point for the base case.

Much of the data used for this report was collected prior to the decision to end native forest logging and therefore will not reflect recent changes or impacts from this decision. Where possible, the data has been presented in a way which highlights those aspects of the population and economy which are linked to the logging industry and therefore where the existing data is more likely to misrepresent the current state in the RFA area. The timing of the census data collection with reference to the end of native forest logging in Victoria is shown in Figure 1.

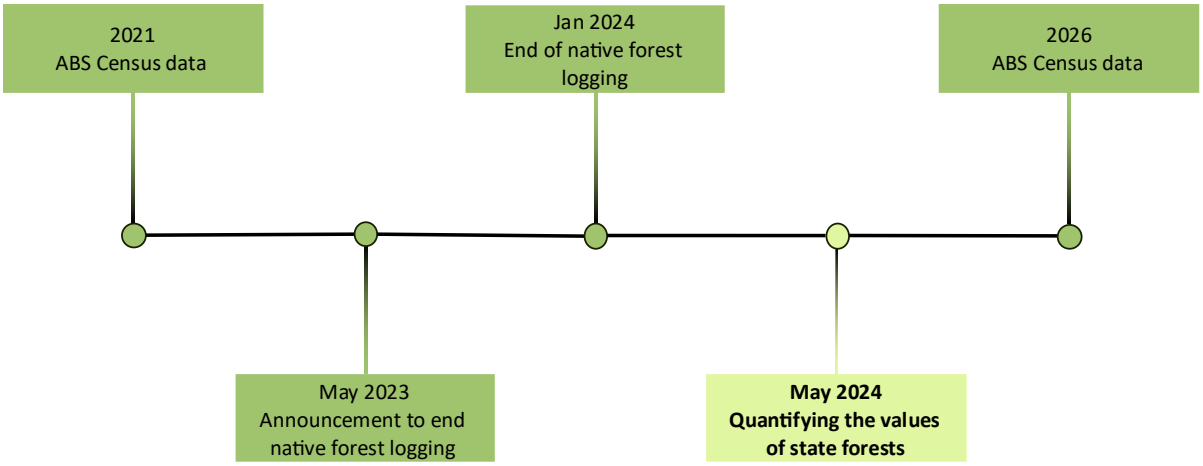

Figure 1. Timing of ABS census data collection with reference to the end of native forest logging in Victoria

1.3 Presentation of the socio-economic profile and boundary of the assessment

This report presents the socio-economic profile of the communities living and working within and nearby to the Central Highlands RFA area. These communities are expected to be most affected by changes to future land uses.

The boundary of this assessment is defined by statistical area level 2 (SA2) units that have all or part of their area within the RFA boundary. This broader region, as opposed to the exact boundary of the RFA area, has been used as SA2s are generally the smallest area available for relevant ABS statistics. The study area is about 70% larger than the area covered by the RFA area. As such, it is expected provide a more comprehensive picture of the communities that are expected to be linked with the RFA area, than focusing only on the communities in the RFA area.

In the rest of the report, the terms 'RFA region' and 'study area' will refer to the broader RFA region inclusive of the SA2 units. 'RFA area' will refer to the area within the RFA boundary, which is the boundary of VEAC's assessment of values of state forests and the area subject to recommendations on future public land uses by the EPCE.

To more easily compare the populations and economies across the RFA region, we have divided it into two sections, Urban and Rural. The area within the Melbourne Greater Capital City Statistical Area was classified as Urban, whereas the rest of the RFA region was classified as Rural. This distinction is illustrated in Figure 2, along with the boundaries of the SA2s underpinning the analysis. Table 15 of the Appendix provides a comparison of the proportion to which each SA2 area is within the RFA boundary.[1]

[1] SA2 units Craigieburn – North West and Craigieburn – West do not overlap with the RFA area. However, they are completely surrounded by the Mickleham – Yuroke and Craigieburn – South SA2s, which overlap the RFA area. As such, they have been included in the analysis.

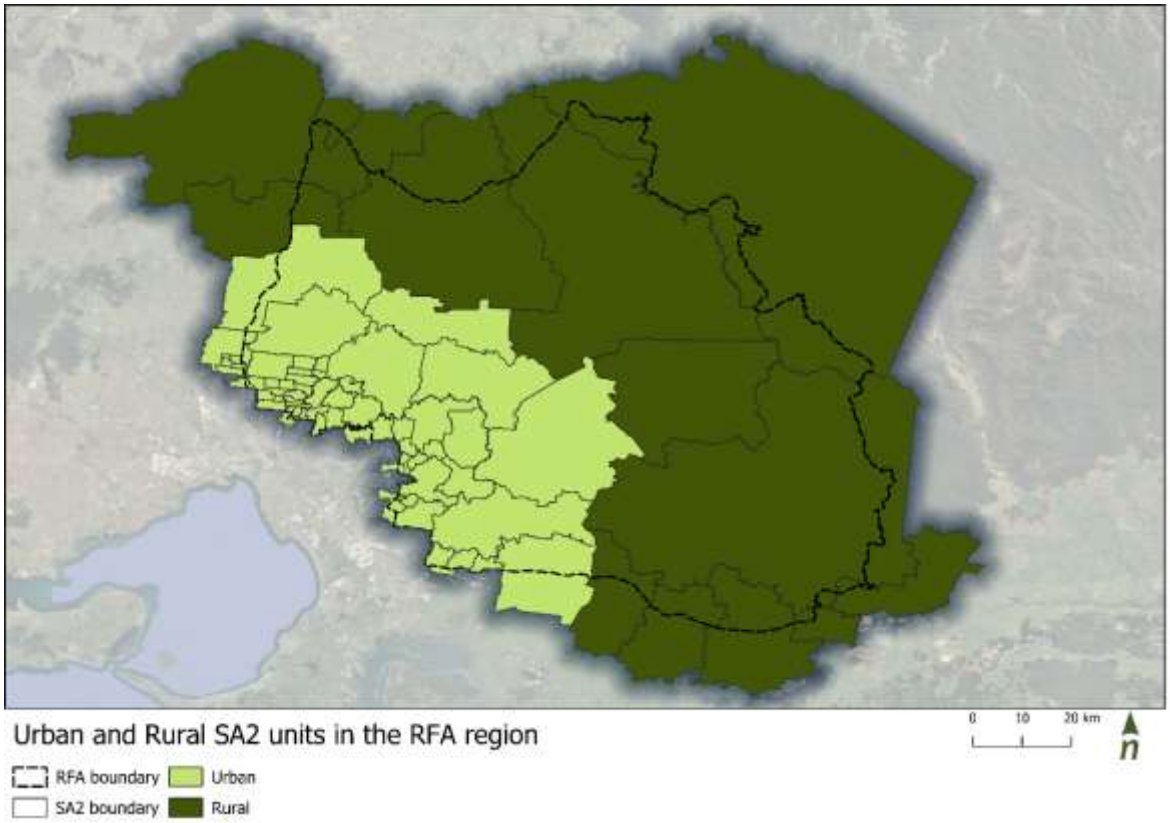

Figure 2. Urban–Rural split of the RFA region

The Urban–Rural distinction aims to highlight key differences across the RFA region in a more succinct manner than would be possible at a LGA level. The data underpinning the Urban and Rural comparison is predominantly SA2 data. This SA2 data is also intended to underpin the economic assessment in the next phase of the project.

The total area covered by the Rural and Urban SA2s is approximately 1.94 million hectares (M ha), where the Rural area is 1.50 M ha (77%), and the Urban area is 0.44 M ha (23%). By comparison, the total area covered by the RFA area is 1.13 M ha.

Public land use in the RFA area is shown in Figure 3 and represents approximately 617,000 ha, or 55% of the total RFA area. This covers a wide range of different land use categories, such as state forests, national parks, water production reserves and frontages, and a variety of reserves for purposes such as nature conservation, recreation, and utilities including for transport, communications and earth resources.

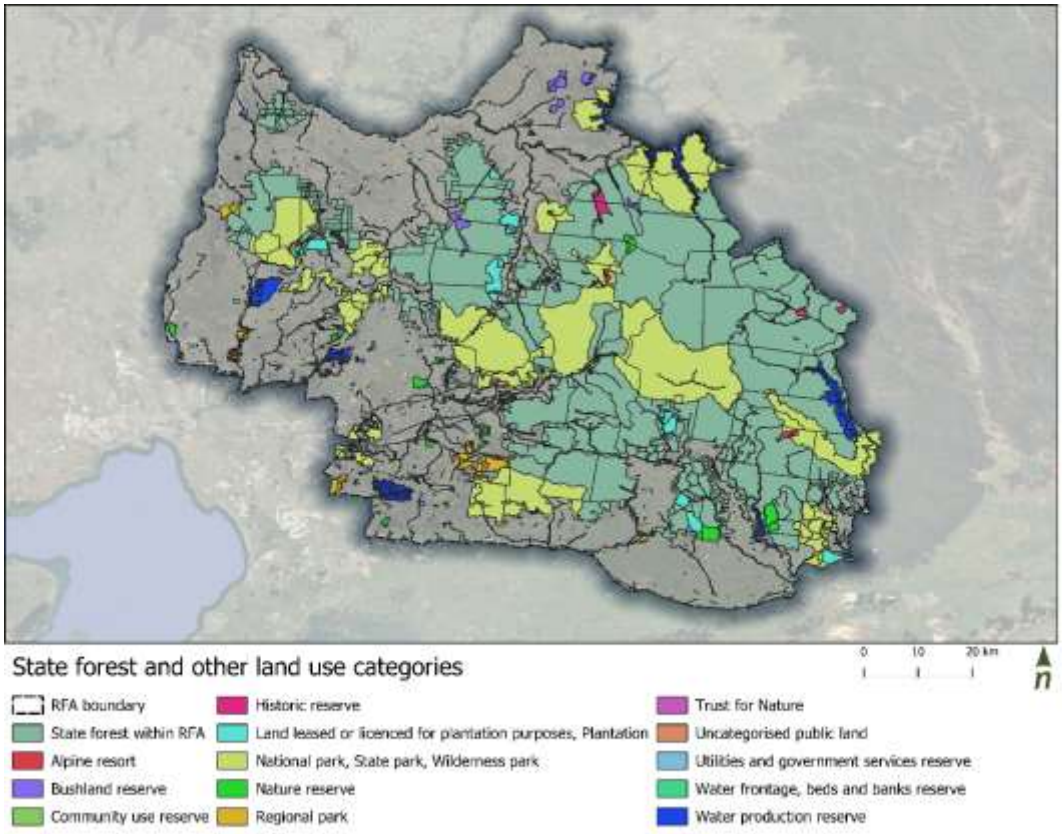

Figure 3. State forest and other land use categories in the RFA area

The LGAs that fall within or partially overlap the RFA area are Banyule, Baw Baw, Cardinia, Darebin, Hume, Latrobe, Manningham, Mansfield, Maroondah, Mitchell, Murrindindi, Nillumbik, Knox, Whittlesea, and Yarra Ranges, as presented in Figure 4.

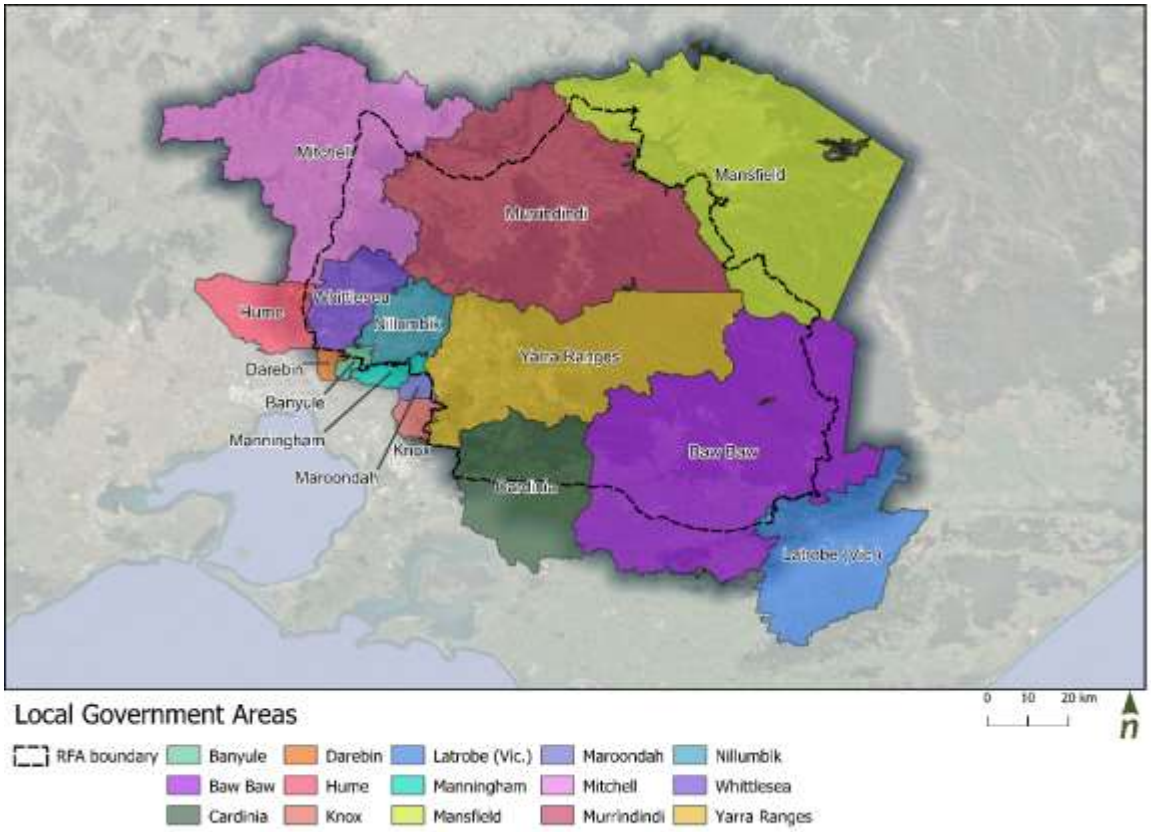

Figure 4. LGAs within the RFA region

2 Socio-economic profile of the RFA region

The following section provides an overview of the socio-economic setting of the RFA region. This includes demographic information on the community; economic information related to the local economy and indicators related to community wellbeing and resilience.

2.1 Community demographics

The following section describes the demographics of the communities living in the RFA region. This includes presenting the size and growth rate of the region's population and age profiles. A high-level summary of the communities' demographics is shown in Table 1. This is based on ABS 2021 Census data.

Table 1. Summary statistics for the RFA region (2021 Census)

Variable	Urban	Rural	RFA region	Rest of Victoria
Population (millions of people)	0.77	0.13	0.89	5.65
Aboriginal and Torres Strait Islander status (% of population)	0.88%	1.66%	0.99%	0.97%
Year 10 secondary schooling and above (% of population)*	82%	77%	81%	81%
Average age (years)	37	42	38	39
Average weekly personal income ($)	$1,168	$1,137	$1,163	$1,398
Unemployment rate (% of population)	4.90%	4.37%	4.83%	5.07%

Source: ABS 2021 Census

* This refers to the proportion of people who reported having a postgraduate degree, a graduate diploma, a bachelor's degree, an advanced diploma, Certificate Level III & IV, and Secondary Education – years 10 and above.

