Report prepared for the
Murray Region Forestry Hub & Central West Forestry Hub

Land Use Review and Comparison

The relative contribution of potential environmental plantings and harvestable timber plantations to regional economies in NSW and northern Victoria

Final Report

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PREFACE

Indufor Asia Pacific (Australia) Pty Ltd ('Indufor') has prepared this report for the Murray Region Forestry Hub and the Central West NSW Forestry Hub, which are among 11 Regional Forestry Hubs established by the Australian Government under the *National Forestry Industry Plan 2018*.

The Regional Forestry Hubs ('the Hubs') work with industry, state and local governments, and other key stakeholders to prepare and provide the Australian Government with strategic planning, technical assessments and analyses that aim to support growth in the forest industries in their region.

This report represents a technical assessment and analysis, which is intended to assist the Australian Government, industry, state and local governments, including policymakers and regulators, and other key stakeholders to understand the key drivers of land use decisions in the Murray Region and Central West NSW region especially, and associated factors that are influencing those decisions.

This report is intended to inform Government policy development at the national, state and local government levels, and to assist Regional Forestry Hubs provide meaningful, comprehensive and timely information to support stakeholders with their land use decisions. The information provided is regional in nature and is not intended to be relied on for investment decisions pertaining to specific properties.

This report was prepared between February and June 2025, and the observations and findings reflect the information available at that time.

Indufor would like to thank all the contributors to the report, who provided valuable viewpoints and, in some cases, relevant data. These contributions were provided through interviews and other forms of engagement, and collectively, they provided substantial input to this land use review. The findings, interpretations, and conclusions presented in this report do not necessarily reflect the views of these key stakeholders; however, their support for the project and inputs to the review are gratefully appreciated.

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EXECUTIVE SUMMARY

This report presents a land use review and comparison relating to the potential establishment of new woody plantings on cleared agricultural land in Australia. This comparison is set in the context of the Australian Carbon Credit Unit (ACCU) Scheme, which incentivises projects that reduce emissions or store carbon in soils and vegetation, using approved methods to ensure credible, measurable, and verifiable climate benefits.

The primary focus is a land use comparison between potential *environmental plantings* (EPs) and *harvestable timber plantations* (TPs) and their relative contribution to the regional economies of Central West New South Wales (NSW) and the Murray River region of southern NSW and northern Victoria.

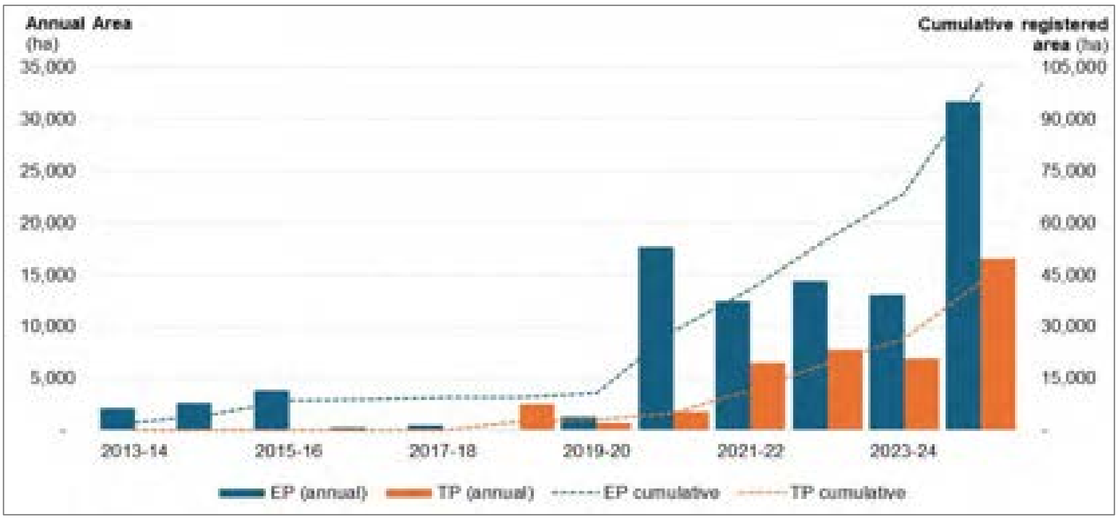
EPs are defined for the purpose of this study as a planting that consists of a mixture of trees and shrubs that are native to the local area of the planting and may reflect the structure and composition of the local native vegetation community. EPs are supported by the ACCU Scheme under the *Reforestation by Environmental or Mallee Plantings FullCAM Method 2024*. Mallee plantings were excluded from this land use review and analysis of EPs, as they are typically seen in lower rainfall areas, outside the primary areas of focus for the two study regions, and do not reflect the structure and composition of the local native vegetation communities.

TPs are generally understood as commercially planted forests, established for harvesting to produce timber and wood fibre, and combining the values of timber production and carbon sequestration. Plantation forests can comprise native or exotic species. Establishment of plantation forests on cleared agricultural land and commercial harvesting of wood products is eligible for crediting under the *Plantation Forestry Method 2022*.

Context for new plantings and land use change in Australia

EP projects have been eligible under the ACCU Scheme since 2014, and the ACCU Scheme Project Register indicates the total national area being registered for reforestation under approved environmental plantings methods has been steadily increasing over that time (ES Figure 1). The cumulative project area registered nationally as EPs (~100,200 hectares (ha)) is approximately three times that of TPs registered under Schedule 1 of the Plantation Forestry Method 2022 (~33,250ha); albeit the total areas registered for the EP projects especially may be larger than the areas to be planted for carbon sequestration and ACCU generation.

ES Figure 1 Registered areas of planting projects under the ACCU Scheme, nationally



Source: Clean Energy Regulator (2025), Indufor. Note the EP totals include mallee projects.

In the Central West NSW region, the total area of registered TP and EPs to December 2024 was approximately 17,200ha, comprising around 70% of TPs and 30% EPs.

In contrast, in the Murray Valley NPI region, the total area of registered TPs and EPs ACCU Scheme projects to December 2024 was ~5,100ha and comprised almost entirely of EPs. In adjacent regions in NSW and Victoria, there have been substantial increases in EPs, with large areas of EPs registered in East Gippsland - Bombala region especially over the past 18 months.

Policy and market drivers

Land use decisions regarding the establishment of new EPs or TPs on cleared agricultural land in Australia are shaped by a complex and evolving policy landscape. Furthermore, Australia's agricultural landscapes are facing increasing competition and alternatives for land uses, driven by shifting market demands, product prices, climate change, and evolving policy priorities. Landowners can face complex trade-offs and opportunities with traditional land uses, e.g. cropping and grazing, and emerging opportunities, including carbon farming, plantation forestry and ecosystem services markets.

This review has identified various policies and incentives for both EPs and TPs (ES Table 1). At the national and state levels, TPs are supported by programs such as the ACCU Scheme, the Support Plantation Establishment (SPE) program, and the *NSW Plantations and Reforestation Act*, which offers government support, regulatory consistency, and operational protections. TPs also benefit from policy drivers focused on forest industry development and climate action.

ES Table 1 Key enabling frameworks supporting EPs and TPs in NSW and Victoria

Key drivers	Environmental plantings	Timber plantations
Climate	• ACCU Scheme & approved methods • The Safeguard Mechanism • NSW Primary Industries Productivity and Abatement Program (PIPAP) • *Climate Change Act 2017* (Vic) • *Climate Change (Net Zero Future) Act 2023* (NSW)	• ACCU Scheme & approved methods • The Safeguard Mechanism • NSW Primary Industries Productivity and Abatement Program (PIPAP) • *Climate Change Act 2017* (Vic) • *Climate Change (Net Zero Future) Act 2023* (NSW)
Nature & biodiversity	• *Nature Repair Market Act 2023* (Cwth) • Biodiversity Conservation Offsets Policy (EPBC Act 1999) • *Biodiversity Conservation Act 2016* (NSW) • The Kunming-Montreal Global Biodiversity Framework (2022)	• *No nature-oriented policies identified as directly supporting or enabling new timber plantation establishment*
Plantation forest management	• *Plantations and Reafforestation Act 1999* (NSW) and the *Code (Regulation) 2001*	• National Forest Industries Plan 2018 (which underpins the Support Plantation Establishment Program) • *Plantations and Reafforestation Act 1999* (NSW) / *Code (Regulation) 2001* • *Victorian Code of Practice for Timber Production 2014*
Regional development	• *Local Land Services Act 2013* (NSW) • Victorian Planning Scheme Provisions	• *Local Land Services Act 2013* (NSW) • Victorian Planning Scheme Provisions

As a comparison, nature and biodiversity-oriented policies tend to favour EPs more specifically and, in some cases, explicitly exclude timber harvesting activities. Additionally, some policies and instruments support the potential for 'stacking' with EPs - i.e. combining carbon, biodiversity, and other ecosystem service credits such as soil or water benefits and potential alignment of EPs with nature repair programs.

Stacking opportunities for TPs are more constrained. Biodiversity frameworks to date may exclude commercial plantations from eligibility for biodiversity certificates and nature repair markets or impose limitations on the commercial use of planted trees.

Area analysis

An analysis of the area of land suitable for establishing TPs and EPs in the Central West NSW and Murray Region was conducted building on recent land capability and land suitability mapping assessments by the two Hubs. This analysis led to the following conclusions:

- All land that has been determined to be available and suitable for TPs may also be considered as suitable for EPs.
- There are substantial areas of land that are marginally suitable for TPs but are likely to be suited for EPs.
- There are also areas that have been excluded from the suitable area for TPs, because they receive lower rainfall or are higher in elevation, which may be suitable for EPs.

In this context, the land suitable for establishing TPs and EPs in the two regions was classified as either highly suitable or suitable with higher risks (ES Table 2).

ES Table 2 Summary of modelled area (ha) suitability for EPs and TPs, by region

	Central West NSW		Murray Region	
MAI -based classifications	**TP**	**EP**	**TP**	**EP**
Highly suitable	114 947	114 947	175 642	175 642
Suitable with higher risks	925 997	925 997	391 691	524 512
Total	**1 040 944**	**1 040 944**	**567 333**	**700 154**

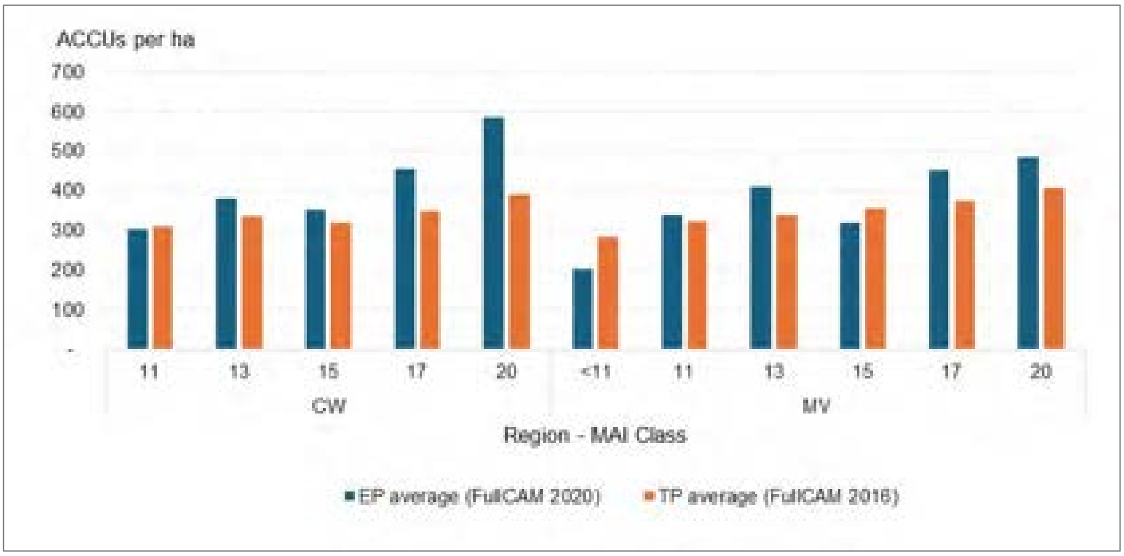
Sources: CWFH (2022) and derived from MRFH (2023), with Indufor reclassification and remapping of plantation land suitability classes to align with MAI productivity classes applied in the plantation land capability for the CWFH.

Potential for carbon credits

The analysis of land availability and suitability for TPs and EPs within the two Hub regions was used to provide a quantitative comparison of the indicative timing and total ACCUs that could be generated from these types of planting projects over time.

This analysis found that over a 25-year crediting period, the total ACCUs generated by EPs and TPs are broadly comparable, on a per hectare (ha) basis, although variable by productivity class (ES Figure 2).

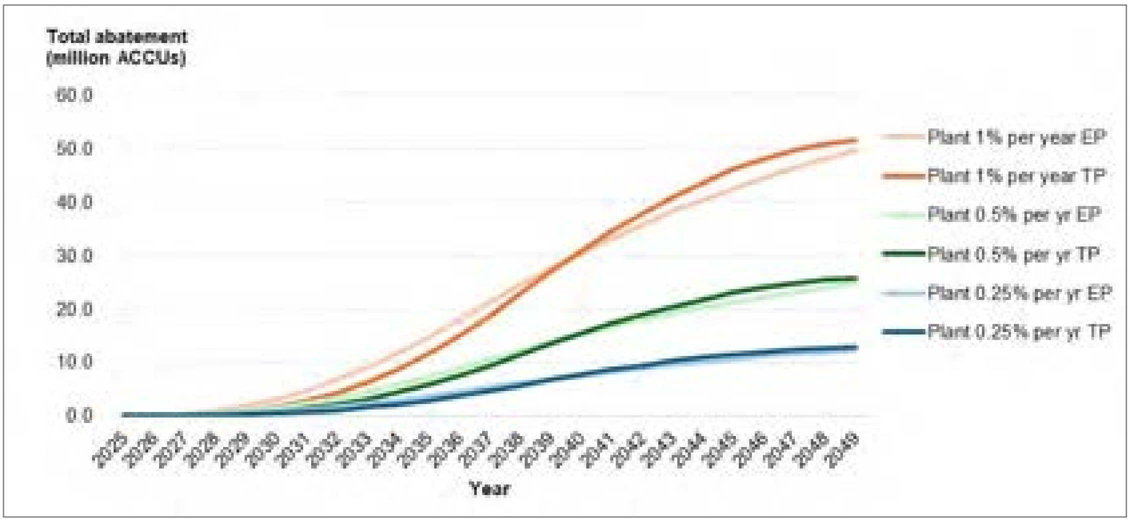
ES Figure 2 Average ACCUs by method, by region and MAI class



Source: Indufor modelling using FullCAM, based on assumptions set out in this review.

Furthermore, modelling of the crediting potential across a range of planting scenarios (e.g. planting between 0.25% - 1% of the total suitable area available in both regions) over 25 years indicates a comparable level of ACCU estimates (ES Figure 3), based on the same scale of plantings (noting the ACCU Scheme requirement to apply different FullCAM model versions for TPs and EPs).

ES Figure 3 Comparison of crediting potential, across a range of planting scenarios, for Central West NSW region and Murray Region combined areas



Source: Indufor modelling using FullCAM, based on assumptions set out in this review.

The findings that the potential for carbon crediting is comparable are attributed to several key factors. While TPs generally represent a more intensive planting model, in terms of initial stocking and silvicultural management, ACCU crediting is affected by the application of the 100-year average carbon stock 'cap', as well as the lower biological growth assumptions incorporated within FullCAM on many sites when compared to EPs.

Furthermore, modelling using the FullCAM 2020 version for EP projects are modelled to generate significantly more carbon credits than TP (using FullCAM 2016) projects on higher productivity sites.

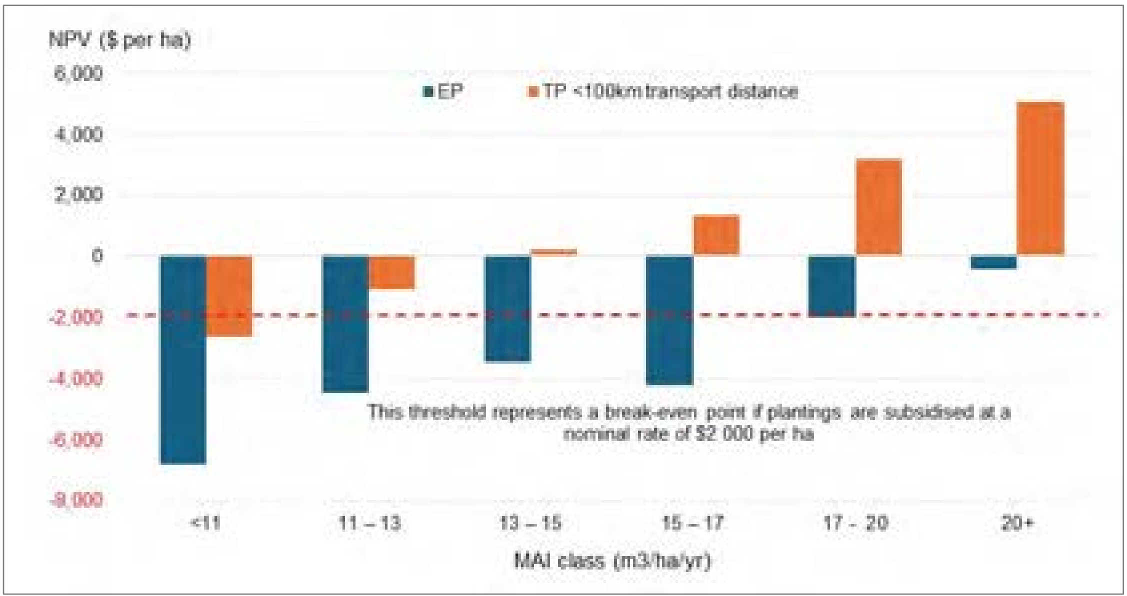
Economic returns

To further inform Hub initiatives and Government policy development, this land use review encompassed the development of a model to compare the economic returns from TPs and EPs for the current settings for new plantings projects in the two study regions.

Key inputs for the model, including assumptions relating to costs and prices, were developed with reference to industry knowledge, stakeholder consultation and market observations, while carbon yields were determined using FullCAM and validation with relevant Hub studies.

Applying a base set of assumptions (including a fixed land cost and a carbon price of $40 per ACCU), modelling results indicated that TPs will typically generate higher economic returns (higher NPVs) across all the productivity classes (ES Figure 4), which largely reflects the impact of the dual revenue streams from timber and ACCUs.

ES Figure 4 Economic returns from alternative land uses (base case)



Source: Indufor modelling of economic returns. Note: NPV determined @ 6.5% real pre-tax discount rate.

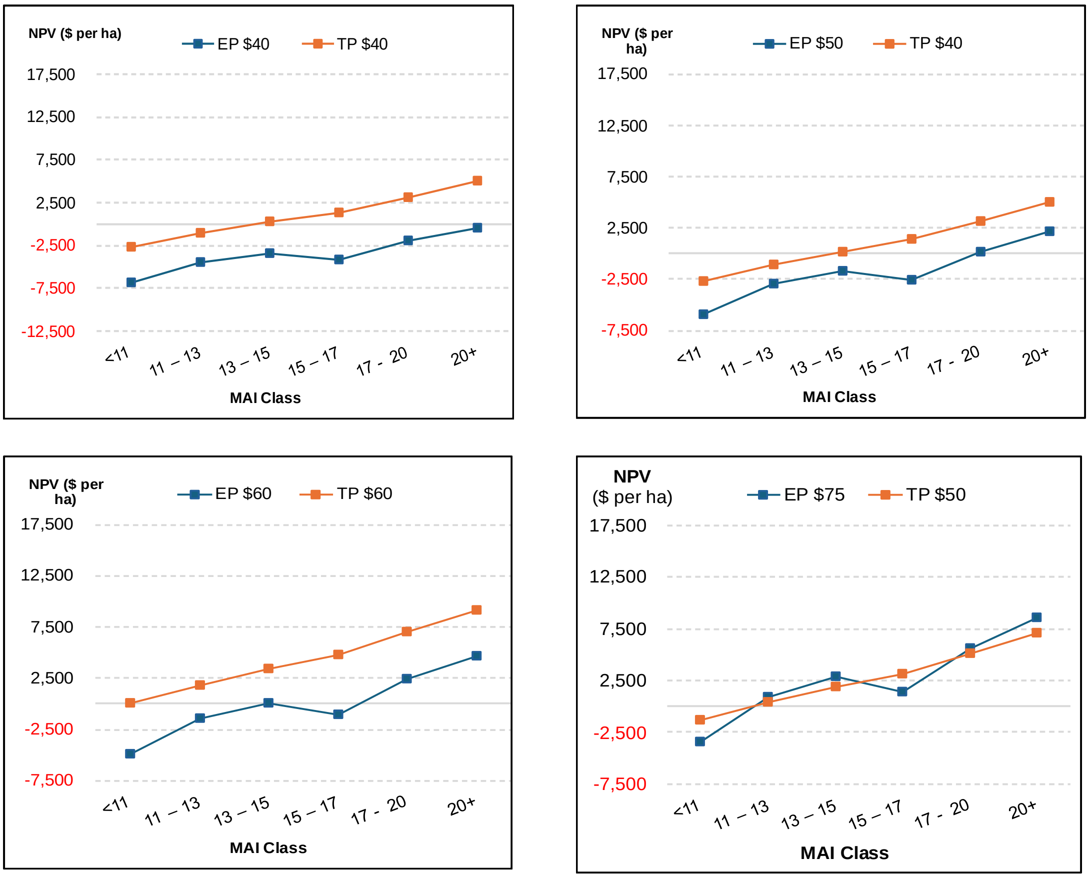
This profile of indicative NPV returns using base assumptions excludes consideration of government subsidies or incentives that may be accessible by investors. The potential for incentives to change the profile of economic returns is illustrated simply above, with a threshold (as shown by the red dashed line) representing the breakeven point if the establishment of the plantings (for TPs or EPs) was subsidised at a nominal rate of $2,000/ha. In this scenario, all the NPVs above this line would be NPV positive, which includes plantation productivity classes of >11-13 m^3/ha/year for TPs and >17-20 m^3/ha/year for EPs.

To address the extent to which changes to key variables could impact on economic returns, a set of sensitivity analyses were developed for key factors comprising: site location and transport distance to timber markets, land costs, log prices, and carbon prices. The sensitivity analysis found that economic returns from both TP and EP clearly decrease as land costs increase. However, the economic returns from TPs tend to increase at a higher rate as productivity increases, with returns impacted positively by both higher timber and ACCU yields.

TPs will generally provide higher economic returns regardless of the transport distance (assuming all other variables are held the same as the base assumptions).

TPs will continue to generate higher economic returns when the ACCU price for TPs and EPs is comparable. However, if the EP price were to increase to, indicatively, $75/ACCU, while the TP price attained a lower price of $50/ACCU, EPs could deliver higher economic returns (ES Figure 5).

ES Figure 5 NPV by productivity class and selected carbon pricing scenarios (base case)



Source: Indufor modelling of economic returns through use of FullCAM and industry data.

Socio-economic contributions

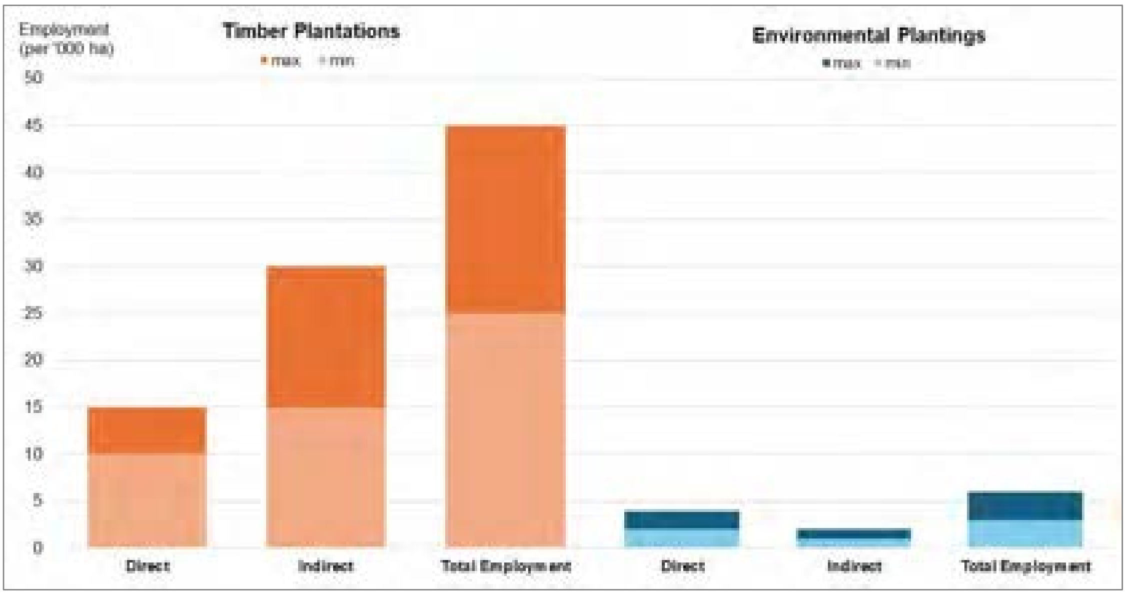
A review of the socio-economic contributions of EPs and TPs was conducted for the two study regions, with a primary focus on quantifying and comparing how these projects may translate into regional jobs, household income and Gross Regional Product (GRP). This assessment drew upon publicly available datasets, principally the Hub-commissioned socio-economic studies completed between 2020 and 2023, which remain the most robust sources of plantation economic data for these regions.

There is no equivalent Hub-level economic survey for EPs, so the figures presented in this report were extrapolated from the Hub plantation forestry studies and an analogous restoration study. EP results should therefore be interpreted as indicative ranges with a relatively high level of uncertainty.

This review found that TPs (as represented by plantation forestry) currently provide a strong economic base in both regions, supporting substantial employment, income, and GRP relative to the size of the regions. EPs, if pursued at scale, are expected to yield significantly lower economic contributions per unit area.

The evidence assembled for the MRFH and CWFH demonstrates differences in the socio-economic outcomes of TPs and EPs. On a normalised basis of 1,000/ha, TPs are estimated to support around 25–45 jobs (ES Figure 6), generate $3–6 million annually in value-added and inject $2–3 million in wages each year, whereas EPs are estimated to sustain 3–6 jobs, add $0.4–0.9 million of annual GRP and circulate $0.3–1 million in annual household income.

ES Figure 6 Side by side comparison of employment metrics, on per '000 ha basis



Source: Indufor literature review and project consultation.

The difference in socio-economic contributions from TPs versus EPs reflects the presence of high-value processing and continuous commercial activity in TPs versus the low-intensity, non-harvest nature of EPs. Sensitivity analysis, considering high-contribution sectors such as mining, suggests that even under optimistic assumptions, EPs would not exceed perhaps 10 jobs and $2 million annual GRP per 1,000ha, which is still well below the TP impact.

Comparative risks for project types

A comparative risk assessment of the two alternative land uses, TPs and EPs, was also conducted for this land use review. For the purposes of this comparison, it was assumed that the EP projects reflect a broadacre-high stocking model.

Risks were considered specifically and discretely from the perspective of project investors *and* regional communities. Bringing these two perspectives together is intended to inform the Regional Forestry Hubs, in recognition of their work with the plantation forestry industry including investors, as well as state and local governments (including policymakers and regulators), and other key stakeholders to prepare and provide the Government with strategic planning, technical assessments and analyses that aim to support growth in the forest industries in their region.

The identification of key risks was informed by project consultation with stakeholders and the literature review conducted for this study. The most prominent risks identified, from an investor perspective and a regional community perspective, are set out below (ES Table 3).

ES Table 3 Summary of key risks for TPs and EPs as alternative land uses in the regions

Key risks from an investor perspective	Key risks from a regional community perspective
• ***Market risk:*** Lower than expected price for ACCUs and/or timber from planting projects	• ***Local employment and community risk:*** Reduced employment in the region and a resultant impact on local communities
• ***Modelling risk:*** FullCAM updates result in lower carbon credit projections for the project	• ***Regional investment risk*:** Reduced capital investment and associated infrastructure in the region
• ***Productivity risk*:** Lower than anticipated growth in plantings due to site productivity factors	• ***Bushfire risk*:** Increased threat of bushfire damage to adjoining properties and communities
• ***Plantation loss risk*:** Loss of planted assets due to bushfire, drought, storms or other complex events	• ***Weeds and pests' risk*:** Spread of weeds and pests to adjoining properties and regional landscapes
• ***Regulatory risk*:** Risk of non-compliance with relevant Codes or planning requirements	• ***Traffic related risks*:** Increased traffic, including heavy vehicle movements, and impacts on regional roads
• ***Social licence risk:*** Loss of social licence and community support	• ***Permanent land use change risk*:** Land use change is effectively permanent and limits land use options in the future

A summary of the risk ratings assigned to the identified risks is set out below (ES Table 4).

ES Table 4 Summary of comparative risk rating assessments for TPs and EPs

Key risks for investors	TPs	EPs	Key risks for communities	TPs	EPs
• Market risk	🟢	⭕🟡🟡	• Local employment risk	🟢	🔴🟡🟡
• Modelling risk	🟡🟡	🔴🟡🟡	• Regional investment risk	🟢	⭕🟡🟡
• Productivity risk	🟢	⭕🟡🟡	• Traffic related risks	🟡🟡	🟢
• Bushfire risk	🟡🟡	🟡🟡	• Weeds & pests-related risks	🟡🟢	🟡🟡
• Regulatory risk	🟢	🟢	• Bushfire risk	🟡🟡	⭕🟡🟡
• Social licence risk	🟡🟡	🟡🟡	• Permanent land use change	🟡🟢	🟡🟡

Key to risk ratings: 🟢 Low; 🟡🟢 Low-Medium; 🟡🟡 Medium; ⭕🟡🟡 Medium-High; and 🔴🟡🟡 High.

This comparative risk assessment found that EPs generally carry a higher level of risk than TPs from both investor and regional community perspectives.

From an investor standpoint, TPs are assessed as low–medium risk, while EPs are rated medium+. The primary risk for EPs lies in modelling uncertainty, particularly with FullCAM, where ACCU projections vary across versions for similar sites. This is compounded by limited empirical data on EP productivity under emerging management regimes, creating longer term revenue uncertainty. EPs also face greater market risk, relying on a single income stream—carbon credits—with limited evidence of demonstrable returns under current or experimental models.

TPs, while also exposed to ACCU modelling risk and bushfires, benefit from a mature industry, established radiata pine plantations, dual revenue streams (timber and carbon), and strong fire management systems. These reduce investment risk and support proactive management.

EPs may face long term high risks from a regional community perspective due to lower employment and minimal regional economic activity. TPs may trigger some concerns regarding traffic and exotic species use but also contribute more visibly to local economies. Additionally, EPs may face future land use constraints due to native vegetation regulations. Overall, TPs offer lower risk through economic diversification, industry maturity and community integration.

Key findings

This land use review and comparison comprised a multi-staged assessment of the key drivers and related factors that are continuing to influence land use decisions in relation to new plantings on cleared agricultural land. Key findings from this study comprise the following:

1. Over the past five years, there has been a steady increase in EP projects nationally. The total area of EP projects and TP (Schedule 1) projects registered nationally under the ACCU Scheme have been approximately 90,000ha and 30,000ha, respectively.

2. The Central West NSW region has seen relatively more substantial TP project activity, compared to the Murray Region and other Hub regions in NSW and Victoria. In the last 1-2 years there has been a significant uplift in registered EP areas in adjacent regions.

3. In this context, the investment case for EPs has attractive elements evident across regions:
   - The EP model is viewed as relatively simple compared to plantation forestry, and multiple stakeholders highlighted potential biodiversity benefits associated with EPs, notwithstanding the mechanisms to monetise biodiversity are not yet developed.
   - In addition, use of the FullCAM 2020 version to model carbon crediting for EPs typically results in significantly higher ACCUs than the 2016 FullCAM version and exceeds crediting estimates for radiata pine plantations on moderate to high productivity sites.

4. The 2020 version of FullCAM appears to favour EPs overall. This finding reflects results based on the currently available data for EPs (and TPs) and the current state of development of FullCAM, which is periodically updated with continuous improvement principles and incorporation of new data as it becomes available. The risks and impacts of potential changes to FullCAM outputs over time should be factored into *both* models; and especially EPs for which there is a higher level of uncertainty in ACCU projections.

5. The investment case for TPs can also be compelling and is generally well understood by timberland investors and other stakeholders within the forestry sector. However, this case needs to be more effectively communicated to other investors and local communities.

6. Focusing specifically on economic returns, TPs will typically generate higher economic returns across all the productivity classes (assuming the same ACCU prices), which largely reflects the impact of the dual revenue streams from timber and ACCUs.

7. This study also shows TPs will generate a higher socio-economic contribution per unit area, due largely to the continuous commercial activity in plantations with more intensive silvicultural regimes and the presence of high-value processing in downstream industries.

8. In relation to project risks, TPs can draw on multiple rotations of experience, expertise and empirical data from the plantation forestry sector, which reduces uncertainty and risk with this land use compared to EPs in their more formative stages of development.

9. There are opportunities for more integrated, land use allocation approaches, both within properties and at the regional level, which could promote the benefits of TPs within designated Hub regions while also supporting complementary EP projects across the broader landscape; especially where biophysical or market factors (e.g. distance to manufacturing facilities) result in improved outcomes from integrating EPs.

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ABBREVIATIONS

ACCU	Australian Carbon Credit Unit
CER	Clean Energy Regulator
CWFH	Central West Forestry Hub (in the Central West NSW region)
EP	Environmental Plantings
ha	Hectare
IRR	Internal Rate of Return
LGA	Local Government Areas
MAI	Mean Annual Increment (based of plantation growth and yield)
mm	Millimetres
MRFH	Murray Region Forestry Hub
NPI	National Plantation Inventory
NPV	Net Present Value
PIPAP	Primary Industries Productivity and Abatement Program in NSW
SEEDS	The Central Resource for Sharing and Enabling Environmental Data in NSW
SPE	Support Plantation Establishment program (Australian Government initiative)
TCFD	Taskforce on Climate-related Financial Disclosures
TNFD	Taskforce on Nature-related Financial Disclosures
TP	Timber Plantations, or harvestable timber plantations
UNFCCC	United Nations Framework Convention on Climate Change

1. INTRODUCTION

This report presents a land use review and comparison relating to the potential establishment of new woody plantings on cleared agricultural land in Australia. Specifically, the focus for the comparison is between potential *environmental plantings* (EPs) and *harvestable timber plantations* (TPs), and their relative contribution to the regional economies of Central West New South Wales (NSW) and the Murray River region of southern NSW and northern Victoria.

This comparison is set in the context of the Australian Carbon Credit Unit (ACCU) Scheme, which incentivises projects that reduce emissions or store carbon in soils and vegetation, using approved methods to ensure credible, measurable, and verifiable climate benefits. The ACCU Scheme includes vegetation methods that incorporate afforestation and reforestation on cleared land. The context for this comparison also comprises an observed rise across Australia in the number and scale of vegetation-based ACCU Scheme projects that do not include or involve productive timber plantations, i.e. EPs.

EPs are supported by the ACCU Scheme under the *Reforestation and afforestation method 2015*[1] or the *Reforestation by Environmental or Mallee Plantings FullCAM Method 2024*[2]. The latter method especially supports two broad types of environmental planting: mixed-species environmental plantings *and* mallee plantings.

In relation to mallee plantings, it is recognised that outside the Murray Region and Central West NSW Hub regions, there are ACCU Scheme projects that are based on mallee plantings. However, mallee plantings are typically seen in lower rainfall areas with less than 600 millimetres (mm) rainfall per year – which are outside the primary areas of focus for the two Hub regions. Therefore, for this study, EPs are expected to be represented by mixed-species environmental plantings, and the analysis herein excludes consideration of mallee plantings.

In this context, EPs are defined for the purpose of this study as a planting that consists of a mixture of trees and shrubs that are native to the local area of the planting and may reflect the structure and composition of the local native vegetation community[3]. The method clearly specifies the project must maintain permanent plantings that are not harvested other than for thinning, removing debris for fire management or in accordance with traditional Indigenous practices or native title rights.

TPs are generally understood as commercially planted forests, established to produce wood, fibre, or other forest products, i.e. combining the values of timber production and carbon sequestration. Plantation forests can comprise native or exotic species. Establishment of plantation forests on cleared agricultural land for commercial harvesting of wood products is eligible for crediting under the *Plantation Forestry Method 2022*[4].

While this review relates mainly to new plantings in the Murray Region, of northeast Victoria and southwest slopes of NSW, and Central West NSW, it incorporates consideration of land use change across a range of other regions across Australia. The review is intended to assist and inform national, state and local government decision making in respect to the policy settings for new plantings under the ACCU Scheme especially.

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[1] CER (2025a) *Reforestation and afforestation method.* Online: https://cer.gov.au/schemes/australian-carbon-credit-unit-scheme/accu-scheme-methods/reforestation-and-afforestation-method

[2] CER (2025b) *Reforestation by environmental or mallee plantings FullCAM method 2024.* Online: https://cer.gov.au/schemes/australian-carbon-credit-unit-scheme/accu-scheme-methods

[3] *Carbon Credits (Carbon Farming Initiative) (Reforestation by Environmental or Mallee Plantings – FullCAM) Methodology Determination 2024.* Refer Division 5 – Domain group – planting types and requirements.

[4] CER (2025c) *Plantation Forestry Method*. Online: https://cer.gov.au/schemes/australian-carbon-credit-unit-scheme/accu-scheme-methods/plantation-forestry-method

It may also be useful in assisting Regional Forestry Hubs to provide meaningful, comprehensive and timely information to support stakeholders with their land use decisions.

1.1 Background to Regional Forestry Hubs

The Regional Forestry Hubs were established as part of the Australian Government policy *Growing a Better Australia, A billion trees for jobs and growth*[5]. One of the key roles of the Hubs is to provide advice to the Commonwealth Government that will assist in addressing regional issues in the forestry sector and to stimulate growth.

The Murray Region Forestry Hub (MRFH), (formerly the South West Slopes Forestry Hub), was established in 2020. It covers the region east of the Hume Highway, west of the Great Dividing Range, south of Gundagai, and northeast Victoria down to Lake Eildon. Contained within the Hub are the NSW forestry towns of Tumut, Batlow, Tumbarumba and Adelong, while the Victorian Hub area, contains the towns of Corryong, Tallangatta, Myrtleford, Wangaratta and Benalla (Figure 1-1). The Hub region contains approximately 170,000 hectares (ha) of softwood timber plantations (both public and private), featuring predominantly radiata pine (*Pinus radiata*), and is home to one of the largest softwood plantation forestry industries in Australia.

The Central West Forestry Hub (CWFH) was established in May 2020. The Hub is made up of members from the forestry industry in Central West of NSW, with a concentration around the wood processing facilities in the towns of Oberon, Raglan and Burraga, while the Hub region extends north of Orange, west to Cowra, and south to Goulburn (Figure 1-2). The existing timber plantation estate is approximately 90,000ha and since the inception of the Hubs program regional landowners have established approximately 8,900ha of greenfield plantations. The forest industry in Central West NSW is estimated to directly employ 900 workers.

A key strategic objective of both Hubs is facilitating the sustainable growth of the timber plantation estate within their respective boundaries. With this objective, both Hubs have conducted land suitability analysis[6] and plantation capability mapping[7] to identify areas of suitable non-forested land that can support plantation forestry across the regions.

Furthermore, the plantation timber industry is recognised for delivering strong regional socio-economic benefits[8],[9] as well as offering an important contribution to climate change mitigation, through sequestering carbon in forests, while carbon can be stored for many decades in long term harvested wood products[10].

