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MURRINDINDI FARM FORESTRY FEASIBILITY ASSESSMENT

FINAL REPORT

MURRINDINDI SHIRE COUNCIL | JUNE 2022



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FILE

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VERSION

1

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ACRONYMS

AAGR	Annual Average Growth Rate
ACCU	Australian Carbon Credit Unit
BCR	Benefit Cost Ratio
HA	Hectares
NPV	Net Present Value
P.A.	Per Annum

GLOSSARY OF TERMS

Direct Impacts	Direct output or value of development/construction activity, or operation
Indirect Impacts	<p><u>Supply-Chain effects</u> – The increased output generated by servicing industry sectors in response to the direct change in output and demand; and</p> <p><u>Consumption effects</u> – As output increases, so too does employment and wages and salaries paid to local employees. Part of this additional income to households is used for consumption in the local economy which leads to further increases in demand and output region</p>
Input-Output Model	This method is based on the interdependencies and relationship between industry sectors and is widely used across the public and private sector to estimate the direct and flow on economic impacts of a project or activity to an economy (using industry multipliers).
Employment	Employment data represents the number of people employed by businesses/organisations in each of the industry sectors in a defined region. Employment data presented in this report is destination of work data. That is, no inference is made as to where people in a defined region reside. This employment represents full-time equivalent jobs, based on a 38-hour work week.
Output	Represents the gross revenue generated by businesses / organisations in each of the industry sectors in a defined region. Gross revenue is also referred to as total sales or total income.
Benefit Cost Ratio	The BCR determines the overall benefits that a project or investment is likely to generate, relative to its costs. If a project has a BCR greater than 1, this suggests that the project will generate a positive financial impact, as the present value of the project benefits will exceed the present value of total costs (and vice versa).
Net Present Value	The difference between the present value of income and the present value of expenditure over a period of time. A positive NPV indicates that the projected revenue generated by a project or investment exceeds the anticipated expenditure and is, therefore, likely to be profitable and financially beneficial (and vice versa).
Australian Carbon Credit Unit	An ACCU is a unit representing one tonne of carbon dioxide equivalent (CO ₂ e) stored or avoided by a project. An ACCU can only be issued by the Clean Energy Regulator if the entity is identified as a 'fit and proper person' and would be lodged into their Registry account

MURRINDINDI FARM FORESTRY FEASIBILITY ASSESSMENT

Financial Impact Assessment

Scenarios	1 Base Case 30-Year Model	2 Timber Harvesting 30-Year Model	3 Carbon Trading 25-Year Model
Establishment Costs	N/A	(\$ 363,545)	(\$ 363,545)
Average Expenditure p.a.	N/A	(\$ 16,351)	(\$ 13,554)
Average Profit p.a.	\$ 11,186	\$ 37,712	\$ 2,278
NPV	N/A	(\$ 269,359)	(\$ 340,945)
BCR	N/A	0.53	0.35

All Scenarios generate some level of profit over the life of the model. However, after factoring in high establishment costs, the average Return on Investment for both Scenarios 2 and 3 are negative, demonstrated by a negative NPV and BCR less than 1.

Overall, there is a degree of uncertainty in the farm forestry project and potential impact on revenue for Council, including timber revenue and carbon trading revenue. Further investigation is required into larger parcels of land to achieve economies of scale and improve revenue generating capabilities.

Project Risks



Governance

The in-house management of the farm forestry project may require out-sourcing to a specialist manager, and also requires continuity of management over the life of the project.



Environmental

Low rate of tree survival due to a combination of external environmental factors, including extreme weather events (i.e. bushfires, floods and pest grazing).



Market

The market for timber prices and carbon unit spot prices is volatile and could decrease below the estimates in the model (causing revenue and overall profit to decrease).



Reputational

Reputational risk for Council if the farm forestry initiative fails, given the upfront development costs required and ongoing use of resources to manage and support farm forestry.

Other Project Impacts

- **Environmental benefits** associated with planting additional trees in the shire, which will benefit the environment through increased carbon capture, as well as enhance the habitat for local flora and fauna.
- **Improve grazing outcomes** as farm forestry will improve the quality of soil, which will also contribute to **higher quality land and increased land values**.
- Assisting Council and the community in general to achieve broader targets for **carbon net neutrality**.
- Supporting more **productive rural land** in the Shire, which can often remain relatively underutilised (e.g. for grazing).
- **Diversifying income** for farmers and primary producers, as farm forestry can support alternative income generation.
- Developing **skills and knowledge** of farmers.
- Supporting **local businesses and local jobs in the forestry sector**, as the project could increase the overall rate of timber harvesting in the Shire.
- Facilitate a more **sustainable logging industry**, as farm forestry will increase the stock of sustainable timber, which will substitute native logging.

1. INTRODUCTION

1.1. BACKGROUND

Murrindindi Shire Council (Council) has identified an opportunity to establish a farm forestry enterprise¹ on Council-owned land in Yea, which is designed to integrate both agriculture and forestry components within the same site.

The identified site is currently used for grazing, whereby Council receives annual leasing revenue from the lease. However, Council aims to achieve additional benefits through implementation of a farm forestry project (over and above current grazing revenue generated at the site), including income generated through tree harvesting and/or carbon trading. This is in addition to other environmental, economic and social benefits that could be realised.

1.2. ENGAGEMENT AND PURPOSE

Council engaged Urban Enterprise to prepare a comprehensive feasibility assessment for a farm forestry plantation on Council land, building on a background *Feasibility Plan* prepared in March 2022.