In total, 0.89 million people live in the RFA region, with the majority located on the western side of the region on the outskirts of Melbourne. In general, persons living in the Urban area have completed more schooling, are younger, and earn a higher weekly income than those living in the Rural area. There is a marginally lower rate of unemployment in the Rural area compared to the Urban area and the rest of Victoria.

Population

The Victorian Department of Transport and Planning (DTP) provides population projections at the SA2 level for Victoria. These projections are presented in Table 2 for the Urban and Rural areas and for the RFA region, for the years 2026, 2031, and 2036, with 2021 as the reference year.

Between 2021 and 2036, the population in the Urban area is expected to grow faster than the population in the Rural area. Over the 15-year period, the population in the Urban area is projected to grow by an average of 2.23% per year, while the Rural area population is expected to grow by an average of 1.50% per year.

Based on these population projections, approximately 90% of the projected population growth from 2021 to 2036 for the RFA region is attributed to growth in the Urban area. In the Urban area, the population is projected to grow by 301,000 people, whereas, in the Rural area, the population is projected to increase by 32,000 people.

Table 2. Projected population growth from 2021 to 2036

Variable	2021	2026	2031	2036	Compound Annual Growth Rate[2] over 15 years (%)
Urban	766,000	860,000	961,000	1,067,000	2.23%
Rural	128,000	138,000	149,000	160,000	1.50%
RFA region	894,000	998,000	1,110,000	1,227,000	2.13%

Note: Values are rounded to the nearest 1,000.
Source: DTP (2024)

[2] This shows the estimated average yearly rate of change for the population over 15 years.

Figure 6 presents the population for the RFA region in 2021 and the projected population in 2036 by SA2, with darker colour representing a higher population. It shows that the RFA region's population is concentrated towards the northern and especially western and southern boundaries of the RFA region, with the centre of the RFA region occupied by state forest and other public land. In general, SA2s closer to Melbourne, have higher populations, despite generally being smaller than the SA2s further from Melbourne, as shown in Figure 6. Figure 6 also shows the location for the urban centres and localities in the RFA region.[3]

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[3] SA1 units that meet the benchmarks for density and/or levels of urban infrastructure, according to the ABS.

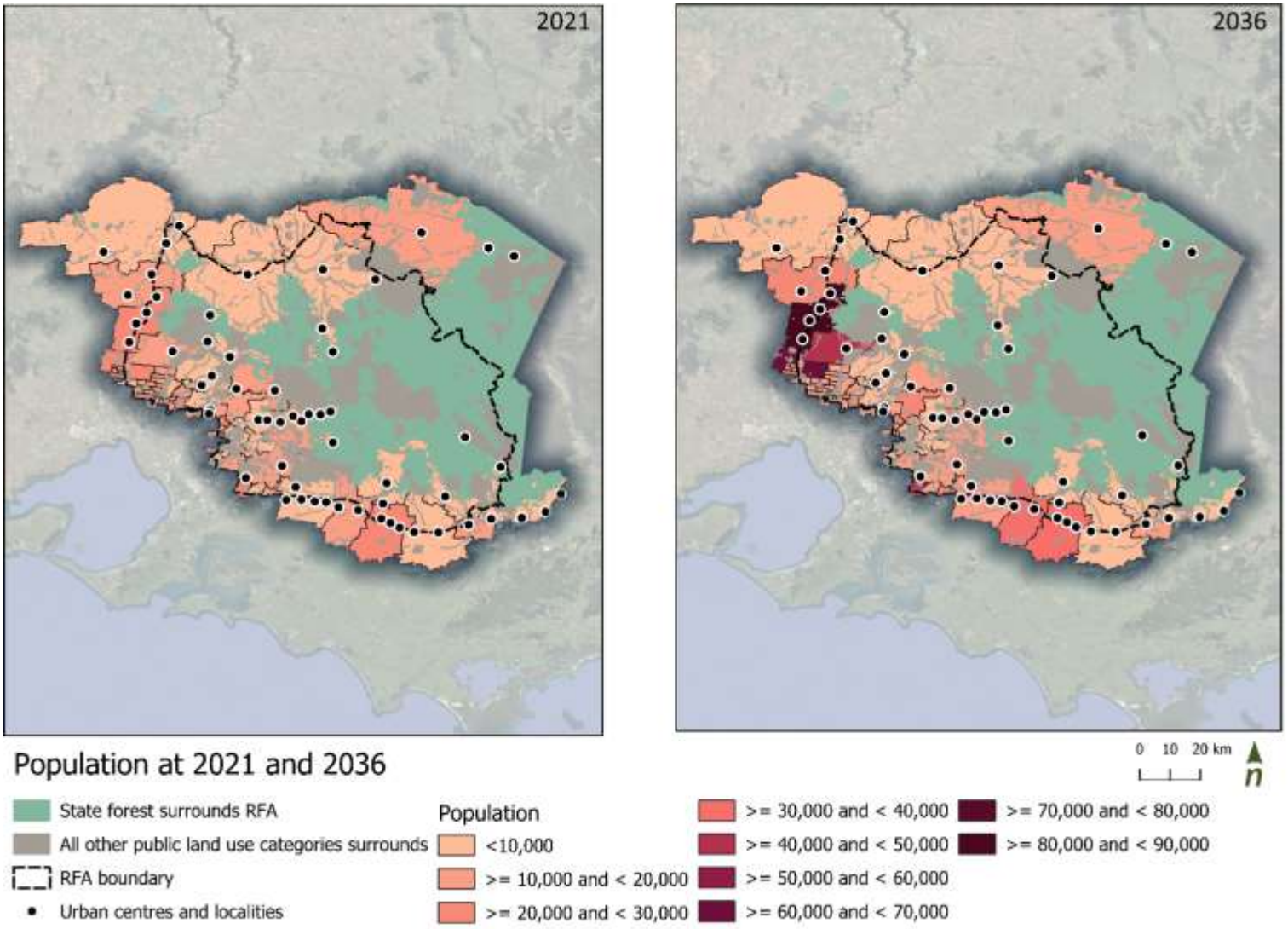

Figure 6. Population for the RFA region in 2021 and projected population in 2036, by SA2
Source: DTP (2024)

The SA2 units that are projected to experience a population increase of more than 25% between 2021 and 2036 are shown in Figure 7**Error! Reference source not found.**. The 6 SA2 units projected to experience the greatest increase, both in terms of absolute and percentage change in population growth, are Wallan, Mickleham – Yuroke, Wollert, Whittlesea, Beaconsfield – Officer, and Pakenham – North West. These are all located in the Urban area and account for 70% of the Urban areas total projected population increase between 2021 and 2036. This highlights that population growth is not expected to be uniform across the SA2s in the Urban area, as illustrated in Figure 6.

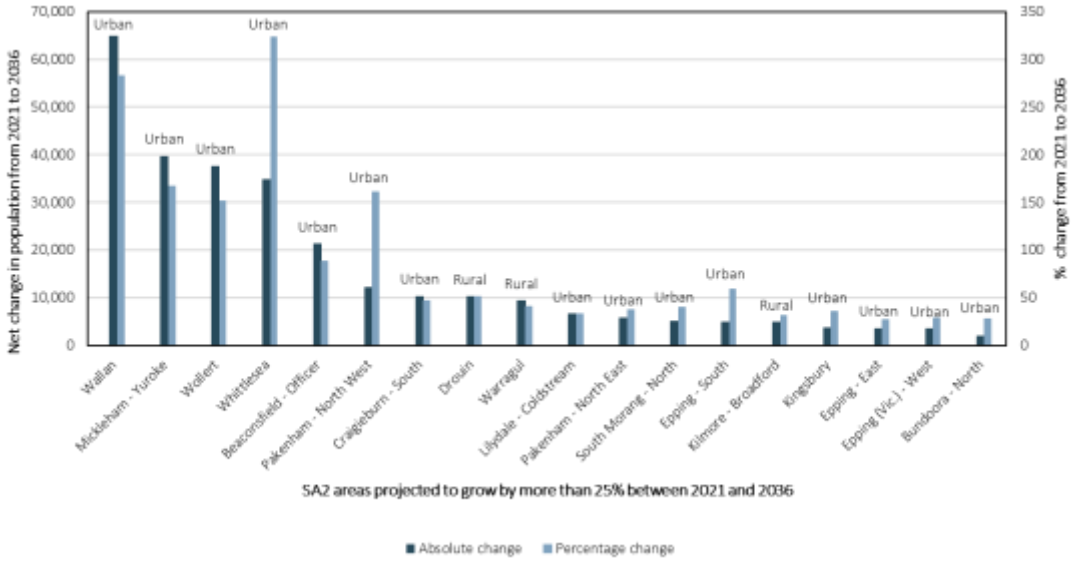

Figure 7. SA2 projected to undergo a significant increase in population in the RFA region

Age

The age distribution for the RFA region is illustrated in Figure 8. Generally, the age distribution for residents residing in the RFA region aligns with the age distributions for the rest of Victoria. Residents in Rural areas skew older compared to those in Urban areas, and the average age for the two groups is 42 and 37, respectively.

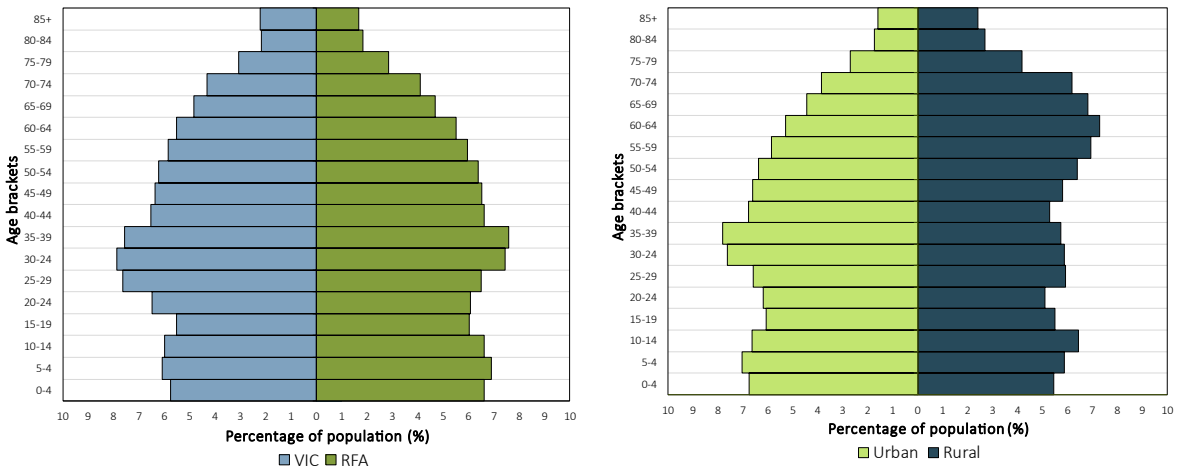

Figure 8. Age distribution pyramid

Figure 9 shows the share of the working age population relative to the total population in the RFA region for 2021 to 2036 based on projections by DTP. The share of the working age population relative to total population for both the Urban and Rural areas is projected to have a slight decrease from 2021 to 2036. The working age population is projected to remain proportionately larger in the Urban area compared to the Rural area.

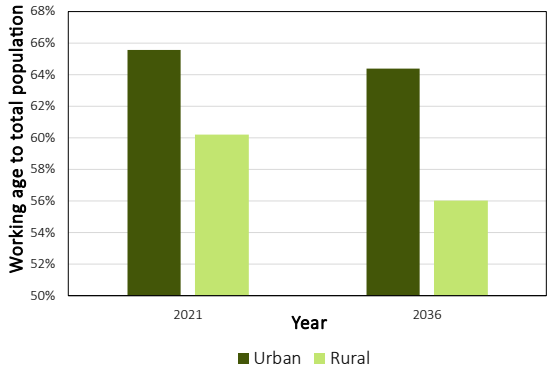

Figure 9. Share of working age population to total population
Source: DTP (2024).

When factoring in population growth, the working age population in the Urban area is projected to increase by 37% from 2021 to 2036. Over the same period, the working age population in the Rural area is projected to increase by 17%.

Table 3. Estimated working age population

Variable	2021	2026	2031	2036	% change from 2021 to 2036
Urban	502,000	559,000	622,000	687,000	37%
Rural	77,000	81,000	85,000	90,000	17%

Note: Values are rounded to the nearest 1,000.
Source: DTP (2024).

Key Point

The majority of the RFA region's population is concentrated to the west in the Urban area on the outskirts of Greater Melbourne. On average, Urban area communities are younger than their Rural counterparts and earn a higher weekly income. Urban communities are projected to have a higher rate of population growth compared to Rural communities.

2.2 Local economy

The following section provides an overview of the local economy in the RFA region. This includes presenting information on employment by industry, economic diversity, and industry value-added.

Accounting for the end of native forest logging in Victoria

As noted in section 1.2, much of the data used for this report was collected prior to the decision to end native forest logging on public land and therefore will not reflect recent changes or impacts from this decision. To account for this, in presenting the economic data, we have highlighted jobs directly linked to the logging industry. This aims to highlight information which may have changed since the data was collected (e.g., loss of jobs).

Importantly, many of the jobs linked to the logging industry may be unaffected by the decision to end native logging on public land in Victoria. This includes jobs linked to plantation forestry, jobs linked to forest fire management, and jobs in businesses that can import substitute timber or timber products from elsewhere. Furthermore, affected persons may have been redeployed into alternative jobs including in relation to forest and fire management (Forest Fire Management Victoria, 2024). In the absence of more robust information, data on jobs linked to the logging industry in the RFA region are highlighted to provide an understanding of the potential scale of direct impacts on the region's communities and economy from the cessation of logging.

Employment

Our analysis has identified 1,748 jobs in the RFA region directly linked to the logging industry. This represents 2% of jobs for the Agriculture, Forestry and Fishing industry, 6% of jobs for the Manufacturing industry,[4] and 5% of jobs in Wholesale Trade. These jobs are summarised using the Urban-Rural distinction in Table 4 and presented in Figure 10. The specific industry of employment categories used for this analysis are listed in **Error! Reference source not found.** of Appendix A.

Table 4. Jobs directly linked to the logging industry in the RFA region

Area	Agriculture, Forestry and Fishing		Manufacturing		Wholesale Trade	
	People employed	Job linked to logging industry (% of area)	People employed	Job linked to logging industry (% of area)	People employed	Job linked to logging industry (% of area)
RFA region	7,674	173 (2%)	20,606	1,281 (6%)	6,029	294 (5%)
Urban	4,132	91 (2%)	18,454	1,153 (6%)	5,317	251 (5%)
Rural	3,542	82 (2%)	2,152	128 (6%)	712	43 (6%)

Note: Jobs linked to logging industry are those in the 'industry of employment' categories listed in Table 16 of Appendix A.