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5 Department of Agriculture and Water Resources (2018) *Growing a better Australia – A billion trees for jobs and growth*, Canberra. CC BY 4.0. ISBN 978-1-76003-174-9 (printed)

6 Murray Region Forestry Hub (2023) *Plantation Land Suitability Analysis*. Report prepared by PF Olsen, October 2023.

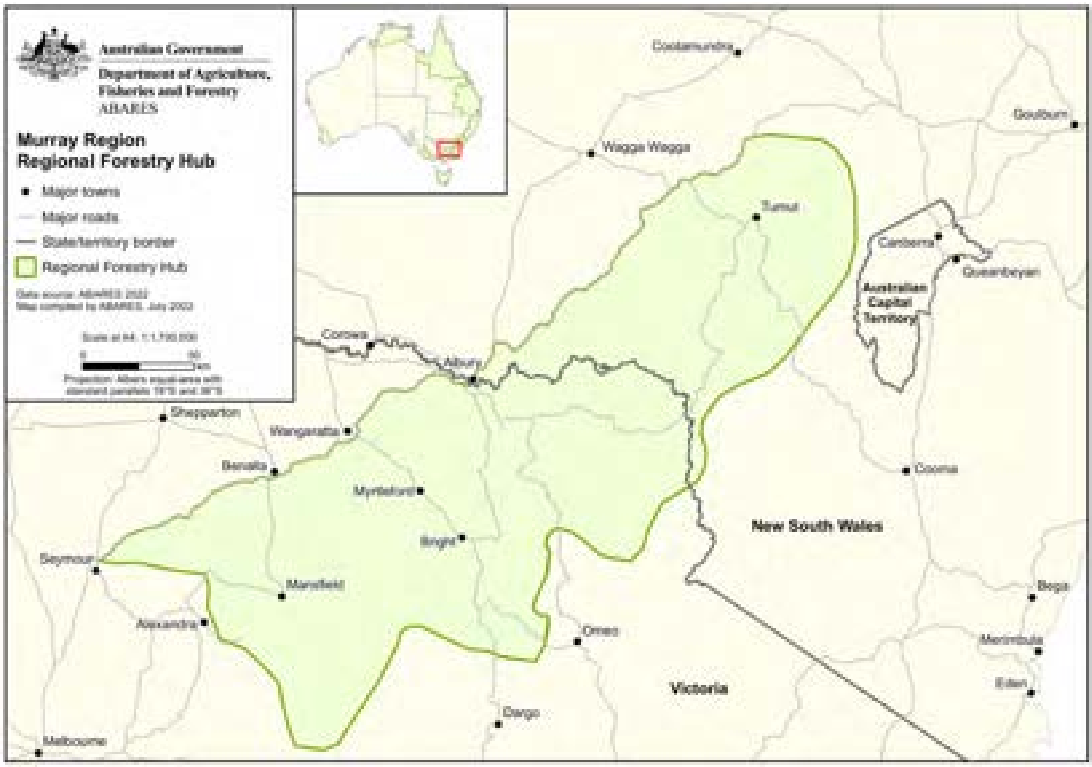
7 Central West Forestry Hub (2022) *Plantation Capability Mapping*. Report prepared by Greenwood Strategy.

8 South West Slopes Forestry Hub (2020) *Socioeconomic impacts of the softwood plantation industry – South West Slopes Forestry Hub Region, NSW and Vic*. Summary Report, May 2020.

9 Central West Forestry Hub (2023) *Socio-economic impact of the softwood plantation industry in the Central West NSW Forestry Hub Region, 2021-22*. Report prepared by BDO and the University of Canberra.

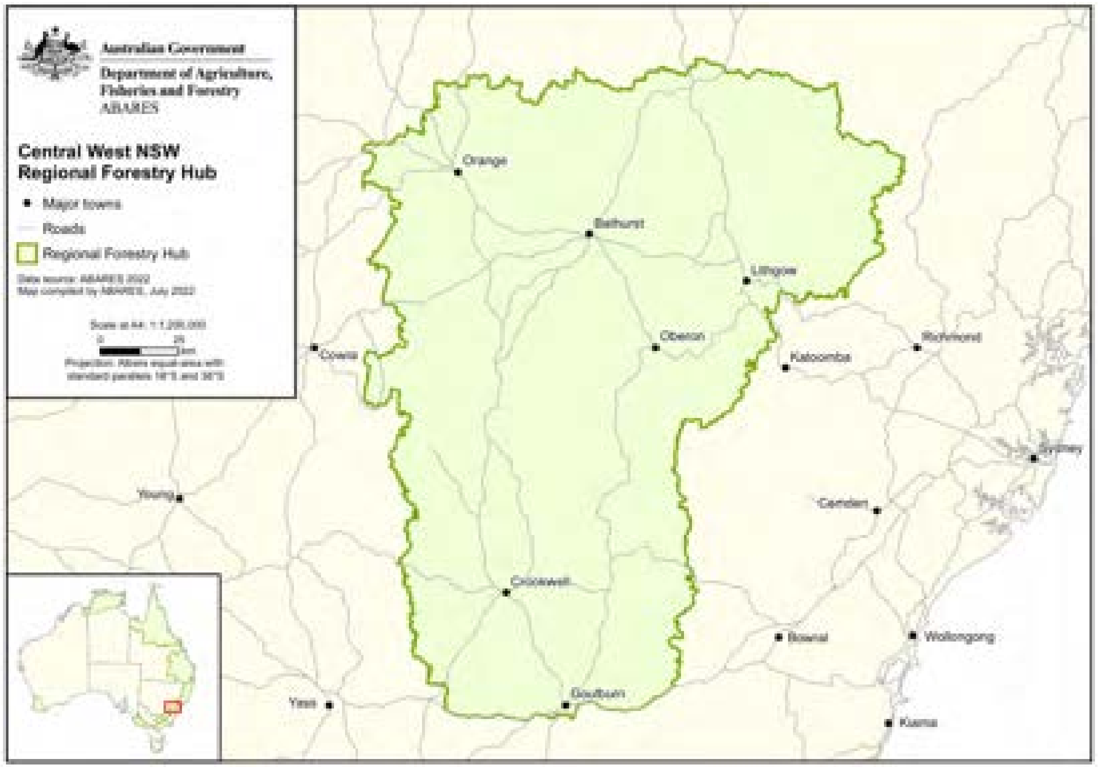
10 Forest & Wood Products Australia (2023) *Forests, Plantations, Wood Products & Australia's Carbon Balance*. Report published September 2023.

Figure 1-1 Overview map of the Murray Region Regional Forestry Hub



Source: Australian Government Department of Agriculture, Fisheries and Forestry

Figure 1-2 Overview map of the Central West NSW Regional Forestry Hub



Source: Australian Government Department of Agriculture, Fisheries and Forestry

1.2 Study scope and approach

This land use review and comparison encompasses a multi-staged assessment of the key drivers and related factors that are continuing to influence land use decisions in relation to new plantings on cleared agricultural land. The multiple stages comprised a review of:

- The statistical dimensions of land use change in Australia over the past two decades, and specifically, the total areas of new plantings of EPs and TPs by year, with associated trends over time (*section 2*)
- Key policy and regulatory drivers for new planting projects and the extent to which they encourage EPs or TPs or both forms of afforestation and reforestation (*section 3*)
- Key market drivers for new planting projects, which may result from key policy and regulatory drivers, but also reflect broader drivers of private sector investment in the land sector (*section 4*).

This land use review and comparison also comprised the preparation and review of the following assessments, principally for the Murray Region and Central West NSW region:

- A spatial analysis of areas of land suitable for productive timber plantations and EPs within the Hub boundaries and suitability for generating ACCUs (according to respective ACCU Scheme methods) (*section 5*)
- A quantitative comparison of the indicative timing and total ACCUs that could be generated in the two regions (*section 6*)
- An assessment of the economic returns from EPs and TPs in each Hub region, with these returns expressed in terms of the potential return (i.e. $/ha/year) and completed on a like for like basis (i.e. on the same land) for EP and productive timber plantations (*section 7*)
- The socio-economic contribution of both EPs and TPs at a regional level (*section 8*).

In relation to socio-economic contributions, both the MRFH and CWFH have completed socio-economic assessments of their respective regions during the past five years (refer section 8 for further discussion of these assessments). These assessments provide substantial insights into the plantation industry's contribution to the regional economy, including downstream value chains for wood and paper products. However, none of these assessments to date have included specific data on the socio-economic impacts of environmental plantings (EPs), presenting a key challenge for this study. As a result, additional data sources were required to assess the socio-economic contributions of alternative land uses in both regions.

This review also includes an assessment of comparative risks across the land use alternatives, considering how likelihood and consequence may vary between them (Section 8).

To support the assessment, the project team conducted interviews with stakeholders in the Murray Region and Central West NSW and undertook site visits to examine planting designs and validate key assumptions. Around 20 online interviews were also conducted with a wide range of stakeholders directly involved in establishing and managing new planting projects under the ACCU Scheme, as well as those engaged in regulation and sectoral support. A list of the consulted stakeholder organisations is provided in **Annex 1**.

These site visits and interviews provided valuable insights into recent land use changes, as well as key policies and regulatory frameworks, market drivers for plantation investments, major risks, and the socio-economic dimensions of different land use options.

2. CONTEXT FOR NEW PLANTINGS AND LAND USE CHANGE IN AUSTRALIA

This land use review and comparison is focussed largely on the establishment of new woody plantings on cleared agricultural land in the Murray Region and Central West Forestry Hub regions. The following section provides context for these developments, with consideration of national trends and relevant developments in other selected regions.

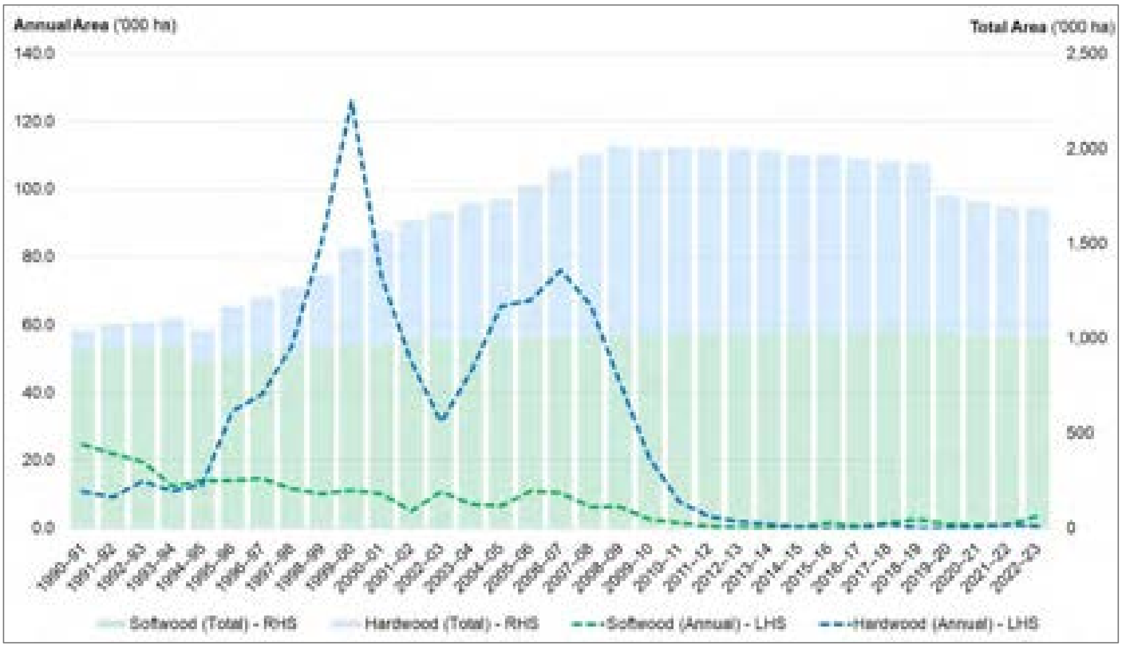
2.1 National trends

The National Plantation Inventory (NPI) collects data and reports on plantations established primarily for timber production in Australia[11] and this includes TPs. The NPI dataset does not include other types of plantings, e.g. EPs, and currently there is no equivalent national dataset for new EPs beyond the ACCU Scheme project register, which is discussed further below.

Since the late 2000s, there has been minimal new establishment of softwood and hardwood timber plantations in Australia. Hardwood plantations expanded rapidly from the mid-1990s to 2010, driven by an easing of woodchip export regulations and the rise of Managed Investment Schemes (MIS) (Figure 2-1). However, the collapse of several MIS companies after 2008 saw a sharp decline in plantation establishment. Some hardwood plantations have since been converted back to agriculture, reflecting higher-value land uses. As a result, the national plantation estate has declined from a peak of 2.08 million ha in 2014–15 to 1.71 million ha in 2022–23 (Figure 2-1), an average loss of around 50,000ha per year.

In contrast to the substantial changes in Australia’s hardwood plantation estate, the softwood plantation estate has been relatively stable over this period, remaining close to a total national area of around 1 million ha. New establishment between 2011-12 and 2021-22 averaged around 1,000ha per year, with a discernible increase (from a low base) over the past three years.

Figure 2-1 Annual and cumulative plantation establishment (1999 – 2023)



Source: Australian Plantation Statistics (2024), ABARES.

[11] ABARES (2025) *Plantation inventory and statistics*. Online: https://www.agriculture.gov.au/abares/forestsaustralia/plantation-inventory-and-statistics

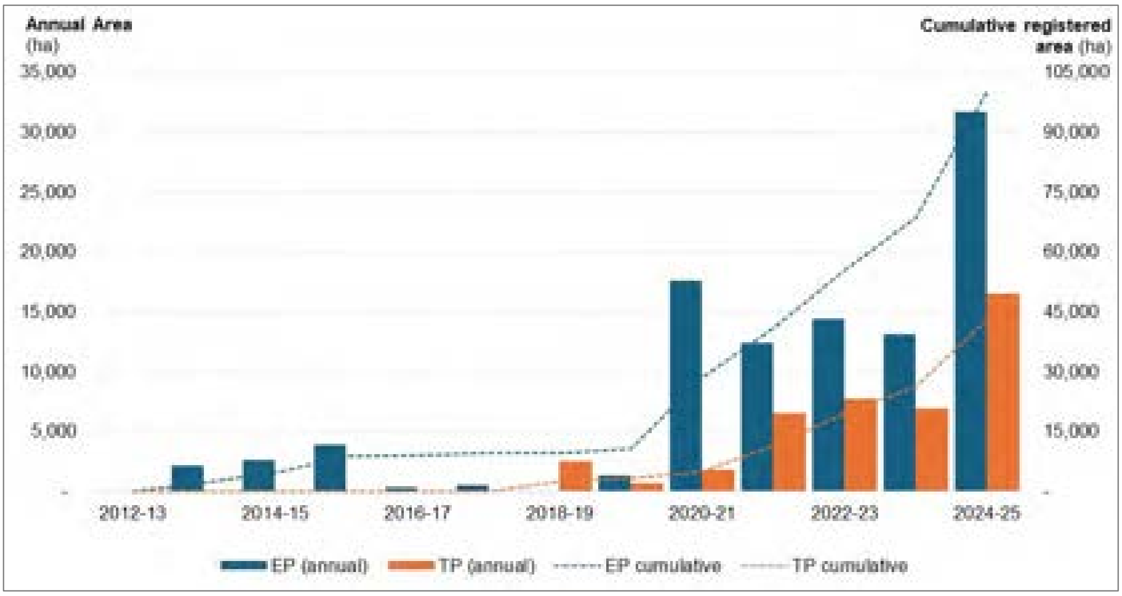
During this period, the former Emission Reduction Fund, now ACCU Scheme, was introduced in 2014; and more recently, a range of other policy initiatives aimed at supporting long rotation new TP investment (as reflected in the Australian Government's *Support Plantation Establishment*[12] grants) as well as carbon sequestration, biodiversity and landscape restoration. These policy initiatives including relevant grants are discussed further in this report. This has translated to modest annual gains of new timber plantation establishment over this time ranging from 700ha new area in 2016-17 to approximately 4,500ha in 2022-23.

Without an equivalent national dataset for new environmental plantings, the ACCU Scheme Project Register provides some guidance for a comparison of trends over the same period[13].

EP projects have been eligible under the ACCU Scheme since 2014, and analysis of the ACCU Scheme Project Register indicates interest and area being registered for reforestation via approved environmental plantings methods has been steadily increasing over that time. The cumulative project area registered nationally as EP projects (100,237 ha), shown in Figure 2-2, is approximately three times that of TP projects registered under Schedule 1 of the *Plantation Forestry Method 2022* (33,254 ha) (based on early 2025 data)[14]. This data for EPs incorporates mallee plantings (not readily separated), comprising around 6,000ha in total across the country.

Please note that these registered areas are the designated 'Project Area'; and in most cases this will be somewhat higher than the actual planted area. In some cases, they may represent the project property title area which can include non-cleared land or land that ultimately will not be planted. A summary of all project areas for EPs and TPs registered on the ACCU Scheme Project Register is set out in **Annex 2**.

Figure 2-2 Registered areas of plantings projects under the ACCU Scheme



Source: Clean Energy Regulator (2025d), Indufor. Note, EP totals include mallee projects.

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[12] Australian Government (2025) *Support Plantation Establishment program.* Online: https://www.agriculture.gov.au/agriculture-land/forestry/industries/support-plantation-establishment-program

[13] CER (2025d) *Emissions Reduction Fund Register*. Available online: https://cer.gov.au/document/accu-scheme-project-register

[14] Ibid.

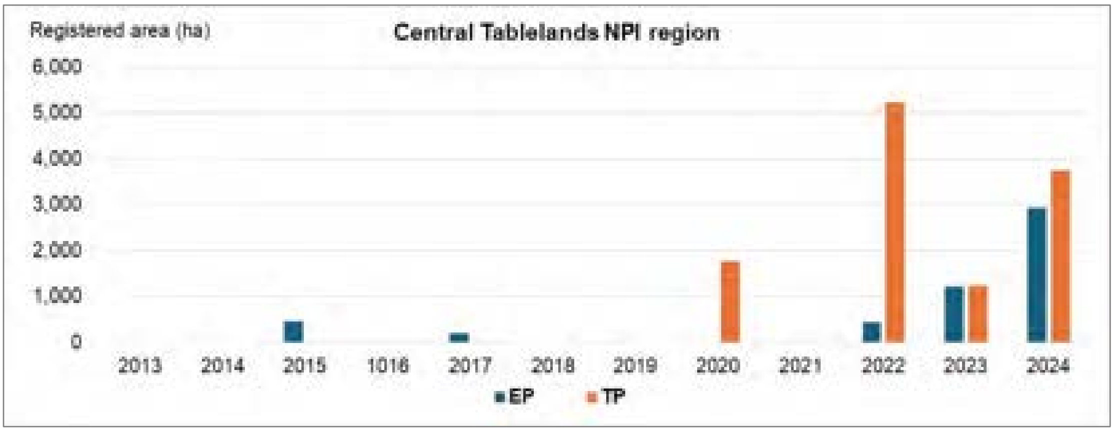
2.2 Regional trends

In the two Hub regions for this study, there are differing profiles for the areas of EPs and TPs registered under the ACCU Scheme.

An analysis of the registered areas by project type and region was conducted using National Plantation Inventory (NPI) region boundaries rather than Regional Forestry Hub boundaries. This approach was adopted to enable a spatial analysis using national datasets. However, for the purposes of this study, there is generally close alignment between the Central West NSW Forestry Hub boundary and the Central Tablelands (NSW) NPI region, and likewise, between the Murray Region Forestry Hub and the Murray Valley NPI region.

Based on these boundaries, in the Central Tablelands NPI region, the total area of registered TP and EP projects to December 2024 was ~17,200ha (Figure 2-3), comprising almost 12,000ha (approximately 70%) of TPs and ~5,200ha of EPs (30%). This reflects a predominant focus on TPs in this region, although ACCU Scheme registrations reflect a notable rise in EP registrations over the past three years; up from negligible areas until 2022.

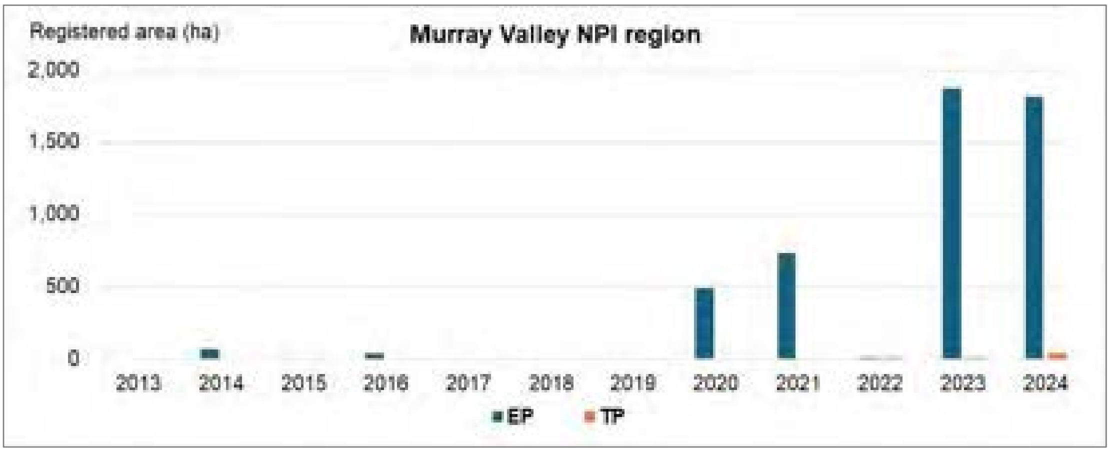
Figure 2-3 Areas of ACCU Scheme registered plantings in Central Tablelands NPI region



Source: Clean Energy Regulator (2025d), Indufor analysis.

In the Murray Valley NPI region, the total area of registered TPs and EPs ACCU Scheme projects to December 2024 was ~5,100ha (Figure 2-4), comprised almost entirely of EPs (98%). The registration of TPs in the Murray Region has been negligible to date.

Figure 2-4 Areas of ACCU Scheme registered plantings in Murray Valley NPI region



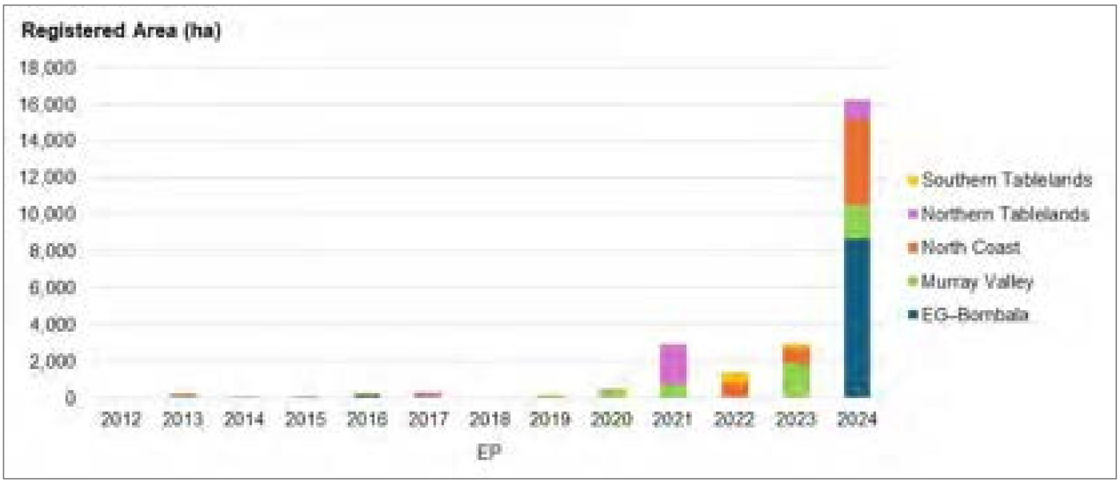
Source: Clean Energy Regulator (2025d), Indufor analysis.

2.3 State level trends

In terms of state-based trends, there is limited consistency in the publicly available tracking and reporting of planting areas, comprising TPs and EPs, other than those registered under the ACCU Scheme Project Register.

Looking outside the Central Tablelands NSW and the Murray Region, a review of ACCU Scheme projects in adjacent NPI regions in NSW and Victoria shows there has been a substantial increase in EP projects in 2024, with stakeholder consultation suggesting this trend is continuing through 2025. Notably, the large areas of EP registrations in East-Gippsland-Bombala in 2024 (over 8,000ha) has contributed to total EP registrations of around 16,000ha in adjacent regions over the past year (Figure 2-5).

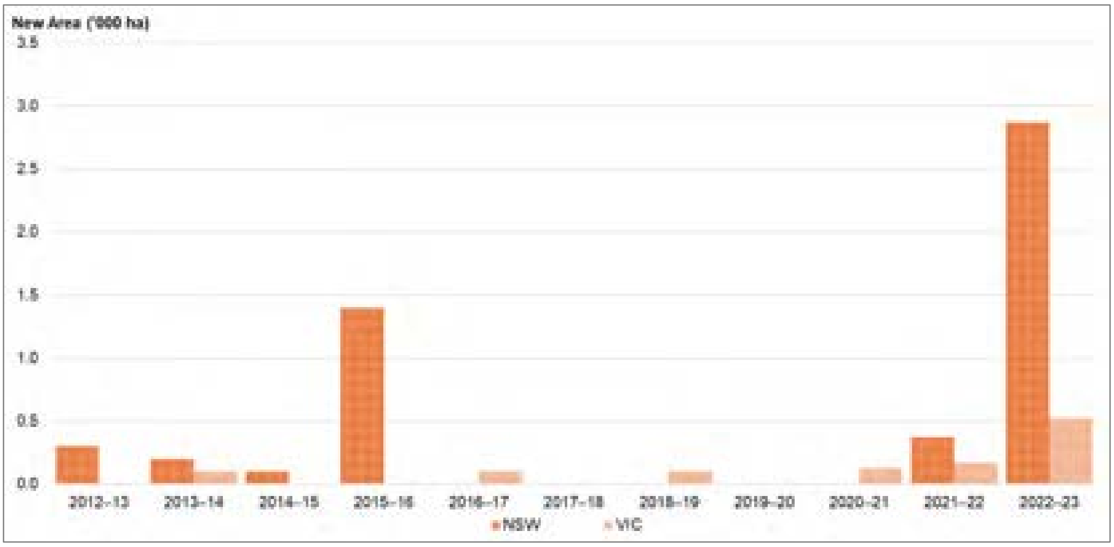
Figure 2-5 Areas of registered EP projects in adjacent NPI regions of NSW and Victoria



Source: CER (2025d), Indufor analysis.

Meanwhile, new softwood timber plantations (comprising TPs) established in NSW and Victoria over the same period have totalled around 6,400ha, with a highly variable profile over time, notwithstanding a discernible increase in the past three years (Figure 2-6). This data, drawn from the National Plantation Statistics, shows new plantation establishment up to 2023.

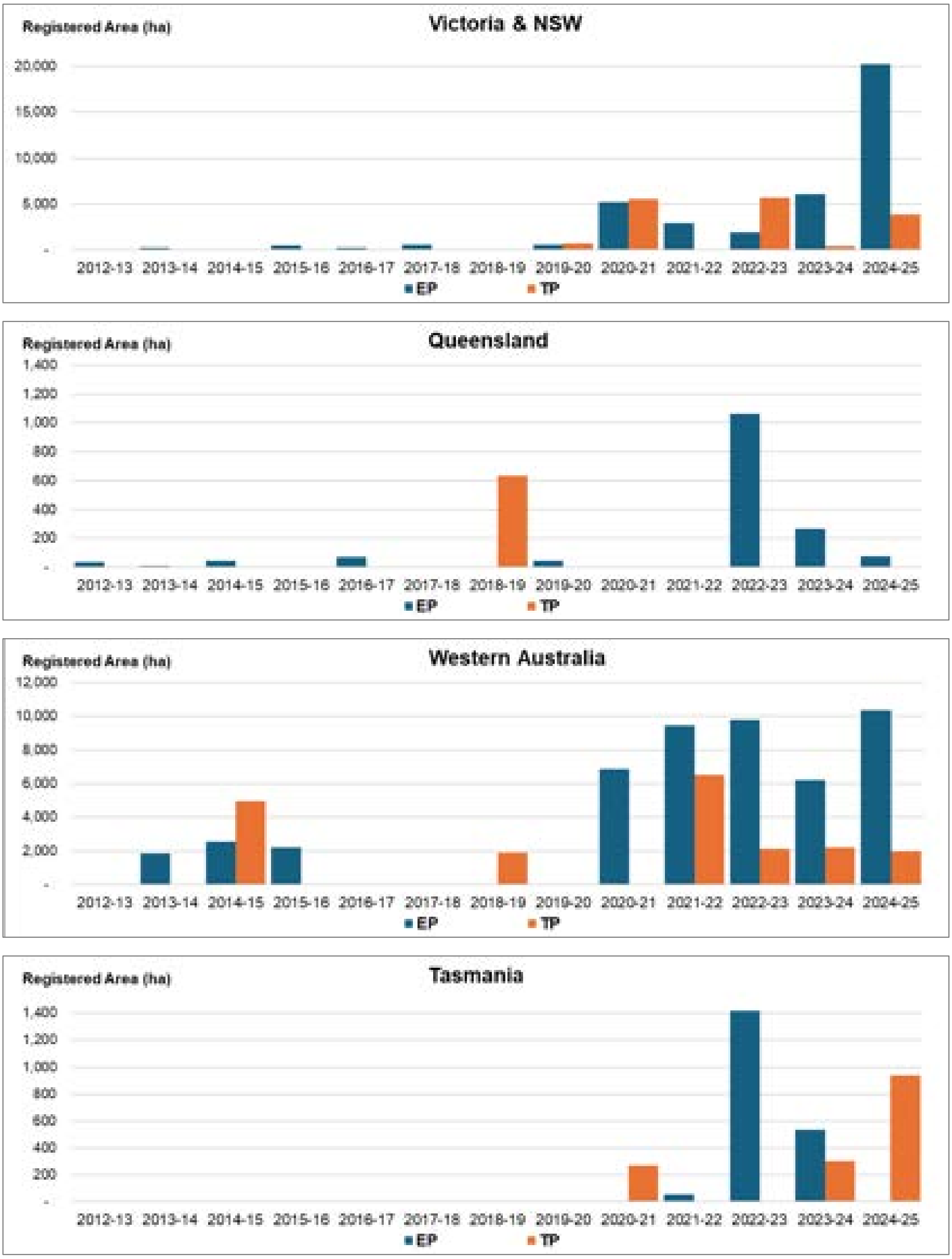
Figure 2-6 New softwood timber plantation established in Victoria and NSW (2012-2023)



Source: Australian Plantation Statistics (2024), ABARES.

A national analysis of the ACCU Scheme registered areas by state and method type is set out below in Figure 2-7. This analysis presents the registered areas of projects directly relevant to this land use review, comprising EPs established under the *Reforestation by Environmental or Mallee Plantings Method 2024*, and TPs, limited to Schedule 1 projects under the *Plantation Forestry Method 2022* (and excluding Schedule 2, 3 and 4 projects under this method).

Figure 2-7 Areas of ACCU Scheme registered plantings by state and project type



Source: Clean Energy Regulator (2025d), Indufor analysis. Note varying scales for the y-axis in each figure above.

Looking at projects registered in Victoria and NSW combined, the analysis shows the relatively recent development of EPs and TPs, from 2019-20 onwards. It also shows that the registered area of EP projects (noting this can reflect property title area or gross area rather than actual planted area) has steadily increased over the past three years, while the registered area of TP projects has varied with an inconsistent trend over the past five years.

The trends in registrations of EPs and TPs have varied across the other states.

In Queensland, the ACCU Scheme project register indicates only EP projects are being registered, and at much smaller scales than in other states - i.e. no more than 1,000ha/year in 2022-23 and less than 300ha/year over the past two years.

Conversely, Western Australia has sustained regular annual EP project registrations above 6,000ha since 2020, far exceeding the total project area of TPs.

In Tasmania, there has been comparable levels of interest in TPs and EPs projects in recent years; however, there are no apparent trends in the plantings over the past five years, which reflects the formative stage of development of ACCU Scheme planting projects in Tasmania and other parts of the country.

2.4 Summary of findings

At a national level, the introduction of the ACCU Scheme and a range of other policy initiatives has resulted in an increase in woody plantings as emission reduction projects (EPs and TPs) over the past 5-10 years.

In some regions such as the Central West NSW, there has been significant new areas of TPs, and nationally, the total area of new plantation establishment (including TPs) since 2016/17 has been around 33,200ha.

However, in the Murray Region and across a broader range of regions, there has been substantially more investment in EPs, with the cumulative EP project area registered nationally (up to early 2025) as EP projects totalling around 100,200ha, which is around three times that of TP projects registered under Schedule 1 of the *Plantation Forestry Method 2022*.

This increase in EPs in the Central West and Murray Regions validates forest industry concerns that EPs are - in some areas at least - competing for land that is suitable for TPs and the long-term supply of forest fibre to the regions' processing facilities.

Using NPI regional boundaries as a proxy for the Regional Forestry Hub boundaries, in the Central Tablelands of NSW the total area of registered TP and EPs to December 2024 was ~17,200ha, comprising around 70% of TPs and 30% EPs. In the Murray Valley NPI region, the total area of registered TPs and EPs ACCU Scheme projects to December 2024 was ~5,100ha, comprised almost entirely of EPs.

In adjacent regions in NSW and Victoria, there have been substantial increases in EPs, with large areas of EPs registered in East-Gippsland - Bombala especially in 2024/2025.

In Queensland, the register indicates only small-scale EP projects are being registered. Conversely, Western Australia has sustained regular annual EP project registrations above 6,000ha since 2020, far exceeding the total project area of TPs. In Tasmania, there has been comparable levels of interest in TPs and EPs projects in recent years, with only modest areas being registered.

3. POLICIES AND REGULATORY DRIVERS

Land use decisions regarding the establishment of new EPs or TPs on cleared agricultural land in Australia are shaped by a complex and evolving policy landscape. This chapter explores the key international frameworks that have and continue to influence Australia's domestic policies, as well as national strategies and programs that represent drivers for land use decisions, particularly those involving the planting and management of EPs and TPs.

3.1 Identifying and characterising types of drivers

There are numerous national and state-based government policies, legislation and regulatory instruments that can potentially influence land use and management decisions in relation to afforestation or reforestation projects for EPs or TPs. The identification of the various policies and instruments was followed by grouping the drivers based on their primary objective, the type of planting model it supports, and the type of incentive (direct or indirect), together with a brief description of the likely relevance to EP or TP projects. A summary listing of all the relevant policy and regulatory drivers identified through this process is set out in **Annex 3**.

This identification process was not exhaustive. There are various other policies and legislation that may be relevant to land use or project decisions of this nature, such as those related to, for example, protection and management of Native Title, and cultural heritage value management. However, these have not been included in the primary list or considered as being particularly influential candidates.

To better understand the policy landscape, the identified list of policy and regulatory drivers have been classified into three broad groups:

- *Supporting and enabling frameworks:* Instruments that encourage uptake through policy directions or signals of support
- *Direct funding or market-based incentives:* Instruments or programs providing direct funding or resourcing
- *Disincentives:* Regulatory complexity or constraints that impact eligibility, implementation or ongoing management.

Additionally, to clarify the full range of national and state-based influences on land manager or investor decisions to plant trees for timber or environmental purposes, the policy, legislative, and regulatory drivers have been broadly characterised based on their primary objectives and grouped under the following themes:

- *Climate*: Climate action and emissions reduction contributing to net zero outcomes
- *Nature*: Nature repair, biodiversity conservation and ecosystem restoration
- *Forestry*: Forest industry development
- *Regional development*: Broader industry development, including agriculture, other land uses
- *Fire management*: Fire prevention, mitigation, and bushfire management.

3.2 International policy context

There are a range of international agreements related to climate change, biodiversity conservation and sustainable development that have strongly influenced Australia's evolving national and State-based frameworks for carbon offsetting, emissions reduction and biodiversity conservation, which by extension, are acting as drivers for afforestation and reforestation projects on cleared land in Australia. Of note is the UNFCCC and the 2015 Paris Agreement, under which Australia has committed to economy-wide emissions reduction targets and achieving net-zero emissions by 2050.

Under these international agreements, annual ‘conferences of the parties’ (COPs) have advanced key goals, including climate finance and accountability mechanisms, climate adaptation plans, and carbon markets (Article 6 of the Paris Agreement), which establishes the framework for international cooperation on carbon markets and non-market approaches to help countries meet their emissions reduction targets (nationally determined contributions or NDCs).

In parallel, the Convention on Biological Diversity (CBD) which focusses on biodiversity conservation, through CBD COP15 (2022), developed the Kunming-Montreal Global Biodiversity Framework which recognises climate change as a key driver of biodiversity loss and calls for integrated planning across climate, biodiversity and sustainable development. The framework also set key targets to which Australia agreed, including restoring 30% of degraded ecosystems and protecting 30% of the planets land and oceans by 2030[15].

Following COP27 and COP28, which placed some emphasis on industrial emissions reduction and carbon market mechanisms under Article 6 of the Partis Agreement, Australia introduced the *Safeguard Mechanism (Crediting) Amendment Act 2023*, which legislated declining emissions baselines for large emitters and allowed for the creation and trade of ACCUs.

Separately, but relatedly, the Financial Stability Board (2015) established the Taskforce for Climate-related Financial Disclosures (or TCFD), which aligns strongly with Paris Agreements goals and is often referenced at COPs, to improve and standardise financial risk disclosure reporting for investors, lenders and insurers. Similarly, a market-led initiative supported by the United Nations Development Program (UNDP), United Nations Environment Program (UNEP), Worldwide Fund for nature (WWF) and Global Canopy, established the Taskforce for Nature-related Financial Disclosures (TNFD) which was designed to align closely with the Kunming-Montreal Global Biodiversity Framework and is increasingly referenced at COP discussions regarding nature-positive economies.

In recognition of these developments, Australia introduced the *Nature Repair Market Bill 2023* to establish a voluntary biodiversity credit market and signalled an intent to reform the *Environmental Protection and Biodiversity Conservation Act 1999* (the EPBC Act) within its ‘nature-positive’ plan, to include stronger protections and a National Environmental Standard for Restoration Actions and Restoration Contributions[16]. However, to date, no biodiversity credits have been generated or traded so this ‘nature repair market’ is yet to materialise.

3.3 Key Australian policy and regulatory frameworks

Australia’s domestic response to international commitments has been shaped through various national and state-based strategies and legislation. A summary of the key instruments providing an enabling or supporting framework for EPs and TPs is shown in Table 3-1.

Climate-oriented policy drivers include the *Climate Change Act 2022* (Cwth), which legally enshrines Australia’s emission reduction targets agreed under the Paris Agreement and reinforces the role of carbon sequestration projects in national climate strategies. Additionally, the *Carbon Credits (Carbon Farming Initiative) Act 2011* or ACCU Scheme, provides a supporting framework for generating and trading carbon credits from eligible carbon sequestration or emissions avoidance projects.

The *Safeguard Mechanism (Crediting) Amendment Act 2023* (Cwth) also plays a pivotal role in creating sustained and credible market demand for ACCUs by placing legally binding emissions limits on Australia’s largest industrial emitters.

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[15] DCCEEW (2024) *National Roadmap for protecting and conserving 30% of Australia’s land by 2030.* Online: https://www.dcceew.gov.au/environment/land/achieving-30-by-30/national-roadmap

[16] DCCEEQ (2022) *Nature Positive Plan: better for the environment, better for business.*

Under the amended mechanism, facilities emitting more than 100,000 tonnes of CO_2-e per year are required to progressively reduce their net emissions in line with national emission reduction targets of 43% below 2005 levels by 2030 and net zero by 2050[17]. This can be achieved through on-site abatement (sometimes called 'in-setting') or, importantly, by purchasing ACCUs (also called 'offsetting'), thereby establishing a long-term and scalable demand signal for carbon credits generated through projects such as environmental plantings and timber plantations.

The safeguard reforms effectively integrate the carbon market into Australia's broader national climate strategy, aligning industrial emissions management with international obligations under the Paris Agreement. It also provides a clear economic rationale for private-sector investment in land-based sequestration, helping to unlock regional economic benefits while contributing to Australia's international commitments (market drivers are discussed further in Section 4).