The purpose of this report is to examine this project's financial impacts on Council, as well as the flow-on economic, environmental and social impacts through project delivery and operation. The feasibility assessment will be used by Council to inform future budget allocations for the implementation of this project.

1.3. METHODOLOGY

To prepare the feasibility assessment report, the following approach was undertaken:

- An overview of the proposed project, including a description of works, estimated costs and objectives;
- Evaluating the project's strategic alignment with broader government policy;
- Undertake a cost-benefit analysis to identify the financial viability of the project (incorporating various scenarios) and calculate the project benefits relative to its costs;
- Assessing the other project benefits and impacts, including the economic, environmental and industry implications; and
- Identifying the potential risks associated with the project.

¹ The integration of productive trees into the farming landscape.

2. PROJECT PROPOSAL

2.1. OVERVIEW

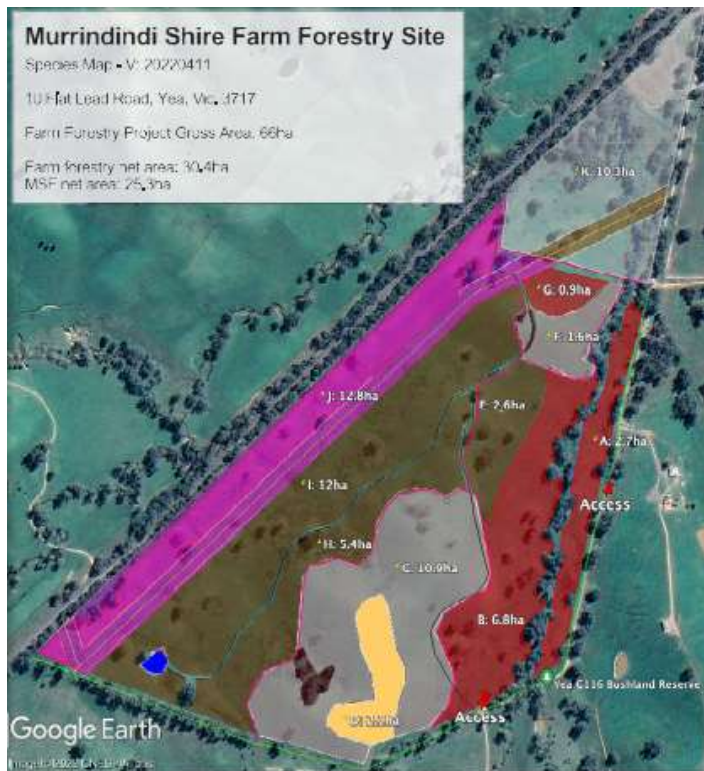
The following details the proposed project, including a description of works, costs and stated objectives to be achieved (note: this information is based on background documents provided by Council).

2.2. DESCRIPTION OF WORKS

Figure F1 shows an outline of the proposed farm forestry site (on Council land), which has a gross project area of 65.8 hectares (ha)². It is anticipated that 34,400 trees could be established across 48.9ha, comprising a mix of native species including red ironbark, lightwood, yellow box, grey box and sugar gum.

The planting of these trees on grazing land, which will be developed over the 2022-23 and 2023-24 financial years, will enable the integration of forestry and agriculture components to be operational from 2024-25 onwards.

F1. FARM FORESTRY SITE



Source: Farm Forestry Feasibility Plan, Just Add Trees, 2022

It is assumed that project establishment will cost a total of **\$363,545** over two years, including:

- \$227,076 in 2022-23; and
- \$136,469 in 2023-24.

These establishment costs include a combination of fencing, site clean-up and planning, as well as planting.

² This discounts approx. 10ha used for a resource recovery centre

2.3. OBJECTIVES

As identified by Council, the project is designed to achieve several objectives, including:

- Implementation of farm forestry and regenerative agriculture principles to create more productive and dynamic farming land;
- Creating of a more diverse and flexible agricultural system that provides a wider range of production and output opportunities;
- Enhancing income generating potential, including through commercial timber harvesting and carbon trading;
- Creating flow-on economic benefits through job creation;
- Increasing the rate of carbon capture and purchase carbon credit units to help achieve the Shire's emissions reduction targets; and
- Support and lead business and community growth in the direction of the green economy.

3. PROJECT CONTEXT

3.1. OVERVIEW

This section provides the context to support the proposal, including relevant strategies that align with the project objectives and key demographic and tourism trends that will support project delivery.

3.2. MACRO-ECONOMIC CONTEXT

- Both the Victorian, Federal and Local Governments have committed to reducing emissions by legislating a long-term target for emission reductions. Businesses are also transitioning to more environmentally sustainable practices, particularly as consumer demand is increasingly influenced by the environmental impact of goods and services.
- In response, the promotion and adoption of environmentally sustainable practices is playing an increasing role within economic development and influencing how Local Governments operate.
- This will inform future decision making and investment within the municipality, including the implementation of projects that support climate change.

3.3. STRATEGIC CONTEXT

There are a range of federal, state and local strategies that support the farm forestry project, particularly its potential to support the environment (via carbon capture) and help achieve emissions reduction targets. These are outlined in Table T1.