[4] In January 2023, the production of white pulp and graphic paper ceased at Opal Australian Paper's Maryvale mill due to a lack of available timber supplies. This is expected to have caused the loss of around 200 jobs (Godde et al., 2023).

Figure 10 presents the share of employment for each industry across the Urban and Rural areas, based on place of work. Healthcare and social assistance employs the most people in both areas. The second largest employer of people in the Urban and Rural areas is the education and training industry. The proportion of jobs linked to logging are similar, in percentage terms, for both regions. They account for 1% of the total jobs in the RFA region.

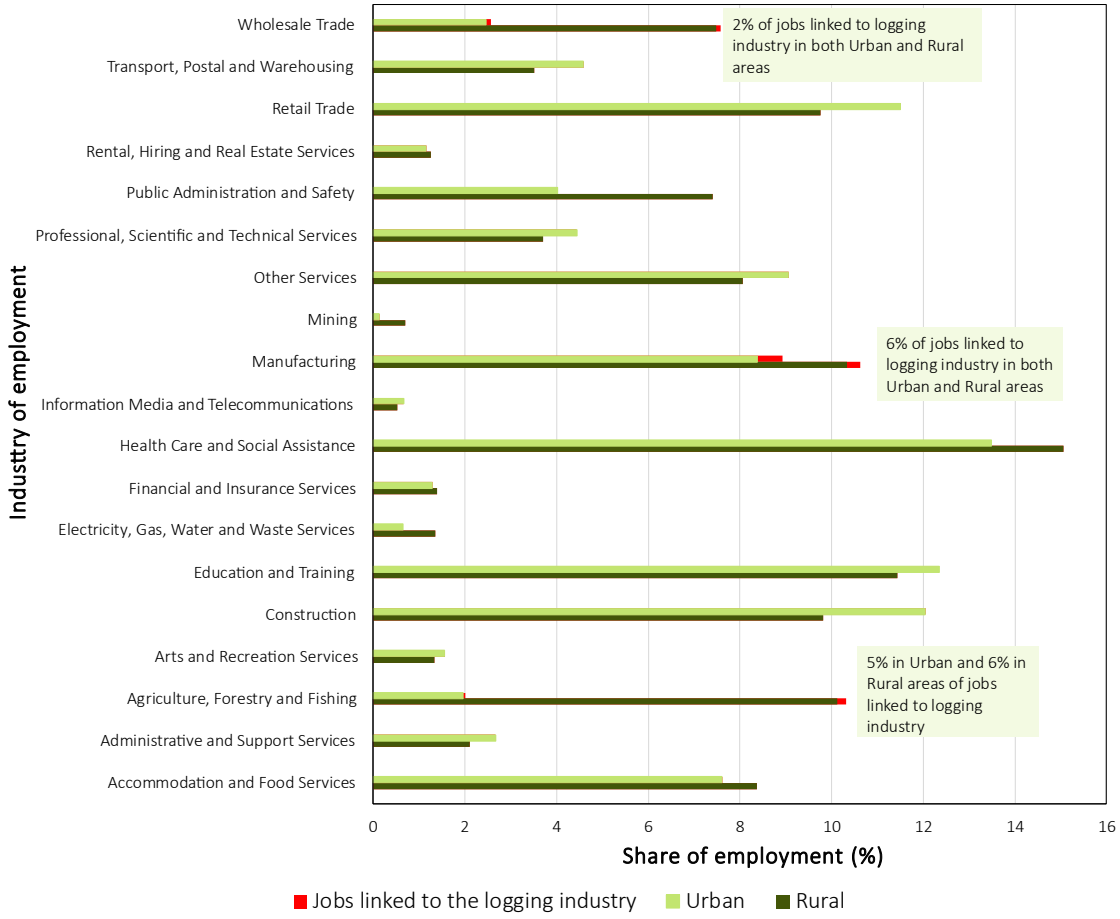

Figure 10. Urban–Rural share of employment in the RFA region

Figure 11 shows how the share of employment for each industry has changed over the three census periods in the RFA region. In the RFA region, the three industries that employed the most people in 2021 were healthcare and social assistance, education and training, and construction. The three industries that saw the greatest increases in percentage terms from 2011 (and excluding 'other services') are healthcare and social assistance (156%), transport, postal, and warehousing (155%), and public administration and safety (131%).

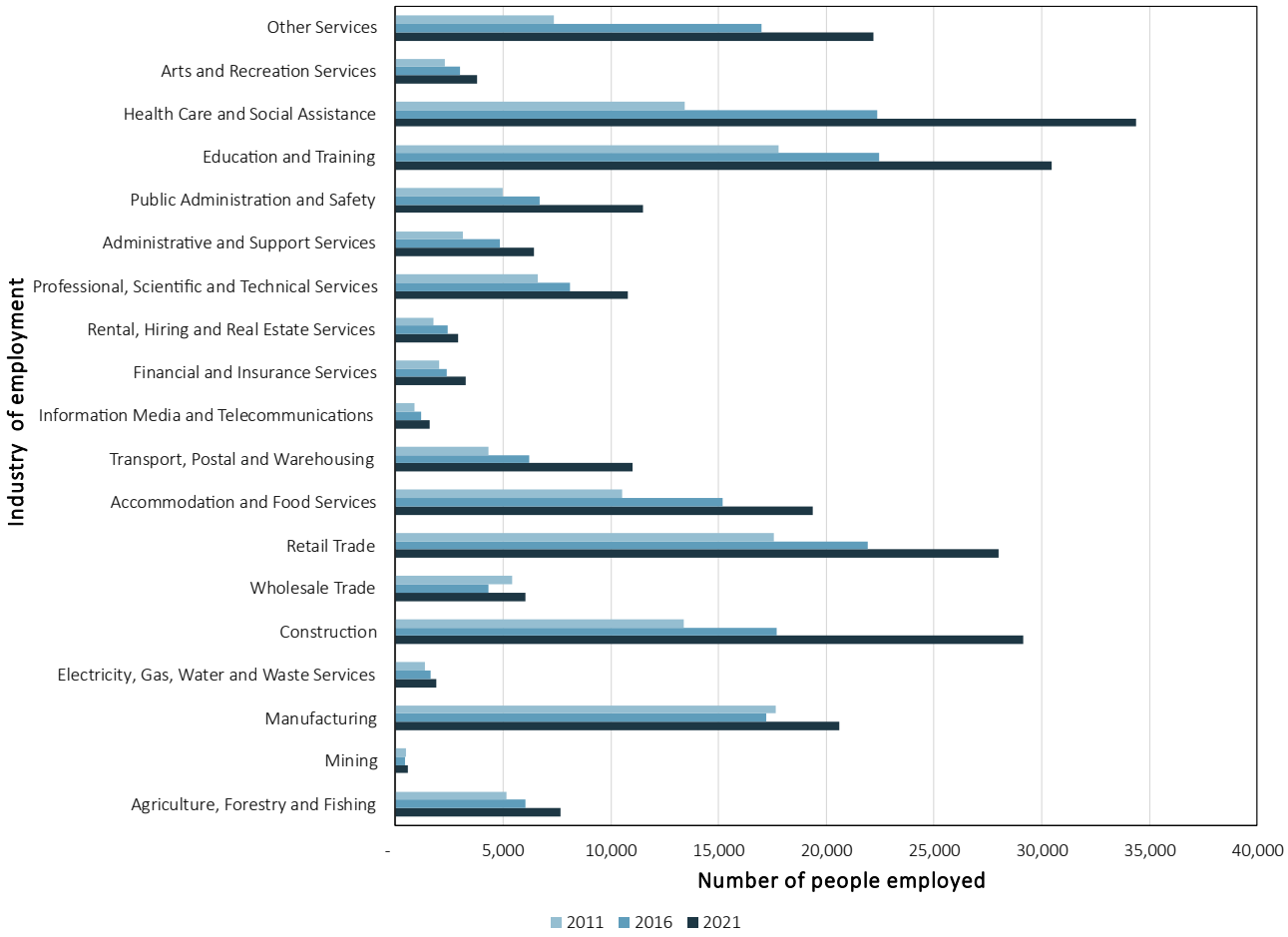

Figure 11. Change in employment for all industries over 2011 to 2021 in the RFA region

Economic diversity

This section uses the Herfindahl–Hirschman Index (HHI) to assess the level of economic diversification within the RFA region. This supports an understanding of the area's vulnerability to economic shocks.

The HHI is a standard measure of economic concentration (DITRDCA, 2023) and ranges from 0 to 1. Lower values indicate a diverse economy with employment spread across many sectors, while higher values reflect concentration in a small number of industries and increasing vulnerability to sector-specific shocks.[5]

The estimated HHI for the Urban area, Rural area, RFA region and the rest of Victoria are presented in **Error! Not a valid bookmark self-reference.**, based on the 2021 Census data. The RFA region is found to have a marginally higher HHI compared to Victoria. The Urban area is also found to have a marginally higher HHI value than the Rural area. Overall, the HHI results suggest similar levels of economic diversification across all these areas. The results also indicate that an economy on the urban fringe (i.e., Urban area) is similar to that of a more rural economy (i.e., Rural area) from a diversification perspective.

Table 5. HHI (2021 Census)

Region	HHI
RFA region	0.09
Urban	0.09
Rural	0.08
Rest of Victoria	0.08

Note: Typically, HHI values greater than 0.25 indicate a high concentration of employment in a few industries. Values between 0.25 to 0.15 are taken to infer a moderately concentrated region and values less than 0.15 as moderately diversified. A region with a score less than 0.01 indicates a highly diversified economy (US Department of Justice and Federal Trade Commission, 2010).

Based on HHI values, both the RFA region and the rest of Victoria are expected to exhibit a similar level of vulnerability to economic shocks. The same pattern applies when comparing Rural and Urban areas. These results reflect average conditions for each area, however, it is important to recognise that within these areas, some locations may be significantly more vulnerable than the regional average.

Levels of public sector versus private employment may also influence an area's level of vulnerability to economic shocks, with the public sector often having more secure long-term funding. Table 6 shows the proportion of people employed in the public sector for the different regions. The Rural area has a higher proportion of workers employed in the public sector compared to the Urban area. The RFA region has a slightly lower proportion of workers employed in the public sector compared to the rest of Victoria.

Table 6. Public and private sector employment in the RFA region (2021 Census)

Region	Public sector employment (%)
RFA region	13.5%
Urban	12.9%
Rural	16.3%
Rest of Victoria	14.7%

Table 7 shows the share of employment for each industry across the Urban and Rural areas by comparison to the rest of Victoria. This highlights the industries which are more prevalent (based on employment) in the RFA region compared to the rest of Victoria, which include construction, manufacturing, and agriculture, forestry and fishing.

[5] A region with high employment concentration is more exposed to sector-specific shocks. For example, a downturn in construction, a fall in demand for manufacturing output, or policy changes affecting public administration. When a large share of local jobs depends on only one or two sectors, a shock to those sectors can trigger disproportionate job losses, reduced income, and slower recovery. In contrast, a more diversified economy can absorb these shocks because declines in one sector are partly offset by stability or growth in others.

Table 7. Share of employment in the RFA region (2021 Census)

Industry	Share of employment (%)			
	RFA region	Urban	Rural	Rest of VIC
Accommodation and Food Services	8%	8%	8%	6%
Administrative and Support Services	3%	3%	2%	3%
Agriculture, Forestry and Fishing	3%	2%	8%	2%
Arts and Recreation Services	2%	2%	1%	2%
Construction	12%	12%	10%	8%
Education and Training	12%	12%	11%	9%
Electricity, Gas, Water and Waste Services	1%	1%	1%	1%
Financial and Insurance Services	1%	1%	1%	4%
Health Care and Social Assistance	14%	13%	15%	15%
Information Media and Telecommunications	1%	1%	1%	2%
Manufacturing	8%	9%	5%	7%
Mining	0%	0%	1%	0%
Other Services	9%	9%	8%	8%
Professional, Scientific and Technical Services	4%	4%	4%	9%
Public Administration and Safety	5%	4%	7%	6%
Rental, Hiring and Real Estate Services	1%	1%	1%	2%
Retail Trade	11%	11%	10%	10%
Transport, Postal and Warehousing	4%	5%	3%	5%
Wholesale Trade	2%	3%	2%	3%
Total	100%	100%	100%	100%

Key Point

A comparison of economic diversification between the Urban and Rural areas in the RFA region indicates that the Urban area is slightly more vulnerable to economic shocks than the Rural area. Other factors, such as level of household income, accommodation costs, level of educational attainment, etc, which influence an area's ability to cope with economic shocks are discussed in section 2.4.

Industry Valued Added (IVA)

Industry value added (IVA) is a measure of economic output. It is the difference between the market value of the products or services generated by an industry less the cost of inputs required. It provides an understanding the productivity of different industries and their contributions to the economy.

Table 8 presents an estimate of IVA by industry and the total for the RFA region. These estimates are derived using industry employment data (as shown in Figure 11) and an estimate of each industry's IVA per full-time equivalent (FTE) (as shown in Table 13 of the Appendix). Total IVA in the RFA region is estimated to be around $26 billion (B).

Table 8. Industry value added for the RFA region

Industry of employment (INDP) Level 1	Estimated IVA ($2021 B)
Construction	$4.35
Manufacturing	$3.68
Health Care and Social Assistance	$2.64
Education and Training	$2.09
Retail Trade	$1.89
Other Services	$1.44
Financial and Insurance Services	$1.46
Professional, Scientific and Technical Services	$1.25
Public Administration and Safety	$1.18
Wholesale Trade	$0.89
Transport, Postal and Warehousing	$0.91
Accommodation and Food Services	$0.94
Agriculture, Forestry and Fishing	$0.87
Rental, Hiring and Real Estate Services	$0.60
Electricity, Gas, Water and Waste Services	$0.54
Administrative and Support Services	$0.59
Arts and Recreation Services	$0.35
Information Media and Telecommunications	$0.27
Mining	$0.06
Total	$26.00

Source: Alluvium data transformation based on National Institute of Economic and Industry Research (NIEIR) (2022) data. See Table 17 for further supplementary information regarding data derivation.
Note: Information presented in this table is based on 2020/21 base prices.

Figure 12 shows the percentage contribution of each industry to IVA in the RFA region. It indicates that Construction, Manufacturing, and Health Care and Social Assistance contribute the highest proportion with 17%, 14%, and 10% of the total, respectively. Figure 12 also highlights the proportion of IVA attributable to jobs linked to the logging industry, for the relevant industries. In total, jobs linked to the logging industry contribute $293 million or 1.1% of the RFA region's total IVA (78% of this value add is attributed to the manufacturing sector, 15% is attributed to wholesale trade, and 7% is attributed to agriculture, forestry, and fishing).

Further information on how IVA was estimated for the RFA region is provided in Table 17 in Appendix A.