Table 3-1 Key enabling frameworks supporting EPs and TPs in NSW and Victoria

Key driver	Environmental plantings	Timber plantations
Climate	• ACCU Scheme & approved methods • The Safeguard Mechanism • NSW Primary Industries Productivity and Abatement Program (PIPAP) • *Climate Change Act 2017* (Vic) • *Climate Change (Net Zero Future) Act 2023* (NSW)	• ACCU Scheme & approved methods • The Safeguard Mechanism • NSW Primary Industries Productivity and Abatement Program (PIPAP) • *Climate Change Act 2017* (Vic) • *Climate Change (Net Zero Future) Act 2023* (NSW)
Nature & Biodiversity	• *Nature Repair Market Act 2023* (Cwth) • Biodiversity Conservation Offsets Policy (EPBC Act 1999) • *Biodiversity Conservation Act 2016* (NSW) • The Kunming-Montreal Global Biodiversity Framework (2022)	• *No nature-oriented policies identified as directly supporting or enabling new timber plantation establishment*
Plantation forest management	• *Plantations and Reafforestation Act 1999* (NSW) / *Code (Regulation) 2001*	• National Forest Industries Plan 2018 • *Plantations and Reafforestation Act 1999* (NSW) / *Code (Regulation) 2001* • *Victorian Code of Practice for Timber Production 2014*
Regional development	• *Local Land Services Act 2013* (NSW) • Victorian Planning Scheme Provisions	• *Local Land Services Act 2013* (NSW) • Victorian Planning Scheme Provisions

In terms of forestry industry-themed policies, the Commonwealth Government's 2018 National Forest Industries Plan, '*Growing a Better Australia – A billion trees for jobs and growth*', provides a supporting, enabling framework for expansion of Australia's plantation estate, and signals increased industry assistance, innovation and support to meet challenges of the future.

Both EPs and TPs are enabled through legislation like the *Plantations and Reafforestation Act 1999* (NSW), the *Local Land Services Act 2013* (NSW) and the Victorian Planning Scheme - all of which include provisions for plantation development, planning and associated compliance and enforcement considerations.

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[17] CER (2025e) *Safeguard Mechanism*. Online: https://cer.gov.au/schemes/safeguard-mechanism

During the consultation phase of this study, it was apparent that there is strong support for the state-based regulatory environment afforded new plantations in NSW under the *Plantations and Reafforestation (Code) Regulation 2001*. In contrast, new plantation projects in Victoria including TPs and EPs are subject to local government approvals, and there is an apparent lack of consistency with which conditions are applied, which in some cases has reportedly discouraged new plantation investment in TPs, including in the Murray Region.

Meanwhile, nature-related policies and legislation centred on biodiversity conservation provide a range of enabling and supporting frameworks indirectly incentivising EPs, but with very limited support for, if not explicit exclusions of, commercial timber production plantings, i.e. TPs. The Nature Repair Market Act seemingly favours methods and activities that promote restoration or reforestation, without provisioning for timber production or utilisation from project areas. Similarly, national and state-based biodiversity conservation legislation, which promote biodiversity conservation offsets, encourage native vegetation plantings and conservation plantings rather than production-based plantings as eligible offsets.

Australia has introduced biodiversity-focused policies such as the *Nature Repair Market Bill 2023*, establishing the world's first legislated national voluntary market for biodiversity certificates. This aims to support restoration and protection activities that may complement carbon projects. As of early 2025, only one method—*Replanting native forest and woodland ecosystems 2024*—has been approved. It targets restoration of previously cleared farmland but excludes commercial timber production. Other relevant legislation includes the EPBC Act and the *Biodiversity Conservation Act 2016* (NSW), both of which promote biodiversity conservation through offset requirements in planning approvals. These frameworks can indirectly encourage tree planting projects, particularly those aligned with conservation goals such as EPs.

Within this context of these enabling frameworks and policies, the ACCU Scheme provides more direct incentives for EPs and TPs through specific methodology determinations. It is through these legislated instruments that eligible EP and TP plantings can generate and use ACCUs to underpin or support funding for the initial investment or ongoing management costs.

3.4 Key funding mechanisms for EPs and TPs

In addition to the ACCU Scheme methods, there is a range of national and state-level grants programs that directly incentivised tree plantings. A summary list of the key policies and mechanisms that provide *direct funding or resourcing* for EPs and TPs is set out in Table 3-2.

Relevant funding mechanisms directly incentivising EPs

Most prominently, the ACCU Scheme's methodology determinations relating to reforestation and environmental plantings provide a direct financial incentive for establishing EPs. These methods comprise the *Reforestation and Afforestation 2.0 Methodology Determination 2015* – which will expire on 30 September 2025 - and the *Reforestation by Environmental or Mallee Plantings) Methodology Determination 2024*, which will remain in force thereafter.

In addition, looking at the State level, the NSW Governments' Primary Industries Productivity and Abatement Program (PIPAP) incorporates the *Living Carbon* grants program[18], which offers up to $200,000 per project, sourced from a $5 million fund aimed at landholders undertaking carbon abatement plantings in three regions: Riverina, North Coast, and Mid-Coast local government areas (LGAs), i.e. outside the two Hub regions for this study. Eligible applicants include private landholders, Aboriginal organisations or Traditional Owner groups, and

[18] NSW Government (2025) *Living Carbon grants*. Online, accessed May 2025: https://www.energy.nsw.gov.au/business-and-industry/programs-grants-and-schemes/primary-industries-productivity-and-abatement/living-carbon-grants

potentially public land managers may apply with pre-approval. Projects must involve 10–200 ha of revegetation, with individual sites no smaller than 4 ha. These plantings need to support threatened or iconic native species (e.g., koalas, native flora) and comply with both the ACCU Scheme (under the Environmental Plantings Pilot or 2024 method) and Accounting for Nature biodiversity accounting systems.

The *Living Carbon* grant program precludes plantings that are primarily for timber production and may fund up to 100% of eligible establishment costs. Eligible costs include site preparation, planting materials, fencing (up to 50%), labour, technical planning, administration, and biodiversity monitoring, with ongoing monitoring and reporting obligations to the Clean Energy Regulator and Accounting for Nature. Applicants must contribute funding and/or in-kind support. The NSW Government does not have a similar program to support TPs directly.

In Victoria, the State Government's BushBank Program is a $77 million initiative designed to restore over 20,000ha of native vegetation across Victoria, supporting biodiversity, habitat recovery, and carbon sequestration in line with the state's net-zero emissions target by 2045[19]. The program includes streams for both public and private land. Private land projects, delivered in partnership with Trust for Nature, require landholders to enter permanent conservation covenants, with typical minimum project sizes of 10ha. Public land projects must be at least 20ha, creating patches of woody native vegetation achieving at least 20% canopy cover over 0.2 ha areas. Targeted restoration includes native trees and shrubs aligned with forest-cover ecological vegetation classes, particularly those supporting threatened species.

Eligible BushBank activities include site preparation, native seed collection, planting, fencing, and weed control. Projects must deliver long-term ecological benefits, with permanent protection and maintenance commitments. Funding is available over several years and may involve co-investment. The program also encourages participation by Traditional Owners and seeks to generate ACCUs where applicable. Delivery is supported by partners, with regional implementation across Victoria's most ecologically valuable landscapes.

Table 3-2 Key policy drivers directly incentivising EPs and TPs in NSW and Victoria

Theme	Environmental plantings	Timber plantations
Climate	• *Reforestation and Afforestation 2.0 method 2015* (expiring 30 Sep 2025) • *Reforestation by Environmental or Mallee Plantings FullCAM Method 2024* • Living Carbon Grants Program (NSW)	• *Plantation Forestry Methodology Determination 2022*
Nature	• BushBank Victoria • Replanting native forest and woodland ecosystems Method 2024	• *No nature-oriented policies identified as directly funding or resourcing new timber plantation establishment*
Plantation forest management	• *No forest industry-oriented policies identified as directly funding or resourcing environmental plantings*	• Support Plantation Establishment (SPE) program • HVP Plantations & Victorian Government Softwood Expansion Partnership (or GPIP)

[19] Victoria State Government (2025) *BushBank program*. Available online: https://www.environment.vic.gov.au/bushbank

Relevant funding mechanisms directly incentivising TPs

In relation to funding mechanisms for TPs, one of the primary incentives for TPs is the Australian Government's *Support Plantation Establishment* (SPE) Program, which is underpinned by the National Forest Industries Plan (2018) and *Growing a Better Australia* policies.

The SPE program provides grants of $2,000 per hectare (minimum planting area of 20ha) to support new long-rotation softwood and hardwood plantations on previously cleared land not used for forestry in the past seven years. With funding of ~$74 million, available from 2023–2027, the program aims to boost domestic timber supply and support climate goals[20]. Eligible applicants include private companies, farm foresters, First Nations enterprises, and government bodies. Projects require a co-contribution equal to the grant funding, with no cap on maximum grant amounts. Funding can cover planting, site preparation, and establishment costs, and applicants must submit a management plan endorsed by a qualified forestry professional.

At the state level, there are some examples of substantial state-based programs supporting TPs. However, the most prominent schemes, in Victoria and WA, feature State government agencies taking lead responsibility for acquiring land and establishing plantations. For example, in Victoria, the Gippsland Plantation Investment Program (GPIP)[21] is a $120 million partnership agreement between Hancock Victorian Plantations (HVP) and the Victorian Government, aimed at expanding Victoria's softwood plantation estate, by around 14,000ha over a 5–10-year period. In WA, the State Government has established a $350 million Softwood Plantation Investment Program[22] to grow the State's softwood plantation timber estate. Under this program, the Forest Products Commission (FPC) will acquire suitable land in the Southwest WA to develop as pine plantations that will help secure the future of WA's softwood industry over a 10-year period.

The modality of these state government-led programs in Victoria and WA differs from the national SPE program, which was designed to make grant funding available to a broader base of project proponents, including those applying for registration of TPs under the ACCU Scheme.

3.5 Summary of findings

This review of policy drivers has identified various policies and incentives for both EPs and TPs. At the national and state levels, TPs are supported by programs such as the ACCU Scheme, the SPE program, and the *NSW Plantations and Reforestation Act*, which offers government support, regulatory consistency, and operational protections—features less evident in Victoria. TPs also benefit from policy drivers focused on forest industry development and climate action.

In contrast, nature and biodiversity-oriented policies tend to favour EPs more specifically and, in some cases, explicitly exclude timber harvesting activities (including TPs). Additionally, there are significant indirect incentives for EPs, with many policies and instruments supporting the potential for 'stacking'—combining carbon, biodiversity, and other ecosystem service credits such as soil or water benefits. This aligns EPs closely with nature repair programs. By comparison, stacking opportunities for TPs are more constrained. Biodiversity frameworks often exclude commercial plantations from eligibility for biodiversity certificates and nature repair markets or impose restrictions on the commercial use of planted trees. These policies generally do not acknowledge or recognise the potential soil, water, or biodiversity benefits of TPs, limiting their access to the full suite of incentives available to EPs.

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[20] Australian Government (2025) *Support Plantation Establishment program*. Online: https://www.agriculture.gov.au/agriculture-land/forestry/industries/support-plantation-establishment-program

[21] Premier of Victoria (2024) *One Million Trees for Gippsland Timber Plantations.* Online: https://www.premier.vic.gov.au/one-million-trees-gippsland-timber-plantations

[22] Western Australian Government (2021) *Softwood Plantation Investment Program*. Online: https://www.wa.gov.au/organisation/forest-products-commission/softwood-plantation-investment-program

4. MARKET DRIVERS

Land-use decisions in Australia are strongly shaped by financial returns, with factors such as commodity prices, rural land prices, and input costs often being major determinants whether landholders retain land for existing uses (e.g. agriculture) or change to a new land use (e.g. TPs or EPs), or combination of uses (agriculture, plantation forestry, and environmental restoration).

In this context, access to market-based incentives, including carbon and biodiversity credits for offsetting or in-setting, is becoming increasingly important in land-use profitability calculations.

Market-based incentives, such as the generation and potential sale of ACCUs, access to biodiversity or ecosystem service payments, and increasing demand for timber are key drivers directly influencing investment decisions in both commercial and non-commercial forestry or reforestation projects. For timber plantations, strong domestic demand for sawn timber, engineered wood products, and pulp and paper products, combined with emerging export opportunities and growing supply constraints from native forest phase-outs, provide an additional financial incentive that complements carbon market participation and shapes long-term investment decisions.

Additionally, there are existing land use factors that are considered, whereby agricultural-based commodity production, prices and demand for food also play a significant role in driving investment decisions, which includes optimisation of integrated land use options that improve existing use productivity, overall profitability and resilience through diversified income streams and capitalising on co-benefits.

The following section sets out a review of a range of empirical data and publicly available information that illustrate the main market drivers influencing land use decisions.

4.1 ACCU generation for insetting or offsetting emissions

Australia's ACCU Scheme is Australia's primary carbon market mechanism and is administered by the Clean Energy Regulator (CER). It allows investors and land holders, including individuals, companies and governments to earn, buy or sell ACCUs that have been generated by implementing approved activities that either reduce or remove greenhouse gas emissions.

Land managers and investors can participate in the scheme by registering projects under approved methods that involve planting trees for carbon sequestration, such as:

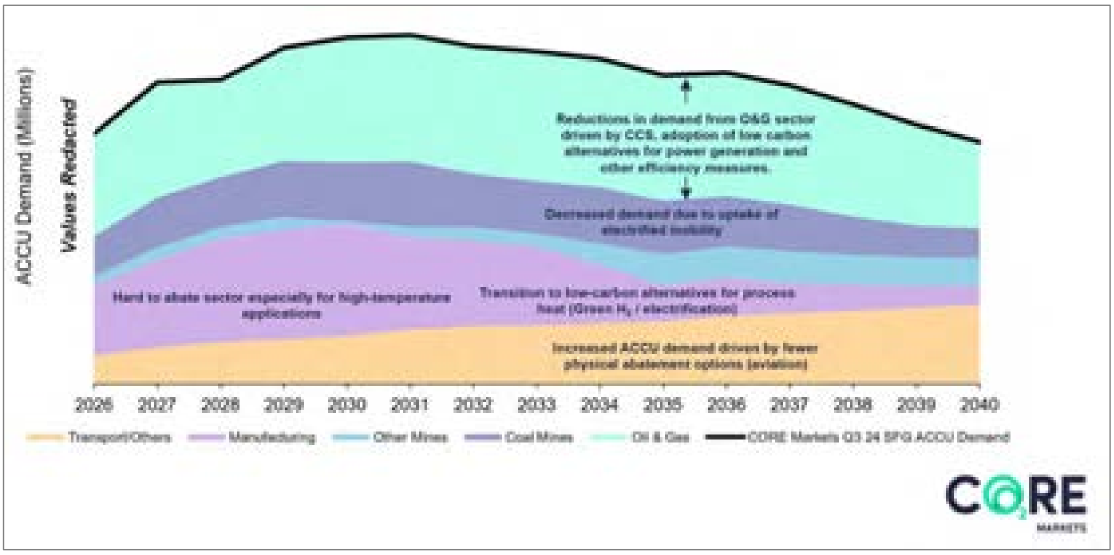
- The *Plantation Forestry Method 2022*
- The *Afforestation or Reforestation Method 2.0* (which will expire in September 2025)
- The *Reforestation by Environmental or Mallee Plantings FullCAM Method 2024*.

ACCUs generated under an approved method project can be sold to the Commonwealth Government, traded on the voluntary carbon market to corporations or banked to meet carbon emissions obligations either under the Safeguard Mechanism or corporate sustainability commitments and voluntary demand due to Scope 3 reduction targets.

Demand for ACCUs as emissions offsets is expected to be sustained over the 2026 to 2040 period, with the Safeguard Mechanism expected to create increased demand for ACCUs as carbon offsets, particularly over the next five years (see Figure 4-1). This overall demand will indirectly incentivise investment in carbon sequestration projects, including EPs and TPs.

Relatedly, mandatory climate-related financial disclosures (TCFD) and forthcoming nature-related financial disclosures (TNFD) will further incentivise planting projects that deliver carbon emissions *and* measurable biodiversity co-benefits, which is expected to add to demand for credible carbon credits to address company exposure to climate and nature-related risks.

Figure 4-1 ACCU demand forecast from Safeguard entities 2026 to 2040



Source: Core Markets (2024)

The key factors influencing carbon as a driver of land use change or investment options include the carbon price; the associated permanence obligations; the complexity of implementation; and the longer-term risk and revenue certainty.

In terms of carbon price, there is publicly available data on ACCU spot prices, based on trades in a voluntary market for ACCUs generated from a range of project sources. Current spot prices and recent trends in ACCU spot prices over the past 18 months are set out below (Figure 4-2).

Figure 4-2 ACCU spot price by method featuring 'Generic' and 'Plantings' ACCUs

Source: Core Markets (2025)

This type of market data provides guidance on potential returns from EP and TP projects, to varying extents. The ACCU spot price data shown above presents prices specifically for '*Environmental Plantings*', i.e. EPs (represented by the blue dashed line). This data indicates the carbon price for EP projects has stepped up in the past 12 months, from an average around $45-50/ACCU, to currently around $50-55/ACCU.

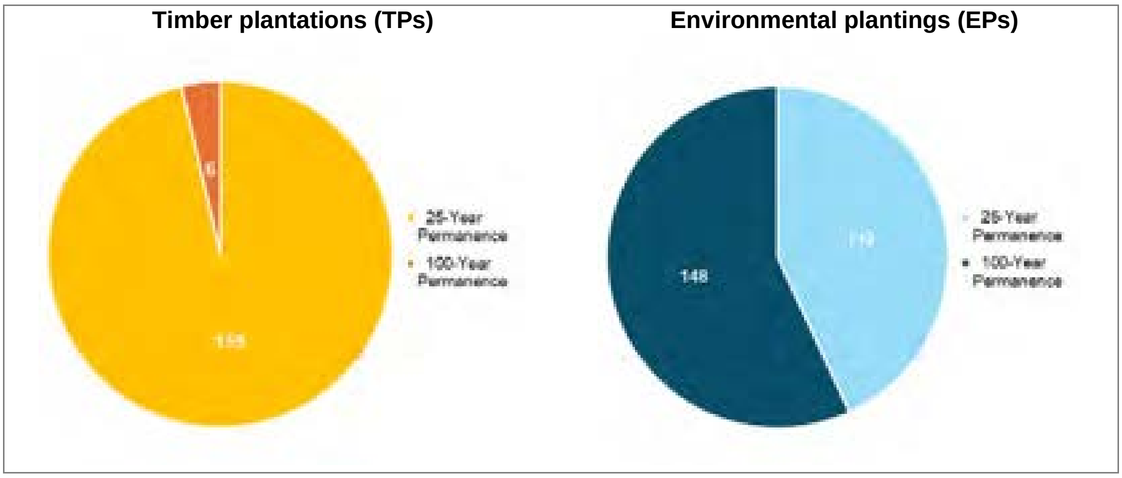
In contrast, spot price data for TPs are not shown separately; and in the absence of specific data, the default guidance for TIP prices is the '*Generic Spot Price*' trend (represented by the black solid line). Generic spot prices have moved up and down between $35-43/ACCU over the past two years. ACCU spot prices for transactions involving Savanna Fire Management and Human Induced Regeneration projects are shown separately, but the reported carbon prices for transaction on those projects have closely followed the generic spot prices over this period.

It is important to recognise the ACCU spot price data for 'Environmental Plantings' (i.e. EPs) is based on limited transaction data—i.e. few and relatively low-volume trades compared to total ACCU market trades—so they are market signals that should be viewed cautiously, as reflecting the early stages of product-type differentiation rather than established pricing trends.

Furthermore, there may be off-market transactions involving TPs and EPs that have recognised higher or lower carbon prices (or 'carbon values') for ACCUs over this same period. However, in terms of publicly available data on ACCU prices, the data reported above (Figure 4-2) is illustrative of current market activity and carbon values, and it underpins carbon price assumptions set out in this land use review and comparison.

Regarding project permanence obligations, both environmental plantings and plantation forestry methods offer 25- or 100-year permanence options. As of December 2024, most TP projects (96%) and 43% of EP projects have opted for 25-year permanence, with applicable discounts, rather than the full 100-year period (refer Figure 4-3).

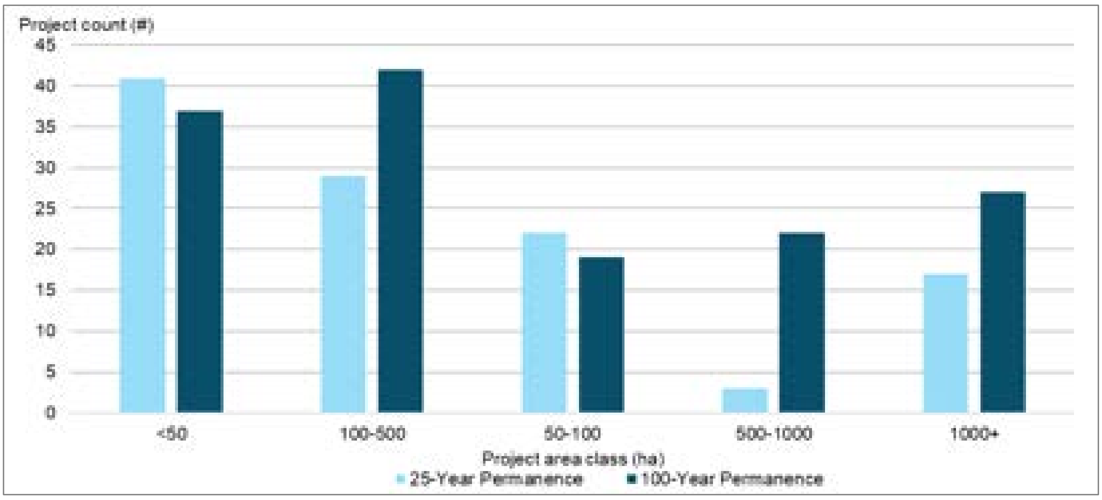
Figure 4-3 Comparison of permanence periods adopted for registered projects



Source: CER. Note: This comparison is based on the *number* of registered projects in each category.

Furthermore, analysis of EP project size by permanence period shows no clear trend suggesting project size or age significantly favours 100-year over 25-year commitments (Figure 4-4).

Figure 4-4 EP project size distribution by adopted permanence period



Source: Derived from the CER, incorporating Indufor analysis.

Overall, carbon markets, and the opportunity for investors to acquire and trade in carbon credits, provides a clear market-based driver to either fund or diversify potential revenue streams from ACCU Scheme planting projects.

4.2 Timber production

Regional timber demand is another key market driver for land use decisions, especially on rural land deemed suitable for plantations within Regional Forestry Hub boundaries.

Timber production provides a more diversified financial return pathway than EPs alone, as TPs and farm forestry projects can produce revenue from wood products and carbon credits. This commercial return potential can make TPs more attractive for investors seeking income streams aligned to real assets and growing markets, especially where access to land, logistics infrastructure, and processing capacity align.

There is a range of factors that directly influence timber demand, including population growth and expected housing requirements and construction activity, balanced by supply-side variables and constraints, including the age class profile of existing plantation estates and the impacts of major bushfires on wood product supply profiles.

Bushfires, most notably the Black Summer fires of 2019/20, have impacted on the short-medium term log supply, particularly within the Murray Valley, and this has resulted in major timber processors seeking to increase and diversify their log supply for existing processing facilities. High marginal log costs to maintain supply to those facilities at full production post-fires, i.e. by importing logs from other growing regions, have encouraged major processors and investors to consider expanding the plantation estate at a local level.

Over the next five years, and likely beyond, the softwood sub-sector of the Australian wood products market is expected to continue to be most heavily influenced by the short-term dynamics of the residential construction sector[23]. Historical and projected residential construction activity by State and dwelling type is shown in Figure 4-5.

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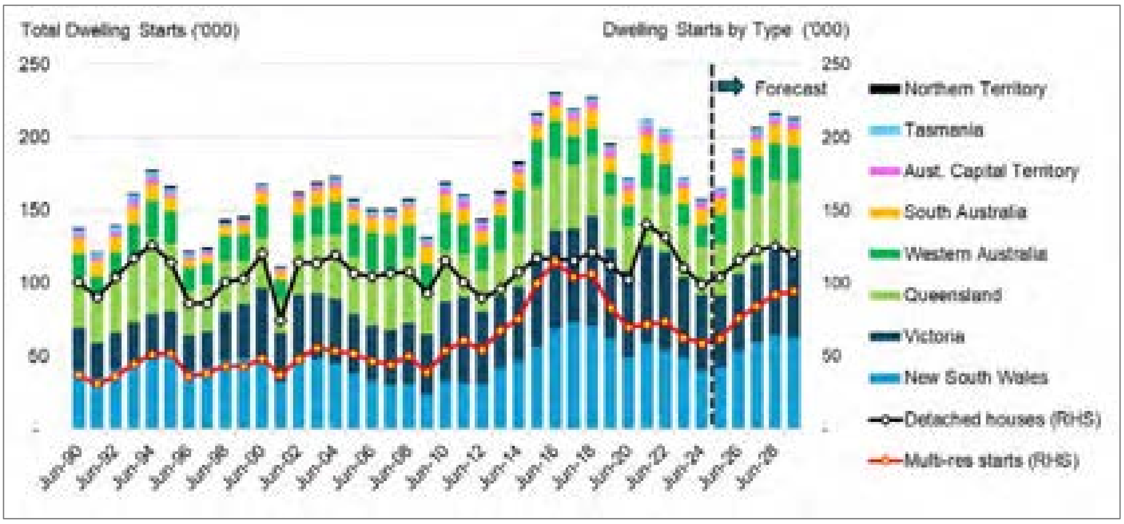
[23] ABARES (2025) *Australian Wood Volumes Analysis.*

Figure 4-5 Annual residential construction activity by State and dwelling type



Source: ABS Building Activity (2024), Master Builders Australia, Housing Industry Association, Indufor.

Detached dwelling (houses) construction, which use more timber per unit of floor area compared to multi-resident developments, is expected to increase in response to domestic housing shortages and policies aimed at addressing housing affordability and availability, or buildings for decarbonisation and sustainability, with the bulk of new dwelling starts expected from Victoria and NSW.

These trends have prompted forest product companies, superannuation funds, and institutional investors to seek land in NSW and Victoria for new softwood plantation establishment especially, with the dual goals of generating timber revenue and capturing carbon value through ACCUs, where eligible under the Plantation Forestry Method.

Market drivers for timber production also encompass a combination of economic, geographic and logistical factors that underpin the economics of plantation forestry and TPs. These include:

- *Land suitability and availability:* Investors or owners need to assess the productivity of the land (e.g., rainfall, soil type, slope, and elevation) to ensure it can support commercially viable tree growth. Suitable land must be available for purchase, lease or use at a price (opportunity costs) that enables positive returns over the chosen investment horizon. In this context, the rural land market is a key driver of land use decisions relating to TPs.
- *Proximity to processing facilities:* Log transport costs are a significant component of plantation economics. Land located closer to sawmills or processing plants is more attractive, as it reduces haulage costs and increases net stumpage returns. Limited access to infrastructure can reduce competitiveness or exclude otherwise viable planting sites.
- *Upfront costs (i.e. land prices):* High land prices, particularly in areas of competing agricultural or urban demand, may challenge the economics of plantation investments. Recent land price data[24] for rural farmland areas within the Central West and Murray Region Forestry Hubs, especially the LGAs representing higher productivity land areas, suggest land purchase prices of around $15,000 per hectare as a reasonable base case across these regions.

  This data includes:

[24] Bendigo Bank Agribusiness (2025) *Australian Farmland Values: 2025 report*.

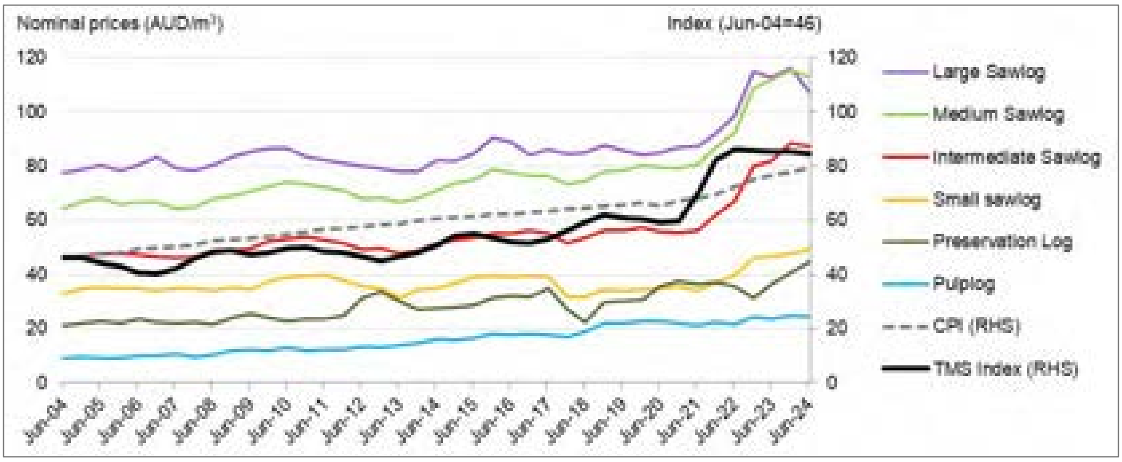
o Central West NSW - average land purchase price of around $13,668 per ha (based on Oberon, Lithgow, Bathurst LGA data); and

o Murray Region - average land purchase price of around $16,315 per ha (based on Snowy Valleys (NSW), Greater Hume (NSW), Towong (Vic), Indigo (Vic) and Alpine (Vic) LGAs.

- *Movement in log prices:* Log prices are also a critical factor in the economics of plantation forestry and TP-based land use decisions. In the context of the MRFH and CWFH, the most prominent timber plantation products are radiata pine softwood sawlogs, which are predominantly directed to the residential construction markets. Log price data are monitored and reported in publicly available datasets, which show log price movement over time, with a high level of correlation to residential construction building cycles and macro-economic factors such as interest rates; as well as a generally stable upward trend in nominal terms over time (Figure 4-6).

Notwithstanding this generally stable profile over the long term, log price movements over the past 5-6 years (reflecting pre- and post-COVID impacts) and regional market dynamics can be important factors in driving land use decisions relating to plantation forestry and TPs.

Figure 4-6 Australian Pine Log Price Index (Stumpage) price trends, 2004 - 2024



Source: KPMG (2024) *Australian Pine Log Price Index (Stumpage), to June 2024*

4.3 Biodiversity and Nature Repair Markets

Biodiversity and 'nature repair' are emerging as significant market drivers for land use decisions. Australia has progressed a suite of policy and market-based mechanisms aimed at incentivising biodiversity and nature repair outcomes, some of which serve as market-based drivers for landholders and investors considering tree planting projects.

One of the most significant recent developments is the introduction of the *Nature Repair Market Act 2023*, which has established a voluntary, national market framework for participants to generate biodiversity certificates by undertaking eligible projects that measurably enhance or protect biodiversity. The first method available under the Nature Repair Market is called the '*Replanting native forest and woodland ecosystems method 2025'*, which enables people to take action to restore previously cleared landscapes by replanting native forest and woodland species. This market has also been designed to align with the ACCU Scheme, enabling project proponents to earn both biodiversity certificates and ACCUs. This dual benefit encourages broader participation and investment in nature repair activities.

State-based conservation covenant and biodiversity offset schemes complement federal initiatives. They include those administered by the NSW Biodiversity Conservation Trust (BCT) and NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW), or Victoria's Native Vegetation Offsets Framework, which is administered by the Department of Environment, Energy and Climate Action (DEECA).

Such schemes enable landholders to restore or permanently protect land for conservation in exchange for financial incentives or the right to sell biodiversity offset credits. These credits are tradable units that represent measurable gains in native species or ecosystems and are used to offset biodiversity losses from approved developments.

Importantly, there are two distinct forms of biodiversity-related incentives:

- Stewardship payments, such as those issued under a BCT agreement which can provide annual, long-term payments to landholders to manage land[25]; and
- Biodiversity credit (certificate) trading credits or 'gains', either via the NSW Biodiversity Offsets Scheme or Victoria's Native Vegetation (Biodiversity) Offsets Framework[26].

Together these mechanisms are re-shaping the market landscape for land use, with biodiversity or nature repair outcomes becoming an increasingly central financial consideration alongside carbon and timber, particularly on marginal or previously cleared lower-productivity, agricultural land.

There is also evidence of reasonable demand for high-integrity offsets with biodiversity co-benefits - including for example, the NSW Biodiversity Conservation Trust's Biodiversity Offsets program, which has purchased approximately $75m in credits[27]. According to the NSW Biodiversity credit market sales dashboard[28] there has been more than 800 sales of biodiversity credits since 2019 with a total market value of $562 million, and the average weighted price of ecosystem-based credits has been around $2,800 per credit, with some fetching prices as high as $42,000 per credit.

4.4 Summary of findings

Australia's agricultural landscapes are facing increasing competition for land uses, driven by shifting market demands, product prices, climate change, and evolving policy priorities. Landowners can face complex trade-offs between traditional land uses, e.g. cropping and grazing, and emerging opportunities, including carbon farming, plantation forestry, renewable energy, and ecosystem services markets.

In this context, the following factors can play a key role in land use decision-making:

- *Opportunity costs:* transitioning land from agriculture to EPs or TPs may result in the loss of immediate agricultural income and reduced land-use flexibility
- *Market volatility:* Carbon credits and timber prices are subject to fluctuations based partly on a suite of factors including policy or regulatory changes, overall economic activity and global trade and economic factors

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[25] NSW Government Biodiversity Conservation Trust (2025) *Biodiversity Offsets Program Outcomes*. Online: https://www.bct.nsw.gov.au/info/biodiversity-offsets-program-outcomes
[26] Victoria State Government (2025) Offsets for the removal of native vegetation. Online: *https://www.environment.vic.gov.au/native-vegetation/native-vegetation-removal-regulations/*
[27] NSW Government Biodiversity Conservation Trust (2025).
[28] NSW Government DCCEEW (2025) *Biodiversity Credits Market Sales Dashboard*.

- *Regulatory complexity:* Engaging in tree planting projects under the ACCU Scheme, especially those that proposed as timber production plantations, requires navigating often complex regulatory frameworks at the local, state and national levels. This generally includes monitoring, auditing and verification requirements
- *Upfront investment:* Establishing long-term plantings (EPs or TPs) requires significant initial costs with returns expected over extended time periods.

Other factors include the influence of external capital and involvement of institutional investors, carbon fund managers and forestry investment groups that can re-shape regional landscapes. These entities often have a tailored risk appetite and capital to invest in larger-scale projects, which may affect regional land markets, and so challenge accessibility for smaller landholders.

5. AREA ANALYSIS FOR STUDY REGIONS

The total area of land suitable for establishment of TPs and EPs in the Central West NSW and Murray Region can be determined using recent land capability and land suitability mapping undertaken by the two Regional Forestry Hubs. These mapping initiatives were focused specifically on land suitability and capability for harvestable timber plantations, notably radiata pine, and did not specifically consider or address environmental plantings. However, key assumptions can be made to inform the assessment for environmental plantings also.

5.1 Land suitability for harvestable timber plantations

5.1.1 Central West NSW region

A plantation land capability mapping project was completed for the CWFH in February 2022[29].

The approach used a four-step methodology, comprising: defining the regional boundary; applying a land suitability rating, based on rainfall, elevation, slope and soil fertility; identifying hard exclusions such as native vegetation and existing plantations and land zoning constraints; and then assigning a land capability and productivity classification.

The final step in this methodology led to the derivation of a productivity classification by using an elevation - rainfall matrix as per Table 5-1 below.

Table 5-1 Central West NSW plantation productivity (MAI) classifications, based on rainfall and elevation

Elevation ASL (m)	Rainfall > 850 mm	Rainfall <850 mm
<900	15 m^3/ha/yr	11 m^3/ha/yr
900 - 1 100	17 m^3/ha/yr	13 m^3/ha/yr
1 100 - 1 300	20 m^3/ha/yr	17 m^3/ha/yr

Source: CWFH (2022) *Plantation Capability Mapping Report*, CWFH003.
Note: ASL – altitude above sea level (in metres); MAI – mean annual increment (in cubic metres per hectare per year)

Based on this analysis, the plantation land capability modelling identified 1.04 million ha (about 46% of the total Hub land area that is potentially available after accounting for excluded areas) as moderately capable or capable (i.e. estimated productivity ranging from 11 to 20 m^3/ha/year) of supporting commercially viable plantations of radiata pine (Table 5-2). This included approximately 114,000ha modelled as being (highly) capable of supporting plantation growth at ≥17 m^3/ha/year. The extent of these areas by productivity class is shown in Figure 5-1.

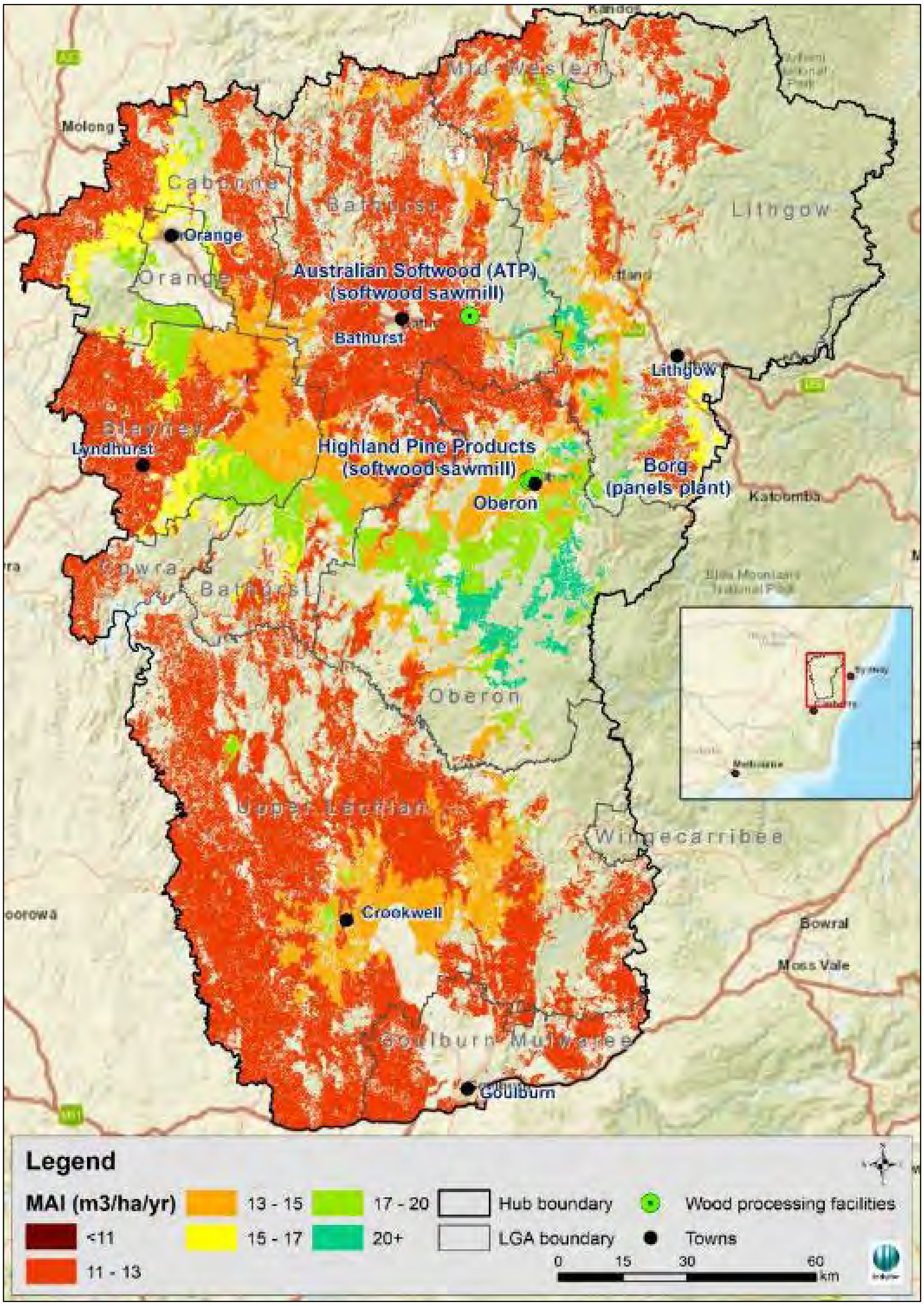
Table 5-2 Central West NSW modelled areas (ha) of suitable land by plantation productivity (MAI) classes

< 11 m^3/ha/yr	11-13 m^3/ha/yr	13-15 m^3/ha/yr	15-17 m^3/ha/yr	17-20 m^3/ha/yr	>20 m^3/ha/yr	Total (ha)
0	715,886	173,381	36,731	89,546	25,402	**1,040,944**

Source: CWFH (2022) *Plantation Capability Mapping Report*, CWFH003.