T1. STRATEGIC CONTEXT

Strategy	Relevant Objectives and Actions	Project Alignment
Federal		
National Climate Resilience and Adaptation Strategy 2021 – 2025	<p>The national strategy aims to position Australia to better anticipate, manage and adapt to our changing climate. It sets out three interlinked objectives to ensure Australians can better protect our natural assets, build community resilience and generate economic opportunities in a changing climate.</p> <ul style="list-style-type: none"> • Drive investment and action through collaboration; • Improve climate information and services; and • Assess progress and improve over time. 	<p>Carbon Offsets implements a practical adaptation strategy to fight the onset of climate change. This project achieves all three objectives of the national strategy including:</p> <ul style="list-style-type: none"> • Offsetting carbon within the atmosphere and provide a leading example of sustainable business practice within Regional Victoria; and • Demonstrate ongoing progress and improvement in farm forestry opportunities for other regional areas.
Australia's Long-Term Emissions Reduction Plan	<ul style="list-style-type: none"> • This plan outlines Australia's goal to achieve net zero emissions by 2050. • The plan focuses on technology and enables the private sector to invest into new industries that promote net neutrality. 	<ul style="list-style-type: none"> • Implementing farm forestry projects in Murrindindi provides an opportunity to increase the rate of carbon offsets and reduce emissions. • Australia's carbon offset scheme can incentivise farm forestry and help private, local, state and federal reach the nations net neutrality goal.

Strategy	Relevant Objectives and Actions	Project Alignment
State		
Victoria's Climate Change Strategy	<ul style="list-style-type: none"> Victoria's Climate Change Strategy is a roadmap to achieve net-zero emissions and a climate resilient Victoria by 2050 The strategy also focuses on agriculture to ensure farmers are equipped to achieve emissions reduction targets by harnessing new technologies and practices 	<ul style="list-style-type: none"> Farm forestry on agricultural land provides opportunities for farmers to offset carbon (via carbon capture) and help achieve the targets for emissions reduction, Supporting farmers in adopting new environmentally sustainable practices, including farm forestry, will help support the government's progress in combating the effects of climate change.
Building Victoria's Climate Resilience	<ul style="list-style-type: none"> Outlines the Victorian Government's current adaptation action and next steps, guided by the priorities of Victoria's Climate Change Strategy Demonstrates sustainable business practices at the local level for agricultural and farming industries Continues to push climate resilient practices at the local and state level. 	<ul style="list-style-type: none"> Farm forestry can help build Victoria's climate resilience by reducing emissions and increasing the rate of carbon capture. This will help ensure the agricultural sector is more climate resilient.
Natural Environment Climate Change Adaptation Action Plan 2022-2026	<ul style="list-style-type: none"> This plan focuses on building the practices, systems and knowledge that will enable effective adaptation to climate impacts on Victoria's natural environments. The plan will help guide adaptation planning in regional and place-based plans that manage specific areas and ecosystems, species and natural environment values. 	<ul style="list-style-type: none"> Supports Murrindindi's goals to combat climate change and achieve local emissions reductions. The implementation of farm forestry projects could support more environmentally sustainable practices across rural industries.
Primary Production Climate Change Adaptation Action Plan 2022-2026	This focuses on building the climate resilience of value chains, facilitating research and innovation and supporting primary industries to build further on their climate change adaptation information, skills and capacity.	<ul style="list-style-type: none"> Farm Forestry projects on primary production business located on rural land will help build the climate resilience of the industry (and Shire more generally).
LOCAL		
Murrindindi Health and Wellbeing Plan 2021-2025	<ul style="list-style-type: none"> Protect and enhance health and wellbeing for the people of Murrindindi, including through supporting the environment. The Plan <i>recognise the relationship between climate change and our health and aims to achieve resilient and safe communities in light of future challenges.</i> 	<ul style="list-style-type: none"> Adopting farm forestry practices could help promote the resilience of the agricultural sector by providing additional revenue for farmers, as well as supporting environmentally sustainable practices.
Murrindindi Shire Council's 2021 -2025 Council Plan	<ul style="list-style-type: none"> Protecting the natural environment and taking action on climate change was a key community focus identified through local consultation. 	<ul style="list-style-type: none"> Farm forestry could help store carbon and reduce carbon emissions in the Shire, which will help the community to support the environment and combat climate change.
Murrindindi Shire Community Vision (2020)	<p>Relevant visions identified include:</p> <ul style="list-style-type: none"> Leaders in waste reduction and combating climate change; Protect our natural environment and biodiversity and preserve our rural landscapes; and Grow through managed land development, business entrepreneurship and enhanced learning opportunities. 	<ul style="list-style-type: none"> The farm forestry project (and expansion of this project across the Shire) could help transition the local community into a greener economy through increasing carbon offsets. This will increase economic opportunities for local farmers and promote learning of new, diverse practices on rural land.

Strategy	Relevant Objectives and Actions	Project Alignment
<p>Council's Climate Change Pledge</p>	<ul style="list-style-type: none"> • Council aims to reduce an estimated 10% of greenhouse gas emissions by 2025 from current levels, caused or otherwise influenced by council. • Council aims to achieve net zero emissions by 2035. • Council will continue to reduce its own greenhouse gas emissions by investing in and/or supporting projects that improve energy efficiency and promote the use of renewable energy across the municipality. It will also lead the community and business to reduce emissions 	<ul style="list-style-type: none"> • This project aligns with council's climate change pledge as it supports and leads business and community growth in the direction of the green economy. • It reduces greenhouse gas emissions through sustainable harvesting and forestry projects which store carbon.

Source: Various, derived by Urban Enterprise, 2022.