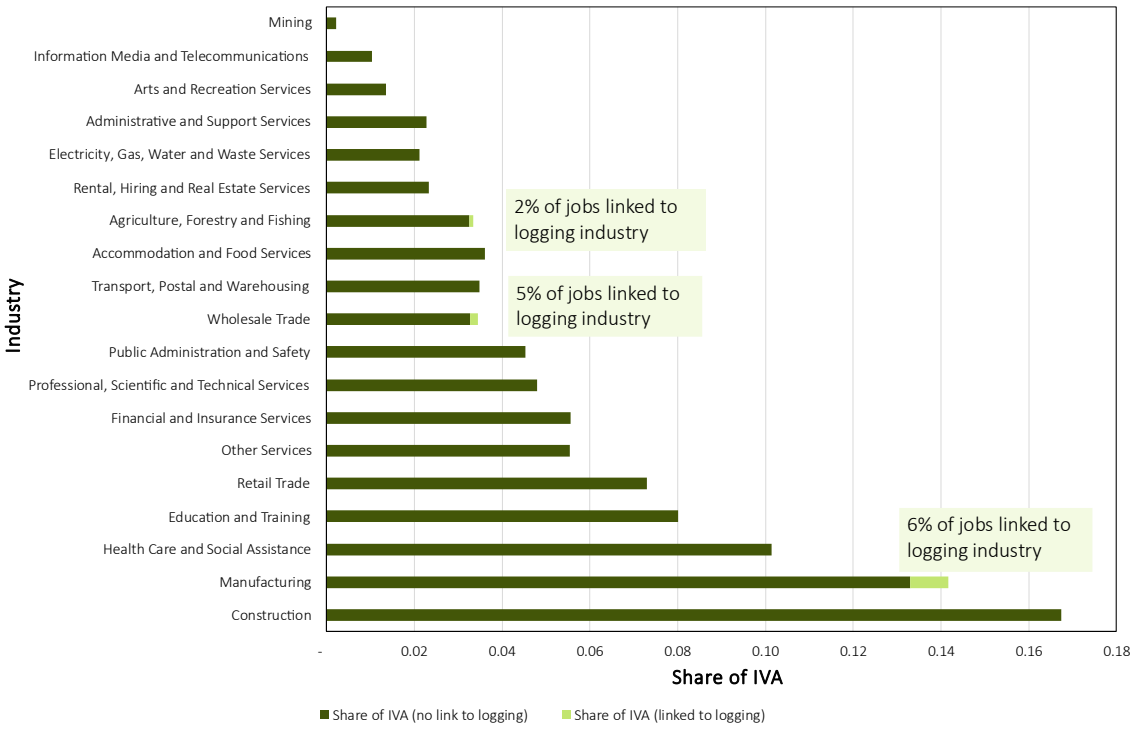

Figure 12. Industry value added for the RFA region

Key Point

Total IVA in the RFA region is estimated to be around $26 B. Based on IVA, significant industries in the RFA region include Construction, Manufacturing and Health Care and Social Assistance. Jobs linked to the logging industry are estimated to contribute $293 million or 1.1% of the RFA region's total IVA.

2.3 Town profiles within the RFA region

This section presents a snapshot of the demographics of some of the towns within the RFA region. This includes Alexandra, Marysville, Noojee, Powelltown, and Warburton. Communities in these towns are some of those eligible for grant funding through the Victorian Forestry Transition Program; [6] a program aimed at supporting communities to secure new employment opportunities for workers employed in the native timber harvesting industry. The locations of the towns are shown in Figure 13 and a summary of the towns demographics is presented in Table 9.

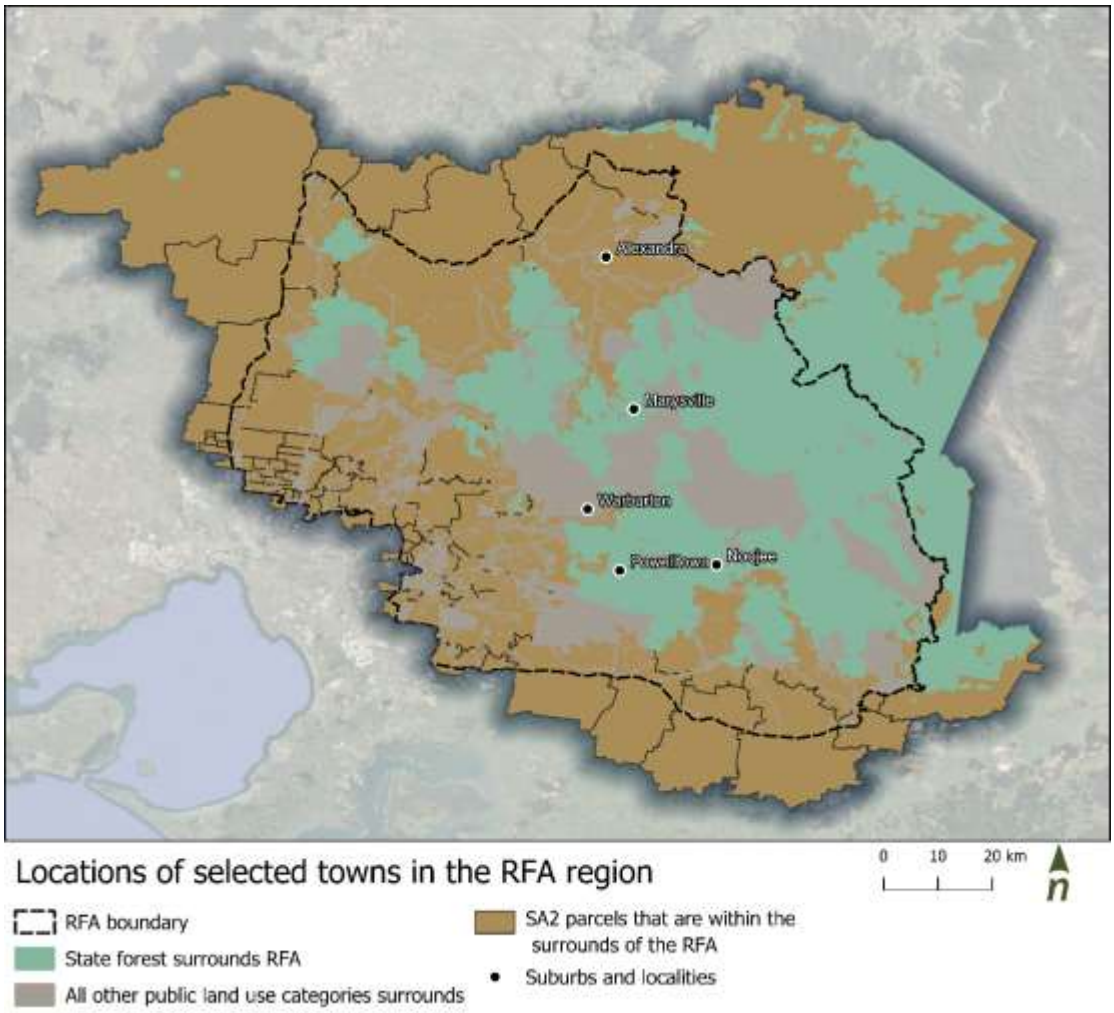

Figure 13. Selected towns in the RFA region

Table 9. Summary statistics for selected townships in RFA region (2021 Census)

Variable	Alexandra	Marysville	Noojee	Powelltown	Warburton
Population	2,801	501	177	214	2,020
Aboriginal and Torres Strait Islander status (% of population)	1.9%	2.4%	2.3%	1.9%	1.0%
Year 10 secondary schooling and above (% of population) *	76%	78%	70%	67%	76%
Average age (years)	51	59	56	47	50
Average weekly personal income ($)	$1,086	$1,078	$1,053	$1,125	$1,147
Unemployment rate (% of population)	3.6%	5.8%	7.7%	2.7%	5.7%

[6] The Victorian Forestry Transition Program provides grant funding to businesses, industry groups, incorporated non-profits, or local governments (DEECA, 2025).

Source: ABS 2021 Census Suburbs and Localities
* This refers to the proportion of people who reported having a postgraduate degree, a graduate diploma, a bachelor's degree, an advanced diploma, Certificate Level III & IV, and Secondary Education – Years 10 and above.

Compared to the rest of Victoria (Table 1), the selected towns are found to have:

- a higher proportion of their population who have either Aboriginal or Torres Strait Islander Status,
- a lower level of formal educational attainment,
- a higher average age, and
- a lower average weekly personal income.

2.4 Indicators of community wellbeing and resilience

The ABS's Socio-economic Indexes for Areas (SEIFA) provide a comparison of the relative socio-economic advantages and disadvantages for communities across the country. Two indexes from SEIFA are discussed to get a broad understanding of the characteristics of the RFA region, namely the Index of Relative Socio-economic Advantage and Disadvantage (IRSAD) and the Index of Education and Occupation (IEO). These indexes present additional context about how well communities in the RFA region can cope with and adapt to economic shocks.

Index of Relative Socio-economic Advantage and Disadvantage (IRSAD)

The IRSAD summarises the relative advantage and disadvantage scores from several other statistics into a single number. Indicators of advantage include high levels of household income, proportion of employed people classified as professionals, high costs of rent and mortgages reflecting dwelling values, and education status. Indicators of disadvantage are low levels of household income, higher rates of housing crowdedness, lower levels of educational attainment, higher rates of joblessness, higher rates of people employed at Occupational Skill Level 4 and 5, and higher rates of family separation.

Figure 12 shows the IRSAD for the SA2s in the RFA region from ABS (2023a). A high score (lighter colour) indicates a lower relative disadvantage and a higher relative advantage, whereas a low score (darker colour) indicates a higher relative disadvantage and a lower relative advantage. These scores are sorted into 10 equal sized categories (deciles) in Figure 14.

The ABS (2023a) provide examples of what a low and high score could mean as follows:

- An area could have a **low score** if there are many households with low incomes, or many people in unskilled occupations, AND few households with high incomes, or few people in skilled occupations.
- An area may have a **high score** if there are many households with high incomes, or many people in skilled occupations, AND few households with low incomes, or few people in unskilled occupations.

Broadly speaking, the communities within the Urban area have higher IRSAD scores compared to those in residing in the Rural area. This reflects a relatively higher household income level, higher skilled employment, a lower unemployment rate, higher property values, and higher levels of educational attainment. This is expected as households closer to capital cities experience relatively less disadvantage compared to those that are living further out.

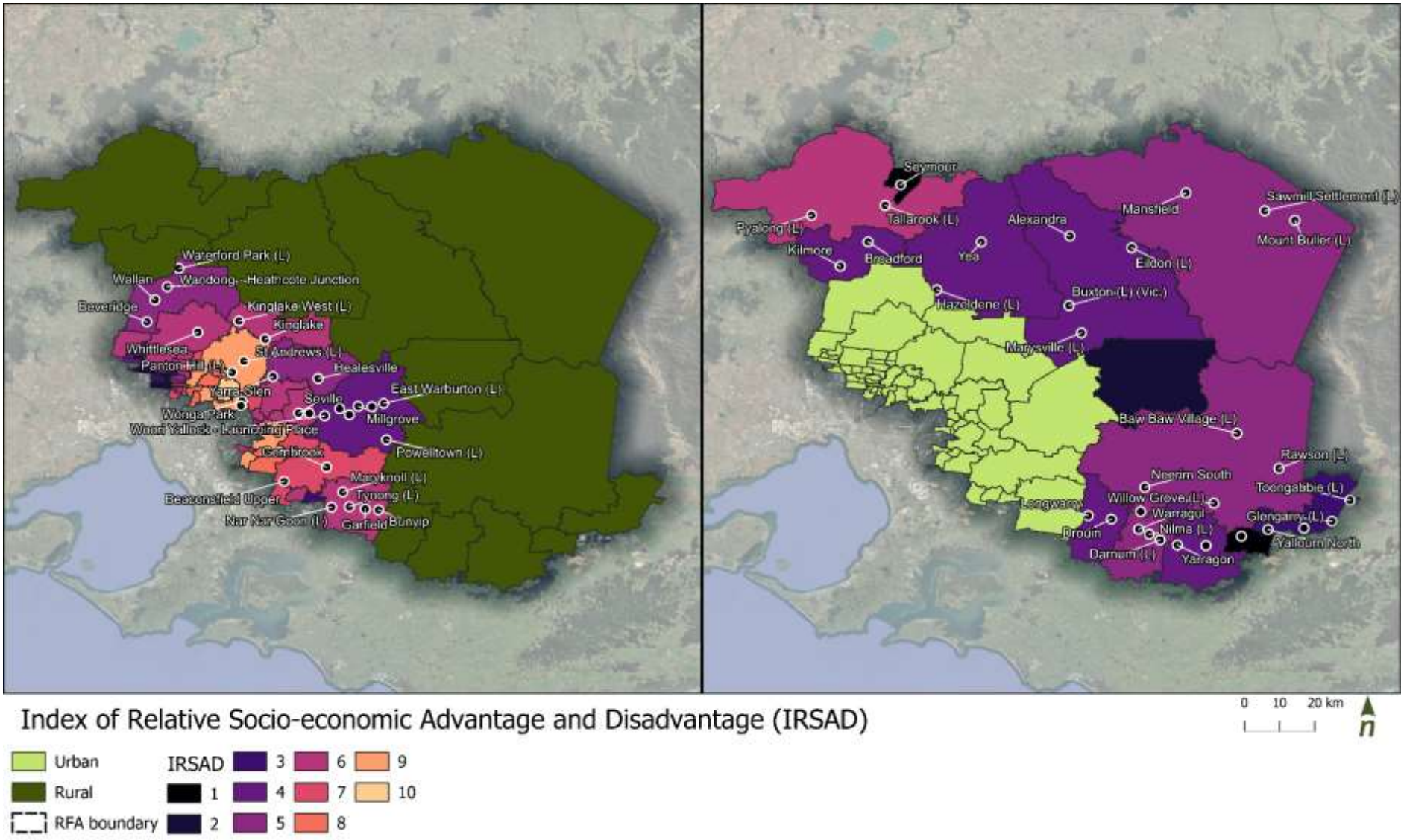

Figure 14. IRSAD deciles by SA2 for the RFA region

Index of Education and Occupation (IEO)

The IEO is a measure of communities' levels of educational attainment and employment status. Unlike the IRSAD, the IEO excludes income as a measure. A higher IEO score indicates that communities in the area are employed in occupations that require higher levels of educational attainment (e.g., bachelor's degree or higher qualification) and a smaller share of people who are employed in occupations that require fewer formal qualifications.

The IEO scores for the RFA region are illustrated in Figure 15. The figure shows that communities in the Urban area have a higher IEO score compared to those that live in the Rural area. The Productivity Commission finds that greater levels of educational attainment are generally associated with increased labour force participation and higher lifetime earnings (Productivity Commission, 2023).

The ABS (2023b) provide examples of what a low and high score could mean as follows:

- an area could have a **low score** if there are many people without qualifications, or many people in low skilled occupations or many people unemployed, AND few people with a high level of qualifications or in highly skilled occupations.
- an area could have a **high score** if there are many people with higher education qualifications or many people in highly skilled occupations, AND few people without qualifications or few people in low skilled occupations.

Key Point

Based on selected indicators of community wellbeing, communities closer to Metropolitan Melbourne (Urban areas) generally have higher education and occupation status, and are more socially and economical advantaged, by comparison to those communities in Rural areas. Due to this, it is expected that communities residing in the Urban area will be better equipped to cope and adapt to changes in economic conditions compared to those living in the Rural areas.