[29] CWFH (2022) *Plantation Capability Mapping*. Report prepared by Greenwood Strategy. Project no: CWFH003.

Figure 5-1 Modelled plantation productivity across the Central West NSW region



Source: CWFH (2022) *Plantation Capability Mapping Report*, CWFH003.

5.1.2 Murray Region

A plantation land suitability analysis was conducted for the Murray Region Forestry Hub in 2023[30]. The analysis considered biophysical parameters including forecast changes to rainfall patterns, slope and soils, as well as land exclusions, lot sizes, transport distance, and land values. Land suitability was mapped in accordance with the following classifications (Table 5-3).

Table 5-3 Murray Region land suitability and indicative plantation productivity (MAI) classifications

Land suitability class	Indicative MAI range (m^3/ha)	Classification commentary
1	Not suitable	Excessive slope
2	15-20	Slope on specific sites may need to be checked
3	15-20	Potential for low survival on some sites
4	20-25	Suitable for plantations
5	25-30	Suitable for plantations

Source: MRFH (2023) *Plantation Land Suitability Analysis*.

This analysis assessed over 715,000ha of land outside designated exclusions within the region and concluded there was 185,000ha of land that was highly suitable for radiata pine, with a further 524,000ha potentially suitable with caveats on potential slope and survival risks.

While this land suitability mapping for the Murray Region is broadly comparable with the land capability mapping for the Central West NSW region, it differs in the way it allocated land to plantation productivity classes. In addition, it does not delineate land with a modelled MAI potential of between 11 and 15, which may be suitable for TPs or EPs, notwithstanding the productivity may be moderate or low.

To enable a consistent approach to classifying suitable area between the two regions for environmental plantings and timber plantations, further analysis of the land suitability in the Murray Region was undertaken, by applying an elevation - rainfall classification in a similar format to that previously applied in the Central West NSW region (refer to Table 5-1).

The applicability of the same classification to the Murray Region was considered; however, there are fundamental differences in the rainfall patterns and terrain between the two regions that mean the application of the same criteria would deliver skewed results. A revised classification system was developed, calibrated and tested with representatives of major growers across the region to verify and validate its reasonableness. The revised classification for the Murray Region is set out in Table 5-4.

[30] MRFH (2023) *Plantation Land Suitability Analysis*. Report prepared by PF Olsen. Project no: MRFH-2022-014.

Table 5-4 Revised Murray Region plantation productivity classifications, by rainfall and elevation

	MAI classes (m^3/ha/yr)					
	Annual Rainfall (mm)					
Elevation (m)	<600	600-750	750-850	850-950	950-1050	1050+
<300	<11	<11	11-13	11-13	13-15	15-17
300-400	<11	11-13	11-13	13-15	15-17	15-17
400-500	<11	11-13	11-13	13-15	15-17	15-17
500-600	<11	11-13	13-15	15-17	17-20	17-20
600-700	<11	13-15	15-17	15-17	20+	20+
700+	<11	15-17	15-17	17-20	20+	20+

Source: LTA Rainfall (DCCEEW), data.gov.au

The resultant productivity layer was considered to provide a sound basis for further area analysis for this study. A map of this productivity layer for the Murray Region is presented in Figure 5-2 and Figure 5-3. It is not intended to be a guide to potential productivity for any specific site within the region, but it does provide an indication of the estimates area of available and capable land across the region, in productivity classes aligned with the Central West NSW.

A detailed description of the process followed to generate these land productivity maps is set out in **Annex 4**.

This further analysis indicated that there is approximately 700,000ha of land in the Murray Region that is available for plantation development.

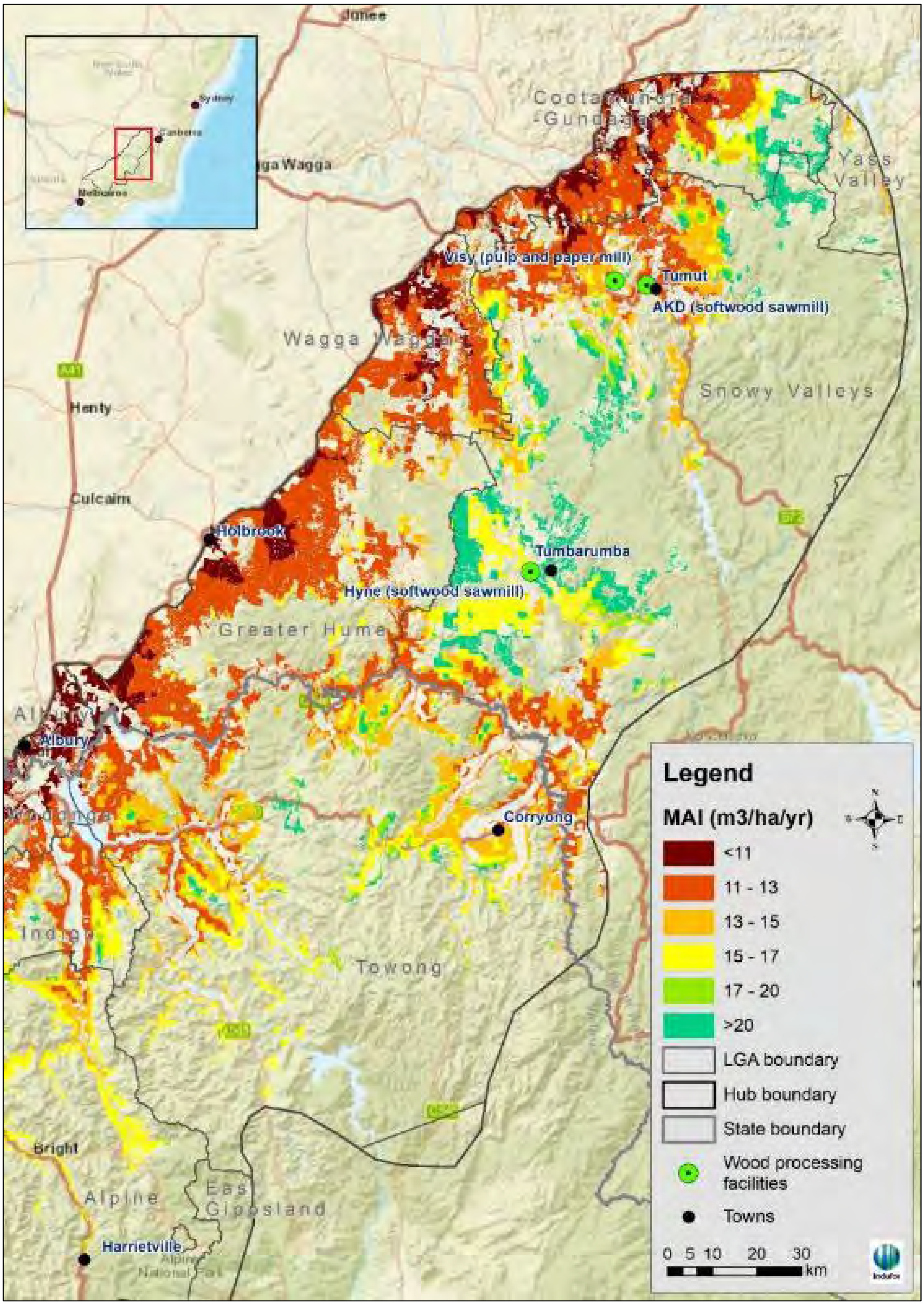
However, this includes around 132,000ha with a modelled MAI of less than 11 m^3/ha/year, which indicates relatively low productivity and higher risk of drought impacts. Excluding this MAI class, there is a modelled area of approximately 567,000ha that could support the establishment of additional areas of commercially viable plantations of radiata pine, as well as environmental plantings. Of this total, approximately 175,642ha is modelled as being capable of supporting plantation growth at ≥15 m^3/ha/year. The breakdown by productivity class is shown in Table 5-5.

Table 5-5 Murray Region modelled areas (ha) of suitable land by plantation productivity (MAI) classes

< 11 m^3/ha/yr	11-13 m^3/ha/yr	13-15 m^3/ha/yr	15-17 m^3/ha/yr	17-20 m^3/ha/yr	>20 m^3/ha/yr	Total (ha)
132,821	281,176	110,515	102,414	25,583	47,645	**700,154**

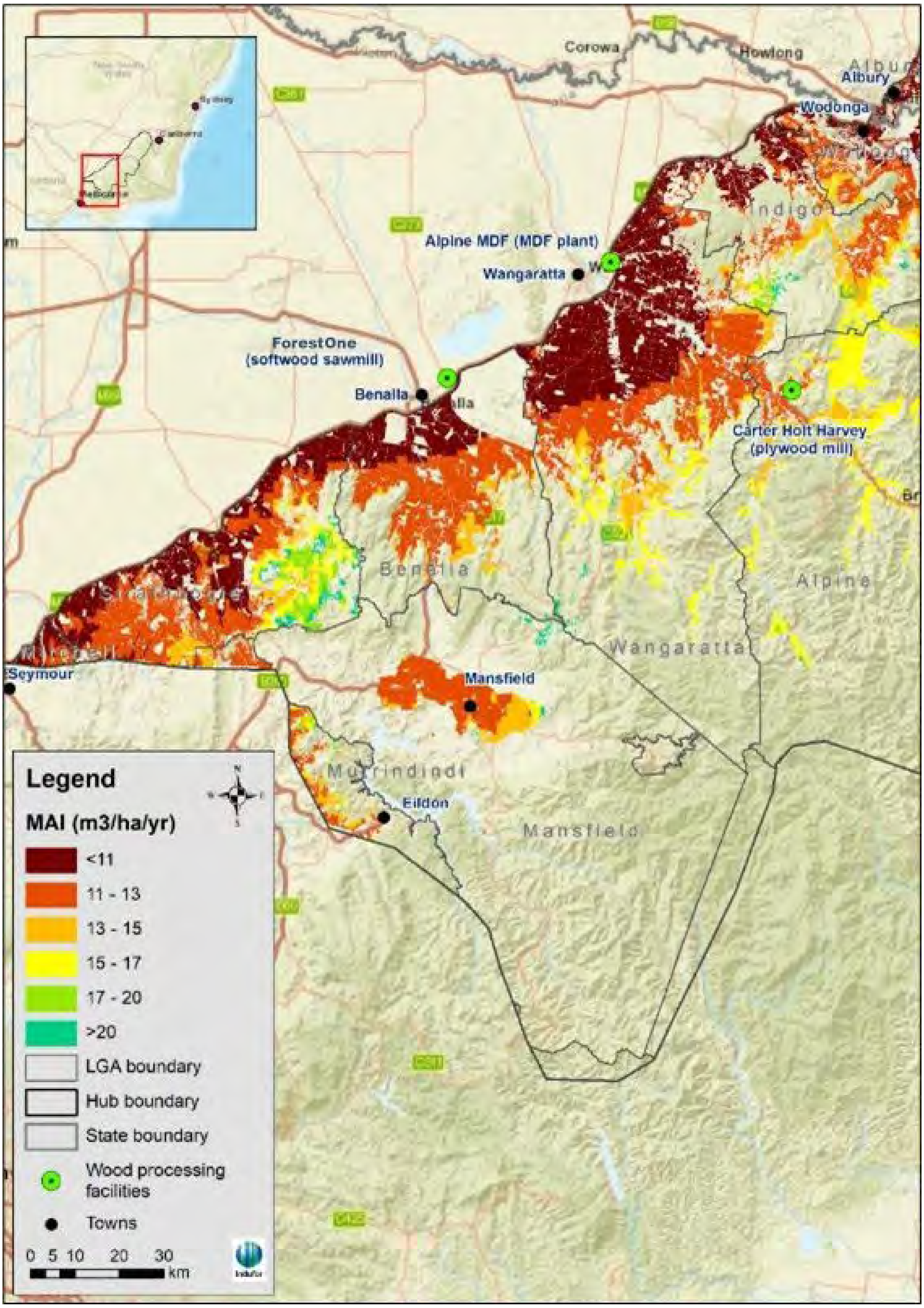
Source: MRFH (2023) *Plantation Land Suitability Analysis*, and Indufor analysis.

Figure 5-2 Modelled plantation productivity across the Murray Region (eastern)



Source: Derived from MRFH (2023) *Plantation Land Suitability Analysis*, with Indufor reclassifications to align data with land capability mapping by plantation productivity class for the Central West NSW region.

Figure 5-3 Modelled plantation productivity across the Murray Region (western)



Source: Derived from MRFH (2023) *Plantation Land Suitability Analysis*, with Indufor reclassifications to align data with land capability mapping by plantation productivity class for the Central West NSW region.

5.2 Land suitability for environmental plantings

Indufor reviewed recent Hub studies assessing the areas suitable for TPs and considered the applicability of these assessments to EPs within the two regions. A comparison of the extent to which the constraints applied in the plantation capability mapping for TPs are applicable to EPs is set out below, firstly for the Central West (Table 5-6) and then the Murray Region (Table 5-7).

Table 5-6 Key factors determining land suitability for EPs and TPs in Central West NSW

Criteria	Biophysical thresholds and constraints applied in the 2022 plantation capability mapping	Potentially suitable for TPs	Potentially suitable to EPs
Rainfall	• Rainfall <550mm	✗	✓
	• Rainfall of 550-700mm	✓	✓
Elevation	• Area above 1300 metres	✗	✓
Slope	• Slopes > 30º	✗	✗
Soil fertility	• Excluded water or unclassified areas	✗	✗
Native vegetation and existing plantations	• Tree cover >2m, plantations and water bodies excluded	✗	✗
Land use / zoning	• Include forestry areas, large lot residential, primary production and rural landscapes	✓	✓

Source: Derived from CWFH (2022) Plantation Capability Mapping Report CWFH003.

Table 5-7 Key factors determining land suitability for EPs and TPs in Murray Region

Criteria	Biophysical thresholds and constraints applied in the 2023 land suitability analysis	Potentially suitable for TPs	Potentially suitable for EPs
Rainfall	• Rainfall <700 mm	✗	✓
# frost days	• >150 rated as 'very poor', 100-150 rated 'poor'	✗	✓
Slope	• Slopes > 30º • Where slopes were considered 'very poor'	✗	✗
Soil fertility	• No exclusions	n/a	n/a
Native vegetation and existing plantations	• Tree cover >2m, plantations and water bodies excluded	✗	✗
Land use / zoning	• Include areas of cropping, grazing, mixed farming, livestock, horticulture and forestry rural conservation and rural living zones	✓	✓

Source: MRFH (2023) Plantation Land Suitability Analysis MURR-2022-014. Note no exclusions were applied based on tenure, lot size, soil fertility, distance or land values.

For the Central West NSW region, this comparison indicates:

- EPs could potentially be planted in areas where average annual rainfall is too low for TPs, e.g. <550mm, or on areas with elevations above 1,300 metres. However, the land suitability analysis for this region shows there are only very small areas within the Hub region that fit those criteria. Furthermore, establishing planting projects on lands above 1300 m ASL would present significant logistical challenges and higher costs of operations.
- Therefore, the extent of land that is unsuitable for TPs that could be established as EPs is quite limited.

For the Murray Region, this comparison indicates:

- There is more scope for EPs to be planted particularly in areas where average annual rainfall is too low for TPs, e.g. <700mm.
- Therefore, based on this comparison of land suitability criteria and the reclassification of plantation productivity classes, there is a more significant land area that is unsuitable for TPs that could potentially be established as EPs.

5.3 Summary of findings

This analysis of the parameters incorporated into the land suitability and plantation capability studies for the Central West NSW and Murray Regions leads to the following conclusions:

- All land that has been determined to be available and suitable for commercial timber plantations may also be considered as suitable for environmental plantings.
- There are substantial areas of land that are marginally suitable for timber plantations but are likely to be well suited for environmental plantings. These are likely to be in the MAI productivity zone of 11-13 m^3/ha/yr. The area analysis includes these areas as ‘suitable’ for growing timber plantations, but viability will be dependent upon economic factors (including but not limited to access to carbon revenue and distance to markets) as well as the ability to manage drought risk. This is discussed further in Section 6 and Section 7.
- There are areas that have been excluded from the suitable area for timber plantations, because they receive lower rainfall or are higher in elevation, which may be suitable for environmental plantings. Based on the plantation land capability mapping project in the Central West NSW region, this area is expected to be minimal[31] , while in the Murray Region, there may be more opportunities, especially where average annual rainfall is between 550 mm and 700 mm.
- The addition of the overlay of elevation and rainfall to the Murray Region land suitability mapping has identified the potential for substantial areas with an MAI of less than 11 m^3/ha/yr. It is assumed that these areas would not be viable for commercial timber plantations but could be considered for environmental plantings.

A summary of the modelled areas of land suitability, for TPs and EPs, based on recent plantation land suitability and capability mapping for each region, is presented below in Table 5-8.

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[31] CWFH (2022) *Plantation Capability Mapping* Report, CWFH003, February 2022.

Table 5-8 Summary of modelled area (ha) suitability for EPs and TPs, by region

	Central West NSW		Murray Region	
MAI classes (m^3/ha/year)	TP	EP	TP	EP
MAI <11	0	0	-	132 821
MAI 11-13	715 886	715 886	281 176	281 176
MAI 13-15	173 380	173 380	110 515	110 515
MAI 15-17	36 730	36 730	102 414	102 414
MAI 17-20	89 546	89 546	25 583	25 583
MAI 20+	25 402	25 402	47 645	47 645
Total	**1 040 944**	**1 040 944**	**567 333**	**700 154**

Subtotals (ha):				
Classified as ***Highly suitable***	114 947	114 947	175 642	175 642
Classified as ***Suitable with higher risks***	925 997	925 997	391 691	524 512
Total	**1 040 944**	**1 040 944**	**567 333**	**700 154**

Sources: CWFH (2022) and derived from MRFH (2023), with Indufor reclassification and remapping of plantation land suitability classes to align with MAI productivity classes applied in the plantation land capability for the CWFH.

A further analysis of area within key transport distance thresholds of timber processing centres demonstrates that essentially all TP suitable land is less than 200km, and nearly all TP suitable land in the Murray Region and approximately half in the Central West in closer than 100kms. This is set out in Table 5-9 below.

Table 5-9 Area of TP suitable land within transport distance thresholds

	Area (ha)	
Distance class	Central West NSW	Murray Region
<100 kms	594 319	559 415
100 - 200 kms	446 625	7 918
Total area (ha)	**1 040 944**	**567 333**

In summary, this area analysis for the study regions indicates:

- In the Central West NSW region, the total area of land assessed as *highly suitable* (or highly capable) for TPs or EPs in Central West NSW is approximately 115,000ha. The total area of land assessed as *suitable*, including areas assessed as having a higher risk of reduced productivity or mortality during drought periods, is approximately 1.04 million ha.
- In the Murray Region, the total area of land assessed as *highly suitable* (or highly capable) for TPs or EPs in the Murray Region is ~176,000ha. The total area of land assessed as *suitable* for TPs in the Murray Region differs from the area assessed as suitable for EPs. The total area for TPs is approximately 567,000ha, while for EPs, it is around 700,000ha.

These estimated areas are applied to the estimated potential for carbon crediting, discussed in section 6.

6. POTENTIAL FOR CARBON CREDITS

This section of the land use review provides a comparison of the potential for carbon credits (ACCUs) to be generated from TPs and EPs.

Addressing this potential requires a clear distinction between the term *abatement* and related terms such as *carbon crediting* and *ACCU estimates*. This distinction is set out below.

Thereafter, this review draws on the analysis of land availability and suitability for TPs and EPs within the two Hub regions (section 5), to provide a quantitative comparison of the indicative timing and total ACCUs that could be generated from these types of planting projects over time.

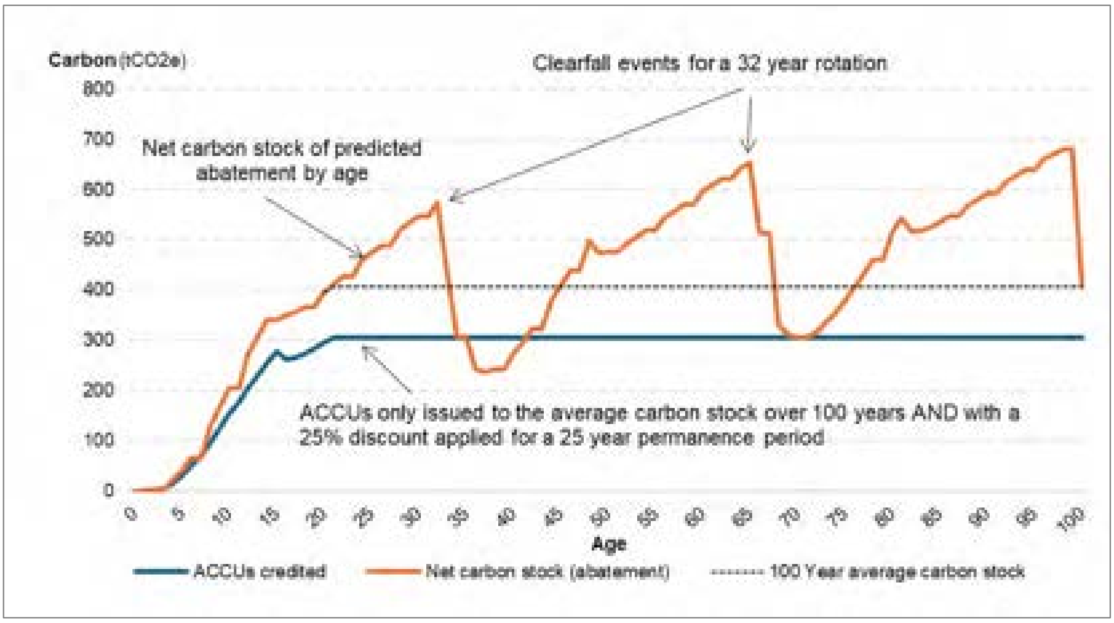
6.1 Abatement and carbon crediting

For an analysis of the potential for carbon crediting, it is important to make the distinction between term *abatement* and related terms such as *carbon crediting*, *ACCU estimates* and variations. For the purposes of this study, the following definitions are used:

- Carbon abatement is the amount of carbon dioxide sequestered by plantation forests (in tonnes of CO_{2e} or CO_{2e}/ha), as measured (using forest inventory procedures) or modelled (using forest & carbon growth models), *before* applying deductions for reversal risks or permanence period discounts under carbon accounting rules. Actual carbon sequestration or abatement in any one year is directly proportional to the biomass produced in that year, less losses associated with decay, burning or fuel used in managing or harvesting.
- Carbon crediting is the calculation of the amount of carbon credits, e.g. ACCUs (a tonne of CO_{2e}) that can be issued for carbon sequestered in plantation forests, *after* incorporating adjustments for the risk of reversal buffer, permanence period discounts, and capped by the 100-year long-term average carbon stock defined under scheme rules.

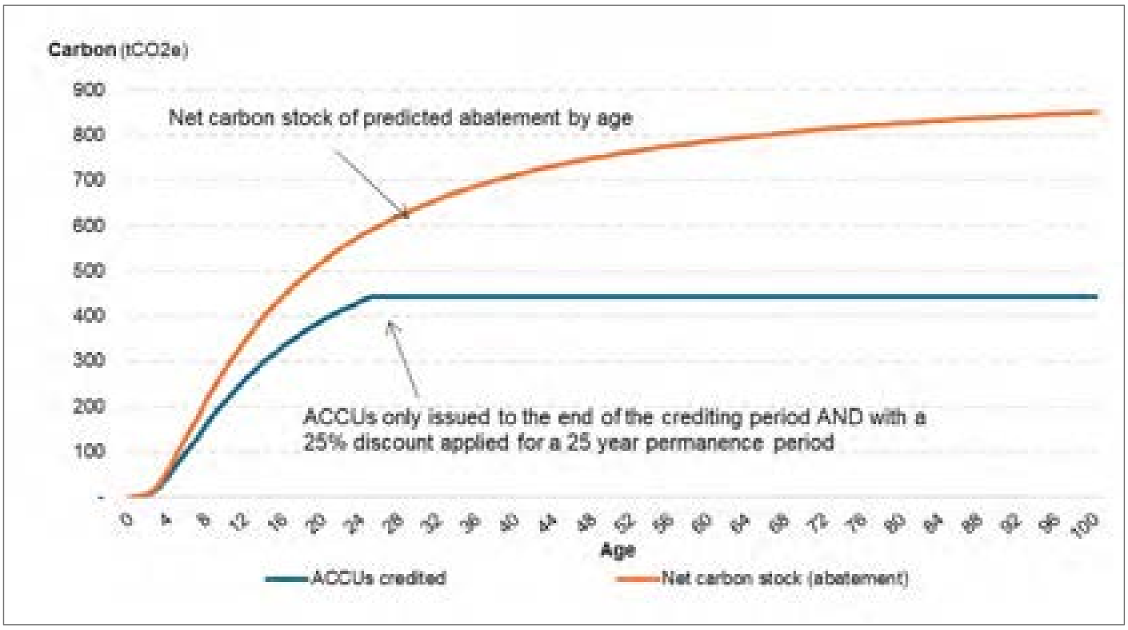
This difference is illustrated below, by comparing the actual net carbon stock profile of a 32-year softwood rotation for TPs (Figure 6-1), and a permanent planting for EPs (Figure 6-2), with ACCUs that would be credited against the project.

Figure 6-1 Illustration of single hectare TP project abatement and ACCU generation



Source: Indufor FullCAM (example from Central West MAI Class 15-17)

Figure 6-2 Illustration of single hectare EP project abatement and ACCU generation



Source: Indufor FullCAM (example from Central West MAI Class 15-17)

For TPs, the net carbon stock is used to establish the 100-year average carbon stock. For a carbon project with a 25-year permanence period, a 25% discount is applied. In this illustrative example of TP, carbon abatement increases progressively up to the point of a clearfell harvest (at around age 32 years), and the carbon stocks profile then follows a sawtooth pattern through multiple rotations over 100 years. However, ACCUs are issued up to the long term, 100-year (post discount) average carbon stock is reached (around 22 years), at which point it is capped.

This distinction between carbon credits and carbon abatement reflects the ACCU Scheme design principles, which incorporate applying conservatism to abatement estimates to ensure that credits issued genuinely recognise a project's contribution to sequestering carbon over the long term.

In this context, this land use review and comparison is focussed primarily on carbon crediting and ACCU estimates, as these values will underpin economic returns from ACCU Scheme projects and therefore land use decision making. Hereafter in this report, any references to abatement are intended to refer to carbon crediting, unless otherwise stated.

6.2 Carbon profiling to date

The CWFH has previously commissioned a project in 2023 to quantify and map potential ACCUs across the region[32]. This carbon profiling analysis was focused exclusively on TPs, specifically radiata pine plantations, with no direct consideration of EPs.

The methodology for the carbon profiling analysis involved overlaying a 3-kilometre (km) x 3 km grid across the Hub area, resulting in approximately 2,500 points for analysis. For each point, three plantation regimes were modelled using the 2016 version of FullCAM[33]:

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[32] CWFH (2023) *Carbon Profiling Analysis*. Report prepared by PF Olsen, 1/02/2023.

[33] DCCEEW (2025) *Full Carbon Accounting Model (FullCAM).* Online: https://www.dcceew.gov.au/climate-change/publications/full-carbon-accounting-model-fullcam

(i) a short rotation (15-year clearfell) regime,

(ii) long rotation with one thinning (i.e. at 15 years) and clearfell at 32 years, and

(iii) long rotation with two thinnings (i.e. at 17 and 25 years) and clearfell at 32 years.

Each point was classified into one of five productivity classes based on MAI estimates. The model calculated carbon stock changes over a 100-year period, converting biomass data into CO_2-equivalent emissions and removals. Outputs included average carbon sequestration estimates, heat maps, and carbon profiles for each regime and productivity class.

This carbon profiling analysis concluded that the average carbon sequestration potential (i.e. claimable ACCUs) across the Central West NSW region ranges from 219 - 412 tonnes of CO_2/ha across the identified potential plantation areas. This is based on a 25-year permanence period, with the variation relating to the productivity classification and regime. The study also provided carbon profiles over 100 years for all regimes and productivity classes.

The same type of carbon profiling analysis has not been conducted in the Murray Region. Furthermore, the same type of analysis has not yet been conducted for EPs in either region.

6.3 Approach

Recognising the carbon profiling analysis for the Central West NSW was limited to assessing the carbon sequestration potential of radiata pine plantations in that region, i.e. TPs, Indufor has applied a similar approach to derive carbon crediting estimates for both TPs and EPs, across both regions.

To address the requirement for a consistent analysis across regions, the approach conducted in the Central West NSW region was adopted and extended to the Murray Region, as set out below. This provided a comparable basis for generating ACCU estimates based on TPs, in accordance with the *Plantation Forestry Method 2022*.

In addition, crediting estimates have been derived for both the Central West NSW region and Murray Region, following the *Reforestation by Environmental or Mallee Plantings FullCAM Method 2024*. The approach to developing these crediting estimates is set out below.

Calculating carbon crediting in TPs

The plot locations from the carbon profiling analysis project in Central West NSW were selected to provide a side-by-side comparison of TPs and EPs for this region (1,132 plots in total). To extend this analysis to the Murray Region, a series of random points were created within each of the productivity classes (70 in total).

These plots were then modelled in FullCAM (2016 version), as specified in the *Plantation Forestry Method 2022*, adopting a radiata pine, long rotation single-thinned regime. This provided a common basis to calculate crediting potential for TPs across both regions. The crediting potential of TPs was calculated using a 25-year permanence period, as this is the predominant period adopted in TPs registered under the ACCU Scheme (refer to Figure 4-3).

Calculating carbon crediting in EPs

The estimate of crediting in EPs was modelled using the same plot locations used for the TP carbon crediting calculations. Crediting estimates were calculated for each of the plots, using FullCAM (2020 version), as specified in the *Reforestation by environmental or mallee planting method 2024*, to establish a point-based comparison of ACCU generation across each of the productivity classes.

While noting the ACCU Scheme Project Register data shows a portion of registered EP projects will calculate crediting based on use of the 100-year permanence period, this analysis adopted the use of a 25-year permanence period, for direct comparison purposes with TPs, which are predominantly based on a 25-year permanence period.

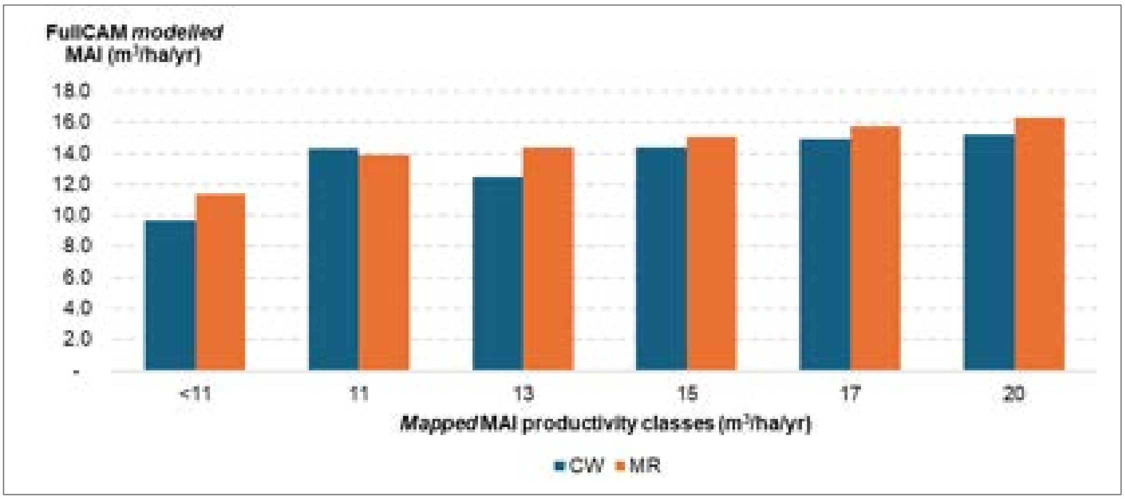
Crediting estimates

FullCAM incorporates modelling of the productivity of plantations and environmental plantings, i.e. TPs and EPs, to determine growth and yield over time and associated carbon sequestration and carbon stocks. To validate the productivity modelling in FullCAM, the results were compared to the productivity (MAI classes) incorporated in this land use review as discussed in Section 5. A comparison of the modelled MAI from FullCAM (based on 90% of the stem volume) for the TP plots located within each mapped MAI class across both regions is shown in Figure 6-3.

This comparison shows that the growth trends predicted by FullCAM generally correspond with the mapped productivity classes for both regions. However, in the FullCAM model, modelled growth tapers off in the higher productivity classes (i.e. MAI 17–20 and 20+), plateauing at approximately 15-16 m³/ha/year. This plateau directly affects the modelled crediting and is reflected in the ACCUs estimated for TPs, i.e. modelled crediting reaches a plateau and 'cap out' before the end of the first rotation.

In contrast, for EPs, the modelled ACCUs tend to be significantly higher on the higher productivity site classes, as there is no apparent flattening of growth.

Figure 6-3 Comparison of FullCAM-modelled MAI with mapped MAI productivity classes for TPs in both regions



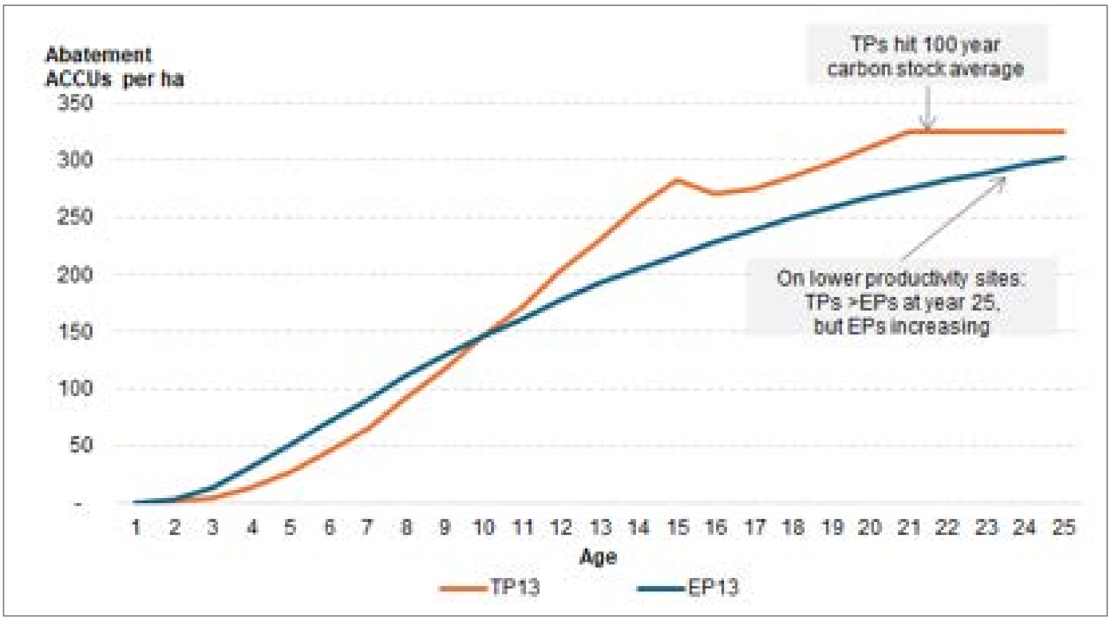
Source: FullCAM plot analysis (2016 version) for TPs, in accordance with the *Plantation Forestry Method 2022.*

6.4 Carbon crediting trends

Growth profiles and carbon crediting trends for TPs and EPs across productivity classes are illustrated in Figure 6-4 and Figure 6-5. Crediting profiles for two selected MAI classes (MAI 13-15 and 17-20) are compared. These profiles reflect a 25-year modelling period, consistent with the crediting period[34] and 25-year permanence period.

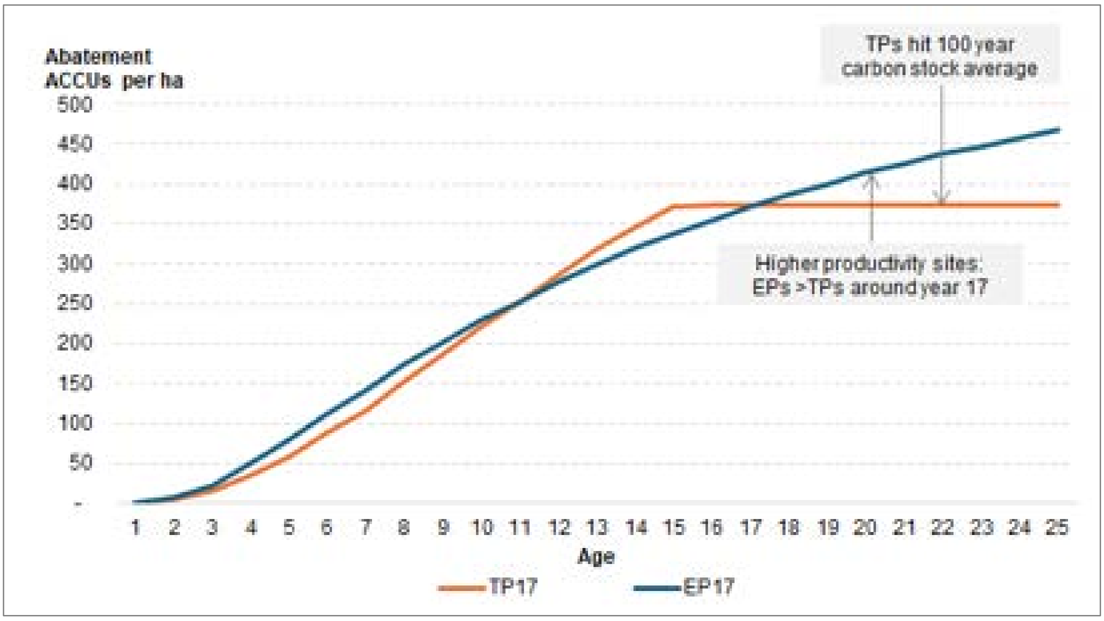
[34] The crediting period is the period a project can apply to claim ACCUs. The crediting period starts on the date a project is registered or a start date nominated up to 18 months after a project is registered.

Figure 6-4 Crediting estimates - single hectare, low-medium productivity (MAI 13)



Source: Indufor modelling using FullCAM with land productivity estimates in this review.

Figure 6-5 Crediting estimates - single hectare, medium-high productivity (MAI 17)



Source: Indufor modelling using FullCAM with land productivity estimates in this review.