4. COST-BENEFIT ASSESSMENT

4.1. OVERVIEW

This section provides a financial cost-benefit assessment for the farm forestry project. This is designed to demonstrate the project's Return On Investment (ROI), which is assessed via the Net Present Value (NPV) and Benefit Cost Ratio (BCR). Definitions of cost-benefit terms can be found in the glossary.

As part of this assessment, a financial model was prepared for the establishment and operation of the site (over a 30-year period), incorporating the agricultural and forestry elements. This model details the ongoing net financial result by drawing on several key variables, including:

- Establishment/set-up costs;
- Ongoing operating costs; and
- Ongoing project revenue.

Although the project's operating model (i.e. management and governance structure) will influence the site operation and financial outcome, this report assumes **Council will manage the project in-house through a dedicated project manager.**

Unless indicated otherwise, it is assumed that all financial estimates are in current (2022) dollars and no inflation has been applied to costs or revenue. Please note that all assumptions have been benchmarked against existing reports and industry standards (where relevant). As such, these figures are indicative only and subject to further investigation and market testing.

4.2. SCENARIO ANALYSIS

Given the complex nature of the project and the range of income generating possibilities, a set of scenarios have been adopted to test the potential impact of the project. These are detailed below.

T2. SCENARIO ANALYSIS

Scenario	Revenue	Description
Scenario 1 (Base case)	<ul style="list-style-type: none">• Lease fee for grazing	This examines the status quo to provide a basis for comparison. This is used to measure the relative impact of farm forestry and whether the project will positively benefit Council.
Scenario 2 (Timber harvesting)	<ul style="list-style-type: none">• Lease fee for grazing• Sale revenue from commercial timber harvesting	This examines the income generating potential (and ROI) for the commercial timber harvesting of the forestry element. This scenario includes a prices sensitivity analysis to factor in fluctuations in timber prices
Scenario 3 (Carbon trading)	<ul style="list-style-type: none">• Lease fee for grazing• Revenue from sales of carbon credits	This examines the income generating potential of carbon capture and the revenue received through the subsequent sale of carbon credits. This scenario includes a prices sensitivity analysis to factor in the volatility in carbon trading.

Note: The income generating potential from timber harvesting and carbon trading have been separated into different scenarios, as Urban Enterprise has been advised that that harvesting will decrease the carbon capture potential and offset the ability to generate additional income via carbon trading.

4.3. SCENARIO 1 (BASE CASE)

The following outlines the financial outcomes for Council assuming no farm forestry project is implemented. This demonstrates the status quo and provides a basis for comparison to assess the impact of the other scenarios.

4.3.1. PROJECT EXPENDITURE

Given the land is currently leased by a private farmer, there are no additional establishment costs or ongoing project costs for Council

4.3.2. PROJECT REVENUE

Grazing revenue is assumed to be \$170/ha p.a.³, which equates to a total revenue of \$11,186 p.a. when accounting for the site area of 65.8ha.

Under the base case, assuming a 30-year model, total revenue received by Council over the life of the model is \$335,580.

4.3.3. COST BENEFIT RESULTS

Given that no investment is required for the base case, the ROI (including NPV and BCR) was not calculated

4.4. SCENARIO 2 (TIMBER HARVESTING)

This scenario examines the return on investment of establishing and operating a farm forestry project for the purposes of generating additional revenue through commercial timber harvesting – in addition to lease revenue (from grazing).

4.4.1. PROJECT CASHFLOW

Establishment Costs

As detailed in Section 2, the establishment costs to set-up the farm forestry project totals **\$363,545** over two years, which will include fencing, design, site clean-up, planning and planting as follows:

- \$227,076 in 2022-23 (or \$3,451/ha); and
- \$136,469 in 2023-24 (or \$2,075/ha)⁴.

Ongoing Project Cashflow

Table T3 outlines the ongoing project cashflow over a 30-year period of operation, which demonstrates the net impact based on the projected revenue and costs.

This is based on the information provided in the *Farm Forestry Feasibility Plan* and includes the following assumptions:

- Grazing revenue (via lease arrangements) ceases during initial planting and continues from Year 4 onwards at same fee (of \$170/ha p.a.);
- Ongoing management costs of \$80/ha p.a. are incurred to oversee the farm forestry project;

³ Farm Forestry Feasibility Plan, Just Add Trees, 2022

⁴ Farm Forestry Feasibility Plan, Just Add Trees, 2022

- Ongoing insurance costs of \$50/ha p.a. are incurred (note: based on average insurance costs for a similar project in Ballarat);
- Significant costs are incurred to prune, fertilise and ready trees for harvesting in Years 4, 6, 13 and 21; and
- Revenue from commercial harvesting is generated during Years 12 (approx. \$420/ha p.a.), 20 (approx. \$2,200/ha p.a.) and 30 (approx. \$17,400/ha p.a.), which excludes the lease revenue.