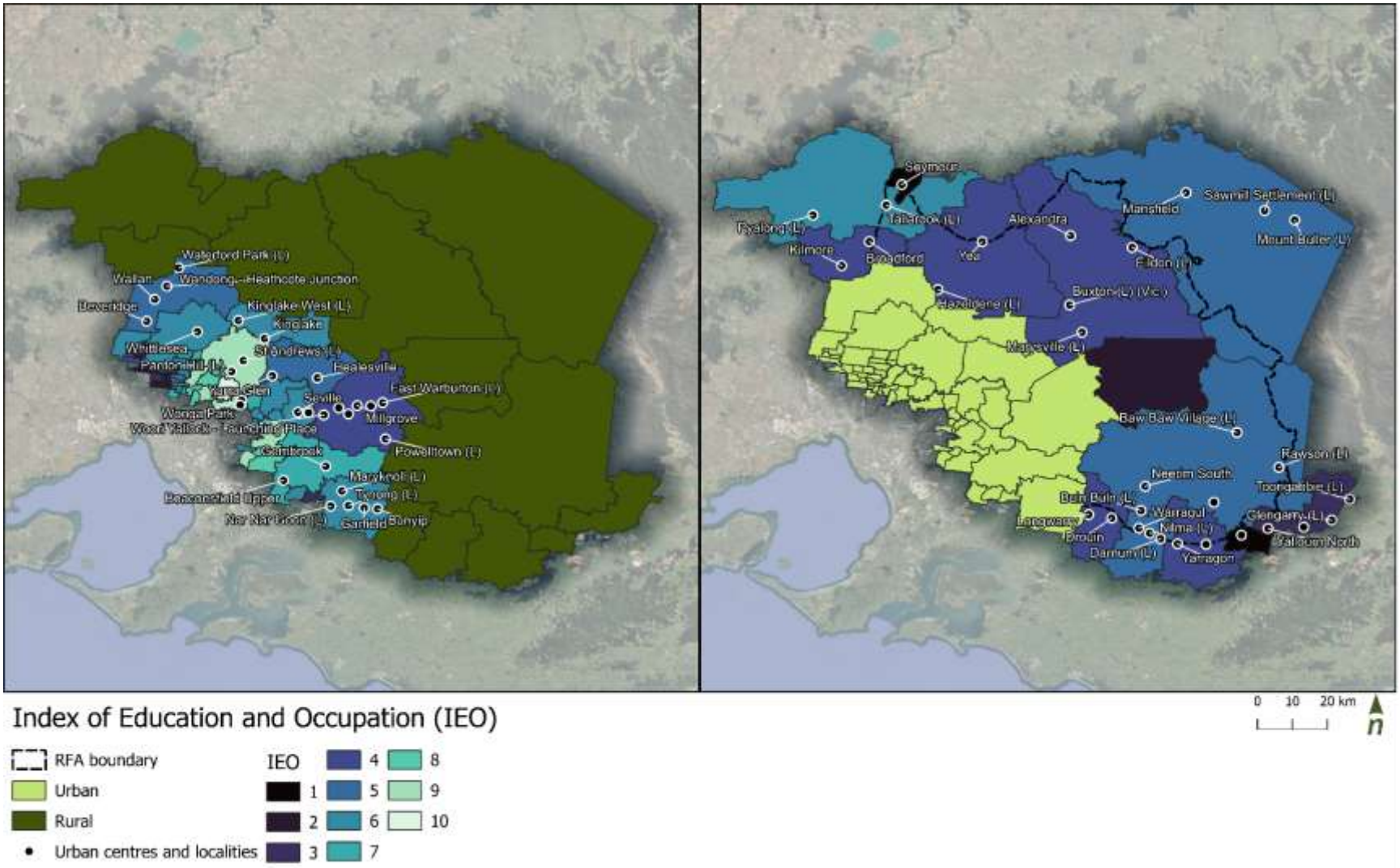

Figure 15. IEO deciles by SA2 for the RFA region

3 Economic values for the RFA region

This section describes the values of the state forests within the RFA region. These values are organised by type of ecosystems services using an ecosystem services framework, with ecosystem services reflecting the benefits (goods and services) derived by humans from the environment.

This section is not intended to provide a complete account of the uses and values of the state forests within the RFA region. Instead, it aims to establish a foundation of data and information that can be used to inform the next phase of the project. The next phase of the project is intended to use this data and information, along with the data on the region's population and economy (as described in section 2), to support the establishment of the base case and to assess how changes to future land uses will affect the communities in the region and the values provided by forests.

3.1 Overview of an ecosystem services framework

An ecosystem services framework provides a structure for identifying, categorising and valuing the benefits from forests in the RFA region. It involves linking the ecosystem assets (i.e., the forests and their specific biophysical characteristics) to the services they provide and then linking these services to associated economic and social values. An overview of an ecosystem service framework is shown in Figure 16.

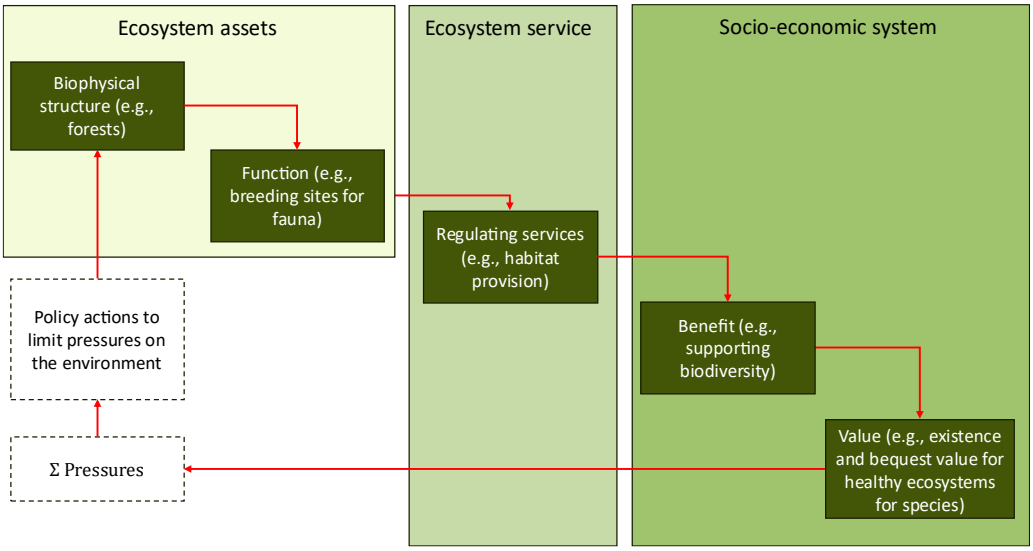

Figure 16. Overview of ecosystem services framework

The general approach for using this framework is described as follows:

1. The ecosystem assets are identified (i.e., the forest estate), including its extent and condition. This is the ecosystems from which ecosystem services and their economic and social benefits are derived.
2. The ecosystem services that flow from the assets are identified and measured (where possible). This step involves exploring how the ecosystem assets are used, and other benefits being derived.
3. The economic and social values of the ecosystem services are estimated in monetary terms. This can include estimating the values attributable to consumptive uses (e.g., firewood collection) and non-consumptive uses (e.g., recreation).
4. Through an understanding of the ecosystem services, potential beneficiaries of interventions can be identified, which can inform the design of interventions and potential investors and/or collaborators. (Note: This is not the major focus of this study).

Importantly, the ecosystem services framework can incorporate benefits and uses that are typically traded in markets, as well as the economic values that are not traded in markets (e.g., access for recreation). This allows for the full suite of values to be captured.

3.2 Ecosystem services in the RFA region

Ecosystem services are often categorised into three key categories which are described below:

- Cultural services: services directly experienced by humans
- Provisioning services: services describing the material or energy outputs from ecosystems
- Regulating services: services that ecosystems provide by acting as regulators

Some cultural and provisioning services are intertwined, and it can be challenging to differentiate between the two. Take an example of a cultural service such as fossicking or prospecting. A prospector may derive utility from collecting minerals but also from the excitement of potentially finding gold or gemstones and may still feel satisfied despite being unlucky in their search. This overlap in cultural and provisioning services can apply to a range of different activities such as hunting and fishing. For this report, these examples of ecosystem services will be considered cultural services.

A fourth category called supporting services (ecological functions) is also often used to describe services that underpin other ecosystem services categories. However, supporting or intermediate services may be better described as "structures, processes and functions that give rise to services" rather than being a final service (Fabis Consulting, 2018).

Using the three categories of ecosystem services described above, a summary of the key ecosystem services in the RFA region is presented in Table 10. More detailed information on these ecosystem services is provided in the following sections of the report.

Table 10. Key ecosystem services in the RFA region

Cultural services	Provisioning services	Regulating services
• Amenity • Cultural heritage connection • Education and research • Spiritual interactions • Recreation & Tourism incl.: – Bush walking – Camping – Dog walking – Four-wheel driving – Hunting – Fishing – Prospecting – Horse riding – Mountain biking – Orienteering – Picnicking – Trail bike riding	• Genetic resources (e.g., seeds) • Firewood • Honey • Livestock feed (i.e., grazing) • Minerals (i.e., mining) • Water supply	• Climate regulation (incl. carbon sequestration) • Erosion regulation • Habitat provision • Natural hazard protection • Pest and disease regulation • Pollination • Seed dispersal • Water purification

The rest of this chapter discusses the ecosystem services that were identified for the RFA region. For each ecosystem service, readily available geospatial data is mapped and the appropriateness of the data for estimating economic value is commented on. A Low-Medium-High scale is used to communicate the ease of which the economic value can be quantified:

Low Limited data available. Significant missing information. Data gaps will require notable effort. Valuation may lead to estimates with high levels of uncertainty and may not be possible.

Medium	Reasonable amount of data available. Moderate amount of cleaning required to fill in data gaps. Potential variability in the valuation may be more acceptable.
High	Extensive and comprehensive data set. Minimal adjustment required to fill in data gaps. Little uncertainty in economic valuation.

Information related to ecosystem services is presented on maps where data permits. Other relevant information is described in tables following for each ecosystem service. Due to the level of spatial data available for ecosystem services in the RFA region, the maps are expected to underrepresent the prevalence of ecosystem services. Furthermore, where an ecosystem service has not been mapped, it is not an indication that this service does not take place in the RFA region, only that there is insufficient information for illustration purposes.

Cultural services

Cultural services refer to nonmaterial benefits that are directly experienced by humans. Figure 15 provides a spatial overview of key information related to cultural ecosystem services. This includes data on car parks, camping locations, picnicking areas, trail bike visitation locations, rail trails, recreation tracks, and sambar deer hunting areas.

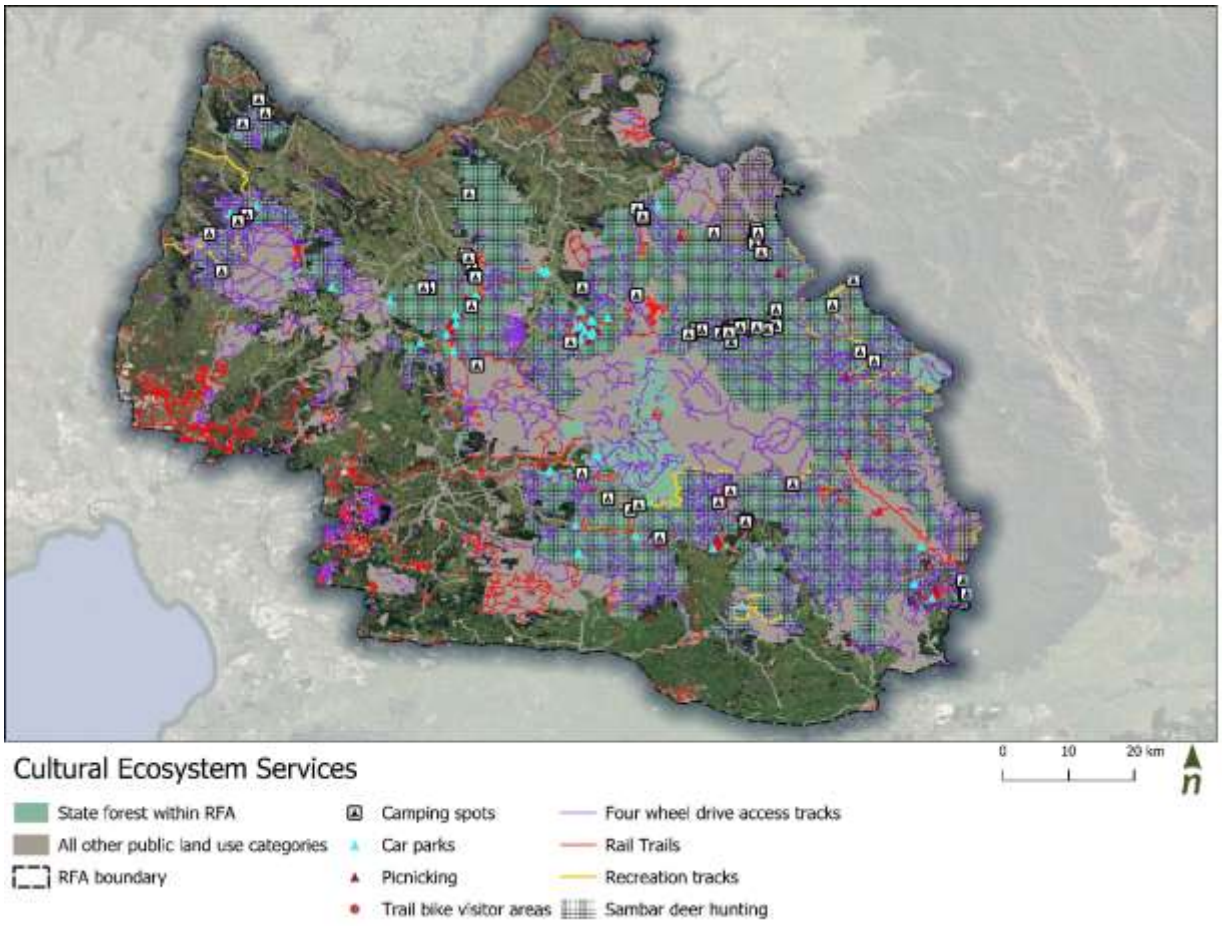

Figure 17. Spatial overview of information related to non-Aboriginal cultural ecosystem services

Table 11 describes the forest assets and uses related to specific cultural ecosystem services. This table also includes an assessment of how suitable available data is for estimating an economic value for each ecosystem service.