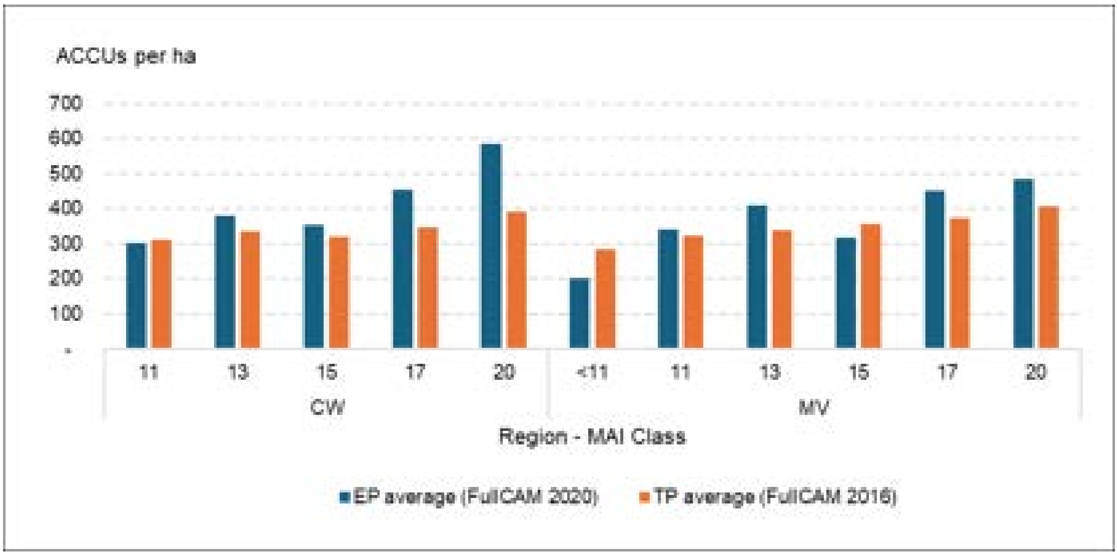
Under the *Plantation Forestry Method 2022*, stands must be modelled over a 100-year period to establish the long-term average carbon stock. This then sets the maximum crediting that can be claimed from establishing a new plantation. Crediting is further reduced by the discounts that are applied to account for the risk of reversal.

In contrast, there is no maximum crediting applied to EPs. However, the same discounts apply (as for long rotation TPs) depending upon the Permanence Periods[35] adopted for each project. Both methods are also subject to a maximum crediting period under the ACCU Scheme of 25 years.

This comparison shows that across the two selected productivity classes, EPs typically deliver higher crediting in the first 8 to 10 years, at which point the TPs modelling tend to see accelerated sequestration before being impacted by thinning events. On higher productivity sites, TPs tend to reach the 100-year long term average carbon stocks sooner, and hence EPs generate higher crediting by year 25; whereas on lower productivity sites, EPs may not achieve an equivalent level of crediting until some years after the Crediting Period is completed.

The modelled crediting for the two methods across the two regions, for each of the productivity classes, is illustrated in Figure 6-6. TPs typically generate higher ACCUs than EPs in the very low productivity classes, but the opposite occurs in areas of higher productivity, where EPs generate more credits.

Figure 6-6 Average ACCUs by method, by region and MAI class (at age 25)



Source: Indufor modelling using FullCAM, based on assumptions set out in this review.

The other noteworthy observation is that in both regions ACCU generation for the MAI 13-15 productivity class is higher in some cases than the MAI 15-17 productivity class. This was a similar finding to that for the carbon profiling analysis undertaken for the Central West region in 2023. This reflects the different parameters used to model productivity for the plantation suitability mapping and for FullCAM.

6.5 Extrapolation of carbon crediting results across the regions

This analysis of the potential for carbon credits and ACCUs provides the basis for an extrapolation of results across the potential planting areas in the two study regions.

To calculate the potential ACCU generation by region and planting type, Indufor developed a model to provide the estimated crediting by year based on user-defined planting assumptions, primarily through applying a proportion of the land suitable that will be planted in any one year,

[35] Scheme participants may nominate either a 25-year or a 100-year permanence period for their sequestration project. A project must be maintained for the period nominated, even though the project's crediting, reporting and delivery periods may have ended.

based on a selected set of planting scenarios. The average ACCU yield by project planting type and productivity class was applied across both regions. The average crediting profile for both regions by age and productivity class are set out in **Annex 5**.

Results for a set of planting scenarios are set out below in Table 6-1 and Table 6-2. These scenarios comprise:

- Scenario A involves planting 0.25% of the suitable land in each productivity class each year over a period of 10 years, i.e. from 2025 – 2034
- Scenario B increases this planting rate to 0.5% of suitable land in each region
- Scenario C increases this planting rate to 1.0% of suitable land in each region.

These scenarios would see in the order of 100,000ha of suitable land being planted in the Central West NSW region, to either TPs or EPs or a combination of both; and up to 57,000ha of TPs or 70,000ha of EPs in the Murray Region.

Using these areas, total cumulative crediting has been calculated for these three scenarios. These calculations indicate the potential for ACCU generation over a 25-year period is similar.

Table 6-1 Potential planting areas by region and planting type, under three scenarios

	Central West NSW		Murray Region	
Planting areas ('000ha)	**TP**	**EP**	**TP**	**EP**
Total area suitable for planting[1]	**1 041**	**1 041**	**567**	**700**
Scenario A: 0.25% x 10 years (to 2034)	26	26	14	18
Scenario B: 0.50% x 10 years (to 2034)	52	52	28	35
Scenario C: 1.00% x 10 years (to 2034)	104	104	57	70

Source: Indufor analysis. Note: Total planting areas deemed available and suitable are based on analysis in Section 5.

Table 6-2 Potential for ACCU generation by region and planting type, under scenarios

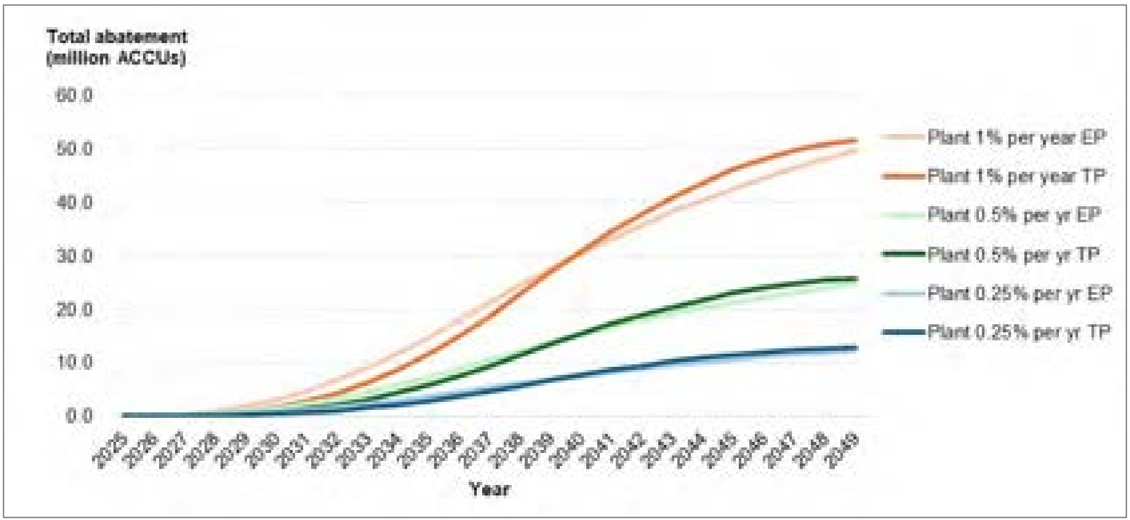
Potential ACCUs ('000) after 25 years (2049)	TP	EP	TP	EP
Scenario A: 0.25%	8 275	7 573	4 594	4 831
Scenario B: 0.50%	16 551	15 147	9 189	9 662
Scenario C: 1.00%	33 102	30 293	18 379	19 324

Source: Indufor analysis.

The consolidated crediting profile under each scenario is charted in Figure 6-7, when the plantings in both regions are combined. The general trend is consistent with the earlier analysis, with EPs providing a superior crediting return during the first few years. However, TPs generally sequester at higher rate for a period and after 25 years, total crediting is similar.

Moreover, while EPs generate more carbon credits on higher productivity sites, these sites represent a relatively small proportion of the land potentially available and modelled in this analysis (refer Table 5-8).

Figure 6-7 Comparison of crediting potential, across a range of planting scenarios, for Central West NSW region and Murray Region combined areas



Source: Indufor modelling using land suitability analysis and crediting profiles developed in FullCAM.

6.6 Summary of findings

This analysis has found that over a 25-year crediting period, the total ACCUs generated by EPs and TPs are broadly comparable, on a per hectare basis. Furthermore, the modelling of the crediting potential across a range of planting scenarios indicates a comparable level of ACCU estimates, based on the same scale of plantings (noting the application of different FullCAM model versions for TPs and EPs). These findings are attributable to:

- While TPs generally represent a more intensive planting model, in terms of initial stocking and silvicultural management, crediting is constrained by the application of the 100-year average carbon stock 'cap', as well as the lower biological growth assumptions incorporated within FullCAM on many sites when compared to EPs. This is also despite the incorporation of harvested wood products into the carbon stock estimates for TPs.
- The typical growth profile for EPs is expected to continue sequestering carbon over time (although at slowing rates as tree growth slows over time) while the carbon stocks in TPs will increase up to a timber harvest event, then drop to lower levels before growth continues, as part of a rotational cycle.
- Modelling using the FullCAM 2020 version found that EP projects are modelled to generate significantly more carbon credits than TP projects on higher productivity sites, where TPs often reach their carbon stock 'cap' earlier, while EPs tend to generate more credits by year 25. On lower productivity sites, EPs may not reach equivalent crediting levels until after the crediting period ends.
- The area analysis for the two regions identified a higher proportion of low productivity land available, so the higher crediting that EPs achieve on higher productivity sites represents a smaller proportion of the total ACCUs modelled.

FullCAM modelling parameters will be reviewed and updated over time, and the potential for this to change ACCU estimates for EPs and TPs is discussed further in this study. However, in terms of the potential for carbon crediting based on current settings, and across the range of sites in the Murray Region and the Central West NSW, the modelling of ACCU estimates that could be realised from EPs and TPs are considered broadly comparable.

7. ECONOMIC RETURNS

To further inform Hub initiatives and Government policy development, this land use review encompassed the development of a model to compare the economic returns from TPs and EPs for the current settings for new plantings projects in the Central West NSW region and the Murray Region.

Following an overview of this modelling, the results from this comparative assessment of economic returns are presented, firstly based on the base assumptions, and secondly, with a sensitivity analysis to consider the influence and impact of key variables in the model.

7.1 Modelling of economic returns

An economic returns model was developed, incorporating work previously completed for productive timber plantations in the CWFH. The model was constructed to compare economic returns on a per hectare basis, with returns calculated in terms of net present value ($/ha), as well as internal rate of return (IRR, in percentage terms) in some instances. Modelling of economic returns for TPs was based on cash flows over 32 years (i.e. a full, single rotation of radiata pine), while modelling of returns for EPs was based on cashflows over 25 years.

Key parameters or variables incorporated into the modelling include the following:

- investment discount rate
- land cost (expressed as notional rent)
- establishment and tending costs
- production and transport costs
- annual protection and management costs
- carbon management costs, yields and prices
- log prices
- potential escalation factors.

Assumptions for key variables incorporated in the economic model are listed in full in **Annex 6**. A selection of these key variables is discussed further below, as the basis for the comparison of economic returns from TPs and EPs on comparable sites.

Land cost and transport distance

Two key variables in the economic model are land cost and the distance to market for timber products. The midpoint for each class was used as the basis for assessing economic returns, and for testing the sensitivity to changes in key variables, as set out in Table 7-1. A generic transport cost of $0-20 per tonne km was applied to establish total transport costs, and a notional annual rent[36] of 3% of the land value was applied to cashflows from both TP and EP tree crops.

Furthermore, income from grazing has been modelled as an offset to land rent. Both EPs and TPs have 50% of the annual rent offset by grazing revenue between ages 4 and 8. Beyond age 8, it is assumed there is no further grazing income.

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[36] There are various approaches that could be adopted to incorporate land cost assumptions into economic modelling of returns from timber plantations and environmental planting projects. The adopted approach of applying a notional land rent annually will tend to reduce investment returns on longer rotations (e.g. comparing rotations of 32 years for TPs with 25 years for EPs), all other things being equal. However, the adopted approach is considered consistent with published standards for forest valuations in Australia.

Table 7-1 Modelling assumptions made for land costs and distance from markets

Distance class	Distance (km)
<100 km	**75**[1]
100 – 200 km	150
>200 km	250

Land cost ($ per ha)	Cost ($)
<$10 000	7 500
$10 000 - $20 000	**15 000**[1]
>$20 000	25 000

Note 1: These base assumptions were adopted when conducting sensitivity analysis for other variables incorporated in the economic model.

Timber and ACCU yields

ACCUs were derived for each plantation productivity class, based on the analysis undertaken in Section 5. The assumed timber productivity is the mid-point of each productivity class. The regime modelled reflects the standard regime used to derive carbon crediting estimates – a single thinned radiata pine regime, with a 32-year clear fall harvest age. A generic log grade mix has been applied across the log products (pulp, small, medium and large sawlogs). Timber yield productivity assumptions for TPs and EPs in the economic model are set out in Table 7-2.

Table 7-2 Timber productivity (MAI) and ACCU yield by MAI class and method

MAI Productivity class	Average MAI (m^3/ha/yr)	ACCU yields[1] EPs	ACCU yields[1] TPs
<11	9.6	201	284
11-13	12.0	321	316
13-15	14.0	395	337
15-17	16.0	335	337
17-20	18.5	453	361
20+	22.5	535	399

Source: Indufor modelling. Note 1: Based on application of a 25-year permanence period, average across both regions

Log prices

Log prices (on a mill door basis) adopted in the model are set out in Table 7-3. For this land use review, it was assumed that these prices would be maintained flat in real terms over the duration of the analysis.

Table 7-3 Log price assumptions

Log product	$ per m^3
Pulp	85
Small sawlogs	100
Medium sawlogs	130
Large sawlogs	160

Source: Indufor log price databases

ACCU prices

ACCU spot prices were discussed in Section 4.1 of this review. Trading data over the past year show that the ‘generic’ ACCU spot price has oscillated between A$35 – 40 per ACCU certificate (i.e. per tonne of CO_{2e}).

Generic ACCUs have mostly been generated via landfill gas and avoided deforestation methods, while vegetation-based ACCUs to date have been largely based on the Human-Induced Regeneration method (now closed), and, to a lesser extent, the Savannah Fire Management method[37].

Future nature-based ACCUs could be increasingly sourced from projects established under the Plantation Forestry method and Environmental Plantings method.

ACCU spot price data over this period also includes some transactions for 'Environmental Plantings' (or simply 'Plantings') in which the price reflects a premium of around $10 - $15 over generic ACCUs. These plantings transactions relate specifically to environmental plantings (i.e. EPs) and mallee planting projects; they do not include plantation forestry projects (i.e. TPs)[38]; for which transaction prices are captured under generic ACCU prices. While the specific price guidance for EPs is based on relatively few transactions to date, it does reflect pricing signals upon which a current pricing expectation can be based.

Furthermore, based on consultation with carbon plantation project proponents during this study, there is a broadly-based expectation that EPs especially might continue to achieve a premium price over generic ACCUs, based on perceptions that EPs represent higher integrity projects and can provide other non-carbon benefits such as biodiversity gains. It is possible that EPs are more likely to be able to promote the non-carbon benefits to a greater extent than TPs. Therefore, a scenario includes an ACCU price for EPs of $50/ACCU.

In contrast, there is a lack of market trade data available on plantation forestry (TP) ACCUs to support a price differential compared to generic ACCUs (or EPs). Therefore, a base price of $40/ACCUs has been adopted for both TPs and EPs.

A summary of these ACCU carbon price base assumptions, together with alternative price values to be tested in a sensitivity analysis, are set out in Table 7-4. The outcomes of the sensitivity analysis are discussed further below.

Table 7-4 ACCU price assumptions for modelling of economic returns

Pricing scenarios	TP $ per ACCU	EP $ per ACCU
ACCU spot price (April 2025)[1]	35	35 - 50
Base ACCU price[2]	**40**	**40**
Alternate scenario A – low premium for EPs	40	50
Alternate scenario B – moderate premium for both	60	75
Alternate scenario C – high premium for EPs	50	75

Note 1: Core Markets ACCU market overview for April 2025. Online: https://coremarkets.co/

Note 2: Base assumption on ACCU price for modelling economic returns and sensitivity analyses.

7.2 Comparison of economic returns

Based on the modelling approach outlined above, a profile of the modelled economic returns from TPs and EPs across a range of plantation productivity classes is set out in Figure 7-1. This profile presents the modelled net present values from TPs using the base assumptions.

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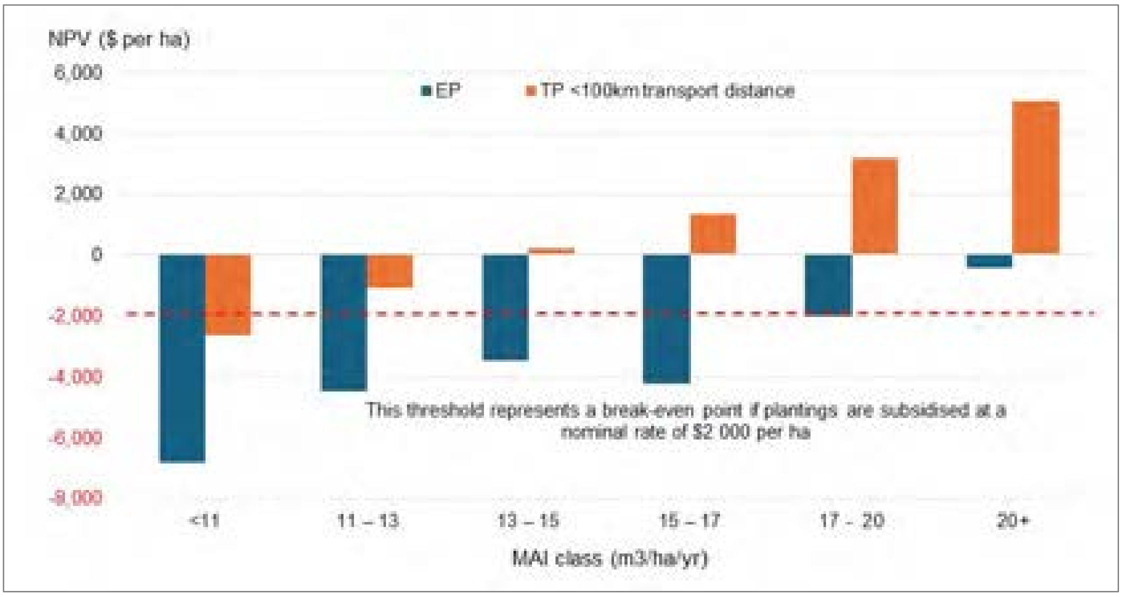
[37] Climate Change Authority (2023) Review of the *Carbon Credits (Carbon Farming Initiative) Act 2011.*

[38] Core Markets, *pers. comm.*, May 2025.

This profile indicates that across all the productivity classes, TPs will generate higher economic returns. In all productivity classes the modelled NPVs for EPs are negative (assuming an ACCU price of $40). Returns tend to increase as site quality improves.

Figure 7-1 Economic returns from alternative land uses (base case assumptions)



Source: Indufor modelling of economic returns. Note: NPV determined @ 6.5% real pre-tax discount rate.

It is important to highlight this profile presents indicative NPV returns using base assumptions *excluding* government subsidies or incentives that may be accessible by investors. The consideration of incentives such as the Support Plantation Establishment (SPE) program for new timber plantations or the Living Carbon grants for environmental plantings is addressed through a sensitivity analysis later in this report.

The potential for incentives to change the profile of economic returns is illustrated simply in the figure above, with a threshold (as shown by the red dashed line) representing the breakeven point if the establishment of the plantings (for TPs or EPs) was subsidised at a nominal rate of $2,000 per ha. In this scenario, NPVs above this line would be NPV positive, which includes plantation productivity classes of >11-13 m^3/ha/year for TPs and >17-20 m^3/ha/year for EPs.

Furthermore, this comparison of economic returns is based on an assessment at the site and project level and does not take account of broader investor considerations of the 'value' of the project. For example, while the profile above may suggest that projects on lower productivity sites may result in a negative NPV at the project level, an investor may consider it a preferred approach to generating ACCUs than purchasing them directly through a trading platform, or at a fixed price under the Safeguard Mechanism's cost containment measure (set at $79.20 in 2024–25 and indexed annually)[39]. Other considerations include the potential for the investor to have an interest in rural land, with land appreciation values over time, or 'nature positive' investments that incorporate values that extend beyond this analysis of economic returns.

Further key considerations in this profile include the carbon price, which are assumed under the base assumptions to be $40/t$CO_{2e}$ (ACCU) for TPs and EPs, with flat real price growth over

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[39] CER (2025f) *Cost containment measure.* Online: https://cer.gov.au/schemes/safeguard-mechanism/managing-excess-emissions/cost-containment-measure

time. Investors may have differing expectations for carbon price trajectories and the potential impacts of alternative prices on economic returns is addressed in the sensitivity analyses below.

7.3 Sensitivity analyses

The economic returns from ACCU Scheme planting projects will depend on many variables, encompassing biophysical factors (such as site location and productivity class), market factors (impacting on the value for ACCUs, timber, grazing rights and potentially biodiversity credits), as well as primary investment factors (such as land costs and applicable discount rates).

To address the extent to which changes to key variables can impact on economic returns, a set of sensitivity analyses have been developed for the following factors:

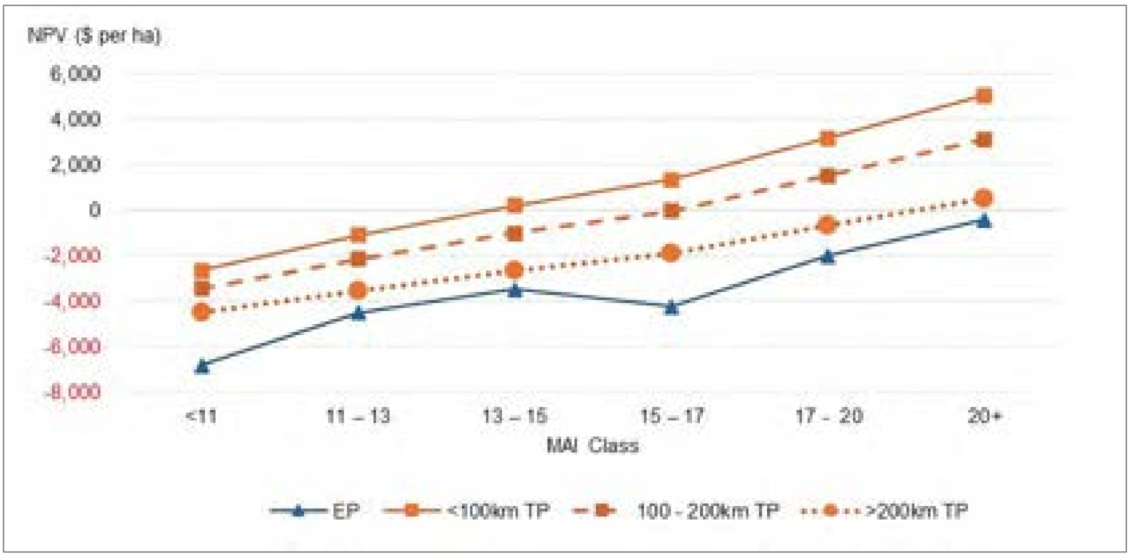
- site location and transport distance to timber markets
- land costs
- log prices
- carbon prices.

The sensitivity analyses have been based on the premise of changing only the selected variable while maintaining the base assumptions (refer Section 7.1 and Annex 6) for all other variables in the economic model. In all cases, the economic returns are compared across the full range of site productivity classes applicable to the Central West NSW region and Murray Region.

Sensitivity to location and transport distance to timber markets

The first sensitivity analysis considers the impact on economic returns when the transport distance to timber markets is varied from the base assumption of <100km (with a point of 75km) and includes 100 - 200km (average distance of 150km) and >200km (average distance of 250km). These tests only impact on economic returns for TPs, as there is not the same requirement to transport timber to market in EPs. The results are presented in Figure 7-2. This analysis indicates that TPs provide higher economic returns regardless of the transport distance (when all other variables being held the same as the base assumptions including an ACCU price of $40 for both TPs and EPs).

Figure 7-2 NPV by productivity class and alternative transport distances to markets (base case assumptions)

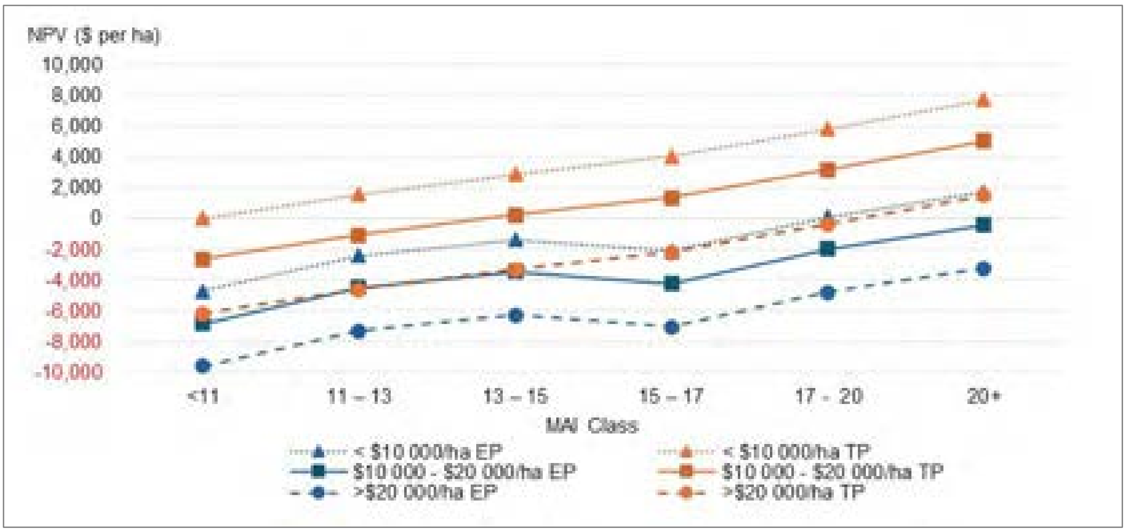


Sensitivity to changes in land costs

Land cost is a significant input into the economic model, and while it can be correlated with plantation productivity, it is also informative to consider this variable separately.

This next analysis considers the impact of varying the land cost from $15,000/ha, downwards to $7,500 /ha and upwards to $25,000/ha. This analysis clearly shows the economic returns from both TP and EP decrease as land costs increase (Figure 7-3). It also shows the economic returns from TPs tend to increase at a higher rate as productivity increases, with returns impacted positively by both higher timber and ACCU yields. This is reflected in the trend showing an expanding gap between TP and EP returns as site productivity increases.

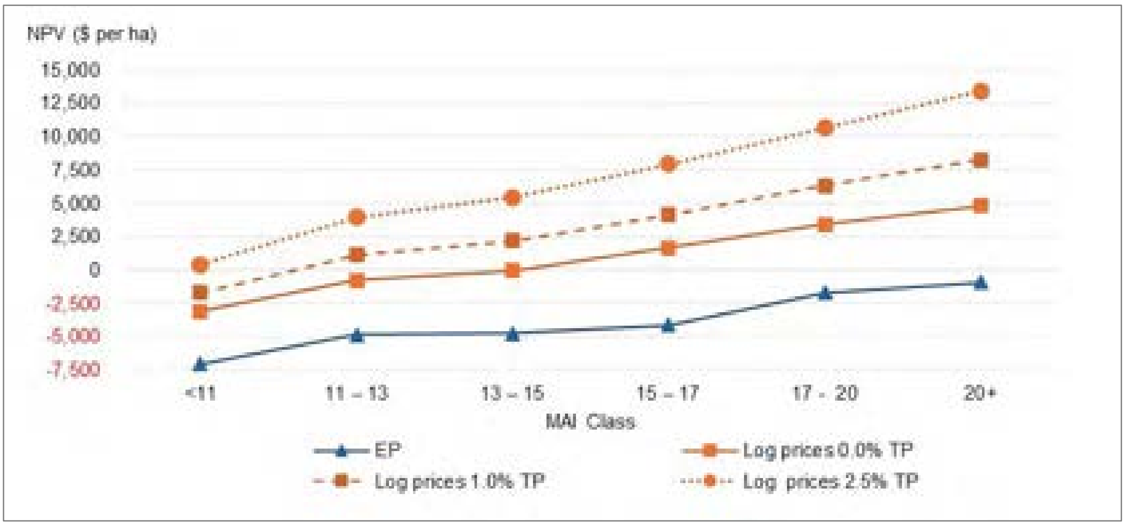
Figure 7-3 NPV by productivity class and alternative land costs (base case assumptions)



Sensitivity to real log price indexation

The base assumption in the economic model is flat real growth in timber prices over time. The impact of real annual timber price increases is illustrated in Figure 7-4. This analysis only relates to the economic returns from TPs, as EPs are not impacted by changes to timber prices.

Figure 7-4 NPV by productivity class and alternative log price indexation assumptions



This analysis shows that in a scenario where log prices escalate in real terms at 1% per year, due for example to increasing demand for plantation timber in construction markets, economic returns from TPs would increase the NPV significantly (from around \$4 800/ha to \$8 200/ha) on the higher productivity sites.

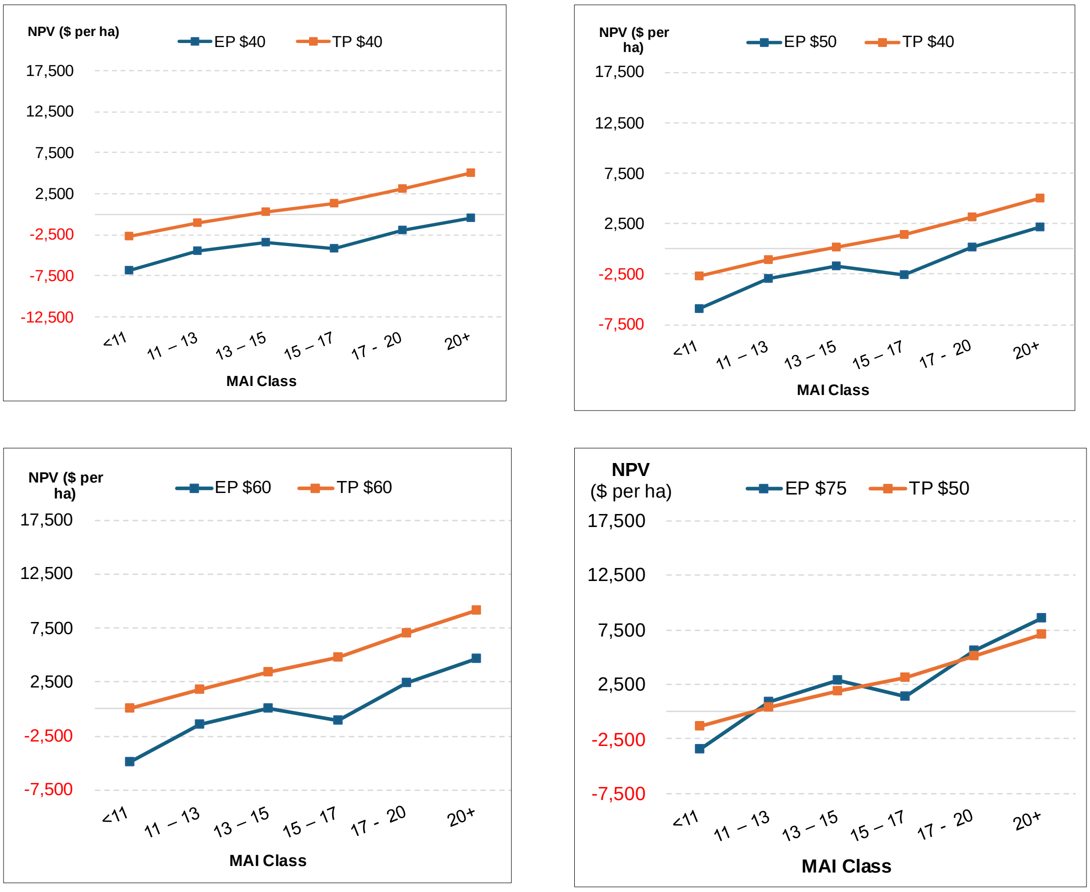
Sensitivity to carbon price

Another key variable in this analysis is the price of carbon, which is expressed as \$ per ACCU (effectively \$ per tonne of CO_{2e}). The base assumptions for ACCU prices are \$40/ACCU. The economic model provides the capacity to model annual price indexation or stepped increases over time.

A summary of alternative price values for ACCU prices is set out in Table 7-4 (above). The alternative price values include scenarios that feature a relatively low premium for both TPs and EPs, a moderate premium for both TPs and EPs, and a relatively high premiums for EPs only (e.g. \$15/ACCU more than a nominal price for TP-based ACCUs), based on the more distinct premium price signal for 'plantings' (i.e. EPs) over the past 1-2 years and the perceived strength of 'high integrity' credits with potential for coupling with biodiversity credits.

These scenarios are presented in Figure 7-5.

Figure 7-5 NPV by productivity class and alternative carbon pricing scenarios (base case assumptions)



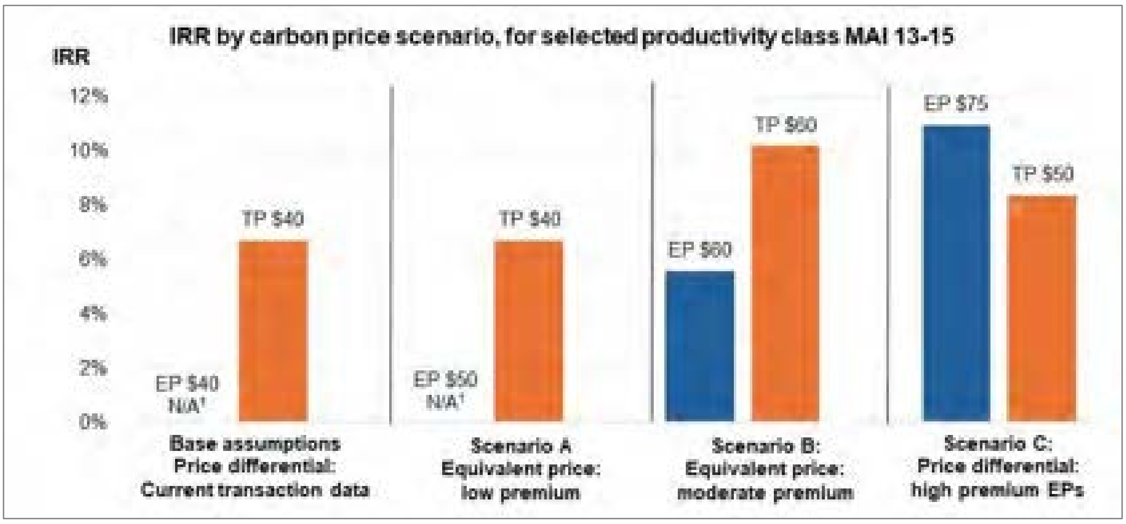
Source: Indufor modelling of economic returns

This analysis indicates that TPs can generate higher economic returns when the ACCU price is comparable (including base prices of \$40/ACCU for both TPs and EPs respectively).

However, if the EP price were to increase to $75/ACCU, while the TP price attained up to $50/ACCU, EPs could deliver higher economic returns. This is attributable to EPs having a predominant focus on carbon sequestration (in contrast to TPs having multiple objectives including timber production) and the relatively high level of ACCUs generated by EPs using the Environmental Plantings method with FullCAM, especially on higher site productivity classes.

A set of modelled IRRs based on the alternative carbon price scenarios is shown in Figure 7-6. This analysis relates to one selected productivity class only, being MAI 13-15 m^3/ha/year.

Figure 7-6 Sensitivity of investment returns (IRR) to carbon price



Source: Indufor modelling of economic returns
Note 1: IRR not defined due to negative or non-conventional cash flows.

7.4 Summary of findings

Notable findings from this assessment of economic returns comprise the following:

- Applying a base set of assumptions, TPs will typically generate higher economic returns (i.e. higher NPVs) across all the productivity classes, which largely reflects the impact of the dual revenue streams from timber and ACCUs. This finding excludes consideration of policy incentives and is based on an assessment at the site and project level and does not take account of broader investor considerations of the 'value' of the project.
- TPs will generally provide higher economic returns regardless of the transport distance (assuming all other variables are held the same as the base assumptions).
- Economic returns from both TP and EP clearly decrease as land costs increase. However, the economic returns from TPs tend to increase at a higher rate as productivity increases, with returns impacted positively by both higher timber and ACCU yields.
- Real log price increases will clearly favour TPs as they do not impact on EP returns.

  TPs will continue to generate higher economic returns when the ACCU prices for TPs and EPs are comparable. Economic returns from EPs are especially sensitive to ACCU prices, as ACCUs are the only substantive source of revenue. If the EP price were to increase to $75/ACCU, for example, while the TP price attained up to $50/ACCU, EPs could deliver higher economic returns. When the price differential is less than $20-25/ACCU, TPs are expected to generate higher economic returns.

8. SOCIO-ECONOMIC CONTRIBUTIONS

This section sets out the socio-economic baseline for the land use review and comparison for the Murray Region and Central West NSW. Its primary purpose is to quantify and compare how TPs and EPs may translate into regional jobs, household income and Gross Regional Product (GRP).

This assessment draws on publicly available datasets, principally the Hub-commissioned socio-economic studies, which remain the most robust sources of plantation economic data for these regions. There is no equivalent Hub-level economic survey for EPs, so the figures presented in this report are extrapolated from the Hub plantation forestry studies and an analogous restoration study. EP results should therefore be interpreted as indicative ranges with a relatively high level of uncertainty.

The analysis completes the evidence chain: policy and market drivers explain *why* landholders might change land use; carbon and capability analyses describe *where* change could occur and *how much* carbon it could deliver; and this chapter explains *what that change could mean* for local economies and communities.

This analysis places the two planting models on a common footing by expressing their economic effects per 1,000ha. For TPs, it is assumed they will follow the full industrial supply chain from nurseries to downstream processing (e.g. sawmills and manufacturing) and sales, capturing both direct and flow-on activity. For EPs the supply chain is narrower, comprising nurseries, establishment and maintenance, and reflecting that these plantings generate no harvestable product. The resulting side-by-side comparison offers a view of the socio-economic differences between TPs and EPs.

8.1 Supply chain characteristics

Timber plantations

TPs, which form part of the plantation forestry industry in Australia, has a broad and integrated supply chain spanning seedling production to downstream manufacturing (Figure 8-1). Key stages include nursery propagation, silviculture, roading, forest and fire management, harvesting and haulage, and extensive primary and secondary processing[40,41].

At the nursery stage, seeds are collected, germinated, and grown into seedlings for TP establishment. Following planting, silviculture practices, including thinning, pruning, pest control, fertilisation, and fire management, are applied to optimise growth and wood quality[42]. These activities can represent a significant employment base in rural areas.

Harvest and haulage contractors harvest the trees and deliver timber and wood products to a range of processing facilities including sawmills, pulp and paper plants, and engineered wood product manufacturers[43]. In the South West Slopes of NSW, for instance, approximately 60% of direct jobs were in primary wood and paper processing, 6% in plantation management, 9% in nursery and silvicultural services, and 21% in harvest and haulage[44]. “Other” activities such as consulting and support services comprised around 1%.