T3. SCENARIO 2 ONGOING PROJECT CASHFLOW (30-YEAR OPERATION)

Year	Item	Expenditure	Revenue	Net Impact: Profit/(Loss)
ESTABLISHMENT				
-1	Annual mgt	(\$227,076)	\$8,225	(\$218,851)
0	-	(\$136,469)	-	(\$136,469)
OPERATION				
1	Annual mgt	(\$8,554)	\$0	(\$8,554)
2	Form pruning, fuel mgt	(\$18,819)	\$0	(\$18,819)
3	Annual mgt, fuel mgt	(\$11,186)	\$0	(\$11,186)
4	1st stem prune +	(\$25,399)	\$11,186	(\$14,213)
5	Annual Mgt+	(\$8,554)	\$11,186	\$2,632
6	2nd Stem prune, Mulch NCT	(\$64,221)	\$11,186	(\$53,035)
7	Coppice control+	(\$19,477)	\$11,186	(\$8,291)
8	3rd stem prune+	(\$37,835)	\$11,186	(\$26,649)
9	Annual Mgt	(\$8,554)	\$11,186	\$2,632
10	Annual Mgt	(\$8,554)	\$11,186	\$2,632
11	Access maintenance and soil sampling+	(\$14,805)	\$11,186	(\$3,619)
12	1st commercial thinning & foilar sampling	(\$5,132)	\$39,019	\$33,887
13	Fertiliser application and coppice control+	(\$61,589)	\$11,186	(\$50,403)
14	Annual Mgt	(\$8,554)	\$11,186	\$2,632
15	Annual Mgt	(\$8,554)	\$11,186	\$2,632
16	Annual Mgt	(\$8,554)	\$11,186	\$2,632
17	Annual Mgt	(\$8,554)	\$11,186	\$2,632
18	Annual Mgt	(\$8,554)	\$11,186	\$2,632
19	Access maintenance and soil sampling+	(\$14,805)	\$11,186	(\$3,619)
20	2nd commercial thinning & foilar sampling	(\$5,132)	\$157,525	\$152,393
21	Fertiliser application and coppice control+	(\$61,589)	\$11,186	(\$50,403)
22	Annual Mgt	(\$8,554)	\$11,186	\$2,632
23	Annual Mgt	(\$8,554)	\$11,186	\$2,632
24	Annual Mgt	(\$8,554)	\$11,186	\$2,632
25	Annual Mgt	(\$8,554)	\$11,186	\$2,632
26	Annual Mgt	(\$8,554)	\$11,186	\$2,632
27	Annual Mgt	(\$8,554)	\$11,186	\$2,632
28	Annual Mgt	(\$8,554)	\$11,186	\$2,632
29	Access maintenance and soil sampling+	(\$8,554)	\$11,186	\$2,632
30	Clearfall and foilar sampling	(\$5,132)	\$1,156,896	\$1,151,763

Source: Farm Forestry Feasibility Plan, Just Add Trees, 2022

Key points to note from the operating cashflow analysis:

- Excluding set-up costs, the net impact is relatively volatile, given the nature of commercial harvesting where revenue is generated every 10 years or so;
- This results in several years of net losses incurred;
- However, significant revenue is generated during harvesting years, which increases exponentially as trees mature. As such, average revenue generated by Council over the 30-year operating period is estimated at **\$54,063 p.a.**; and
- Overall, over the 30-year period the average annual profit generated by Scenario 2 totals **\$37,712 p.a.**

4.4.2. SENSITIVITY ANALYSIS

Before detailing the ROI – through the BCR and NPV analysis – a sensitivity analysis has been undertaken to account for fluctuations in timber prices, to test the analysis for areas of risk as the model relies on various uncertain assumptions. The following sensitivities to timber prices were applied:

- **Conservative price** – a *decrease* in timber price by 20%; and
- **Optimistic price** – an *increase* in timber price by 20%.

4.4.3. COST BENEFIT RESULTS

The cost-benefit results for each change to timber prices is shown in Table T4, which demonstrates the operating results as well as the ROI (i.e. NPV and BCR). The results are calculated using a discount rate of 7%, which is consistent with Victorian Treasury guidelines. Key points to note include:

- For each price sensitivity analysis, the project provides a *negative* ROI, demonstrated by:
 - A **negative NPV**, ranging from **-\$307,226** to **-\$232,382**; and
 - A **BCR less than 1**, ranging from **0.46** to **0.59**.
- Although across all prices, the average profit received by Council over the 30-year period is positive, ranging from \$28,864 p.a. to \$46,438 p.a.
- However, the revenue is more than offset by the establishment costs, which decrease the overall ROI.

T4. COST-BENEFIT RESULTS

	Conservative Price (-20%)	Current Scenario	Optimistic Price (+20%)
Establishment Costs		(\$363,545)	
Average Expenditure p.a.		(\$16,351)	
Average Revenue p.a.	\$45,215	\$54,063	\$62,789
Average Profit/(Loss) p.a.	\$28,864	\$37,712	\$46,438
NPV	(\$307,226)	(\$269,359)	(\$232,382)
BCR	0.46	0.53	0.59

Source: Urban Enterprise, 2022

To achieve a break-even ROI (i.e. NPV greater than zero and BCR greater than 1), the price for timber would need to increase by over 125%. This indicates that the farm forestry project is *not* considered to be financially viable in terms of generating harvesting revenue. As such, although Council will receive ongoing operating profits (for all prices), the high establishment costs mean it is *unlikely* to provide positive financial benefits for Council.

4.5. SCENARIO 3 (CARBON TRADING)

Scenario 3 analysis the cost-benefit to Council from using the farm forestry project to engage in carbon trading as a means to generate revenue (in addition to lease revenue from grazing). This involves capturing carbon through the additional trees planted at the site and selling this as Australian Carbon Credit Units (ACCU) to the carbon market.

4.5.1. PROJECT CASHFLOW

Establishment Costs

The establishment costs slightly increase from Scenario 2 – totalling **\$380,545** over two years (\$229,076 in 2022-23) and \$151,469 in 2023-24), due to:

- Registration fees of \$2,000 (to register for the ACCU scheme); and
- The first offset report (\$15,000), which is part of the accreditation process.