Table 11. Cultural ecosystem services in the RFA region

Ecosystem service	Forest assets	Further information and evidence	Suitability of available data to estimate economic value (Low, Medium, High)
Amenity	• Thousands of ha of state forest providing visual amenity to visitors and immediate neighbours • A range of natural features including waterfalls	• Amenity reflects the aesthetic enjoyment people obtain from spending time in nature • For Victorian residents who were satisfied with their experience in state forests, the biggest reason for their satisfaction was the beautiful area, landscape, and views • Research by Meis-Harris et al. (2019) studying Victorians' connectedness to nature finds that generally, 86% of Victorians have strong pro-environmental values which inform their positive associations with nature • The most common activities undertaken by visitors in state forests were sightseeing, short walks, and nature appreciation (Quantum Market Research, 2019)	Low
Cultural heritage connection (non-Aboriginal)	• Historic reserves covering roughly 2,500 ha • 145 registered historic sites	• Seven sites registered on the Victorian Heritage Register, 133 registered on the Victorian Heritage Inventory, and seven on both • Many of the historic sites are associated with forestry, timber, and mining industries • There are also historic sites for cemeteries, water utilities, rail transport, and dwellings	Low
Cultural heritage connection (Aboriginal)	• A large number of Aboriginal places and objects are known, and many more are likely to be found in areas of cultural sensitivity that have been mapped across much of the RFA region	• Rather than an assortment of places and objects, Traditional Owners perceive cultural heritage as part of Country – much more than just the physical components of land and waters, rather a holistic entity incorporating complex interconnected elements such as belief systems, law, cultural practice, identity and relationships among many other things. Further information related to cultural heritage connection is provided in the section below	Low
Education and research	• Three education areas at Castella, Kinglake West, and Fumina South	• Education areas provide a hub for educational areas in nearby state forests • They are located on community use reserves	Low

Ecosystem service	Forest assets	Further information and evidence	Suitability of available data to estimate economic value (Low, Medium, High)
		• Specific education courses, such as in relation to hunter education, occur across the RFA region • The RFA region's diverse species of flora and fauna are researched and monitored	
Spiritual interactions	• Thousands of ha of state forest with public access	• People can receive spiritual enrichment from interacting and spending time in nature • Meis-Harris et al. (2019) finds that Victorians are more prone to have a high level of connection to nature when expressed in spiritual terms, with older Victorians having higher connectedness with nature compared to younger Victorians • There is a high correlation between connectedness to nature and time spent in native bush and around waterways.	Low
Tourism and recreation			
Bike riding (incl. mountain biking, gravel riding and trail bike riding)	• Many kilometres of tracks and trails suitable for bike riding • 166 kilometres (km) of rail trails • Four trail bike visitor areas • 30-km Cascades Trail for mountain biking • There are various tracks near Narbethong such as the Narbethong Downhill Track, Black Range Track, Dom Dom Creek Track, and others.	• 61 mountain bike trails are being developed as part of the Warburton Mountain Bike Destination to increase visitation to the Yarra Ranges by 128,000 people, annually (VEAC, 2023) • The Cascades Trail is a mountain biking trail which runs for 30 km beginning at Lake Mountain and ending in Marysville. It incorporates a bus shuttle which carries riders and their bikes to the top of Lake Mountain • The Warburton Rail Trail/Yarra Valley Trail runs for 38 km between Lilydale and Warburton • Trail bike riding can take place in the RFA region where vehicles are allowed (that is, on formed roads that are open to the public). • Mountain biking is prominent in the Yarra Ranges	Medium
Bushwalking/hiking	• A wide range of tracks available for bushwalking and hiking that can range from an hour to multi-day walks	• Walking trails are commonly found close to towns adjacent to state forests (e.g., Warburton) • Trails include the Upper Yarra Walking Track (103 km), the Keppel Lookout Trail, Walk into History trail (50 km), Cicada Circuit Trail, and Kendalls Link Trail	Low

Ecosystem service	Forest assets	Further information and evidence	Suitability of available data to estimate economic value (Low, Medium, High)
		• Bush walking tracks are often accessed from adjacent picnicking and camping sites • Walking and hiking trails are also popular with trail runners	
Camping and picnicking	• 72 camping sites mapped • 54 picnicking sites mapped	• These sites often have amenities such as pit toilets, fire pits and picnic tables at designated sites, in addition to dispersed camping at informal sites without facilities • Camping and picnic sites also often provide access for other recreational activities • Sites closer to Melbourne are expected to be more frequently visited than those in more distant locations. • Camping includes paid and free sites • For example, permit fees for camping on an open and grassy area in the Upper Yarra Reservoir Park during peak season is approximately $18 per night for the 2026-27 season (Parks Victoria, 2025) • Permit fees for the 2026-27 season to book a bunkhouse in Nikola Bush Camp (situated in the Plenty Gorge Parklands) is $667 per night	Medium
Fishing, kayaking, and other boating activities	• Waterways flowing from the five river basins in the Central Highlands (Bunyip River, Goulburn River, Latrobe River, Thomson River, Yarra River)	• There are bodies of water in the RFA region (e.g., Lake Eildon) where water-based recreation is permitted • There is no data on the estimated number people who engage in these activities in the RFA region. It is expected to vary significantly based on location • Seven percent of Victorian residents who visited state forests participated in fishing (Quantum Market Research, 2019) • Rolfe and Prayaga (2007) estimate the willingness to pay for a 20% improvement in fishing experience in freshwater dams to be between $19.02 to $43.03 per person, annually	Low
Four-wheel driving	• Many kilometres of four-wheel drive tracks with varying levels of driving difficulty	• Large numbers of tracks have been created originally for timber harvesting and fire protection access • The most popular areas for four-wheel driving are expected to be closer to Melbourne	Low

Ecosystem service	Forest assets	Further information and evidence	Suitability of available data to estimate economic value (Low, Medium, High)
		• Instinct and Reason (2020) reported that the potential market size for Regional Victoria is 8.7 M visitors travelling in 4.2 M vehicles • In 2019, the estimated net spend per visitor and per vehicle for trips to regional Victoria was $1,800 and $3,700, respectively.) This is based on an average trip length of 6.5 nights (Instinct and Reason, 2020) • One general licence is held for four-wheel drive training activities over a 15 ha area	
Horse riding	• Many kilometres of suitable horse ride tracks • The southernmost section of the Bicentennial National Trail, a 5330-km riding trail along the Great Dividing Range from Cooktown in Queensland to Healesville in Victoria • Facilities to cater for horse riders	• A response document written by the Australian Trail Horse Riders Association (ATHRA) (2024) to the Assessment of values of State Forests in the Central Highlands claims that there is significant equestrian participation that takes place across the RFA region, with Yarra Ranges, Baw Baw, Murrindindi, and Nillumbik Councils developing their recreation and open space strategies with horse-riding playing an important role • There are four Trail Horse Riding Association clubs in the RFA region, 30 Adult Riding Clubs, and 19 Pony Clubs of Victoria, with additional members in Endurance Riders and Eventing & Dressage Associations	Low
Hunting	• 376,000 ha available for licensed Sambar deer hunting in the RFA region is mapped, with hunting of other types of deer also permitted, e.g., fallow and red deer	• Hunters value spending time in remote outdoor locations. • It is estimated that hunters take up to six trips per year on average, with the length of each trip ranging from a day to a week or more • There are restrictions on hunting in Melbourne Water closed catchments and around the Rubicon Power Station, and some residential areas • The value of hunting may decline in the future with population growth as that increases the likelihood of conflict with other users of forests. • License fees for stalking is 4 fee units per year (Value of a fee unit is $16.33 from July 2024)	Medium
Prospecting	• Many ha of forest available for recreational prospecting of gold, gemstones and other minerals • No current prospecting licences in the Central Highlands state forests	• A miner's right allows prospecting and fossicking for gold, gemstones and other minerals • There are approximately 73,000 active miner's rights in Victoria • A 10-year miner's right costs $27	Medium

Ecosystem service	Forest assets	Further information and evidence	Suitability of available data to estimate economic value (Low, Medium, High)
		• Prospecting licences, as opposed to a miner's right, allow the holder to apply for a mining or retention licence if they identify a mineral resource	
Recreation (multipurpose assets)	• 632 km of mapped multi-purpose recreation tracks • 89 mapped car parks	• Tracks and car parks provide access to various areas of state forest • Various types of tracks exist including walking trails and tracks more suitable to trail biking or four-wheel driving • Car parks may be located next to other recreation facilities	n/a
Tourism (general)	• The state forests that have high visitation are the Rubicon State Forest, Mt Disappointment State Forest and Big River State Forest, these forests have many camping sites and are close to walking tracks and other recreational activities • Waterwheel Visitor Information Centre in Warburton about 1.5 hours drive away from central Melbourne	• The introduction of railways transformed the Central Highlands into a favoured tourist destination • DELWP (2019) estimated at a high level that total visitations to forests in RFA regions across Victoria to be 34.1 M visits per year • Analysis by Quantum Market Research (2019) finds that on average day trippers spend 4.2 hours in state forests • People who visit multiple times as part of a longer holiday, average 2.8 visits per trip • For People who stayed one night or longer, the average duration of stay was 3.4 nights • Quantum Market Research (2019) estimated that there were more than 6.5 million unique visits to state forests in the first half of 2019. Of this estimate, 42% of visits included state forests in the DEECA Gippsland region, 39% of visits included state forests in the DEECA Hume region, and 22% of visits included state forests in the DEECA Port Phillip Region. The average number of regions visited per visit was 1.7	Medium

Aboriginal cultural values of forests

Indigenous cultures have unique connections to the environment which require consideration when creating environmental management plans. The value of these connections can be considered as another element of the cultural ecosystems services described in this section. However, it is important to note that approaches to reflect Indigenous values of the land can also be different from Western approaches to valuing the environment. Normyle et al. (2023) conducted a review of 48 international papers that estimate cultural ecosystem services from the lens of Indigenous people, finding that values are often considered on a collective, rather than on an individualistic level. Additionally, benefits are also not split into discrete categories like many systems of ecosystem accounts. Instead, they are considered as interlinked between people and nature.

The state forests of the RFA region are on the lands of the Bunurong, Gunaikurnai, Taungurung, and Wurundjeri peoples and their Traditional Owner Corporations have been formally represented in the membership of the Eminent Panel for Community Engagement and in formal statements from each group to the Panel. This has enabled Traditional Owners to directly impart knowledge of and support for Aboriginal cultural values of the forests (among other important considerations), rather than in partnership with VEAC (as has been the case in previous VEAC projects).

The approaches of each of the Traditional Owner groups have varied, reflecting the diverse Traditional Countries of each group and their own different interpretations of their respective Countries. There is also wide variation in the geographic extent of overlap with the respective Traditional lands; Taungurung have by far the largest coverage of state forest in the RFA region and so their biocultural assessment is used and quoted extensively in the following account to exemplify Traditional Owner knowledge and perspectives on cultural values of forests.

The Taungurung Land and Waters Council (2023) conducted a value analysis of the State Forests within the RFA region and explored biocultural and biophysical values associated with the State Forests. To understand biocultural values, 14 sites representing a range of forest types, conditions, and histories were visited with 20–25 Taungurung knowledge holders and Elders to develop biocultural expressions and foster culturally informed discussions of the Cultural landscape. In the case of biophysical values, the analysis considered the rare, threatened or endangered species, threatened ecosystems, forest age classes, and modelled old growth.

The five biocultural expressions that describe the interconnected landscapes as described by the Taungurung Nation are:

Relationality	Relationality describes a state of connectedness which results in Country as biocultural entity. All human and non-human entities (including plants, animals and physical aspects of the landscape) are connected to create Country. Relationality is apparent in the Central Highlands area through the many connections between the five Cultural landscapes, which are the Banit Ngarrap Cultural Landscape, the Nun nun tun Greater Cultural Landscape, Debera Biik Cultural Landscape, Waring Cultural Landscape, and the Yawang Cultural Landscape. Journeys and pathways are a key aspect of this landscape, from the journey of waterways to the journeys of people carrying knowledge. The diverse forest types are interdependent and point to the fact that managing one aspect of Country cannot meaningfully be undertaken without consideration of the whole. The Central Highlands connects people. It is the intersection of three clan groups and contains a large number of historic and contemporary places of gathering. Taungurung people made strong and early expressions of their rights and interests in this Country through the original (but ultimately stolen) selection of the Acheron Station, which continue to this day through the implementation of the Recognition and Settlement Agreement and the active engagement of the Taungurung Nation in the future of Taungurung forests.
Ceremony	The Central Highlands is rich with ceremonial places and knowledge. This relates to the values of connectedness of both people and Country and includes known ceremonial gathering sites associated with powerful cultural landscapes and ancestral knowledge systems. Ceremonial grounds and gathering places, historic and contemporary exist through the area. Ceremony links to ancestral knowledge systems. It is held by the Taungurung Nation and is not to be shared.

Fire	In Taungurung Nun nun tun (the Cathedral Range) is the source of ancestral journeys, creation stories and knowledge associated with fire. This ancestral knowledge flows out of Nun nun tun carried by Bunji (Wedge Tailed Eagle), Baliyang (Bat), Dhara (hawk) and Yurt yurt (kestrel). This knowledge guides management of the Cultural Landscapes of the Central Highlands. Cultural burning maintains Country the right way depending on forest type and culturally determined need. The application of fire is key to practising obligations towards the more open woodland forests of the Nun nun tun cultural landscape, and to supporting journey pathways through Banit Ngarrap. When right fire is applied the forests support plants for food, fibre and medicine and human and non-human entities can build healthy Country together. Since invasion, Taungurung have been limited in their ability to apply right fire, negatively impacting relationships between Taungurung people and Country.
Reciprocity	Strong biocultural relations are found in the ongoing use of the food, fibre, medicine and ceremonial resources that are found in abundance throughout the Central Highlands. Country gives, and care for Country must be reciprocated in return. Taungurung people collect and use multiple resources from Country including tea tree, burls and bracket fungus which support cultural and ceremonial activities. Nuru Nuru and Dagurdi are places names reflecting the pigments red ochre and blue pipe clay associated with ceremonial use Reciprocity and care for Country are supported by healing fire (among other cultural practices) which in some Country types provides the enabling conditions for Taungurung biocultural relationships with Country.
Water	Taungurung are the first people of the rivers and mountains. Baan (water) is a cultural entity of profound importance. The northern fall of the Great Dividing Range marks the Southern Boundary of Taungurung Country. The wet forests and the high places of Debera biik are the water sources that feed north into the entity Waring (the Goulburn River). Protecting the health of the water is a core obligation of Taungurung's obligations to Country. The stewardship of clean water on Country is additionally part of Taungurung's obligations to mobs downstream

Source: Taungurung Land and Waters Council (2023)

Provisioning services

Provisioning services refer to material or energy outputs provided by ecosystems. Figure 18 provides a spatial overview of key information related to provisioning ecosystem services. This includes grazing licenses, firewood collection areas, bee sites, extractive industries, existing mining licenses, and water supply.