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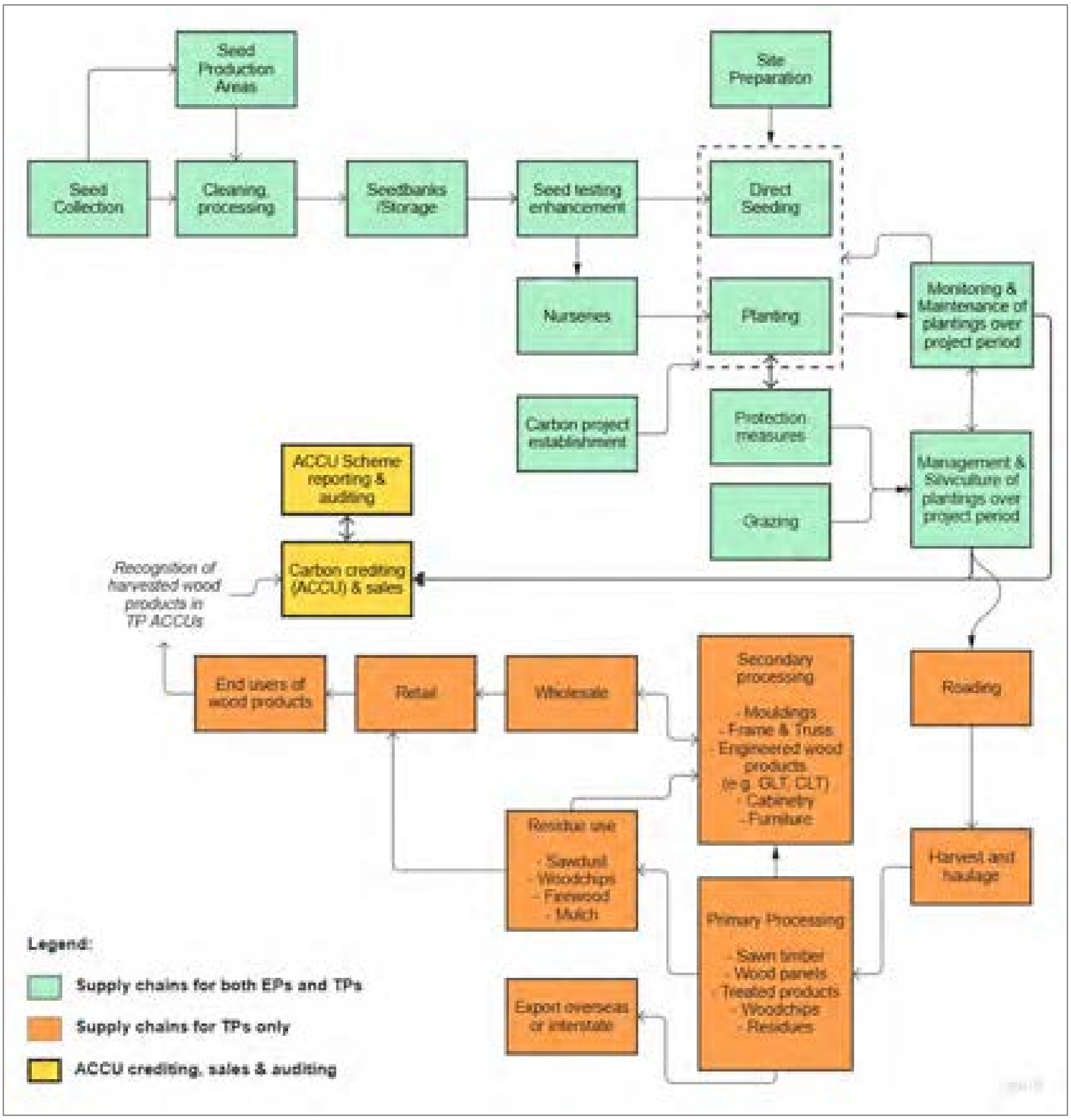
[40] CWFH (2023) *Socio-economic impact of the Softwood Plantation Industry in the Central West NSW Forestry Hub Region, 2021-22.* Report prepared by BDO EconSearch and the University of Canberra.
[41] MRFH (2023*) Socio-economic impacts of the softwood plantation industry: Examining a post-bushfire salvage period*. Report prepared by the University of Canberra and BDO EconSearch. Project number: MURR-2021-011.
[42] CWFH (2023); MRFH (2023).
[43] Ibid.
[44] South West Slopes Forestry Hub (2020) *Socio-economic impacts of the softwood plantation industry: South West Slopes Forestry Hub Region, NSW and Vic*. Report prepared by the University of Canberra and BDO EconSearch.

This means that TPs not only create primary rural employment but also underpin a complex value chain that supports secondary industry activity[45,46]. Indirect contributions include machinery maintenance, transportation services and retail trade[47]. These economic benefits are contingent on a stable estate where TPs are harvested, replanted, and processed continuously. Disruptions such as major fire events can increase employment temporarily but may not translate into sustained long-term job growth without replanting and estate recovery[48].

Figure 8-1 Generalised overview of supply chains for EPs and TPs



Source: Adapted from CWFH (2023) and Dja Dja Wurrung Enterprises Pty Ltd (2021).

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[45] CWFH (2023) *Socio-economic impact of the Softwood Plantation Industry in the CWFH Region, 2021-22*.

[46] Schirmer, J., Loxton, E., & Campbell-Wilson, A (2008) *Monitoring the social and economic impacts of forestry: Recommended indicators for monitoring social and economic impacts of forestry over time in Australia*.

[47] CWFH (2023); MRFH (2023).

[48] MRFH (2023*) Socio-economic impacts of the softwood plantation industry: Examining a post-bushfire salvage period*.

Environmental plantings

EPs focus on establishing native vegetation for carbon sequestration and ecosystem restoration, and do not allow for commercial timber production. The supply chain for EPs is therefore narrower than TPs. It includes seed sourcing, nursery propagation, site preparation, planting, and early-stage maintenance such as weed and pest control[49,50].

Once the vegetation is established, the intensity of management declines compared to TPs, particularly given roading and fire management activities are not generally directly captured as part of the supply chain given councils and rural fire services predominantly deliver these activities to private landholders. The scope for integrating activities such as livestock grazing represents a diversified land use and income stream that can support fuel and weed management and social acceptance through maintenance of agricultural pursuits in farming communities[51,52]. However, like TPs, this scope for grazing will be limited to defined periods in the planting growth and development, in between the establishment- and early growth-stage and later stages in which the tree growth is too dense or restrictive for grazing activity.

Unlike TPs, EPs lack a large downstream processing sector: there are no equivalent industries for log transport, sawmilling, pulp production, or timber and wood fibre manufacturing, nor are there any flow on effects from the manufacture and use of timber products, for example, in the housing, furniture and packaging sectors[53,54]. Economic flow-on effects from EPs are therefore mainly tied to upfront project establishment, input supply chains (nurseries, fencing materials, herbicides), and local service industries that benefit from project wage spending[55].

The Australian Native Seed Survey underscores that the native seed supply sector is critical to scaling EPs, but is currently underdeveloped, suffering from fragmented supply, inconsistent quality standards, and chronic shortages of species-diverse seed sources[56]. Seed Production Areas (SPAs) and better coordination are needed to support large-scale EP goals[57,58].

EP projects can create short bursts of labour-intensive activity during establishment phases but offer fewer long-term maintenance or processing jobs compared to TPs[59]. Restoration projects are labour-intensive at the outset but taper off significantly once plantings are established and mature. Nevertheless, carbon-farming buyers are a fast-growing segment suggesting that EP expansion will continue to increase its socio-economic contribution[60].

8.2 Approach

Literature and data review

The first step in this analysis was a structured scan of peer-reviewed papers, grey literature and hub-commissioned reports to map the TP and EP supply chains and qualitative and quantitative socio-economic characteristics. Comprehensive socio-economic studies recently prepared for

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[49] Clean Energy Regulator (2021) *Environmental Plantings Pilot -Information Pack V.01*.
[50] Hancock, N., Gibson-Roy, P., Driver, M., & Broadhurst, L. (2020) *The Australian Native Seed Survey Report*.
[51] Baumber, A., Cross, R., Waters, C., Metternicht, G., & Kam, H. (2022) Understanding the social licence of carbon farming in the Australian rangelands. *Sustainability*, 14, 174.
[52] Pollinate & Band Consulting (2024) *Study into the Impacts of Carbon Farming in South West Queensland Communities*.
[53] BenDor, T., Lester, T. W., Livengood, A., Davis, A., & Yonavjak, L. (2015) Estimating the size and impact of the ecological restoration economy. *PLoS ONE*, 10(6). https://doi.org/10.1371/journal.pone.0128339
[54] Young, R., Subroy, V., Trevenen, E., Kiatkoski, K. M., Jonson, J., Pandit, R., Whitten, S., Poole, M., & Kragt, M. (2023) T*he Western Australian Restoration Economy: A roadmap towards a sustainable industry with better environmental outcomes*. The Western Australian Biodiversity Science Institute.
[55] Ibid.
[56] Hancock *et al.* (2020).
[57] Dja Dja Wurrung Enterprises Pty Ltd (2021) *Right Plant, Right Way*. Online: https://www.anpc.asn.au/wp-content/uploads/2021/10/Right-Plant-Right-Way.pdf
[58] Hancock *et al.* (2020).
[59] BenDor *et al.* (2015); Young *et al.* (2023).
[60] Young *et al.* (2023).

the Hubs provided the main quantitative inputs to the TP figures presented in this analysis. These reports comprise the *Socio-economic Impact of the Softwood Plantation Industry in the Central West NSW Forestry Hub, 2021-22*[61] and *Socio-economic impacts of the softwood plantation industry: South West Slopes Forestry Hub Region, NSW and Vic*[62].

In addition, the *Socio-economic Impacts of the Softwood Plantation Industry: Examining a Post-Bushfire Salvage Period, Murray Region Forestry Hub*[63] was reviewed, but this data was not used in the socio-economic figures reported, given the post-bushfire circumstances of that study did not reflect a 'normal' period[64].

Earlier baseline work[65],[66] was consulted to understand temporal consistency. However, it must be noted that these earlier reports do not include the Victorian contribution to the MRFH.

To benchmark EPs, the *Western Australian Restoration Economy* (WARE) survey[67] was the only Australian study identified as reporting socio-economic data, such as employment and expenditure per hectare, for native revegetation. This study reports on the whole restoration economy including mine-site rehabilitation, urban revegetation, rangelands carbon projects, and not just EP projects. The WARE study, used in combination with the TP Hub data, informed the figures reported, as described in section 8.3.

All these contributing reports were based on sector-specific survey data, comprising responses from restoration economy companies and organisations[68] and plantation industry companies[69].

Regional baseline statistics

2021 Census tables for each Hub's constituent Local Government Areas (LGAs) were extracted through ABS QuickStats to obtain headline statistics[70]. As Hub boundaries do not align perfectly with LGAs, these values are provided only as indicative context. GRP estimates were sourced from Snapshot Climate, which uses the NIEIR regional accounts models benchmarked each year to ABS state accounts and industry input–output tables[71].

Supply-chain framing

The Hub reports used for the quantitative analysis group up the plantation industry subsectors slightly differently, with supply chain stages set out in Table 8-1. The reports analyse the socio-economic contributions of the softwood plantation industry up to the sale of primary-processed products. Secondary processing is excluded, unless co-located with primary processing.

Both direct and indirect (flow-on) contributions were considered. 'Direct' contributions were calculated as the sales, spending, value-add and jobs *inside* the supply chain stages outlined in Table 8-1, net of any payments between companies within the supply chain to avoid double counting. 'Indirect' figures are the sum of *production-induced effects* i.e. spending by direct supply chain businesses on immediate suppliers (e.g. fuel depots, mechanics, professional services, insurance, utilities, parts wholesalers) plus the second and subsequent rounds of spending as those suppliers buy inputs from other industries, and *consumption-induced effects*,

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[61] CWFH (2023) *Socio-economic impact of the Softwood Plantation Industry in the CWFH Region, 2021-22*.
[62] South West Slopes Forestry Hub (2020).
[63] MRFH (2023*) Socio-economic impacts of the softwood plantation industry: Examining a post-bushfire salvage period.*
[64] Dr Mel Mylek, University of Canberra, *pers. com*.
[65] NSW Department of Industry (2017) *Socio-economic impacts of the softwood plantation industry in the South West Slopes and Bombala region, NSW*. Report prepared by the University of Canberra and BDO EconSearch.
[66] FWPA (2018) *Socio-economic impacts of the softwood plantation industry South West Slopes and Central Tablelands regions, NSW*. Report prepared by the University of Canberra and BDO EconSearch.
[67] Young *et al.* (2023).
[68] Ibid.
[69] CWFH (2023); and South West Slopes Forestry Hub (2020).
[70] ABS (2025) *2021 Census QuickStats*. Online: https://www.abs.gov.au/census/find-census-data/quickstats/2021/AUS
[71] Snapshot (2025) *Snapshot Climate – Australian Emissions Profiles*. Online: https://snapshotclimate.com.au/

which are the local spending of wages earned by employees (e.g. rent, groceries, health care, hospitality).

Figures reported for the 'Grower and Silviculture' subsector, or combined 'Nurseries, silvicultural & roading contracting businesses' and 'Growers (forest-management companies)' were used to calculate equivalent figures for EPs.

Table 8-1 Supply chain characterisation used for socio-economic reporting in the Hub studies drawn upon for quantitative analysis

Stages in the supply chain for plantation forestry and TPs	Central West NSW Hub report (2023)	South West Slopes report (2020)
• Raising seedlings, contract planting, weed-control, fertilising, firebreak and road construction *These businesses provide services or seedlings to plantation owners.*	Incorporated into the category '*Grower & Silviculture*'	'*Nurseries, silvicultural & roading contracting businesses'*
• Plantation establishment, tending and administration performed by the owner/manager *As distinct from the contracted crews above.*	Incorporated into the category '*Grower & Silviculture*'	'*Growers*' (forest-management companies)
• Felling, in-forest processing, loading and transport of logs to mills.	Captured under '*Harvest & Haulage & Transport*'	'*Harvest & haulage contracting businesses*'
• Sawmilling, kiln-drying, treating, MDF/particleboard, pulp and paper carried out in regional mills (plus any secondary processes that occur on those same sites)	Captured under '*Processing*'	*'Primary wood and paper processing'*
• Consulting, equipment sales, training, and similar services	Not detailed; study notes that '*Other*' is captured only in flow-on (indirect) effects	*Other* (consultants, equipment sales, training)

Estimating impacts

For TPs, direct metrics reported in the Hub socio-economic studies (e.g. total GRP, jobs) were divided by each study's reported plantation estate to derive per-hectare values, then multiplied by 1,000 to give "per 1,000ha" indicators.

There is a lack of comparable socio-economic data existing for EPs in the study regions. Given this, labour-intensity and spending ratios from the grower and silviculture sub-sectors of the plantation industry, which includes nursery, roading and fire management roles[72], were applied, together with multipliers informed by the costing analysis undertaken in this study. Figures were cross-checked with the WARE survey. In that study, average reported land restoration expenditure of ~$6,000 per ha and employment was on average two jobs per 1,000ha for non-mining plantings, with sensitivity ranges informed by the maximum (>17 jobs/1,000ha in the mining sector) and minimum (~1 job/1,000ha in volunteer driven community groups, such as Landcare)[73]. Annual expenditure reported in the WARE study ranged from on average of $1,176/ha by shires and councils, up to $41,078/ha by mining companies[74].

Employment multipliers for indirect jobs supported by the forestry industry are in the range of 1.4 to 2.8[75]. A midpoint multiplier of 2.0 for indirect activity was therefore applied in this study.

[72] CWFH (2023); South West Slopes Forestry Hub (2020).
[73] Young et al (2023).
[74] Ibid.
[75] CWFH (2023).

Handling uncertainty

Uncertainty is more pronounced for EPs than TPs. For example, the WARE survey's 12.5% response rate, the absence of flow-on modelling and inclusion of diverse restoration types, all limit the transferability confidence[76]. Acknowledging this uncertainty, EP results are presented in this review as ranges and with confidence flagged as "low-to-moderate", while TP metrics are rated "moderate-to-high" given the existence of comprehensive business surveys and peer-reviewed modelling.

The figures reported on a per 1,000ha basis are calculated directly from the Hub reports and cross-referenced with the WARE study. Neither of these reports effectively capture that, for both TPs and EPs, there are flows of activity (including timber and wood products for TPs) both inside and outside the region that may not be accounted for.

Peer review and validation

Calculations for this review were then cross-checked authors on the Hubs' socio-economic reports, to ensure alignment with original report intent. Internal consistency tests were run to verify that per-hectare figures summed back to published totals.

8.3 Socio-economic analysis

The MRFH and CWFH regions are predominantly rural, characterised by forestry, mixed agriculture, mining and related manufacturing. Other important sectors include food processing, education and health services.

Socio-economic contribution of timber plantations

Direct and indirect employment: Based on detailed socio-economic analysis of the South West Slopes (representing 2017 data, collated prior to the impacts of the Black Summer bushfires), the plantation forest industry in the MRFH is estimated to support indicatively 15 direct jobs per 1,000ha and about 29 indirect jobs per 1,000ha, totalling ~44 jobs per 1,000ha[77].

In the CWFH, the most recent socioeconomic study based on 2020/21 data indicates the industry supports about 9–10 direct jobs and 4 indirect jobs per 1,000ha (total ~13–14 jobs per 1,000ha)[78]. This apparent difference reflects the structure of the industry in each region and various inflows and outflows of plantation logs.

However, these figures represent a range of total employment that indicates plantation forests – as represented by TPs - support in the order of 13 to 44 jobs per 1,000ha of plantation forest; of which, around 9–15 jobs are direct on-site or in primary processing, and the rest are secondary jobs in the broader economy.

GRP (value-added) and income: In the MRFH, the total (direct + indirect) GRP contribution from TPs was estimated to be around $6.6 million per 1,000ha, prior to the Black Summer bushfires[79]. Direct GRP (the value-added within the industry itself) made up around half of that total.

In the CWFH, the total contribution has been estimated to be approximately $2.9 million per 1,000ha[80], with direct GRP representing 75% of that value. These figures indicate each hectare of plantation yields about $2,300–$6,600 of GRP annually for the region, largely due to the presence of downstream processing, which contributes more than 60% of direct GRP and >70% of indirect GRP.

[76] Ibid.
[77] South West Slopes Forestry Hub (2020) *Socio-economic impacts of the softwood plantation industry: South West Slopes Forestry Hub Region, NSW and Vic*. Report prepared by the University of Canberra and BDO EconSearch.
[78] CWFH (2023) *Socio-economic impact of the Softwood Plantation Industry in the CWFH Region, 2021-22*.
[79] South West Slopes Forestry Hub (2020).
[80] CWFH (2023) *Socio-economic impact of the Softwood Plantation Industry in the CWFH Region, 2021-22*.

Another key socio-economic metric is the impact of project activity on annual household income. The most recent and relevant Hub studies (excluding the post-Black Summer bushfire report) indicate that 1,000ha, plantations directly generate in the order of $0.9 million in employee household income per year for the MRFH and CWFH regions. Approximately 10% of this income flows to people working in the growing, nursery, silviculture and roading contracting businesses, and between 50-70% flows to those working in the processing sub-sector. Including flow-on labour income in other sectors, the total household income (direct + indirect) supported by the plantation industry is between $1.2–3.2 million per 1,000ha[81].

Socio-economic contribution of environmental plantings

Direct and indirect employment: The direct employment that 1,000ha of EP might support in each phase was estimated using the growers, nurseries, silviculture and roading contacting sub-sectors of the plantation supply chain as a guide. These sub-sectors are outlined below:

- *Nurseries*: This phase involves seed collection and raising seedlings in nurseries. In TPs, nursery and silviculture contribute on average ~0.8 jobs per 1,000ha of plantation (direct), noting this figure includes some growing and ancillary activities such as roading and fire management. For EPs, the nursery effort may be slightly more intensive due to reliance on native seed and raising multiple species[82]. Based on costing analysis undertaken for this study, EPs could support double the employment of TPs in this supply chain phase. The WARE report indicates in the order of 0.5–1 direct job per 1,000ha of EP supported in nursery and seedling production, assuming professional nurseries supply the seedlings[83]. If seedlings are sourced from outside the region, the local job impact would be lower.
- *Planting & establishment*: In TPs, silvicultural contracting (including planting and weed control, etc.) also accounted for part of that ~0.8 jobs/1000ha noted above. For a new EP project, the planting year could temporarily employ a larger crew. For instance, 1,000ha might require dozens of planters for a few months, which in annualised terms could be 1–2 job-years[84]. Based on costing analysis undertaken for this study, EPs could support 1.5 times the employment of TPs in this supply chain phase. In the WARE survey the private carbon-project cohort supports ~5.2 direct jobs per 1,000ha, but that covers *all* restoration tasks, including seed collection, nursery propagation, monitoring, administration and overheads[85]. Sector interviews indicated about one-third of those jobs are in on-ground planting crews.

  Thus, during an active planting year, EPs could create perhaps 1–2 FTE jobs per 1,000ha in direct planting work for that year. Averaged over a multi-year period, the ongoing annual jobs in planting would depend on the rate of new plantings each year. If, for example, 1,000ha are planted every year, one could sustain those 1–2 FTE in a continuous manner. But if it is a one-off project, those jobs are temporary.
- *Growing/maintenance (silviculture):* The estimate of employment assumes there would be a small team periodically managing 1,000ha of dispersed EP blocks. This is supported by the costing analysis undertaken for this study, which indicates that EPs would support ~0.7 times the employment of TPs in this supply chain phase This might equate to indicatively 0.5–1 direct jobs per 1,000ha on an ongoing basis for maintenance and monitoring (e.g. one ranger or Landcare officer could oversee a few thousand hectares of EP sites)[86]. If the EP is on farms, landholders might absorb some upkeep tasks with minimal hired labour.

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[81] South West Slopes Forestry Hub (2020); CWFH (2023).
[82] Hancock *et al.* (2020)
[83] Young *et al.* (2023)
[84] Ibid.
[85] Ibid.
[86] Young *et al.* (2023).

Adding these components together, an indicative estimate for direct employment in EPs is in the order of 2-4 jobs per 1,000ha (in steady state after initial establishment). Most of this comes from the nursery/maintenance side, with additional short-term jobs during planting years.

Using indirect employment multiplier of ~0.5 from the nursery, growing and silviculture segment of the MRFH and CWFH forestry industries, this equates to perhaps 1-2 flow-on jobs.

GRP Contribution and Income from EPs: Based on the costing assumptions used in the analysis of this study (refer Annex 6), EPs are assumed to have an annualised cost per hectare through nurseries, establishment and management phases that is ~87% of the per hectare cost of TPs.

Total GRP, calculated on a per 1000ha basis contributed by the nursery, growing and silviculture segments of the CWFH and MRFH forestry industry supply chain was $0.43 million in the CWFH and $0.98 million in the MRFH (nominally the South West Slopes)[87]. This equates indicatively to a GRP contribution from EPs of between $0.37 million and $0.85 million.

This is consistent with calculated annualised spending per ha by carbon and restoration companies in the WARE report, where calculated GRP is indicatively within the range ~$0.3–0.6 million[88]. Not all of that is value-added (as some goes to buying seedlings, fuel, etc.), but a significant share is local wages and local services[89]. Indicatively, around 60–70% of spending on restoration work may become regional value-added[90].

Based on the costing assumptions used in this study, the wage component of total EP spending is around 10% more than the nursery, growing and silviculture supply chain stages of TPs over the life of a project. Direct household income, calculated to a per 1000ha basis contributed by the nursery, growing and silviculture segments of the CWFH and MRFH forestry industry supply chain was $0.1 million in the CWFH and $0.3 million in the South West Slopes (MRFH)[91]. This equates indicatively to a direct household income contribution from EPs of between $0.11 million and $0.33 million. Including indirect household income, the total EP household contribution may be in the range of $0.33 million to $0.99 million. This is an order of magnitude lower than the $2-3 million per 1,000ha in the TP sector.

EPs do not generate high-value products to sell; their “output” is ecological services which may only be partially monetised (e.g. via carbon credits, biodiversity payments and government grants). So, while EPs can inject spending into the local economy through contract crews, nursery purchases etc., the overall contribution per 1000 hectares is lower than that from TPs.

Data limitations and sensitivities in estimating EP impacts

Assessing the economic contribution of EPs is challenging due to significant data limitations. Unlike TPs, where detailed input-output models provide robust, region-specific estimates with known error bounds, EP figures are largely extrapolated from analogies with the plantation sector and a specific Western Australian study of landscape restoration[92], and these limitations of the data sources introduce a level of uncertainty to the derived estimates.

Several factors could cause wide variation in EP impact estimates:

- *Labour intensity:* Direct employment could vary from <1 to ~5 jobs per 1,000 hectares depending on whether mechanised or manual methods are used. In the mining sector, restoration employment figures may be as high as 17 jobs per 1,000 hectares, noting potential differences in the intensity of restoration likely required on mining operations.

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[87] CWFH (2023); South West Slopes Forestry Hub (2020)
[88] Young *et al.* (2023)
[89] Ibid.
[90] BenDor *et al.* (2015)
[91] CWFH (2023); South West Slopes Forestry Hub (2020)
[92] CWFH (2023); South West Slopes Forestry Hub (2020)

- *Local sourcing:* Regional economic benefits are higher when seedlings, materials, and services are sourced locally; otherwise, impacts shrink.
- *Multiplier effects:* Estimates based on multipliers that equate EPs to the nursery, growing and silviculture supply chain segments of TPs assume a similar general structure and approach between these segments
- *Carbon prices and funding:* Higher carbon credit prices could increase per-hectare expenditure, boosting jobs and GRP; lower prices may constrain impacts.
- *Operating model:* The WARE study demonstrates that there can be a wide variance in expenditure and jobs, depending on the organisation conducting restoration activities, creating significant uncertainty in extrapolating to hub regions. The costings adopted in the analysis of this study are based upon stakeholder consultation conducted for this study and Indufor industry knowledge.

Overall, confidence in EP estimates is low-to-moderate. Reasonable proxies exist, but without direct regional modelling, uncertainty margins of ±50% or more should be assumed. Projections should be presented as ranges (e.g. "3–5 jobs per 1,000ha") rather than point estimates.

8.4 Summary of findings

TPs in the MRFH and CWFH regions currently provide a strong economic base, supporting substantial employment, income, and GRP relative to the size of the regions.

EPs, if pursued at scale, are expected to yield significantly lower economic contributions per unit area. A side-by-side comparison of key metrics per 1,000 hectares of TPs versus EPs, based on the findings above, is presented in Table 8-2 and Figure 8-2. The TP figures represent the range observed across the two Hubs (and supporting studies), while the EP figures represent an anticipated range under typical program assumptions.

Table 8-2 Side by side comparison of key annualised socio-economic metrics

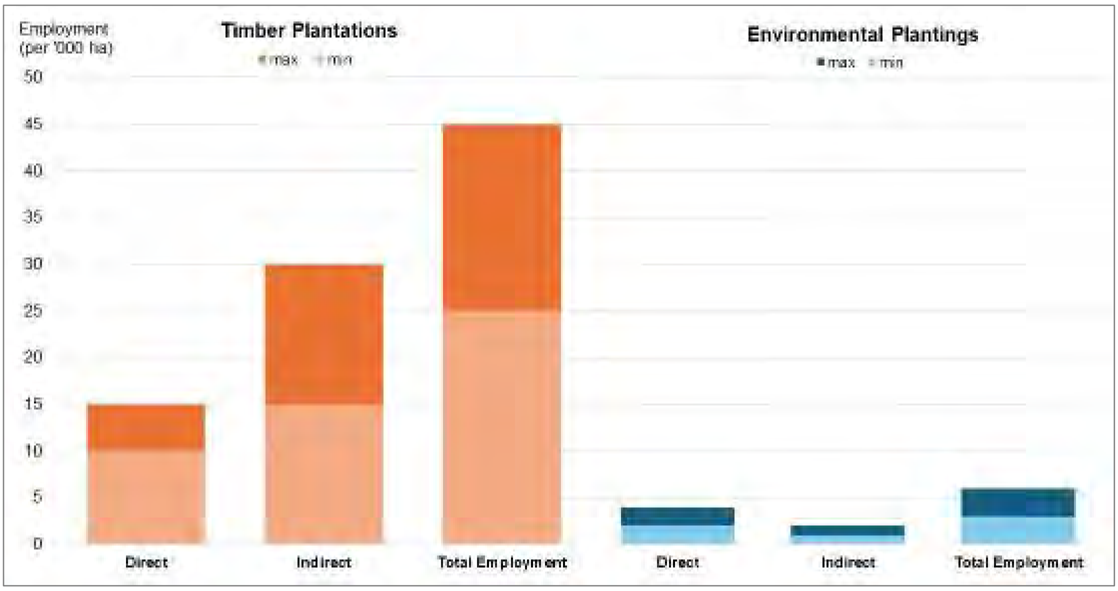
Metric (per 1,000ha)	Timber plantations (TPs)	Environmental plantings (EPs)
Direct employment	~10–15 jobs	~2–4 jobs
Indirect employment	~15–30 jobs	~1–2 jobs
Total employment	~25–45 jobs	~3–6 jobs (indicatively)
Annual GRP (Value-Added)	~$3–6+ million	~$0.4–0.9 million (indicatively)
Annual household income (wages)	~$2–3 million	~$0.3–1 million (indicatively)

Source: Indufor literature review and project consultation.

Notes:

- This comparison is based on key socio-economic metrics for 1,000 hectares of TPs and EPs.
- Plantation figures are derived from Hub-specific socio-economic studies (MRFH, CWFH).
- EP figures are indicative, based on analogous studies and cross-checked with available restoration data.
- All monetary values are annualised socio-economic contributions in current dollars.
- Indirect impacts include supply chain and consumption-induced effects.
- Actual outcomes for EPs can vary widely; values here assume a moderately funded, predominantly professional implementation (no large volunteer component).

Figure 8-2 Side by side comparison of employment metrics, on per '000 ha basis



Source: Indufor literature review and project consultation.

Notes:

- This comparison is based on key socio-economic metrics for 1,000 hectares of TPs and EPs.
- Plantation figures are derived from Hub-specific socio-economic studies (MRFH, CWFH).
- EP figures are approximate, based on analogies and cross-checked with available restoration data.
- Indirect impacts include supply chain and consumption-induced effects.

The evidence assembled for the MRFH and CWFH, drawing on the results of economic input-output modelling work previously commissioned by the Hubs for socio-economic assessments, demonstrates the differences in the socio-economic outcomes of TPs and EPs. On a normalised basis of 1,000 hectares, TPs are estimated to support around 25–45 jobs, generate $3–6 million annually in value-added and inject $2–3 million in wages each year, whereas EPs are estimated to sustain 3–6 jobs, add $0.4–0.9 million of annual GRP and circulate $0.3–1 million in household income.

The difference in socio-economic contributions from TPs compared to EPs reflects the presence of high-value processing and continuous commercial activity in TPs versus the low-intensity, non-harvest nature of EPs. Sensitivity analysis, considering high-contribution sectors such as mining, suggests that even under optimistic assumptions, EPs would not exceed 10 jobs and $2 million annual GRP per 1,000ha, which is still well below the TP impact.

There is significant uncertainty in EP estimates, due to a lack of dedicated and detailed socio-economic analysis focusing on EPs in southeastern Australia. By accounting for both qualitative and quantitative benefits and costs of EPs and TPs, the regions can better plan for balanced land use strategies that meet economic, social and environmental objectives.

9. COMPARATIVE RISKS FOR PROJECT TYPES

This section presents a comparative risk assessment of the two alternative land uses. A comparative risk assessment provides a structured framework to identify, analyse, and weigh potential outcomes, for more informed decision-making based on the relative risks of scenarios.

9.1 Approach

A key consideration in this process is clearly defining the perspective from which risks are assessed. Different stakeholders—such as policymakers, local communities, landowners, investors, and environmental organisations - will perceive and prioritise risks differently based on their values, responsibilities, and exposure to potential consequences. Identifying the risk perspective results in risk assessments that are focused, specific, clear and unbiased.

For this land use review and comparison, risks have been considered and assessed from two distinct perspectives, to align with the objectives of the scope. These are:

1. *Risks from an investor perspective*: This includes project developers, which may comprise timber plantation management companies and organisations focussing more specifically on environmental plantings, as well as landholders involved in the investment in various ways. Considering risks from this perspective is important to the scope consideration of investment decision making on alternative land uses of TPs and EPs, within the two study regions.
2. *Risks from a regional community perspective*: This comprises local communities including local towns as well as regional communities within the Murray Region and Central West NSW, local government interests, and residents who may not be directly invested in either of the alternative land uses. Considering risks from this perspective is important from the perspective of the relative contributions of TPs and EPs to regional economies in the regions.

Bringing these two perspectives together is intended to inform the Regional Forestry Hubs, which work with the plantation forestry industry including investors, as well as state and local governments (including policymakers and regulators), and other key stakeholders to prepare and provide the Government with strategic planning, technical assessments and analyses that aim to support growth in the forest industries in their region[93]. By clarifying these points of view and the context for each assessment, this chapter aims to ensure that the analysis is transparent, relevant, and sound in its rating of risks.

Similarly, it is important to be clear about the nature of alternative land uses that are being compared, to ensure they are being compared on a consistent basis.

There are significant variations to these two types of plantings, especially for EPs. Stakeholder consultation for this project identified a range of EP planting models, in place or intended, ranging from relatively low intensity plantings to create a planting that resembled an open woodland in the long term, with ongoing grazing under and through this woodland, through to the more intensive, broadacre planting models outlined below. Other forms of EPs included belt and patch planting integrated into existing and ongoing agricultural enterprises.

The broader range of alternative types of EPs should not be overlooked entirely. However, for the purposes of this assessment, the following two types of plantings were assessed:

- ***TPs:*** Softwood timber plantations, featuring radiata pine, planted in a broadacre configuration at an initial stocking for around 1,000+ stems per hectare; with this planting representing the primary land use with exclusions for remnant vegetation, other high conservation values, and land infrastructure including roads and dams.

[93] Australian Government (2025) *Regional Forestry Hubs*. Online: https://www.agriculture.gov.au/agriculture-land/forestry/regional-forestry-hubs

- ***EPs:*** Mixed environmental plantings of native species, planted in a broadacre configuration at an initial stocking in the order of 800 – 1500 stems per hectare (i.e. relatively high stocking to maximise ACCU generation potential); with this planting representing the primary land use and planted across the entire plantable area with exclusions limited to those for remnant vegetation, high conservation values, and land infrastructure including roads and dams.

Focusing the comparative risk assessment on these two types of planting is consistent with the economic returns analysis (section 7) and socio-economic assessment (section 8) set out earlier in this land use review and comparison.

9.2 Key risks

The identification of key risks was informed by project consultation with stakeholders and the literature review conducted for various aspects of this study. Based on these two primary sources, the most prominent risks identified, from an investor perspective and a regional community perspective, are set out below (Table 9-1).

Table 9-1 Summary of key risks for TPs and EPs as alternative land uses in the regions

Key risks from an investor perspective	Key risks from a regional community perspective
• ***Market risk:*** Lower than expected price for ACCUs and/or timber from planting projects	• ***Local employment and community risk:*** Reduced employment in the region and a resultant impact on local communities
• ***Modelling risk:*** FullCAM updates result in lower carbon credit projections for the project	• ***Regional investment risk*:** Reduced capital investment and associated infrastructure in the region
• ***Productivity risk*:** Lower than anticipated growth in plantings due to site productivity factors	• ***Bushfire risk*:** Increased threat of bushfire damage to adjoining properties and communities
• ***Plantation loss risk*:** Loss of planted assets due to bushfire, drought, storms or other complex events	• ***Weeds and pests' risk*:** Spread of weeds and pests to adjoining properties and regional landscapes
• ***Regulatory risk*:** Risk of non-compliance with relevant Codes or planning requirements	• ***Traffic related risks*:** Increased traffic, including heavy vehicle movements, and impacts on regional roads
• ***Social licence risk:*** Loss of social licence and community support	• ***Permanent land use change risk*:** Land use change is effectively permanent and limits land use options in the future

9.3 Comparative risk assessment from project investor perspective

Risk considerations from an investor perspective are set out below (Table 9-2). These considerations incorporate existing mitigation measures, while the potential for future mitigation measures to be introduced has been excluded, to present this assessment as a current position.

Table 9-2 Comparative risks for TPs and EPs from a project investor perspective

Risk	Timber plantations (TPs)	Environmental plantings (EPs)
Market risk: *Lower than expected demand for ACCUs from planting projects, due to policy changes, or new, low-cost emission reduction options for emitters, and/or lower timber prices*	• TPs benefit from dual revenue streams, i.e. ACCUs *and* timber sales, and markets with strong demand trajectories. • There is a strong demand outlook for structural timber, engineered wood products, and pulp and paper products in domestic markets over the medium to longer term[94], and an extensive history of relatively stable timber prices. • In contrast, there is potentially greater uncertainty in ACCU markets, which both TPs and EPs are exposed to. • Combined with ACCU revenue, TPs will generate cashflow for the duration of the project, and resources for ongoing management. *Investor risk rating: Low*	• EPs are effectively reliant on ACCU sales, with limited co-benefit income sources. Hence, EPs are more exposed than TPs to the risk that price and volume requirements for ACCUs shift significantly over time. • Prospects in the Nature Repair Market are emerging, with future potential for recognition of biodiversity credits; however, they are still at a highly formative stage. *Investor risk rating: Medium-High*
Modelling risk: *FullCAM updates result in lower carbon credit projections for the project*	• TPs can draw on data from the plantation forestry sector, which has extensive data on plantation growth and yield that has been made available to inform and calibrate FullCAM over time. • There has been considerable work done to ensure FullCAM projections are aligned with plantation inventory data, notably, a 2019 study confirmed the current 2016 FullCAM release projections of product yields generally remained current and reasonable[95]. Such reports have also observed further work is required to establish greater precision at the *project-scale*, and confidence in the growth and management of plantation species. *Investor risk rating: Medium*	• FullCAM has been used to support EP projects for around 10 years; noting the *Reforestation by Environmental or Mallee Plantings FullCAM Method* was first established in 2014. • However, the establishment of EP projects in the two study regions is more recent, and there is much less project experience and empirical data for mature EPs in these regions. • Therefore, there is a significantly higher level of uncertainty associated with FullCAM projections for these plantings, particularly on higher productivity sites for which modelling generates high ACCU yields. *Investor risk rating: High*
Productivity risk: *Lower than anticipated growth in plantings due to biophysical factors and productivity*	• TP growth rates, and sequestration, could be lower than expected, due to various biophysical factors such as competition from weeds or browsing, lower than expected rainfall, or simply lower site productivity. • However, this risk is largely mitigated by extensive plantation industry experience in the Hub regions, and multiple rotations on similar sites	• The significant increase in interest in EP projects over the past decade has led to new planting designs and management regimes, currently at formative stages of development. • Focusing on like-for-like broadacre plantings, there are no mature EPs projects in the two study regions nor substantial datasets available on EP growth & yield.

[94] Whittle, L., Lock, P. & Hug, B. (2019) *Economic potential for new plantation establishment in Australia: outlook to 2050*. ABARES research report, Canberra, February. CC BY 4.0. https://doi.org/10.25814/5c6e1da578f9a

[95] Roxburgh, S, England, J, Paul, K (2019) *Recalibration of the Tree Yield Formula in FullCAM for plantations*. CSIRO.

Risk	Timber plantations (TPs)	Environmental plantings (EPs)
	over 100+ years[96]. This experience and empirical data on growth and yield across a range of productivity classes provides a high level of confidence in estimates of carbon and timber yields and returns. *Investor risk rating: Low*	• Therefore, there is a higher level of uncertainty associated with expected actual carbon sequestration in EPs in the two regions. *Investor risk rating: Medium-High*
Bushfire risk: *Loss of planted assets due to bushfires*	• TPs face economic impacts of bushfires, which can lead to significant losses on future timber sales[97], and potentially ACCUs, depending on the age classes. • Participation in the ACCU Scheme comes with an obligation to proactively protect carbon stores for the permanence period[98]. This includes managing for the risk of fire. ACCU Scheme proponents must replace carbon stores that have been credited and are lost in significant reversals, by paying back ACCUs that have been issued for the lost carbon, or by restoring the vegetation on the project. *Note this obligation applies equally to TPs and EPs; it is included in this comparative analysis for completeness.* • Mitigating this risk, the plantation forest industry typically implements rigorous fire prevention and suppression strategies, including fuel reduction, firebreaks, early detection systems, and coordinated firefighting efforts[99,100]. Industry bodies also collaborate with government agencies to enhance fire preparedness and response. • Furthermore, the potential impact on ACCUs will be reduced where the owner intends to maintain plantation land use over multiple rotations, as long-term carbon stocks will be reinstated. • Opportunities to salvage timber after bushfires will depend on the age and	• Like TPs, EPs also face the economic impacts of bushfires, and like all ACCU Scheme projects, EPs are obliged to proactively protect carbon stores for the permanence period[102]. • However, the risk profile for EPs differs to TPs, as the maximum value of an EP stand will typically be around 10-15 years when the annual growth peaks and most of the ACCUs have been issued[103]. Thereafter, plantings will continue to accumulate carbon stocks, but at a slower rate than younger plantings. Given this, the EP management regime is assumed to be of relatively lower intensity, especially after establishment, with much less need for silvicultural works after the establishment phase. • In this context, stakeholder consultation for this study observed that for EPs, there is likely to be a relatively lower level of operational presence over time to assist to manage bushfire risks. Also, where EP projects have minimal roading within the planting design, this may impede access during fire events, relative to TPs with road access. • There is also uncertainty around the EP sector's capacity and preparedness for bushfire management. EPs may establish fire management systems at scale but at present the operational history on which to base an objective assessment is limited.