Ongoing Project Cashflow

The information included in the carbon trading operating model (Table T5) is drawn from a combination of the *Farm Forestry Feasibility Plan*, as well as the 'DIY Carbon Feasibility Calculator' from the *Carbon Farming Foundation*⁵.

The following assumptions were used

- The period of operation is 25 years (not 30), as carbon trading is typically modelled at either 25-year or 100-year permanence (note: a 20% discount is applied to carbon credits under the 25-year model);
- The recommended tree species to be planted on the site yields approx. 150 tonnes of CO₂e/ha p.a., or 150 ACCU (1 tonnes of CO₂e = 1 ACCU)⁶;
- The carbon price is assumed to be \$30 per carbon unit, which has been the average ACCU spot price over the past few months (see Figure F2 below);
- Revenue includes lease fees from grazing (\$170/ha p.a.), as well as \$95/ha p.a. from selling carbon credits. (note: This is an average price for selling carbon units that is spread annually over the life of the model, based on an average of 150 tonnes of CO₂e/ha p.a.. The information in the feasibility calculator does not include the variations in CO₂ units generated over time as trees mature)⁷;
- Ongoing management costs of \$80/ha p.a. are incurred to oversee the farm forestry project;
- Ongoing insurance costs of \$50/ha p.a. are incurred (note: based on average insurance costs for a similar project in Ballarat);
- Other carbon trading expenses are incurred as follows⁸:
 - Offset reports are required every five years (as part of the accreditation process) at a cost of \$15,000 per report;
 - Four forester inspections at a cost of \$5,000 per inspection; and
 - Three third-party audits (\$10,000 each) at Years 7, 14 and 21. These are used to monitor the carbon units generated.

⁵ This calculator includes software to assess the financial implications of a carbon trading scenario, which was applied to the farm feasibility project.

⁶ The model calculates carbon capture from trees only and excludes soil, debris or dead wood.

⁷ It is recommended more thorough investigation is conducted to trace the projected carbon units generated by the project, to provide more accurate revenue over the 25-year period.

⁸ These expenses are obtained from the DIY Carbon Feasibility Calculator, noting they are average costs that have not factored in the specifics of the site (including soils, species, tree numbers, etc.). Therefore, it is recommended that a more thorough investigation is conducted to provide more accurate costings.

T5. SCENARIO 3 ONGOING PROJECT CASHFLOW (25-YEAR OPERATION)

Year	Item	Expenditure	Revenue	Net Impact: Profit/(Loss)
ESTABLISHMENT				
-1	Establishment + annual mgt + registration	(\$229,076)	\$8,225	(\$220,851)
0	Establishment + offset report	(\$151,469)	-	(\$151,469)
OPERATION				
1	Annual Mgt	(\$8,554)	\$15,832	\$7,278
2	Annual Mgt	(\$8,554)	\$15,832	\$7,278
3	Annual Mgt	(\$8,554)	\$15,832	\$7,278
4	Annual Mgt	(\$8,554)	\$15,832	\$7,278
5	Offset Report + inspection	(\$28,554)	\$15,832	(\$12,723)
6	Annual Mgt	(\$8,554)	\$15,832	\$7,278
7	Auditing	(\$18,554)	\$15,832	(\$2,723)
8	Annual Mgt	(\$8,554)	\$15,832	\$7,278
9	Annual Mgt	(\$8,554)	\$15,832	\$7,278
10	Offset Report + inspection	(\$28,554)	\$15,832	(\$12,723)
11	Annual Mgt	(\$8,554)	\$15,832	\$7,278
12	Annual Mgt	(\$8,554)	\$15,832	\$7,278
13	Annual Mgt	(\$8,554)	\$15,832	\$7,278
14	Auditing	(\$18,554)	\$15,832	(\$2,723)
15	Offset Report	(\$23,554)	\$15,832	(\$7,723)
16	Annual Mgt	(\$8,554)	\$15,832	\$7,278
17	Annual Mgt	(\$8,554)	\$15,832	\$7,278
18	Annual Mgt	(\$8,554)	\$15,832	\$7,278
19	Annual Mgt	(\$8,554)	\$15,832	\$7,278
20	Offset Report + inspection	(\$28,554)	\$15,832	(\$12,723)
21	Auditing	(\$18,554)	\$15,832	(\$2,723)
22	Annual Mgt	(\$8,554)	\$15,832	\$7,278
23	Annual Mgt	(\$8,554)	\$15,832	\$7,278
24	Annual Mgt	(\$8,554)	\$15,832	\$7,278
25	Offset Report + inspection	(\$28,554)	\$15,832	(\$12,723)

Source: Farm Forestry Feasibility Plan, Just Add Trees, 2022

With average revenue of \$15,832 smoothed over the 25-year period, the average profit generated over the life of the model is estimated at **\$2,278 p.a.**;