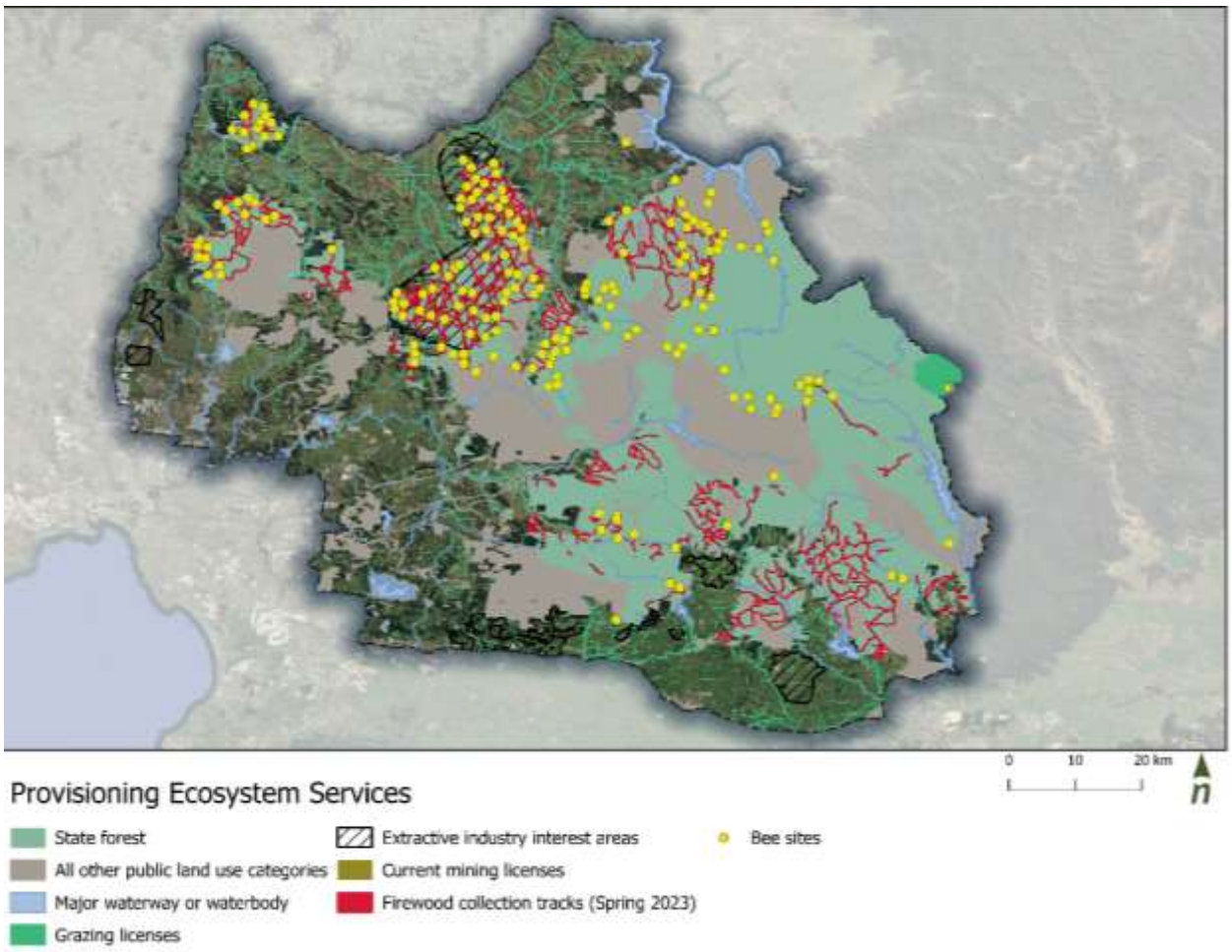

Figure 18. Overview of forest assets related to provisioning ecosystem services

Table 12 describes the forest assets and uses related to specific provisioning ecosystem services. This table also includes an assessment of how suitable available data is for estimating an economic value for each ecosystem service.

Table 12. Provisioning ecosystem services in the RFA region

Ecosystem service	Forest assets	Further information and evidence	Suitability of available data to estimate economic value (Low, Medium, High)
Apiary	• 192 mapped bee sites	• RFA region includes approximately 4% of public land bee sites in Victoria • Majority of sites have an 800-metre buffer from other sites • Category one and category two sites have range diameters of 1.6 and 3.2 km respectively • Annual fees for category one and category two sites are 6.9 and 10.4 fee, respectively (Value of a fee unit is $16.33 from July 2024) • Average annual honey production is estimated to be 59.4 kilograms (kg) per hive • The regulating service provided by bees in terms of pollination is discussed in Table 13	High
Firewood (commercial)	• Assumed to be no current commercial firewood collection	• Commercial firewood was primarily a by-product of sawlog harvesting	n/a
Firewood (domestic)	• 125 mapped firewood collection tracks	• Firewood can be collected from nominated collection areas • Collection can typically occur within a designated distances from forest roads • Collection periods occur in spring (1 September to 30 November) and autumn (1 March to 30 June). • Limit of 2 cubic metres of firewood per person per day • Limit of 16 cubic metres per household per financial year • Qualitative information by areas (i.e., low, medium, high) on firewood volumes is available • At least 45,000 cubic metres of firewood is understood to collected by households each year from public forests in RFA regions across Victoria	Medium
Grazing	• 3,827 ha of mapped grazing areas across 64 licences	• Grazing is permitted via four different types of licences under Land Act 1958 and the Forests Act 1958 • The rental for general Crown land licence (incl. for grazing licences) is determined based on market rates • Rental for an unused road for agricultural use is determined by the carrying capacity of the land • Licences include: 17 licences issued under Land Act 1958 and the Forests Act 1958 for 55.49 ha, one licence issued under the Forests Act 1958 in the nonprimary production category for 5.14 ha, one alpine grazing licences for 24,475 ha of which 3,630 ha is in the RFA region, three unused road	High

Ecosystem service	Forest assets	Further information and evidence	Suitability of available data to estimate economic value (Low, Medium, High)
		licences for the purpose of grazing for 1.34 ha, 42 water frontage licences with the primary purpose of grazing for 133.51 ha	
Mining	• Six current mining licences for gold spread across 1,000 ha • Gold and other mineral deposits/in ground metal content	• Historically, home to mining for gold, tin and other copper and platinum group elements • Current exploration licences are primarily for gold • No current retention licences[1] • Estimated geological value of in-ground metal content available by state forest • Limited information on annual volumes of mineral removed • Royalty rate of 2.75% of the "net market value" for all minerals other than lignite. Excludes the first 2,500 ounces of gold produced each financial year	High
Quarrying	• Seven current extractive industry work authorities • Existing authorities cover about 40 ha • Approximately 61,000 ha of deposits mapped	• Quarrying occurs for basalt, sedimentary hard rock, and hornfels • Mapped deposits include basalt, fluvial and colluvial sand, granite, and gravel • The royalty rate is $3.23 per tonne for dimension stone and marble, and $0.87 per tonne for all other stone	Medium
Seeds	• Quantities of seeds available for harvest	• Quantities of seeds were historically harvested for regeneration of harvested forest areas • Quantities of seeds also harvested for fire recovery operations, and commercial tree growing in nurseries and sale • Royalties are paid for seeds collected by those outside state government • Greening Australia (2021) reports that planting seeds to create a new seed production area (SPA) costs $18,850, directly seeding an SPA costs $10,500, and renovating an existing SPAs cost $21,300 • Greening Australia (2021) reports that the majority of SPAs are smaller than 5 ha, with only 6% ranging between 31 and 100 ha, and there are no SPAs larger than 100 ha	Low
Water supply	• Over 1,800 gigalitres (GL) of capacity in major drinking water storage reservoirs (VEAC, 2023) • Approximately 400,000 ha of designated water supply catchments (VEAC, 2023)	• Central Highlands forests provide drinking water, stock and domestic water and water for irrigated agriculture • Parts of the water supply catchments are closed or restricted to public access to minimise water quality risks at their source • The regulating services that state forests provide in terms of water flow regulation to reduce downstream flooding and water purification is discussed in Table 13Table 13	Medium

[1] A retention licence is an optional licence between the exploration and mining stages. It gives the licensee (licence holder) tenure over the land before progressing to a mining licence. Holders need to comply with an agreed work program that develops the resource towards mining (Resources Victoria, 2024)

Regulating services

Regulating services refer to the services provided by the ecosystem by acting as a 'regulator'. Figure 19 provides a spatial overview of key information related to regulating ecosystem services. This includes pollination locations (i.e., bee sites), water supply catchment areas, and biodiversity values for the RFA region.

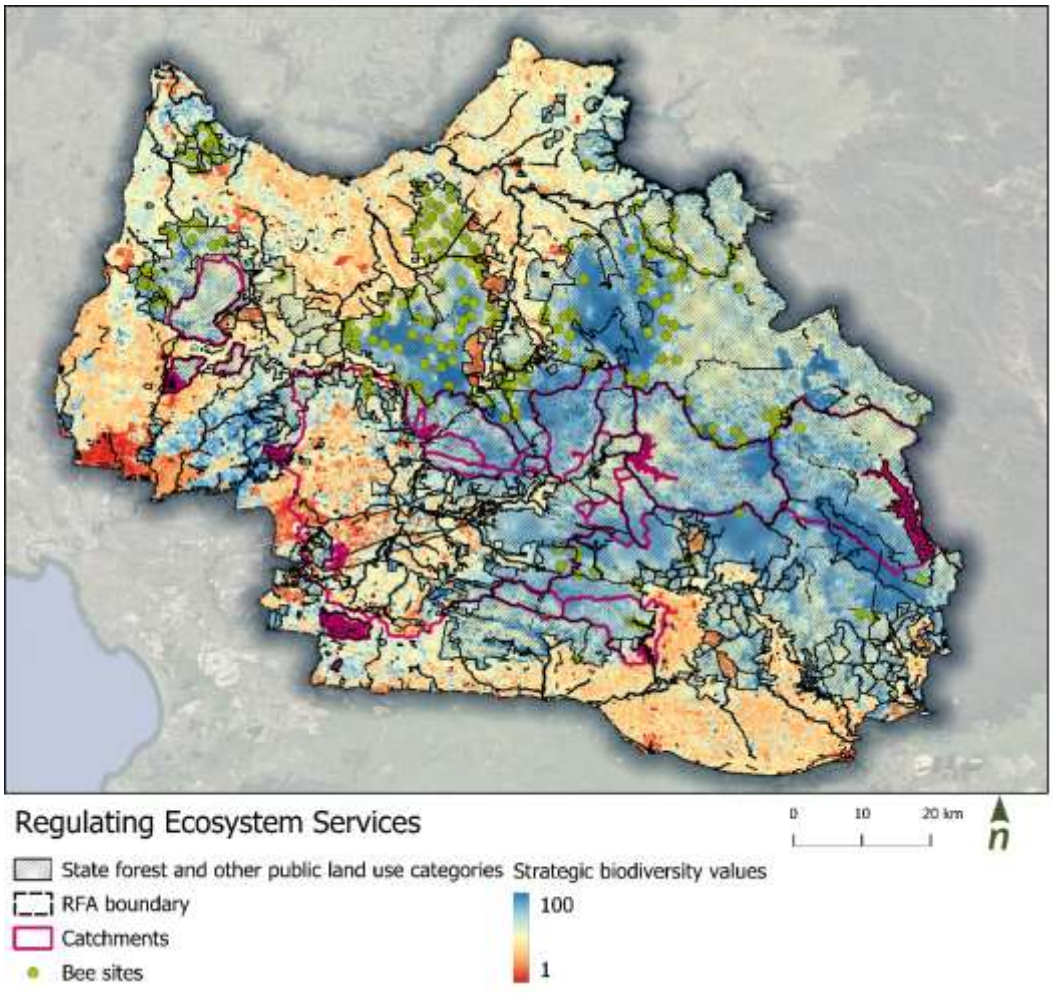

Figure 19. Overview of forest assets related to regulating ecosystem services

Table 13 describes the forest assets and uses related to specific regulating ecosystem services. This table also includes an assessment of how suitable available data is for estimating an economic value for each ecosystem service.

Table 13. Regulating ecosystem services in the RFA region

Ecosystem service	Forest assets	Further information and evidence	Suitability of available data to estimate economic value (Low, Medium, High)
Biodiversity and habitat provision	• State forests provide habitat for many thousands of species, including for almost 400 threatened plant and animal species	• National parks and state forests have areas of high biodiversity value • Strategic Biodiversity Values data provides a ranking of locations across Victoria showing areas of high biodiversity value (blue in Figure 19) to low biodiversity value (red in Figure 19) • Strategic Biodiversity Values 4.0 data from the Department of Environment, Land, Water and Planning (DEECA, 2021) is mapped to show the relative value of biodiversity assets	Low
Climate regulation (incl. carbon sequestration)	• State forests provide varying degrees of climate regulation, including through storing and sequestering carbon dioxide	• Mountain ash forests of the Central Highlands store about 1,867 tonnes of carbon per ha (DEECA, 2019) • The Australian carbon credit unit (ACCU) spot price was around $34 per tonne in Q1 2024 (Clean Energy Regulator, 2024)	Medium
Erosion regulation	• State forests assist with soil retention and preventing of sediment from entering waterways	• A valuation of the soil retention benefits for the RFA region was undertaken by Department of Environment, Land, Water and Planning (2019) and the estimated value of the ecosystem service ranged from $3.1 to $3.8 M in 2018. This was based on the avoided cost of sediment removal from waterways	Medium
Natural hazard protection, Water flow regulation	• State forests provide water flow regulation to reduce downstream flooding	• The estimated value of flood control services provided by forests was estimated at $97 M across the Victorian RFA regions, based on the avoided damages associated with flooding for a 2018 reference year (DELWP, 2019)	Low
Pollination	• 192 mapped bee sites in the RFA	• Victorian RFA region forests support both native and non-native (e.g. European honeybees) pollinators, which provide pollination services to a range of industries and households (DELWP, 2019) • Native forests can support agricultural production even when crops are not located nearby. They are used to store and strengthen hives before they are transported to agricultural areas to pollinate crops (DELWP, 2019)	Medium

Ecosystem service	Forest assets	Further information and evidence	Suitability of available data to estimate economic value (Low, Medium, High)
		• During 2014-15, commercial pollination in Victoria earned an average income of $27,000 (DELWP, 2019). In the same year, commercial beekeepers in Australia travelled 310 kilometres on average to provide their pollination services	
Water purification	• About 400,000 ha of designated water supply catchments, (VEAC, 2023) • Over 1,800 GL of capacity in major drinking water storage reservoirs (VEAC, 2023)	• Parks Victoria (2015) estimated that the benefits in terms of avoided costs to maintain water quality at current levels was $33 M per year based on an average annual reduction of 182,000 kg of total nitrogen • Potable water from closed and other forested catchments is expected to require only minimal treatment	Medium

4 Permitted activities and uses on public land

As shown by the spatial overviews of cultural, provisioning, regulating services (Figure 17, Figure 18, and Figure 19, respectively) not all activities and uses occur in all parts of the RFA region. In some cases, the forest assets and or the biophysical characteristics of the forests influence what activities take place and where. In other cases, activities and uses are influenced by an area's public land use category (e.g., national park, state forest).

Table 14 provides an overview of the permitted activities and uses across the significant public land use categories in the RFA region. The impact of changes to the permitted uses and activities, as a result of proposed changes to future land uses, and the subsequent changes to the ecosystem services being provided will be assessed as part of the next phase of the project.