[96] Bureau of Rural Sciences (2004) *Socioeconomic impacts of plantation forestry in the South West Slopes of NSW*. Report for Forest and Wood Products Research and Development Corporation, PN04.4007.
[97] MRFH (2023) *Socio-economic impacts of the softwood plantation industry: Examining a post-bushfire salvage period*.
[98] Clean Energy Regulator (2024a) *Reducing the risk of fire and preserving sequestered carbon in ACCU Scheme projects*, V1.2 – Dec 2024.
[99] AFAC (2021) *National Bushfire Management Policy Statement for Forests and Rangelands*. Report prepared for the Australasian Fire and Emergency Service Authorities Council.
[100] Softwoods Working Group (2025) *Softwoods Working Group Welcomes Minns Government's Continuing Commitment to Plantation Fire Protection*. Media release, 23 January 2025.
[102] Clean Energy Regulator (2024).
[103] Carbon Farming Foundation (2024) *Reforestation Guide: Australian Carbon Credit Units (ACCU) Scheme Reforestation by Environmental & Mallee Plantings FullCAM Method 2024*.

Risk	Timber plantations (TPs)	Environmental plantings (EPs)
	maturity of the stand[101] and the severity of the fire. With mature stands, salvage harvesting can provide immediate sales revenue and cash flows. *Investor risk rating: Medium*	*Investor risk rating: Medium*
***Regulatory risk**:* *Risk of non-compliance with relevant Codes or planning requirements*	• TPs are regulated under State-based Codes and planning provisions (regulations) that specify standards for environmental protection, biodiversity conservation, waterway buffers, soil management, and harvest operations. • Regulator audits tend to be based on risk-based approaches and focus on the more intensive aspects of management, notably timber harvesting and roading. • A review of publicly available information and stakeholder consultation indicated the inherent risks of non-compliance can be considered low with no major issues. *Investor risk rating: Low*	• Like TPs, EPs are regulated under Codes and planning provisions (regulations) that specify standards for plantations and environmental plantings, including environmental protections. • Recognising EP operations do not comprise the relatively intensive activities of timber harvesting and roading, their exposure to higher risk components of plantation management is likely to be relatively low. • On this basis, the regulatory risk associated with non-compliance with relevant Codes is assessed as low. *Investor risk rating: Low*
Social licence risk: *Loss of social licence and community support*	• TPs represent an expansion of softwood plantation forestry activity, which is well-established in both study regions. In this context, TPs are likely to be comparatively familiar, and their contributions reasonably understood – and the risk of losing community support for TPs is linked to, and potentially buffered by, the broader extent of the existing industry. • While socioeconomic studies show the plantation forest industry has positive impacts on local employment in key regions[104], research in CWFH and other regions such as Gippsland[105] shows there are ongoing challenges to attain and maintain community support, especially compared to agriculture and other industries; and to build social acceptance, new information and communication strategies will be needed to address a range of distinct audiences. *Investor risk rating: Medium*	• Broadacre EPs are relatively new land uses in both the study regions. In this context, community support and 'social licence' for EPs is likely to be shaped by the design and implementation of the first mover projects. • EPs could potentially attain and maintain social licence based on planting of native species with potential biodiversity co-benefits. However, other risks such as the relatively reduced ongoing contribution to primary production, local employment, and control of weeds and pests (also discussed as a risk) may be considered in '*social acceptance judgements*'[106]. • In this context, the risk rating for EPs is assessed as at least medium to account for the lack of familiarity and uncertainty within regional communities in relation to how EPs will operate. *Investor risk rating: Medium*

[101] Ibid.

[104] CWFH (2023) *Socio-economic impact of the Softwood Plantation Industry in the CWFH Region, 2021-22*.

[105] Otchere *et al.* (2025) *Identifying, measuring and modelling critical elements required of plantation forestry to maintain a social licence for operations and expansion in Gippsland*. NIFPI Final Report, Project NV081.

[106] Ford, R.M. & Williams, K.J.H. (2016) *How can social acceptability research in Australian forests inform social licence to operate? Forestry, Volume 89, Issue 5, 15 September 2016.*

9.4 Comparative risk assessment from a regional community perspective

Risk considerations from the regional community perspectives are set out below (Table 9-3). These considerations also incorporate existing mitigation measures, while the potential for future mitigation measures to be introduced has been excluded, to present this assessment as a current position.

Table 9-3 Comparative risks for TPs and EPs from a regional community perspective

Risks	Timber plantations (TPs)	Environmental plantings (EPs)
Local employment risk: *Reduced employment and impacts on local communities across the region*	• The assessment of socio-economic contributions in this study (section 8) observed the plantation forest industry, to which TPs would contribute, provide a strong economic base in the two Hub regions, supporting substantial employment, income, and GRP relative to the size of the regions. • On this basis, TPs will support downstream processing of plantation products, which provide substantially higher employment than EPs. *Community risk rating: Low*	• The socio-economic assessment (section 8) has shown EPs are expected to contribute significantly less direct employment within the district and region than TPs due to a lower intensity management model and no downstream employment. • Less direct employment is expected to increase the risk to the resilience of local communities. • Note the socio-economic assessment in this study was based on a comparison between TPs and EPs; and does not compare to pre-existing or potential future agricultural uses. *Community risk rating: High*
Regional investment risk: *Reduced capital investment and associated infrastructure in the region*	• The socio-economic assessment (section 8) observed the plantation forest industry, to which TPs would contribute, provide a strong economic base in the Hub regions. • Studies show the plantation forest industry in Australia contributes to jobs, economic activity and social wellbeing in multiple regional communities[107]. • In addition, TPs are expected to support more capital investment in road infrastructure and supply chains to support industry. *Community risk rating: Low*	• In contrast to TPs, EPs are not expected to produce outputs beyond carbon credits and therefore excludes support of downstream processing. • Therefore, there would be relatively low regional reinvestment after the establishment phase, with relatively minimal infrastructure requirements and supply chain development. *Community risk rating: Medium-High*
Bushfire risk: *Increased threat of bushfire damage to adjoining properties and communities*	• The risk of bushfire impacts from a regional community perspective is related to the risk from an investor perspective but differs in that communities are expected to be more concerned about potential threats to life and property adjoining the plantations. • Socioeconomic studies have found a significant portion of regional communities consider the plantation forestry industry has a negative effect on bushfire risk[108].	• Likewise, the risk of bushfire impacts from a regional community perspective is expected to be concerns about potential threats to life and property adjoining the plantations. • Assessing this risk for EPs is limited by a lack of operational history and formative stage of new projects, and, for example, the extent of EP management resources for fire management and suppression. • Based on consultation, this study has assumed EP management inputs after establishment will be less than TPs -

[107] CWFH (2023) *Socio-economic impact of the softwood plantation industry in the CWFH region, 2021-22*.
[108] Ibid.

Risks	Timber plantations (TPs)	Environmental plantings (EPs)
	• Mitigating this risk, as noted above, is the plantation forest industry typically implements rigorous fire prevention and suppression strategies, including fuel reduction, firebreaks, early detection systems, and coordinated firefighting efforts[109,110]. • For this study, it is assumed TPs would be managed with access to the extensive resources of the plantation forest industry to plan for and respond to bushfire events. *Community risk rating: Medium*	~30% less than TPs (refer modelling of economic returns - section 7). Hence, management inputs for bushfire prevention and suppression are expected to be less. • Community perceptions of the EP sector's capacity and preparedness for fire management is not well understood at present; hence the risk is moderate. *Community risk rating: Medium-High*
Weeds and pests' risks: *Spread of weeds and pests to adjoining properties*	• TPs are managed on silvicultural regimes that are well established in both regions; generally reflecting intensive management of plantation assets recognises that production and economic viability is dependent on sound weed management practices[111]. Therefore, this risk is mitigated by significant experience in weed (and pest) controls for these projects. • Compared to EPs, TPs (based on radiata pine) present a risk of plantation wildlings which can invade into native remnant vegetation and open eucalypt forests with a consequent reduction in species diversity[112]. This risk can be mitigated with responsible plantation management and the use of physical and chemical control methods. • Furthermore, if plantations are certified under third party forest management certification (not necessarily a requirement of TPs), they are further required to minimise this risk[113]. *Community risk rating: Low-Medium*	• Stakeholder consultation raised the risk of EPs being more prone to harbouring weeds or invasive pest species, due to having lower intensity management inputs compared to TPs, and ACCU revenue will be calculated using FullCAM rather than measured growth of the plantings, which affects timber revenue[114]. • This risk is not readily assessed at present due to the relatively recent emergence of EPs in the two study regions and the lack of empirical data and environmental monitoring for EPs. However, based on consultation, this study has assumed EP management inputs after establishment will be less around 30% less than TPs (refer modelling of economic returns in section 7). Furthermore, cashflows are likely to decline as EPs mature, potentially limiting ongoing funds for management. Hence, there is potential risk associated with some uncertainty about management inputs for evolving regimes. *Community risk rating: Medium*

[109] AFAC (2021) *National Bushfire Management Policy Statement for Forests and Rangelands*. Australasian Fire and Emergency Service Authorities Council.
[110] Softwoods Working Group (2025) *Softwoods Working Group Welcomes Minns Government's Continuing Commitment to Plantation Fire Protection*. Media release, 23 January 2025.
[111] Nambiar, E.K.S. & Sands, R. (2011) Competition for water and nutrients in forests. *Canadian Journal of Forest Research*, 23. 1955-1968.
[112] Weeds Australia (2024) *Radiata Pine Monterey Pine, Wilding Pine*. Online: https://weeds.org.au/profiles/radiata-pine-monterey
[113] The *Australian Standard for Sustainable Forest Management (AS/NZS 4708:2021)* addresses the management of weeds and invasive species; clause 11.2.2 specifies the forest manager shall identify invasive species and manage, control or eradicate them within the defined forest area; and constrain the spread of invasive species and plantation species from the defined forest area into adjacent areas.
[114] Clean Energy Regulator (2024b) *Reforestation by environmental or mallee plantings FullCAM method 2024*.

Risks	Timber plantations (TPs)	Environmental plantings (EPs)
Traffic related risks: Increased traffic, including heavy vehicle movements, and impacts on regional roads	• A socioeconomic assessment of the plantation forestry sector in the CWFH found the most common concern among residents was related to road impacts, with most respondents believing the industry had a negative impact on the quality of local roads and local traffic[115]. • TPs, forming part of the plantation forestry sector with timber harvesting phases, will contribute to log truck traffic, including heavy vehicles. • Depending on the location of the TPs, traffic related risks may be mitigated by focused investment in infrastructure and ongoing improvements to the regional road network. *Community risk: Medium*	• EPs are expected to result in comparatively lower levels of traffic impacts after the planting establishment phase, • Traffic impacts will typically be limited to infrequent site visits for monitoring or maintenance of the plantings. • On this basis, the risk exposure of EPs is assessed to be relatively low. *Community risk rating: Low*
Permanent land use change risk: *Land use change is effectively permanent and limits land use options in the future*	• TPs will typically be established for at least 25-35 years, to complete a full rotation with a final harvest of plantation log products; and cover the minimum permanence period for ACCU Scheme projects (25 years). • On suitable land, plantations would typically be replanted after final harvest. However, the owner or project proponent may choose to cease plantation operations, and the end of the rotation presents the option for land use changes. • TPs, as timber plantations, can be converted to other land uses after harvesting. • In this context, TPs may involve multiple rotations, and this will generally be a desired outcome for the plantation forest industry. However, the legislative restrictions on land use change are considered less for TPs than for EPs. *Community risk rating: Medium*	• Establishing EPs can be seen as a likely permanent land use change, as the scope to remove native vegetation may be constrained by legislation, regulation or community expectations. • The *Reforestation by Environmental or Mallee Plantings—FullCAM Methodology 2024* specifies that these plantings are intended to be *permanent*, non-harvest forests established through the planting of native species[116]. • Upon completion of the permanence period, there is no automatic requirement under the ACCU Scheme to maintain or convert the land to another use. Any land use change would likely need to comply with relevant state planning and environmental regulations. In NSW, this means adhering to the *Environmental Planning and Assessment Act 1979* (if the activity differs from the Plantation Authorisation provisions) and obtaining necessary approvals from local planning authorities. • Therefore, while EPs under the ACCU Scheme are not legally required to be permanent beyond the nominated permanence period (e.g. 25 years), transitioning to an alternative land use post-permanence is subject to state and local regulatory frameworks. *Community risk rating: Medium-High*

[115] CWFH (2023) *Socio-economic impact of the Softwood Plantation Industry in the CWFH Region, 2021-22*.
[116] *Carbon Credits (Carbon Farming Initiative) (Reforestation by Environmental or Mallee Plantings—FullCAM) Methodology Determination 2024*.

9.5 Summary of findings

A summary of the risk ratings assigned to the identified risks is set out below (Table 9-4).

Table 9-4 Summary of comparative risk rating assessments for TPs and EPs

Key risks for investors	TPs	EPs	Key risks for communities	TPs	EPs
• Market risk	●	○●●	• Local employment risk	●	●●●
• Modelling risk	●●	●●●	• Regional investment risk	●	○●●
• Productivity risk	●	○●●	• Traffic related risks	●●	●
• Bushfire risk	●●	●●	• Weeds & pests-related risks	●●	●●
• Regulatory risk	●	●	• Bushfire risk	●●	○●●
• Social licence risk	●●	●●	• Permanent land use change	●●	●●

Key to risk ratings: ● Low; ○● Low-Medium; ●● Medium; ○●● Medium-High; and ●●● High.

This comparative risk assessment, using a three-tier rating system, indicates that EPs generally carry a higher level of risk than TPs from both investor and regional community perspectives.

From an investor perspective, TPs are assessed as low–medium risk, while EPs are rated medium+. The most significant risk for EPs is exposure to changes in carbon credit modelling, particularly in the use of FullCAM. This stems from observed variations in ACCU projections between different FullCAM versions for similar sites, combined with limited empirical data on EP productivity, particularly under emerging management regimes. This modelling uncertainty creates significant risk to projected ACCU yields and revenues.

EPs also face elevated market and productivity risks due to their reliance on a single income stream—ACCU sales or related funding—and a lack of demonstrated outcomes under current or experimental management models. In contrast, while TPs also face ACCU modelling risk and bushfire exposure, these risks are considered more manageable due to the maturity of the plantation forestry sector. Radiata pine plantations are well established in the study regions, supported by extensive experience, productivity data, and established fire management systems. TPs also benefit from dual revenue streams—timber and carbon—underpinning more intensive, proactive management and investment.

Both models are exposed to potential social licence risks, though for different reasons. TPs may draw criticism for their intensive operations, exotic species use, and associated increases in traffic. EPs, however, may be seen as offering limited community benefit due to low-intensity management, minimal employment, and weaker, broader long term economic stimulus. Given the uncertainty surrounding these impacts, EPs are assessed as carrying a similar level of risk.

From the perspective of regional communities, TPs are again assessed as low–medium risk, with EPs rated as medium+. The primary concern for EPs is a potential adverse response to limited local employment and limited downstream investment in processing, manufacturing, or infrastructure. TPs, by contrast, support existing value chains and regional economies.

While TPs carry higher risks relating to road traffic and transport impacts, EPs present a more complex land use risk. As permanent plantings under the ACCU Scheme, converting EPs to alternative land uses in future would require clearing native vegetation, raising regulatory and social challenges.

In summary, EPs are exposed to greater overall risk due to modelling uncertainty, market dependency, limited evidence, and uncertain regional benefits. TPs benefit from established industry frameworks, diversified income, and stronger community integration.

10. CASE STUDIES

To demonstrate the potential plantable area, ACCU generation and economic returns on some actual properties, two case studies have been prepared – one in each of the regions. The properties have been selected as they are currently on the market and identified as suitable for growing both radiata pine as a timber plantation and environmental plantings. They also represent a high and a low-moderate productivity site.

The two representative properties are presented in Figure 10-1 (Property A – Central West NSW) and Figure 10-2 (Property B – Murray Region). Indufor has developed indicative mapping of potential plantable areas for both TPs and EPs. For this mapping, it was assumed that any area suitable for TPs (with radiata pine) will also be suitable for EPs (mixed native species); however, the potential footprint of EPs could be extended to areas that maybe too wet, or too rocky for radiata pine, smaller discrete areas that would not warrant providing access for timber extraction, and potential inter-planting of areas that may contain some remnant native vegetation. Furthermore, the plantable area for timber plantations is potentially further reduced by the requirement to provide roads suitable for heavy vehicles.

From a regulatory perspective, at least in NSW, it is understood that steep slopes and riparian areas, as well as the retention of native vegetation would impose similar restrictions for either TPs or EPs. The extent of the plantable area may be impacted by local regulations relating to soil conservation and drainage requirements, and the practicality of establishing areas with reasonable access for timber extraction. Both types of plantings would still require access and management tracks for protection purposes.

The area statements for each property are incorporated in the relevant maps below.

Figure 10-1 Conceptual plan for 'Property A' - Central West high productivity site

Sources: Indufor, Data.NSW (data.nsw.gov.au)

Disclaimer: Please note the properties shown in Figure 10-1 and Figure 10-2 are presented for illustrative mapping purposes only. The case study analysis and findings do not reflect inputs from nor the views of any specific landholders. At the time of the analysis these properties were for sale on the public market.

Figure 10-2 Conceptual plan for 'Property B' – Murray Region low productivity site

Sources: Indufor, Data.NSW (data.nsw.gov.au)

The substantial area of native forest within Property B is also evident in Figure 10-2. This will impact equally on the cost of land for both EPs and TPs in terms of reducing the plantable area. It may provide other benefits that are described below.

Returns from each of the respective properties are impacted by transport distance (noting the Property A is located much closer to timber processing facilities), land cost per plantable hectare (EPs will have a lower cost per hectare if the additional EP plantable area can be realised), and timber and ACCU yields. While Property B has a lower land cost, the economic returns will be impacted by the reductions in plantable area, lower productivity and, for TPs, additional transport costs compared to Property A.

A comparison of both properties based on the assumed respective planting types in set out in Table 10-1. Overall, the returns are aligned with the findings discussed in Section 7 (Economic returns). The returns from the Property A reflect the short distance to timber processors, generating higher NPV for TPs over EPs, although the margin is impacted by the high land cost. At the lower productivity site, land cost is still significant, moderating returns for both methods, while transport distance is longer, which narrows the margin for TPs.

The final item, relating to the scope for combining TPs and EPs across these properties, assumes that the projects could incorporate TPs and EPs such that the suitable land for TPs is planted to radiata pine as a timber plantation, while the balance of suitable EP area is also established to mixed species environmental plantings.

These two case studies illustrate that while the NPV for EPs in isolation is negative (at a baseline ACCU price assumption of $40 per ACCU), establishing just TPs is the optimal outcome. However, if the ACCU price is increased to, indicatively $60, there is an optimised land use allocation where EPs could also be established on land not otherwise suitable for TPs.

Table 10-1 Summary of ACCU potential and economic returns for case studies

	Property A (high productivity)	Property B (lower productivity)
Land area (gross area, as reflected in real estate market) (ha)	360	334
Land cost (total estimated value, with capital improvements)	$6 800 000	$2 000 000
Mapped area		
Title area (ha)	368.1	336.8
TP or EP plantable area (ha)	190.6	46.4
TP roads (ha)	16.3	3.2
EP plantable area (ha)	231.9	60.5
EP only plantable (ha)	25.1	10.9
Land cost		
Subdivision revenue ($)	$3 000 000	$1 250 000
Net land cost ($)	$3 800 000	$750 000
Land Cost TP per ha ($/ha)	$19 941	$16 159
Land Cost EP ($/ha)	$16 383	$12 397
Distance to processors (km)	29	98
Productivity class: MAI mapping (m^3/ha/year)	17-20	Primarily 13-15
Productivity class: FullCAM-derived MAI (m^3/ha/yr)	15.6	15.3
ACCU estimates		
TP (ACCUs per ha)	378	361
TP (total)	72 103	16 748
EP (ACCUs per ha)	425	311
EP (total)	123 165	31 335
Economic returns per hectare (baseline assumptions):		
NPV (base assumptions) EP ($/ha)	-$2 749	-$1 780
NPV (base assumptions) TP ($/ha)	$1 977	$13
IRR (base assumptions) EP	*negative returns*	*negative returns*
IRR (base assumptions) TP	8.1%	6.5%
Economic returns property level (baseline assumptions):		
NPV (base assumptions) EP ($)	-$637 518	-$107 690
NPV (base assumptions) TP ($)	$376 795	$594
Total NPV (base assumptions) combining EPs and TPs	$307 757	-$18 804
Economic returns property level (with ACCU price of $60):		
NPV (with ACCU price of $60) EP ($)	$543 734	$192 735
NPV (with ACCU price of $60) TP ($)	$1 098 831	$163 267
Total NPV (ACCU $60) combining EPs and TPs	$1 157 713	$197 984

11. KEY FINDINGS

This report presents a land use review and comparison relating to the establishment of new woody plantings on cleared agricultural land in Australia. Key findings are set out below.

1. *Over the past five years, there has been a steady increase in EP projects nationally. The total area of EP projects and TP (Schedule 1) projects registered nationally under the ACCU Scheme have been approximately 90,000ha and 30,000ha, respectively.*

   Since 2019/20, the total area of EP projects registered nationally has been around three times the scale of TP (Schedule 1) projects. As of February 2025, the total registered area of EP projects in Australia was around 100,000ha, in comparison to around 33,000ha of TP projects. These areas represent around 6% and 2% respectively of Australia's total area of plantation forests. Over the past five years, there has been a generally steady increase in EP registered areas, while TP registered areas have fluctuated at lower levels.

2. *The Central West NSW region has seen relatively more substantial TP project activity, compared to the Murray Region and other Hub regions in NSW and Victoria.*

   Contrary to the national trend, the Central West NSW region has seen more substantial TP (Schedule 1) project activity, especially between 2020 and 2022. Most of the registered areas of ACCU Scheme planting projects are TP projects - around 7,200ha of 12,000ha in total. The reasons for this likely reflect the predominant interests of the plantation forest industry and plantation expansion within the Hub region.

   In contrast, the Murray Region has seen a steady rise in EP project registrations over the past five years, totalling around 5000ha to date, with negligible plantings or registrations of TP (Schedule 1) projects under the ACCU Scheme.

3. *In this context, the investment case for EPs has attractive elements evident across a range of regions.*

   Consultation with investors and carbon service providers who are not directly aligned with the forestry sector identified a clear preference for EPs over TPs, with EPs providing a basis for "telling a carbon & biodiversity story", underpinned by the ACCU Scheme and the emerging Nature Repair Market.

   The EP model is relatively simple compared to plantation forestry, in terms of communicating the environmental benefits as well as management of the projects, with minimal silvicultural interventions. Multiple stakeholders pointed to the relative simplicity of the EP model as a strong value proposition for many landholders. Furthermore, multiple stakeholders highlighted the apparent biodiversity benefits associated with EPs, together with the apparently stronger social licence with the broader community. A review of policy drivers also found there is apparently a strong demand for high-integrity offsets with biodiversity co-benefits.

   In addition, this study has observed that using the FullCAM 2020 version to model carbon crediting for EPs results in typically significantly higher ACCUs than the 2016 FullCAM version and, in some cases, approximates the crediting estimates for radiata pine plantations, especially on higher productivity sites. This observation supports the investment case for EPs while further discussion below notes issues in relation to EPs land use decisions and risks.

4. *The 2020 version of FullCAM appears to favour EPs overall and the potential for changes to FullCAM forecasts over time should be factored into both models.*

   A key finding from project consultation and data analysis is the impact of FullCAM modelling on investment expectations and land use decisions.

Multiple stakeholders noted that the FullCAM 2020 version models significantly higher carbon crediting for EPs compared to the 2016 version, in some cases approximating crediting estimates for radiata pine plantations.

This is supported by project analysis using FullCAM, which found that on higher productivity sites, EP project models can generate significantly more carbon credits (ACCUs) than TP projects on the same land. This contributes to the current investment case for EPs and explains the relatively high interest in registering EP projects, partly due to their ACCU generation capacity.

Carbon modelling shows EPs typically deliver higher crediting in the first 8–10 years, after which TPs see accelerated sequestration, though later impacted by thinning events. On high-productivity sites, TPs often reach their 100-year long-term average carbon stocks earlier, while EPs tend to generate more credits by year 25. On lower productivity sites, EPs may not reach equivalent crediting levels until after the Crediting Period ends.

These findings reflect results that are based on the currently available data for EPs (and TPs) and the current state of development of FullCAM, which is periodically updated with continuous improvement principles and incorporation of new data as it becomes available.

In this context, there is also a key risk for consideration, as FullCAM estimates may change with future versions, and expectations for current projects may need to be adjusted, potentially downwards. While this affects both EPs and TPs, the greater variability in EP site quality and crediting potential means EP projects may be more exposed to this modelling risk. The limited observed (empirical) data for EPs constrains further risk assessment within this land use review. This issue may warrant deeper consideration in a broader review of FullCAM modelling and its alignment with observed empirical carbon data.

5. *The investment case for TPs can be compelling and is generally well understood by timberland investors and other stakeholders within the forestry sector. However, the investment case for TPs needs to be more effectively communicated to other investors and local communities.*

Consultation with timberland investors and carbon service providers led to the observation (supported by subsequent analysis) that on across the range of productivity classes within Hub areas, and within 150km of timber markets, TPs should generally provide higher economic returns on account of multiple revenue streams, and reduced investment risk (provided there is capable management expertise) due to diversification and extensive experience with growing commercial plantations, and established supply chains.

Forestry sector interviewees observed that in the establishment or expansion of a forestry business, carbon credits can play an important role in providing additional revenue and early cash flows. Choosing to establish plantations can enable investors to realise value from the carbon, the plantations (timber) and land (appreciation) over time.

Furthermore, over the long term, TPs should support increased employment through downstream processing and value-adding of timber products (discussed further below).

However, beyond plantation forestry companies, there appears to be a lower appetite for establishing TPs, which indicates the value proposition is not compelling or understood unless there is a strong interest in growing plantations.

Consultation with investors and carbon service providers who are not directly aligned with the forestry sector referred to the clear preference for EPs over TPs, as outlined above. This position is supported by and reflected in the national data on ACCU Scheme planting project registrations over the past five years especially, and trends observed in most regions (with the notable exception of the Central West NSW region).

6. *Focusing specifically on economic returns, TPs will typically generate higher economic returns across all the productivity classes (assuming the same ACCU pricing), which largely reflects the impact of the dual revenue streams from timber and ACCUs.*

TPs will generally provide higher economic returns when the transport distance is <150km. Where the transport distance to market exceeds 200km, EPs can provide higher economic returns, assuming all other variables are held constant.

TPs will also typically generate higher economic returns when the ACCU price for TPs and EPs is comparable and continue to do so when there is premium for EPs of up to $10/ACCU. However, if the EP price premium were to exceed $15/ACCU, EPs could potentially deliver higher economic returns.

Real log price increases will clearly favour TPs as they do not impact on EP returns.

These findings exclude consideration of policy incentives (for either TPs or EPs) and is based on an assessment at the site and project level and does not take account of broader investor considerations of the ‘value’ of the project.

7. *In relation to socio-economic contributions, TPs will generate a higher socio-economic contribution per unit area, due largely to the continuous commercial activity in plantations with more intensive silvicultural regimes and the presence of high-value processing in downstream industries.*

The evidence assembled for the Murray Region Forestry Hub and Central West Forestry Hub indicates TPs will typically generate higher socio-economic contributions per unit area, due largely to the continuous commercial activity in plantations with more intensive silvicultural regimes and the presence of high-value processing in downstream industries.

On a normalised basis of 1,000 hectares, plantations are estimated to support approximately 25–45 jobs, generate $3–6 million per year in value-added and inject $2–3 million in wages each year, whereas EPs are estimated to sustain 2–5 jobs, add $0.3–0.6 million of annual GRP and circulate $0.2–0.4 million in annual household income.

The key difference between socio-economic contributions from TPs and EPs reflects the presence of high-value processing and continuous commercial activity in plantations, compared to the low-intensity, non-harvest nature of environmental plantings. Sensitivity analyses suggest even under optimistic assumptions, EPs would not exceed 10 jobs per $1millionGRP per year per 1,000ha, which is still well below the anticipated impacts of TPs.

8. *In relation to project risks, TPs can draw on multiple rotations of experience, expertise and empirical data from the plantation forestry sector, which will reduce uncertainty and risk with this land use compared to EPs in their more formative stages of development.*

The comparative risk assessment for TPs and EPs, in the context of the Murray Region and Central West NSW, has observed that EPs will tend to carry greater overall risk than TPs. There is less experience and therefore a generally higher level of uncertainty with EPs in relation to managing bushfire risks, weeds and pests, as well as FullCAM projections underpinning ACCU estimates.

From an investor perspective, TPs are rated low–medium risk, while EPs are medium+. The most significant risk for EPs is exposure to changes in carbon credit modelling, particularly using FullCAM. The variability between FullCAM versions and limited empirical data on EP productivity under emerging regimes create uncertainty around future ACCU yield determination processes and revenues.

EPs also face elevated market and productivity risks due to reliance on a single income stream— i.e. ACCU sales—and a lack of demonstrated outcomes under current management models.

In contrast, TPs benefit from multiple rotations of industry experience, dual revenue streams (timber and carbon), and more intensive management supported by long-standing fire and productivity systems.

Social licence risks apply to both models but for different reasons. TPs may attract criticism for exotic species and intensive operations, while EPs may be seen as offering limited community value due to low employment and minimal local economic stimulus. As a result, EPs are assessed as carrying a similar level of risk.

From a community perspective, EPs also rate higher due to concerns about reduced employment, lack of downstream investment, and potentially lower management inputs directed to bushfire mitigation and management of weeds and pest species. TPs, by contrast, support existing value chains. EPs also present complex land use risks, with the scope for future conversion to another land use may require native vegetation clearing, which raises a range of regulatory and social challenges.

9. *There is an opportunity for more integrated, land use allocation approaches, both within properties and at the regional level, that could promote the benefits of TPs within designated Hub regions while also supporting complementary EP projects across the broader landscape.*

Consultation with stakeholders in both regions observed there are many landholders that are looking to maintain their existing farming (or other) enterprise; and the interest in a tree planting project is typically as a complementary land use, not a change in land use overall.

Several carbon service providers are now establishing EPs on areas within properties that are not suitable or ideal for agricultural or forestry production. This includes programs that support farmers to identify and aggregate corridors and small patches with existing agricultural enterprises - not well suited to forestry production.

Relatedly, some timberland investors are investing in EPs to optimise land use, where the properties include areas that are not ideally or well suited to timber plantations.

The case studies presented in this review provide examples of an 'optimised' land use allocation that may provide higher economic returns than either TPs or EPs exclusively – however, this will depend largely on key factors such as the ACCU carbon price for these projects. The optimisation approach applied to the case studies is based on seeking to prioritise the establishment of timber plantations on all suitable areas of moderate to high productivity within the properties and then establishing EPs where biophysical limitations (e.g. wetter or drier areas) and access restrictions favour EPs over TPs, while also promoting the opportunity for pursuing the nature repair agenda through protecting and enhancing management of remnant vegetation.

This approach could be elevated to the regional level, with consideration given to designated Hub boundaries, and seeking to prioritise plantations on suitable sites within reasonable transport distances of timber processing centres, i.e. within 100-150km. This would provide recognition and support for TPs to produce an ongoing supply of timber and wood fibre to service regional manufacturing capacity, while also generating ACCUs.

With this approach, EPs may be a preferred model for all other areas of suitable sites across the broader region where biophysical and market factors result in improved economic outcomes without adversely impacting socioeconomic impacts.

In this context, there is scope for more integrated approaches to restoring cleared or degraded landscapes, with biodiversity conservation and other ecosystem services complemented by productive plantation expansion in the right places.

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Annex 1

Consultation conducted for the study

CONSULTATION CONDUCTED FOR THIS STUDY

To address the scope for this land use review and comparison, and collect relevant data and insights, the project team conducted interviews with stakeholders in the Murray Region and Central West NSW region, with site visits to look at planting designs and ground truth key assumptions.

In addition, the project team conducted approximately 20 interviews via online meetings with a broad range of stakeholder organisations involved directly in the establishment and management of new planting projects under the ACCU Scheme, as well as the regulation and sectoral support for these projects.

Stakeholder organisations consulted during this study included representatives of the following:

- Agriwealth Pty Ltd
- AKD
- Australian Carbon Farming
- Borg Group of Companies
- Central West NSW Forestry Hub
- Climate Friendly
- Covalent Land Australia
- Forestry Corporation of NSW
- Greening Australia
- Gippsland Forestry Hub
- HVP Plantations
- Landari Pty Ltd
- Marselle Plantations
- Murray River Forestry Hub
- New Forests
- NSW Government Department of Primary Industries and Regional Development (DPIRD) Plantations Regulations Unit
- PF Olsen
- Snowy Mountains Forests
- South West WA Regional Forestry Hub
- Victorian Government Department of Energy, Environment and Climate Action.

Notwithstanding the consultation with these and other stakeholder organisations, please note that the findings expressed in this report are entirely those of the report authors. *There is no attribution of any findings in this study to any of the stakeholder organisations listed above.*

Collectively, the site visits and interviews provided highly valuable guidance on recent land use change within the two regions, as well as the key policies and regulatory drivers, key market drivers for plantation investments, key risks, and the various dimensions of socio-economic contributions from the alternative land uses.

Annex 2

Planting areas on ACCU Scheme Project Register

SUMMARY OF ACCU SCHEME PROJECT REGISTER

Annex Table 1 Summary of Environmental Plantings (EP) projects registered on the ACCU Scheme Project Register, as of February 2025 (hectares)

NPI Region	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Central Gippsland								470	26		85	2 085	664	3 330
Central Tablelands				459		207					444	1 218	2 924	5 252
Central Victoria										57	380	84	374	894
EG–Bombala					163								8 687	8 850
Green Triangle									4 732		173			4 905
Mount Lofty & KI				361				541	5 567			32	900	7 401
Murray Valley			69		44				490	733	12	1 874	1 814	5 035
North Coast		256		20	42	125		110		35	782	818	4 669	6 858
Northern Queensland	36	10	45			2					481	75	76	724
Northern Tablelands						183				2 125			1 085	3 393
SE Queensland				859				169			286		115	1 429
Southern Tablelands					71			43			581	194		889
Tasmania										55	1 420	536		2 010
Western Australia		1 869	2 561	2 190					6 840	9 433	9 793	6 215	10 365	49 266
Sub-total	**36**	**2 135**	**2 674**	**3 889**	**321**	**517**		**1 333**	**17 655**	**12 437**	**14 437**	**13 130**	**31 673**	**100 237**

Farm Forestry														
Western Australia			4 960											4 960
Farm Forestry Total			**4 960**											**4 960**

Source: CER accessed 28 February 2025. Note includes mallee projects (approximately 6,000ha); and excludes revoked projects.