4.5.2. SENSITIVITY ANALYSIS

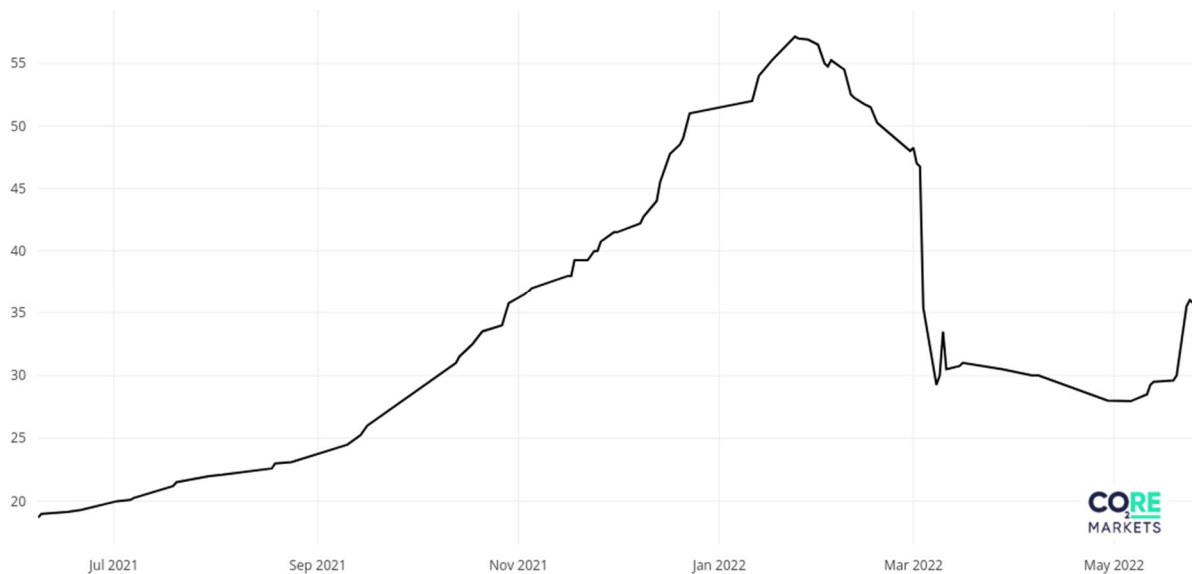
Given the uncertainty around carbon pricing, which is effectively an exchange based on supply and demand for carbon credits, a price sensitivity analysis has been applied to test for areas of risk.

As shown in Figure F2, carbon pricing has fluctuated significantly over the past year, increasing from a low of around \$20 in July 2021 to a high of over \$55 in February 2022, before decreasing to around \$30 since March 2022.

As such, the following price sensitivities were applied:

- **Conservative price** – a *decrease* in ACCU spot price to \$20 per unit (equates to average carbon trading revenue of \$57/ha p.a.); and
- **Optimistic price** – an *increase* in ACCU spot price to \$50 per unit (equates to average carbon trading revenue of \$172/ha p.a.).

F2. ACCU SPOT PRICE CHART (JULY 2021 TO MAY 2022)



Source: <https://www.renewableenergyhub.com.au/market-prices/>

4.5.3. COST BENEFIT RESULTS

The cost-benefit results are shown in Table T6, which assumes expenses remain constant and revenue varies based on changing ACCU spot prices. The results are calculated using a discount rate of 7%, which is consistent with Victorian Treasury guidelines. Key points to note include:

- For each price point, the project provides a *negative* ROI, demonstrated by:
 - A **negative NPV**, ranging from **-\$361,183** to **-\$299,936**; and
 - A **BCR less than 1**, ranging from **0.31** to **0.42**.
- Across all prices, the average profit received by Council over the 30-year period is positive, ranging from \$419 p.a. to \$6,043 p.a. However, the revenue is more than offset by the establishment costs, which decreases the overall ROI.

T6. SCENARIO 3 COST-BENEFIT RESULTS (25-YEAR PERMANENCE)

	Conservative Price (\$20 per unit)	Average Price (\$30 per unit)	Optimistic Price (\$50 per unit)
Establishment Costs		(\$363,545)	
Average Expenditure p.a.		(\$13,554)	
Average Revenue p.a.	\$13,973	\$15,832	\$19,597
Average Profit/(Loss) p.a.	\$419	\$2,278	\$6,043
NPV	(\$361,183)	(\$340,945)	(\$299,936)
BCR	0.31	0.35	0.42

Source: Urban Enterprise, 2022

To achieve a break-even ROI (i.e. NPV greater than zero and BCR greater than 1), the price for carbon units for need to significantly increase above the most recent high point (\$55 per unit). Similar to Scenario 2, although Council will receive ongoing operating profits (for all prices), the carbon trading model is *unlikely* to provide positive financial benefits for Council.

4.5.4. OTHER CONSIDERATIONS

Key assumptions behind the carbon trading scenario – the land size and time-period – will have significant impacts on the financial outcome and require further investigation.

100-Year Permanence

Altering the model to a lifespan of 100 years provides improved financial benefits as it eliminates the 20% discount that applies to 25-year projects, as well as providing more opportunity for carbon capture (with more mature trees) and subsequently selling carbon credits.

Urban Enterprise modelled the cost-benefit results under the varying price points, with the results detailed in the table below (note: all expenses and revenue remain constant and occur at similar intervals to the 25-year model).

Under 100-year permanence, the ROI is almost break-even from \$50 per carbon unit and higher. However, under an average price (\$30) and a conservative price (\$20), the ROI remains *negative*:

T7. SCENARIO 3 COST-BENEFIT RESULTS (100-YEAR PERMANENCE)

	Conservative Price (\$20 per unit)	Average Price (\$30 per unit)	Optimistic Price (\$50 per unit)
NPV	(\$69,423)	(\$35,232)	(\$3,135)
BCR	0.75	0.88	0.99

Source: Urban Enterprise, 2022

Therefore, assuming average prices and allowing for maximum credits over the 100-year period, the carbon trading scenario could be financially viable and generate financial benefits for Council if carbon prices increased to recent maximum levels. However, this would need to factor in an optimistic price point over an extended period of time, which remains uncertain.