Table 14. Overview of allowed activities and uses in different categories of public land in RFA region

Activity	National park	Conservation park	Regional park	Nature reserve	Bushland reserve	Forest park	State forest
Cultural							
Bushwalking, nature observation and picnicking	✓	✓	✓	✓	✓	✓	✓
Bicycle riding (including mountain biking)[5]	✓	✓	✓	✓	✓	✓	✓
Camping[1]	✓	✓	✓	O[2]	O[2]	✓	✓
Car rallies	O[7]	O[7]	✓	O[7]	✓	✓	✓
Car touring, including four-wheel driving[3]	✓	✓	✓	✓	✓	✓	✓
Dog walking (on-lead)	O[8]	O[8]	✓	✗	✓	✓	✓
Horse riding[6]	✓	✓	✓	✗	✓	✓	✓
Trail bike riding[4]	✓	✓	✓	✓	✓	✓	✓
Provisioning							
Apiculture at licensed sites	✓	✓	✓	✓	✓	✓	✓
Domestic firewood collection[9]	✗	✗	✗	✗	✗	✓	✓
Exploration and mining	✗[11]	O[12]	O[12]	O[12]	O[12]	✓	✓
Grazing by domestic stock	✗	✗	✗	✗	✗	✓	✓
Prospecting	✗	✗	✓	✗	✓	✓	✓
Recreational hunting[10]	✗	✗	✗	✗	✗	✓	✓

Source: Adapted from VEAC (2022)

✓ Allowed O Allowed with conditions (see notes) ✗ Not allowed

Note:

1. In designated areas where provided and in other areas as specified through management planning.
2. May not be provided in smaller reserves, where there is high day visitor use or where there are ample camping opportunities on adjacent land.
3. In registered vehicles on formed roads that are open to the public and on other formed roads and tracks as specified through management planning; off road driving is illegal on public land.

4. By licensed riders on registered vehicles on formed roads that are open to the public and on other formed roads and tracks as specified through management planning; off road riding is illegal on public land.
5. On formed roads that are open to the public and on other roads, tracks and trails as specified through management planning.
6. On specified formed roads that are open to the public and on other roads and tracks as specified through management planning.
7. Competitive sections of car rallies generally not allowed in national parks, conservation parks and nature reserves; transport sections through these areas allowed subject to events policy and procedures.
8. May be allowed in visitor areas or along a limited number of tracks as specified through management planning.
9. In designated areas.
10. Recreational hunting for pest animals may be allowed on other public land if part of an authorised control program at the discretion of the land manager.
11. Except where a licence predates the park.
12. Subject to ministerial consent.

5 Next steps

The information presented in this report provides contextual information to support understanding of the potential impacts of proposed land use changes in the RFA area. This includes impacts on communities, economies and forest values being provided. In the next phase of the project, it's anticipated that this information will be used to estimate the value of the base case or 'business-as-usual' scenario. The base case will serve as the reference point for assessing the net impact from proposed changes to future land uses recommended by the EPCE.

The next phase of the project and subsequent report is expected to focus primarily on stage 3 of the ecosystem services framework (Figure 16) and to attach monetary values to the ecosystem services identified. This will not be feasible for all ecosystem services being delivered by state forests in the RFA area. A cost-benefit analysis (CBA) is also expected to be undertaken as part of assessing the changes in values being derived from state forests with proposed changes in land use. This will include consideration of use and non-use values, in line with the total economic value (TEV) framework.

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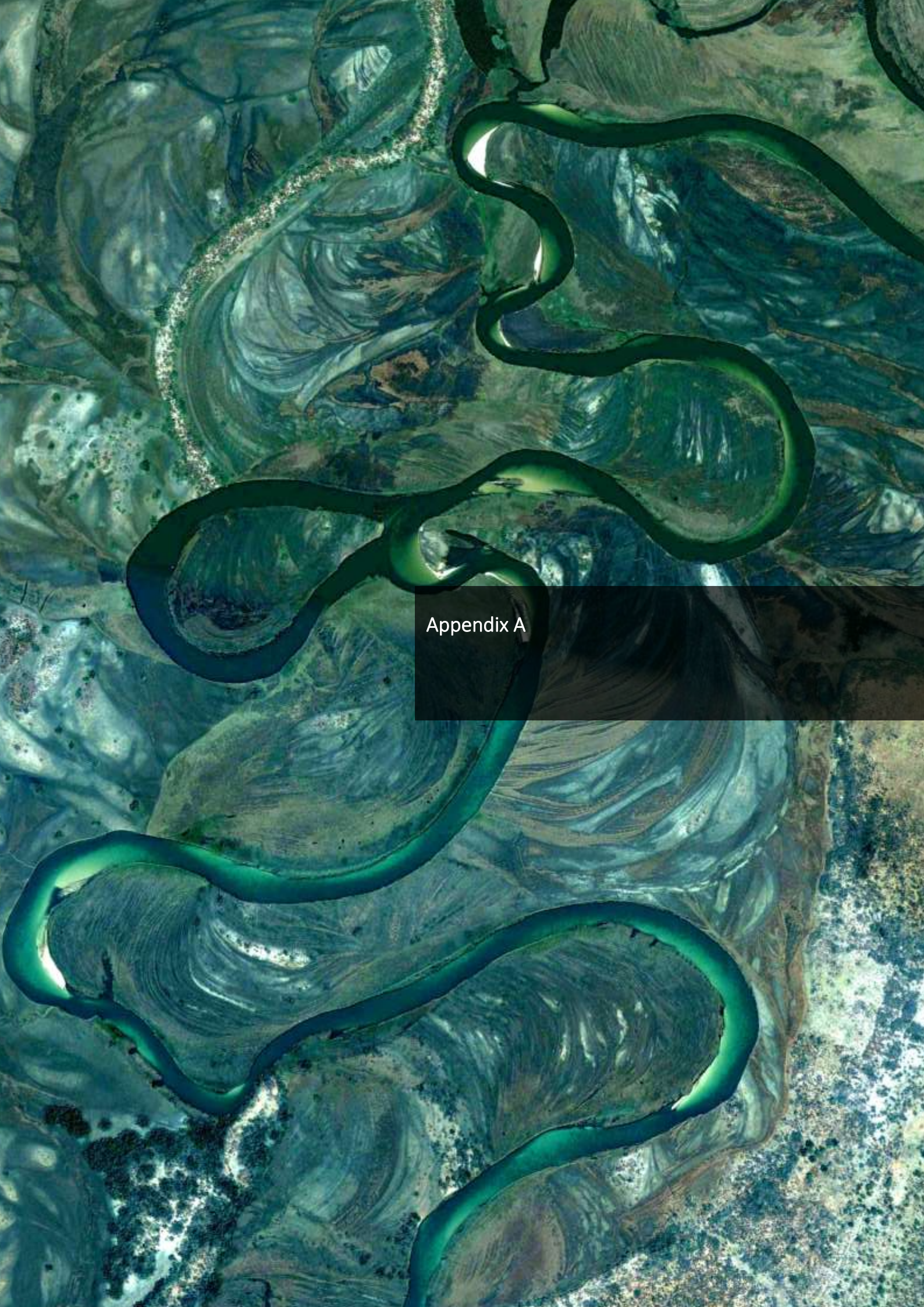

Appendix A

Supplementary information related to SA2s in the RFA region

ABS Census data from 2011, 2016, and 2021 was used to inform this report. In most cases, the most granular spatial unit available for this data was SA2. Therefore, this level of data was used for most of the analysis.

Table 15 lists the SA2s that make up the RFA region, along with each SA2's total area and the proportion of that area within the RFA area. Most SA2s have all or part of their area located inside the RFA area. The exceptions are Craigieburn – North West and Craigieburn – West, which do not overlap the RFA area. However, as these SA2s are completely surrounded by Mickleham – Yuroke and Craigieburn – South, both of which overlap the RFA area, they have been included in the analysis.

Table 15. List of the SA2s that make up the RFA region

SA2 Name	Area (ha)	Proportion of SA2 area that is within the RFA area (%)
Alexandra	211,897	91%
Bayswater North	991	34%
Beaconsfield - Officer	3,325	75%
Belgrave - Selby	5,565	100%
Bundoora - East	408	100%
Bundoora - North	471	100%
Bundoora - West	256	98%
Bunyip - Garfield	36,596	46%
Chirnside Park	2,220	100%
Craigieburn - Central	397	30%
Craigieburn - North	1,335	65%
Craigieburn - North West	192	76%
Craigieburn - South	1,191	0%
Craigieburn - West	409	0%
Doreen - North	944	100%
Doreen - South	502	100%
Drouin	32,681	32%
Eltham	1,949	99%
Emerald - Cockatoo	37,162	100%
Epping - East	777	100%
Epping - South	1,587	100%
Epping (Vic.) - West	736	100%
Ferntree Gully (South) - Upper Ferntree Gully	915	21%
Greensborough	1,010	100%
Healesville - Yarra Glen	36,952	100%
Hurstbridge	1,484	100%
Kilmore - Broadford	46,152	23%
Kilsyth	824	100%
Kinglake	31,950	100%
Kingsbury	901	18%
Lalor - East	332	100%
Lalor - West	874	100%
Lilydale - Coldstream	10,938	100%
Lysterfield	1,849	43%
Mansfield (Vic.)	392,786	14%
Mernda - North	1,520	100%
Mernda - South	863	100%
Mickleham - Yuroke	7,084	10%
Mill Park - North	814	100%
Mill Park - South	493	100%
Moe - Newborough	10,528	11%
Monbulk - Silvan	6,856	100%
Montmorency - Briar Hill	1,203	99%
Montrose	1,054	100%

SA2 Name	Area (ha)	Proportion of SA2 area that is within the RFA area (%)
Mooroolbark	1,254	100%
Mount Baw Baw Region	275,333	84%
Mount Dandenong - Olinda	8,190	100%
Mount Evelyn	1,699	100%
Pakenham - North East	1,893	100%
Pakenham - North West	2,468	100%
Panton Hill - St Andrews	29,220	100%
Plenty - Yarrambat	2,912	100%
Research - North Warrandyte	4,980	100%
Roxburgh Park (South) - Somerton	888	31%
Seymour	7,931	21%
Seymour Surrounds	168,883	10%
South Morang - North	1,371	100%
South Morang - South	774	100%
Thomastown	1,468	100%
Trafalgar (Vic.)	50,153	37%
Upper Yarra Valley	85,626	100%
Upwey - Tecoma	889	100%
Wallan	50,775	69%
Wandin - Seville	11,176	100%
Warragul	35,218	31%
Warrandyte - Wonga Park	4,576	56%
Watsonia	379	99%
Wattle Glen - Diamond Creek	2,682	100%
Whittlesea	29,798	100%
Wollert	5,389	100%
Yallourn North - Glengarry	34,270	4%
Yarra Valley	72,976	100%
Yea	147,430	73%
Total	1,939,573	

Supplementary information on jobs linked to logging industry in RFA region

Table 16 presents the ABS employment categories used to determine jobs linked to the logging industry in RFA region.

Table 16. ABS employment categories used to determine jobs linked to the logging industry in RFA region

INDP Level 1 industry of employment	INDP Level 4 industry of employment
Agriculture, Forestry and Fishing	• Forestry and Logging, nfd • Agriculture, Forestry and Fishing Support Services, nfd
Manufacturing	• Wood Product Manufacturing, nfd • Log Sawmilling and Timber Dressing, nfd • Log Sawmilling • Wood Chipping • Timber Resawing and Dressing • Prefabricated Wooden Building Manufacturing • Wooden Structural Fitting and Component Manufacturing • Veneer and Plywood Manufacturing • Reconstituted Wood Product Manufacturing • Pulp, Paper and Paperboard Manufacturing • Corrugated Paperboard and Paperboard Container Manufacturing • Paper Bag Manufacturing • Paper Stationery Manufacturing • Sanitary Paper Product Manufacturing • Other Converted Paper Product Manufacturing
Wholesale Trade	• Timber and Hardware Goods Wholesaling, nfd • Timber Wholesaling

Source: ABS (2021). Industry of employment (INDP), 2021 Census of Population and Housing.
Note: nfd– not further defined. Nfd categories are utilised by the ABS when there is sufficient information to partially categorize a response, but not enough to assign it to the most specific category in their classification system.

Supplementary information on Industry Value Added for the RFA region

Industry Value Added (IVA) data was collected from NIEIR for selected LGAs and a 5-year average was calculated to estimate the IVA amount per full-time equivalent (FTE) employee for each Industry of employment (INDP) Level 1 industry classification.

Data on the total number of employees for each industry was collected from the ABS. These aggregate numbers are converted to FTE estimates by multiplying against an FTE to total employment ratio for the respective industries. The FTE to total employment ratio was gathered from NIEIR (2024) and presented in economy.id by .id (informed decisions). Estimates of the IVA amount per FTE and FTE for each industry were then combined to determine industry value-added. These estimates are presented in Table 8.

Example: Accommodation and Food Services

- There is an estimated 19,351 people in the RFA region who are employed in accommodation and food services. This estimate is multiplied by 0.6 to get an estimate for the number of fulltime employees to obtain 11,611 FTE employees
- The five-year average IVA per FTE in accommodation and food services is $81,000. This is multiplied against 11,611 fulltime equivalent employees to get an estimated IVA of $0.94 B.

Table 17. Estimated IVA per FTE ($2021)

INDP Level 1 industry of employment	Five-year average IVA per FTE[1]	FTE to total employment ratio	Number of people employed[2]	Estimated IVA ($2021 B)
Accommodation and Food Services	$81,000	0.60	19,400	$0.94
Administrative and Support Services	$142,000	0.65	6,400	$0.59
Agriculture, Forestry and Fishing	$117,000	0.97	7,700	$0.87
Arts and Recreation Services	$141,000	0.66	3,800	$0.35
Construction	$168,000	0.89	29,100	$4.35
Education and Training	$87,000	0.79	30,400	$2.09
Electricity, Gas, Water and Waste Services	$317,000	0.90	1,900	$0.54
Financial and Insurance Services	$525,000	0.84	3,300	$1.46
Health Care and Social Assistance	$108,000	0.71	34,400	$2.64
Information Media and Telecommunications	$227,000	0.74	1,600	$0.27
Manufacturing	$210,000	0.85	20,600	$3.68
Mining	$97,000	1.04	600	$0.06
Other Services	$84,000	0.77	22,200	$1.44
Professional, Scientific and Technical Services	$141,000	0.82	10,800	$1.25
Public Administration and Safety	$125,000	0.82	11,500	$1.18
Rental, Hiring and Real Estate Services	$247,000	0.84	2,900	$0.60
Retail Trade	$101,000	0.67	28,000	$1.89
Transport, Postal and Warehousing	$94,000	0.88	11,000	$0.91
Wholesale Trade	$170,000	0.87	6,000	$0.89
Total				$26.00

Source: NIEIR (2024).
Note: Information presented in this table is based on 2020/21 base prices. Discrepancies in the totals are due to rounding of figures.
[1] Rounded to nearest 1,000.
[2] Rounded to the nearest 100.