Annex Table 2 Summary of Timber Plantation (TP) projects registered on the ACCU Scheme Project Register, as of February 2025 (hectares)

NPI Region	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Central Gippsland										69	416			485
Central Tablelands									1 776		5 237		99	7 112
Central Victoria									110				2 223	2 333
EG–Bombala								689						689
Green Triangle									3 619			397	1 567	5 583
Murray Valley									25		12			37
SE Queensland									76					76
Southern Tablelands							636							636
Tasmania									270			305	939	1 513
Western Australia							1 913	47		6 505	2 126	2 209	1 990	14 790
TP Total							**2 549**	**736**	**5 876**	**6 575**	**7 791**	**2 910**	**6 818**	**33 254**

Source: CER. Note excludes Schedule 2, 3 and 4 projects

Annex 3

Relevant government policies and regulatory drivers

Annex Table 3 List of applicable policies, legislation and regulatory drivers that may influence land use decisions on EPs and TPs

No.	Instrument title	States	Instrument type	Instrument group	Primary objective	Relevant models	Relevance	Active status
1	*Carbon Credits (Carbon Farming Initiative - Plantation Forestry) Methodology Determination 2022*	National	Legislative Instrument - Emissions reduction	Direct	Climate	TPs	Provides the current rules for carbon sequestered by plantation forestry projects based on one of four eligible schedules: - Schedule 1 – establishing new plantation forests (either on cleared agricultural land or plantation land that has been fallow for at least seven years). - Schedule 2 – conversion from a short rotation plantation to a long rotation plantation. - Schedule 3 – continuing with plantation forestry rather than clearing the land for agriculture after harvesting. - Schedule 4 – transitioning a plantation forest to a permanent forest (non-harvest).	2022 - ongoing
2	*Carbon Credits (Carbon Farming Initiative - Reforestation and Afforestation 2.0) Methodology Determination 2015*	National	Legislative Instrument - Emissions reduction	Direct	Climate	EPs	Provides the rules for carbon sequestered by reforestation and afforestation projects through permanent plantings on land that must have been grazed, cropped or is fallow within the last 5 years prior to planting. Plantings cannot be harvested for commercial purposes (can be ecologically thinned, or have firewood, debris or other material removed for traditional rights and practices). *Note this methodology determination will be expiring in September 2025.*	2015 - 2025
3	*Carbon Credits (Carbon Farming Initiative - Reforestation by Environmental or Mallee Plantings) Methodology Determination 2024*	National	Legislative Instrument - Emissions reduction	Direct	Climate	EPs	Provides the rules for eligible carbon sequestration projects related to non-forested land areas, where trees capable of attaining >2m heights and crown cover >20% ('forest'), are established on project land >0.2ha in size, that has been clear for at least 5 years before application. Also includes provisions for eligibility and design considerations compatible with the Nature Repair Market Scheme.	2024 - ongoing
4	HVP Plantations & Victorian Government Softwood Expansion Partnership (GPIP)	Victoria	Policy - Industry & Investment	Direct	Forestry	TPs	A $120 million partnership agreement aimed at expansion of Victoria's softwood plantation estate (focussed on Gippsland), blending commercial timber production with carbon sequestration benefits, and providing market diversification.	2020 - 2030
5	Support Plantation Establishment (SPE) Program	National	Policy - Grants & Investment program	Direct	Forestry	TPs	A 2022-23 Budget commitment of $73.76 million grant funding over 4 years to support establishment of long-rotation softwood and hardwood plantation forests (linked under the National Forestry Industries Plan).	2023 - 2027

No.	Instrument title	States	Instrument type	Instrument group	Primary objective	Relevant models	Relevance	Active status
6	*Replanting Native Forest and Woodland Ecosystems) Methodology Determination 2025* (Nature Repair Scheme)	National	Policy Nature repair	Direct	Nature	EPs	This is the first method approved under the Australian Government's Nature Repair Market Scheme. It enables restoration of cleared farmland by planting native trees and shrubs to enhance biodiversity and ecological connectivity in targeted bioregions. Projects must use local species, maintain plantings for 25 or 100 years, manage threats like weeds and pests, and conduct regular monitoring and reporting. This method supports "stacking" with carbon projects, so landholders can earn both biodiversity certificates and carbon credits.	2024 - Ongoing
7	*Nature Repair Market Act 2023*	National	Policy Market-based Incentive – Nature	In-Direct	Nature	EPs	Supports private sector investment in biodiversity, potentially complementing environmental plantings.	2023 - ongoing
8	NSW Living Carbon Grants	NSW	Policy - Grant & Incentive Program	Direct	Nature	EPs	As a key component of PIPAP, with $5 million grant funding available, it directly funds environmental planting projects (up to $200K per project) that enhance carbon sequestration and biodiversity, targeting specific regions for impactful interventions, and only supports Environmental Plantings carbon methods. This program encapsulates the Koala Friendly Carbon Farming Program - a partnership between NSW Government, WWF and Climate Friendly.	2022 - 2025
9	Future Drought Fund – Carbon & Biodiversity Pilot	National	Policy - Grant & Incentive Program	Direct	Climate	EPs	Australian Government's $34 million Agriculture Stewardship Package which aimed to develop a market mechanism that rewards farmers for improving biodiversity on their land and incentivizes farmers to combine carbon farming with biodiversity conservation.	2021 - 2026
10	BushBank Victoria	Victoria	Policy - Grant & Incentive Program	Direct	Nature	EPs	Offers funding ($5 million over 5 years) for large-scale native reforestation projects that deliver both carbon sequestration and biodiversity outcomes, supporting environmental plantings.	2023 - 2028
11	ACCU Scheme - *Carbon Credits (Carbon Farming Initiative) Act 2011*	National	Legislation - Emissions Reduction	In-Direct	Climate	Both	The primary legislation governing the ACCU Scheme and eligible methodologies for tree planting (e.g., Plantation Forestry Method; Reforestation by Environmental or Mallee Plantings 2024 Method; or the Reforestation and afforestation 2.0 Method). It also sets the specific eligibility rules and integrity standards for carbon credit projects on private land, which may influence landholder investment decisions through carbon credit incentives.	2011 - ongoing
12	*Safeguard Mechanism (Crediting)*	National	Legislation	In-Direct	Climate	Both	Creates market demand for ACCUs. Fast-growing plantations may be more attractive due to high ACCU generation. Environmental plantings may be more attractive due to nature positive co-benefits	2023 - ongoing

No.	Instrument title	States	Instrument type	Instrument group	Primary objective	Relevant models	Relevance	Active status
	Amendment Act 2023							
13	National Forestry Industries Plan 2018 *(Growing a Better Australia - A Billion trees for jobs and growth)*	National	Policy - Industry & Investment	In-Direct	Forestry	TPs	A National Forest Industries plan aimed at expansion of Australia's plantation estate, supporting carbon sequestration alongside timber production, innovation and industry assistance to meet the challenges of the future.	2018 - 2030
14	Primary Industries Productivity and Abatement Program (PIPAP)	NSW	Policy - Grant & Incentive Program	In-Direct	Climate	Both	Key element of the NSW Net Zero Plan Stage 1: 2020-2030. Establishes overarching program of $105 million in funding, technical support, and capacity-building initiatives, through its subsidiary grants and support programs. Overarching support signals for carbon abatement projects, including new tree plantings across agricultural lands. Noting that the funding case studies are all for environmental plantings	2022 - 2030
15	CEFC *Towards Net Zero Agriculture* Investment Strategy	National	Policy Carbon Market & Advisory	In-Direct	Climate	Both	Includes provisions for farmers, such as discounted finance and tools to accelerate their plans to implement low emissions farming activities, as well as carbon sequestration plantings. It has been designed to align with ACCU Scheme methodologies and complement corporate investment, to remove financial and other regulatory barriers to support increased participation in carbon markets and promoting more resilient and sustainable farming landscapes.	2024 - 2050
16	Climate-related Financial Disclosures	National	Policy	In-Direct	Climate	Both	Under changes to the *Corporations Act 2001* sustainability reporting requirements, businesses and financial institutions need to disclose their carbon footprint and demonstrate credible emissions reduction strategies. This could drive higher demand for ACCUs, particularly those supporting biodiversity and social co-benefits.	2024 - ongoing
17	Future Drought Fund	National	Policy - Funding Program	In-Direct	Climate	EPs	The Future Drought Fund in general may incentivise plantings and ACCU Scheme / nature repair participation in ways yet to be announced. Probably funding would be geared towards EPs with concerns about water use by plantations.	2024 - 2030
18	Net Zero Plan	National	Policy	In-Direct	Climate	Both	Limited direct relevance – As an overarching framework, it focuses on economy-wide decarbonization pathways but does not provide direct funding or incentives for land-based carbon sequestration. However, it supports carbon markets and offsets as part of achieving net-zero goals and includes embedded strategies and programs that are relevant.	2025 - 2035

No.	Instrument title	States	Instrument type	Instrument group	Primary objective	Relevant models	Relevance	Active status
19	Carbon Farming Outreach Program	National	Policy - Carbon Market & Advisory	In-Direct	Climate	Both	Offers strategic direction and best practice guidelines for landholders adopting carbon farming methods, including some direct support grants and advice for farmers, landholders and first nations groups.	2024 - ongoing
20	Victorian Carbon Farming Program	Victoria	Policy - Carbon Market & Advisory	In-Direct	Climate	Both	Provides technical and financial assistance to landholders for implementing carbon farming practices, including tree planting projects that generate ACCUs (pilot program expires April 2025)	2020 - 2025
21	Victorian Climate Change Strategy (and Emissions Reduction Pledge)	Victoria	Policy	In-Direct	Climate	Both	Victorian Government policy that integrates forestry-based carbon sequestration into the state's overall emissions reduction targets, encouraging landholders to consider environmental plantings, and land restoration.	2023 - 2030
22	*Climate Change (Net Zero Future) Act 2023*	NSW	Legislation - Emissions Reduction	In-Direct	Climate	Both	Indirectly influences land management decisions through its carbon market mechanism and support for land-use incentives. As with Victorian equivalent, it binds the State to net zero emissions by 2050 and supports integration of carbon markets into land use policy, by aligning with the NSW Carbon Farming Framework and Living Carbon Grants program.	2023 - ongoing
23	*Climate Change Act 2017*	Victoria	Legislation - Emissions Reduction	In-Direct	Climate	Both	Indirectly influences through emissions reduction policies and funding programs, legally binding Victoria to net zero by 2050, which includes land-based carbon sequestration strategies and programs. It also guides state funding programs like BushBank, which directly incentivises (through financial grants) reforestation and revegetation projects	2017 - ongoing
24	*Climate Change Act 2022*	National	Legislation - Emissions Reduction	In-Direct	Climate	Both	Indirectly influences land management decisions by reinforcing long-term carbon sequestration needs, and ACCU Scheme carbon planting projects, which makes tree-planting a potentially viable investment. It doesn't directly mandate reforestation or afforestation but supports voluntary markets and government programs that may incentivise tree planting.	2022 - ongoing
25	*Corporations Act 2001*	National	Legislation - Emissions Reduction	In-Direct	Climate	Both	Climate-related financial disclosures will be mandated through amendments to the *Corporations Act 2001* (Cwth) (Corporations Act) and related legislation. This may indirectly support afforestation and reforestation projects that provide offsets to large corporations with substantive existing carbon footprints.	2024 - ongoing
26	A Better Future for our Regions and A Future Grown in Australia Policies	National	Policy	In-Direct	Forestry	TPs	A suite of initiatives totalling over $300 million to support Australia's forest industries to innovate and improve the capacity and capability of the sector. Includes $3.4 million to review the 1992 National Forest Policy Statement and support the development of a Timber Fibre Strategy as well as funding to support adoption of wood processing innovation.	2023 - 2027

No.	Instrument title	States	Instrument type	Instrument group	Primary objective	Relevant models	Relevance	Active status
27	National Forest Policy Statement (1992)	National	Policy	In-Direct	Forestry	TPs	Indirectly supports forestry industry and sustainable development, including signals for timber plantations. **Note**: A 2023 commitment by Labour to review by early 2025.	1992 - ongoing
28	*Forestry Act 2012*	NSW	Legislation - Forestry and Environment	In-Direct	Forestry	TPs	Regulates plantation establishment and sustainable management, including governance for private and public forestry operations.	2012 - ongoing
29	*Plantations and Reafforestation Act 1999*	NSW	Legislation - Forestry and Environment	In-Direct	Forestry	TPs	Regulates timber and non-timber plantations on freehold land through the Private Native Forestry (PNF) framework, establishing a Code of Practice for Plantations, and requires authorisation and registration for new plantations.	1999 - ongoing
30	*Regional Forest Agreements Act 2002*	National	Legislation - Forestry and Environment	In-Direct	Forestry	TPs	It was intended to provide long-term regulatory stability for timber production and forestry within native forests and timber plantations within RFA regions. To some extent, it may influence native forest management vs. plantation expansion decisions in those RFA regions. (**Note**: Victorian State Government ended its five RFAs in Victoria on 31 December 2024)	2002 - ongoing (for NSW)
31	*Sustainable Forests (Timber) Act 2004*	Victoria	Legislation - Forestry and Environment	In-Direct	Forestry	TPs	Limited primary to regulatory framework, authorisations and offence provisions associated with the Code of Practice for timber production in Victoria.	2004 - ongoing
32	Australia's Strategy for Nature 2024-2030	National	Policy	In-Direct	Nature	EPs	Includes support for nature-related financial disclosures. TNFD-aligned companies will face pressure to integrate nature-based solutions into their carbon strategies. Landholders who can demonstrate both carbon sequestration and nature repair will be in a stronger position to attract investment.	2024 - 2030
33	Biodiversity Conservation Trust (BCT) & Private Land Conservation Agreements	NSW	Policy- Conservation Incentive	In-Direct	Nature	EPs	The NSW Biodiversity Conservation Trust (BCT) offers private landholders in NSW the opportunity to protect and manage biodiversity on their properties through conservation agreements, which can be long-term or in-perpetuity, and can include annual payments or access to grant funding. It in-directly supports environmental plantings by enhancing habitat and ecosystem resilience.	2020 - 2030
34	*EPBC Act 1999 (Biodiversity Conservation Offsets Policy)*	National	Policy	In-Direct	Nature	EPs	As enabled through the *EPBC Act 1999* (Cwth), the biodiversity conservation offsets policy encourages native vegetation planting as offsets for environmental impacts.	2012 - ongoing
35	*Biodiversity Conservation Act 2016*	NSW	Legislation - Environment	In-Direct	Nature	EPs	Governs native vegetation clearing approvals on private land and provides a framework for biodiversity offsets, which may incentivise tree planting projects. It also manages NSW Biodiversity Conservation Trust (BCT) agreements, which promote conservation plantings.	2016 - ongoing

No.	Instrument title	States	Instrument type	Instrument group	Primary objective	Relevant models	Relevance	Active status
36	*Catchment and Land Protection Act 1994*	Victoria	Legislation - Water & Land Management	In-Direct	Nature	EPs	Regulates management of noxious weeds and pests, relevant for plantation projects. It also influences land degradation and revegetation requirements and establishes Catchment Management Authorities (CMAs) to oversee funding and regulatory approvals for reforestation projects.	1994 - ongoing
37	*Local Land Services Act 2013*	NSW	Planning & Regulatory Instrument	In-Direct	Regional development	Both	Regulates land clearing and native vegetation management on freehold land (including for bushfire risk mitigation) and oversees compliance with Native Vegetation Regulatory Map (NVRM) for landholders. The legislation also provides a framework for financial assistance and incentives to landholders, including, but not limited to, incentives that promote land and biodiversity conservation. (interactions with the *Plantations and Reafforestation Act 1999* and *Biodiversity Conservation Act 2016*)	2013 - ongoing
38	Victorian Planning Scheme Provisions	Victoria	Planning and Regulatory Instrument	In-Direct	Regional development	Both	Covers various planning scheme provisions for land use development proposals, permits and conditions related to bushfire, native vegetation management, soil erosion, water and cultural heritage.	Ongoing
39	*State Environmental Planning Policy (Resilience and Hazards) 2021*	NSW	Policy - Planning	Disincentives	Fire management	Both	In conjunction with the Environmental Planning and Assessment Act 1979, it governs land-use planning and requires new plantations and environmental plantings to comply with bushfire hazard reduction rules.	Ongoing
40	*Country Fire Authority Act 1958*	Victoria	Legislation - Fire	Disincentives	Fire management	TPs	During the Fire Danger Period in Victoria, the Country Fire Authority (CFA), imposes restrictions on activities in and around plantations, including requirements for fire permits, equipment, and notifications for burn-offs, and prohibits certain activities during Total Fire Bans.	Ongoing
41	*Planning and Environment Act 1987*	Victoria	Legislation - Planning and Environment	Disincentives	Fire management	TPs	Regulates land use, including specific requirements in bushfire prone areas (Bushfire Management Overlays), which may impact tree planting approvals. (**Note**: Interactions with Victorian Planning Scheme)	Ongoing
42	*Plantations and Reafforestation (Code) Regulation 2001*	NSW	Regulation	Disincentives	Fire management	TPs	Imposes compliance obligations on land holders for plantations of a certain size (>100ha), regarding fire risk management, such as firebreaks, fire-fighting water supply and access road requirements for prevention and bushfire response.	Ongoing
43	*Rural Fires Act 1997*	NSW	Legislation - Fire	Disincentives	Fire management	TPs	Establishes arrangements for the rural Fires Services and Bushfire Management Committees and associated requirements for Bushfire Risk Management plans, including requirements for private landholders to maintain asset protection zones and impose hazard reduction strategies.	Ongoing
44	*Forests Act 1958*	Victoria	Legislation - Forestry and Environment	Disincentives	Forestry	TPs	Regulates commercial timber production from plantations on public and private land (through the Code of Practice for timber production and/or licencing in State forests). Includes provisions for Fire Protection Zones in forested areas and those adjacent to State forests.	Ongoing

No.	Instrument title	States	Instrument type	Instrument group	Primary objective	Relevant models	Relevance	Active status
45	Code of Practice for Timber Production 2014 (amended 2022)	Victoria	Regulatory Instrument	Disincentives	Nature	TPs	Specific environmental regulation for timber plantations on public and private land, imposing minimum standards of environmental protection, planning and operational management to reduce risks to soil, water, biodiversity, cultural heritage and other social values.	2022 - ongoing
46	*Environment Protection and Biodiversity Conservation (EPBC) Act 1999*	National	Legislation - Environment	Disincentives	Nature	TPs	Requires environmental approvals for large-scale plantations or reforestation that may significantly impact nationally protected species/habitats (matters of national environmental significance, MNES), unless within an RFA region where certain exemptions may apply. (**Note**: The five RFAs in Victoria sunset on 31 December 2024).	1999 - ongoing
47	*Flora and Fauna Guarantee Act 1988*	Victoria	Legislation - Environment	Disincentives	Nature	Both	Requires impact assessments for tree planting affecting protected species/habitats, and supports the use of biodiversity conservation offsets, which tend to favour native revegetation over timber plantations.	Ongoing
48	Native Vegetation Removal Regulations	Victoria	Regulation	Disincentives	Nature	Both	Regulates land clearing & offset requirements for native vegetation management (Removal, destruction or lopping), including restrictions for clearing in certain zones and exemptions for some activities, therefore influences land conversion and/or management for plantations or revegetation projects. Associated Guidelines were reviewed in 2017.	2017 - ongoing
49	*Environmental Planning and Assessment Act 1979*	NSW	Legislation - Planning and Environment	Disincentives	Regional development	TPs	Requires environmental impact assessments (EIA) for large-scale tree planting projects and integrates local council planning regulations that may affect tree planting approvals. It also supports local government decisions related to land re-zoning, which may impact plantation forestry or carbon farming ventures. Bushfire-prone land development (including tree planting) must meet RFS requirements and Bushfire Attack Level (BAL) assessment needs	Ongoing
50	*Water Act 1989*	Victoria	Legislation - Water & Land Management	Disincentives	Regional development	TPs	Regulates water use and access for plantations and may impose direct limits or dis-incentives for water-intensive land management uses.	Ongoing
51	*Water Management Act 2000*	NSW	Legislation (Water & Land Management)	Disincentives	Regional development	TPs	Regulates water use and access for plantations and may impose direct limits or dis-incentives for water-intensive land management uses.	Ongoing

Note on Instrument groupings:

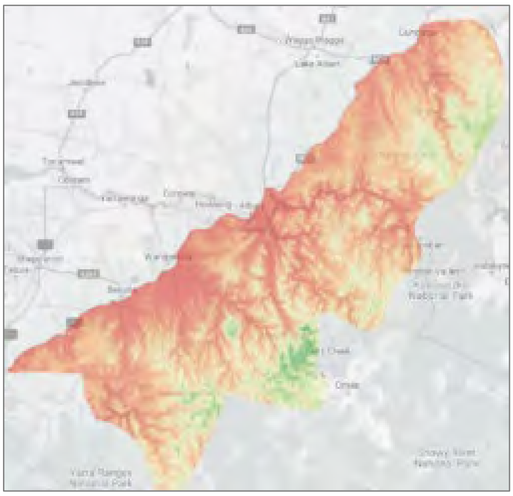
- *Direct* i.e., through direct funding and/or market-based incentives and grants programs
- *In-Direct* i.e., encouraging uptake through policy directions or signals of support
- *Disincentive* i.e., added complexity and/or regulatory constraints impacting eligibility, implementation or management.

Annex 4

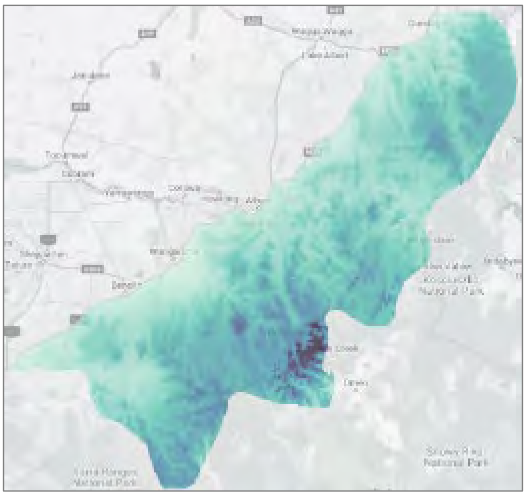
Land suitability analyses

LAND SUITABILITY ANALYSES

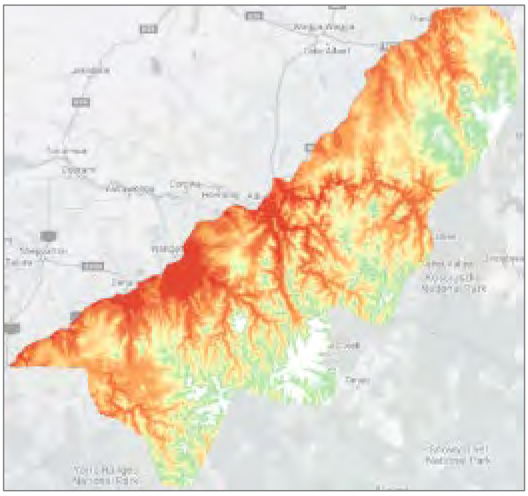
Annex Figure 1 Re-classification of plantation productivity classes for Murray Region



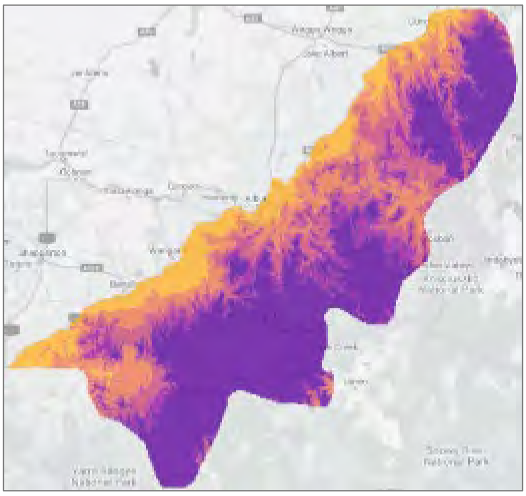
Elevation



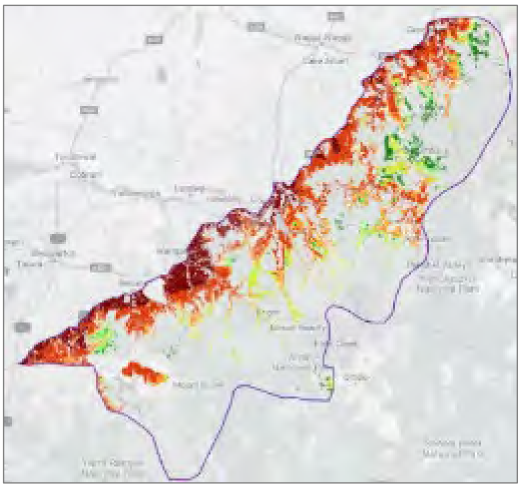
Rainfall



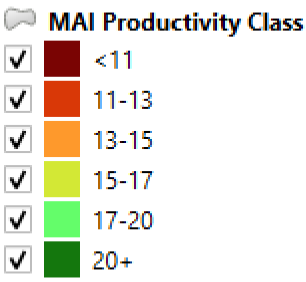
Elevation Re-classified (100m classes)



Rainfall Re-classified



MAI Productivity classes Re-classified



Source: Indufor analysis (2025).

ACCU SCHEME PLANTABLE AREA ANALYSIS

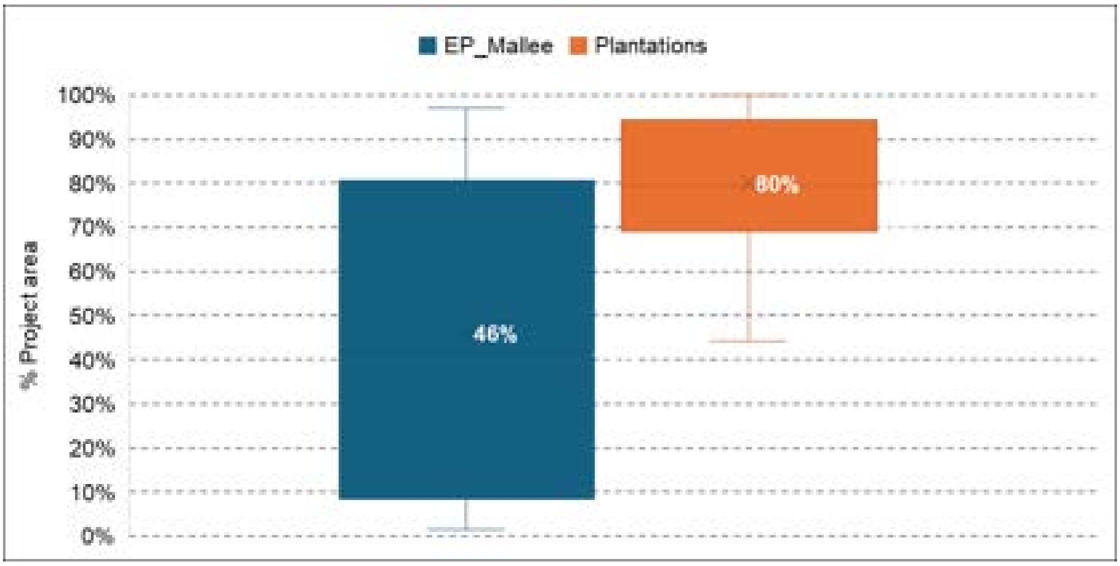
For NSW, plantations must be authorised under the P&R Code (refer to Section 3.3), with the specific plantable area on any one property defined through that authorisation process. The plantable area is available for download from the NSW Plantations Regulation Unit via the *SEEDS* website[117]. A sample of 51 plantations have been analysed using both the ACCU Scheme Project mapping file and the Plantation Plantable Area mapping file.

As the ACCU Scheme project Register only provides link to the project area mapping file for all projects, the following analysis was conducted to provide an indication of typical project area / planted area ratios to enable a reasonable comparison of planted area under the EP and TP approaches:

- NSW Projects were identified that had a corresponding Plantable Area available via the *SEEDS* data download
- Individual projects were mapped and the plantable area and ACCU Schele Project mapping file were joined via a union in QGIS to determine the areas within the project boundary and the Plantable Area Boundary. For those projects the following results were tabulated.

Results of the comparison are illustrated in Annex Figure 2, with on average, 46% of the property area under an EP is planted (and authorised), whereas for plantations this is more likely to be around 80%. It is noted that particularly for EPs, there is significant variation in this aspect.

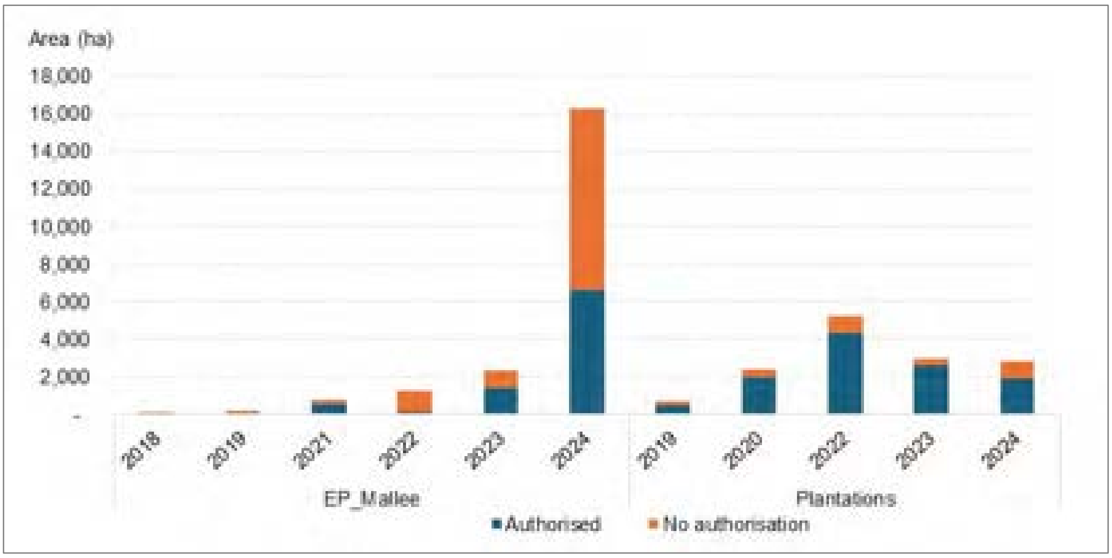
Annex Figure 2 Proportion of carbon project areas authorised for planting in NSW



This is further represented in Annex Figure 3. The area within registered projects of authorised and unauthorised plantations by year is detailed for EPs and TPs

[117] NSW Government (2025) SEED: *The Central Resource for Sharing and Enabling Environmental Data in NSW. Plantation Plantable Area*. Online: https://datasets.seed.nsw.gov.au/dataset/plantation-plantable-area

Annex Figure 3 Gross area of authorised plantings within Registered Projects in NSW



Source: State Government of NSW and Department of Primary Industries and Regional Development (DPIRD) 2025

Annex 5

Carbon crediting analyses

CARBON CREDITING ANALYSES

The carbon crediting analyses conducted for this land use review and comparison builds directly upon the carbon profiling analysis for the Central West Forestry Hub in 2023[118].

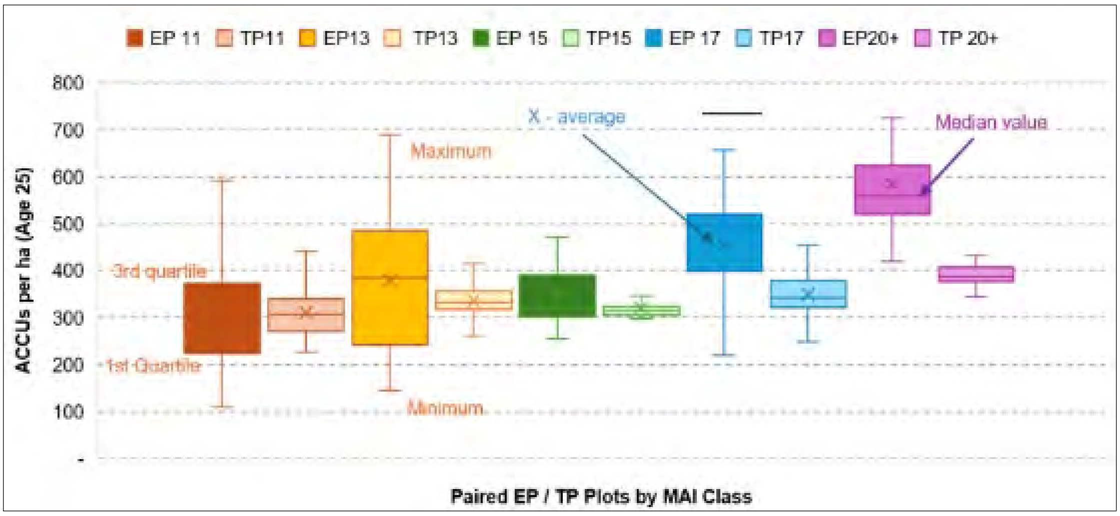
Recognising the carbon profiling analysis for the Central West NSW was limited to assessing the carbon sequestration potential of radiata pine plantations in that region, Indufor has applied a similar approach to derive carbon crediting estimates for both TPs *and* EPs, across *both* regions, i.e. the Murray Region as well as the Central West.

A sample of the plot locations from the carbon profiling analysis project in both regions were selected to provide a side-by-side comparison of TPs and EPs. These points were then selected and modelled in FullCAM (2016 version), using the Plantation Forestry Method 2022, adopting a radiata pine, long rotation single-thinned regime. This provided a common basis to calculate crediting potential for TPs across both regions.

The estimate of crediting in EPs was modelled using the same plot locations used for the Plantation Forestry Method. Crediting estimates were calculated for each of the plots, using FullCAM (2020 version), in accordance with the Reforestation by Environmental or Mallee Planting Method 2024, to establish a point-based comparison of ACCU generation across each of the productivity classes. The crediting potential was calculated using a 25-year permanence period, as this is the predominant period adopted in TP projects registered under the ACCU Scheme, and it enabled a direct comparison to EPs.

The following charts demonstrate the results of the paired (TP / EP) plots. The boxplots provide information on the spread, as well as the median and average values. It highlights the range of potential ACCUs modelled within each productivity class, and although there is a broad positive correlation between mapped productivity and ACCUs per ha, it is more pronounced for EPs. Therefore, this analysis indicates that as site productivity increases beyond an MAI of approximately 13 m^3/ha/year, the modelling of crediting estimates using FullCAM (2020 version) results in higher crediting estimates for EPs compared to TPs.

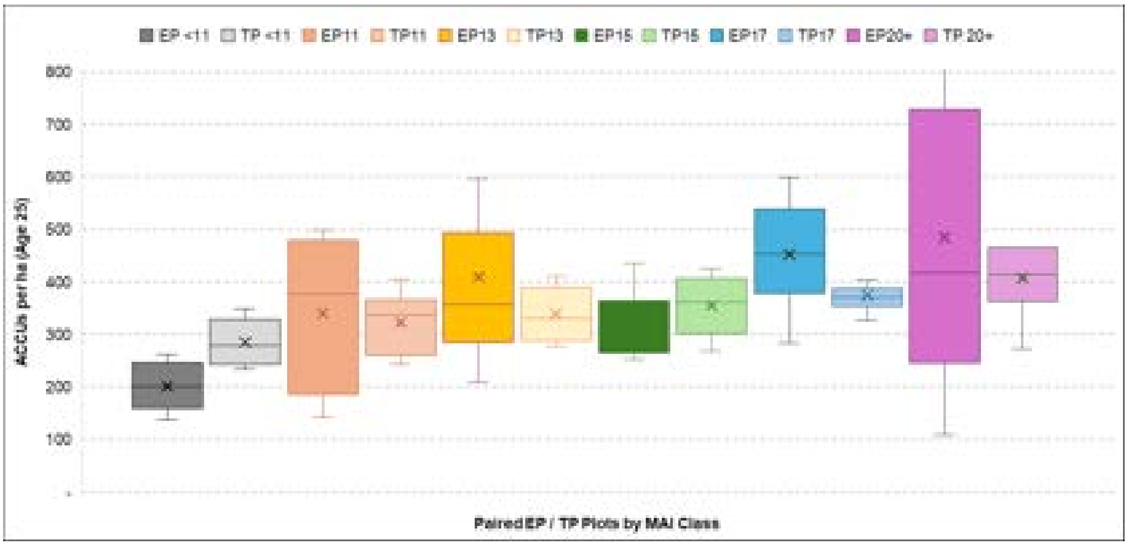
Annex Figure 4 Box-plot analysis of ACCUs from EPs & TPs by MAI class (Central West)



Source: Indufor modelling using FullCAM (2016 version for TPs and 2020 version for EPs).
Note: A total of 1132 paired plots were established across the 5 MAI classes for the Central West.

[118] Central West Forestry Hub (2023) *Carbon Profiling Analysis*. Report prepared by PF Olsen, February 2023.

Annex Figure 5 Box-plot analysis of ACCUs from EPs & TPs by MAI class (Murray Valley)



Source: Indufor modelling using FullCAM (2016 version for TPs and 2020 version for EPs).
Note: A total of 70 paired plots were established across the 7 MAI classes.

Carbon crediting profiles, by planting age and MAI class, for TPs and EPs, are presented below in Annex Table 4 and Annex Table 5, respectively.

Annex Table 4 Assumed ACCU estimates (tCO_{2e}/ha) by age and MAI class for TPs

	MAI classes (m^3/ha/year)					
Year	**<11**	**11-13**	**13-15**	**15-17**	**17-20**	**20+**
1	1.0	1.1	0.9	0.9	1.0	0.9
2	0.7	0.7	0.9	2.2	4.1	2.3
3	2.6	2.5	3.3	6.2	9.6	6.7
4	6.8	7.2	8.7	14.1	19.5	15.6
5	10.4	11.6	13.3	19.3	24.6	21.8
6	14.1	16.3	17.9	24.0	29.0	27.5
7	15.7	18.6	19.9	25.2	29.3	29.1
8	20.9	25.5	26.5	32.1	36.2	37.3
9	21.1	26.1	26.7	31.1	34.1	36.3
10	22.2	27.8	28.0	31.7	34.1	37.2
11	20.8	26.3	26.1	28.9	30.6	34.1
12	24.4	31.1	30.6	33.2	34.6	39.2
13	22.2	28.7	28.0	29.7	30.6	35.3
14	21.9	28.4	27.4	28.6	29.2	34.1
15	19.7	25.7	24.6	25.4	25.6	30.3
16[1]	-9.6	-10.6	-12.8	-19.5	0.6	-
17	4.8	7.3	5.4	2.0	-	-
18	8.0	11.4	9.6	6.7	-	-
19	9.7	13.8	12.0	9.8	-	-
20	12.0	16.7	14.7	12.4	-	-
21	10.5	15.7	12.5	6.8	-	-
22	-	0.9	-	-	-	-
23	-	-	-	-	-	-
24	-	-	-	-	-	-
25	-	-	-	-	-	-
	259.8	**332.8**	**324.3**	**351.0**	**372.6**	**387.7**

Source: Indufor FullCAM analysis

Notes:

1. The negative abatement numbers in year 16 are due to the assumption of thinning at year 15, which results in a short-term decline in carbon stocks, prior to the thinned stand growing on and sequestering carbon through to the end of the rotation.

2. In the later years of these profiles, no ACCUs accrue, due to the 100-year average having been reached. This will vary depending upon the productivity of the site with more productive sites reaching this maximum ACCU yield earlier than on poorer sites. The modelling undertaken by productivity class determined a slightly higher ACCU yield in the MAI 11-13 band than the MAI 13-15 band due to a different set of modelling assumptions employed in FullCAM compared to the productivity analysis undertaken for the Hubs.

Annex Table 5 Assumed ACCU estimates ((tCO_{2e}/ha) by age and MAI class for EPs

	MAI classes (m^3/ha/year)					
Year	**<11**	**11-13**	**13-15**	**15-17**	**17-20**	**20+**
1	0.7	1.5	-	1.2	1.0	1.2
2	2.4	3.9	1.1	4.4	6.0	6.6
3	6.2	9.9	4.3	11.3	15.5	16.8
4	11.1	17.7	10.9	20.1	27.7	29.9
5	12.1	19.4	19.4	21.9	30.2	32.7
6	12.7	20.3	21.2	23.0	31.6	34.2
7	11.6	18.6	22.2	21.0	28.9	31.3
8	13.1	21.1	20.3	23.7	32.7	35.5
9	11.6	18.4	23.0	20.8	28.6	31.1
10	10.9	17.3	20.1	19.5	26.8	29.2
11	9.4	15.0	19.0	16.8	23.2	25.2
12	10.3	16.4	16.3	18.4	25.2	27.6
13	8.8	14.1	17.9	15.7	21.7	23.6
14	8.2	13.1	15.3	14.6	20.1	21.9
15	7.1	11.4	14.2	12.6	17.3	18.9
16	7.7	12.3	12.3	13.7	18.8	20.6
17	6.6	10.6	13.3	11.7	16.1	17.7
18	6.2	9.9	11.5	10.9	15.0	16.5
19	5.4	8.6	10.7	9.5	13.1	14.2
20	5.8	9.3	9.3	10.3	14.1	15.6
21	5.1	8.1	10.0	8.9	12.3	13.4
22	4.7	7.5	8.7	8.4	11.5	12.6
23	4.1	6.6	8.2	7.3	10.0	10.9
24	4.5	7.1	7.1	7.9	10.9	12.0
25	3.9	6.3	7.7	6.9	9.5	10.4
Total	**190.3**	**304.3**	**324.0**	**340.3**	**467.7**	**509.6**

Source: Indufor FullCAM analysis

Annex 6

Economic returns analyses

Annex Table 6 Base assumptions used in economic returns for ACCU planting projects

	Timber Plantations (TPs)		Environmental Plantings (EPs)	
Assumptions	**Year**	**Value**	**Year**	**Value**
Discount rate (real pre-tax)		6.5%		6.5%
Timeframe for economic modelling		32 years		25 years
Land acquisition cost (per ha gross)	0	$15,000	0	$15,000
Plantable proportion (%)		100%		100%
Annual land cost (i.e. rent) %	All years	3.0%	All years	3.0%
Distance to processing centres (km)		50		not applicable
Expected MAI		variable		variable
Establishment and tending ($/ha)				
Establishment management fees	0	200	0	200
Fencing, clearing, tracks	0	100	0	100
Site preparation	0	500	0	500
Seedlings	1	600	1	1,200
Planting	1	450	1	1,000
Weed control 1	1	250	1	250
Weed control 2	2	250	2	500
Weed control 3	4	250	4	500
Fertiliser 1	1	100	1	0
Fertiliser 2	5	-	5	0
Total establishment/tending costs		**$2,700**		**$4,250**
Annual costs ($/ha)				
Fire protection	All	60	All	20
Weeds, pests	All	15	All	50
3rd party property management	All	100	All	50
Total annual costs		**$175**		**$120**
Thinning 1 costs ($/m^3)				
Roading		5		-
Harvesting	15	25		-
Distance pulp customer		50 km		-
Transport cost		$0.20 /t/km		-
Harvesting management		-2.00		-
Total T1 production costs		-32.00		-

	Timber Plantations (TPs)		Environmental Plantings (EPs)	
Assumptions (cont.)	**Year**	**Value**	**Year**	**Value**
Clearfell harvest costs ($/m³)				
Roading	32	2.50	-	-
Harvesting	32	18.00	-	-
Distance pulp customer (km)		50 km	-	-
Distance sawlog customer (km)		50 km	-	-
Transport cost – pulp ($/t/km)	32	$0.20/t/km	-	-
Transport cost – sawlog ($/t/km)	32	$0.20/t/km	-	-
Transport cost - (avg) ($/t/km)	ALL	0.20	-	-
Harvesting management	32	2.00	-	-
Total CF production costs		22.50	-	-
Carbon values ($/ha except where noted)				
Fixed project registration costs		0		0
Project registration costs	0	500	0	500
Carbon audit 1	1	500	1	500
Carbon audit 2	5	250	5	250
Carbon audit 3	10	250	10	250
Reporting	Years 1 to 25	10	Years 1 to 25	10
Carbon price ($/ACCU)	All	40	All	40
Carbon price escalation		Flat real		Flat real
Log prices (base prices) ($/m³)				
Pulp	All	85		-
Small sawlog	All	100		-
Med sawlog	All	130		-
Large sawlog	All	160		-
				-
Log price escalation (%)		Flat real		-

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