Larger Site Area

The project site area (65.8 ha with planting area of 48.9 ha) is relatively small for a carbon trading project. Advice has been provided by third parties that increasing the plantation area will achieve economies of scale as potential revenue generated by carbon capture/trading will increase by a higher rate than plantation and ongoing costs (particularly for 25-year projects).

We understand Council has considered expanding the subject site to around 125 ha (which could involve aggregating another land parcel). However, the costs for establishing and maintaining a larger site is unknown given that further investigation is required (i.e. soil testing, etc.).

As such, we recommend further investigation is undertaken to locate a larger subject site and identify the subsequent project costs for farm forestry.

5. OTHER PROJECT BENEFITS

5.1. OVERVIEW

The following examines the other impacts and benefits of the farm forestry project, taking into account the various scenarios. This includes the potential economic impact, as well as qualitative social and environmental impacts.

5.2. ECONOMIC IMPACT ASSESSMENT

The following examines the economic impacts of the farm forestry project, including the short-term development (i.e. establishment) phase, as well as the ongoing operational phase that will be delivered once the project is complete and functional.

This assessment adopts the input-output method of analysis (I-O). The I-O method is based on the interdependencies and relationship between industry sectors and is widely used across the public and private sector to estimate the direct and flow on economic impacts of a project or activity to an economy.

The Productivity Commission of Australia states that *“input-output tables can be used to compute output, employment and income multipliers. These multipliers take account of one form of interdependence between industries – that relating to the supply and use of products. The numbers add up the direct and indirect impacts of a change in final output of a designated industry on economic activity and employment across all industries in an economy.”*

The economic impact area adopted for this assessment is the Murrindindi Local Government Area. All figures in this section are indicative only and based on an adopted set of assumptions. Definitions of economic terms can be found in the glossary.

5.2.1. ESTABLISHMENT PHASE IMPACT (SHORT-TERM)

The direct investment of \$363,545 over the establishment period is estimated to generate total economic output of around **\$685,000** and **2 jobs** in the Murrindindi economy. This includes:

- \$363,545 in direct output and \$321,191 in indirect output; and
- 1 direct and 1 indirect job⁹.

T8. CONSTRUCTION PHASE ECONOMIC IMPACT

	Direct Impacts	Indirect Impacts	Total Impacts
Output (\$M)	\$363,545	\$321,191	\$684,736
Employment (No.)	1	1	2

Source: Urban Enterprise, 2022.

5.2.2. OPERATIONAL PHASE (ONGOING)

The ongoing economic benefits generated by the project, in terms of output and job creation, will be realised through *net* additional revenue generated. Table T9 demonstrates the *maximum* economic impact that could be generated by each scenario (using the operating cashflow models from Section 4). The results are as follows:

- **Scenario 1** (average revenue of \$11,186 p.a.) – additional annual economic output of over \$16,000 and no jobs created;

⁹ Direct jobs are typically local while indirect jobs are created as part of the broader supply chain.

- **Scenario 2** (maximum revenue of \$1.2 million in Year 30 only) – additional economic output of \$1.6 million and 3 jobs¹⁰ created based on the level of harvesting activities undertaken in Year 30. The level of harvesting activity directly correlates with output and job generation; and
- **Scenario 3** (average revenue of \$15,832 p.a.) – additional annual economic output of around \$23,000 and no jobs created.

T9. OPERATIONAL PHASE ECONOMIC IMPACT (YEAR 1)

	Scenario 1 (Base case)	Scenario 2 (Timber harvesting) ¹¹	Scenario 3 (Carbon trading) ¹²
ECONOMIC OUTPUT (\$M)			
Direct Impacts	\$11,186	\$1,156,896	\$15,832
Indirect Impacts	\$5,110	\$403,150	\$7,231
Total	\$16,296	\$1,560,046	\$23,063
EMPLOYMENT (No.)			
Direct Impacts	-	2	-
Indirect Impacts	-	1	-
Total	-	3	-

Source: Urban Enterprise, 2022.

Although the revenue received by Council through the farm forestry project is likely to generate additional output for each scenario, Scenario 2 is expected to have the greatest impact on the economy and jobs (given the greater revenue impact during the final harvesting period in the model).

5.3. QUALITATIVE PROJECT IMPACTS

While the overall impacts of the pilot project will be limited, given the small scale of land, the expansion of farm forestry across the Shire could potentially deliver a range of broader qualitative benefits, including:

- **Environmental benefits** associated with planting additional trees in the shire, which will benefit the environment through increased carbon capture, as well as enhance the habitat for local flora and fauna;
- Supporting more **productive rural land** in the Shire, which can often remain relatively underutilised. Therefore, farm forestry can promote more uses on public and private farming land;
- **Improve grazing outcomes** as farm forestry requires fertiliser and soil treatment, which will improve the quality of soil. As such, grazing income is likely to be unaffected by farm forestry, while improved soil condition will also contribute to **higher quality land** and **increased land values**;
- **Diversifying income** for farmers and primary producers, as farm forestry can support alternative income generation through timber harvesting and/or carbon trading;
- Developing **skills and knowledge** of farmers, which will support a more sustainable agricultural sector;
- Supporting **local businesses (and local jobs) in the forestry sector**, as the project will increase the overall rate of timber harvesting in the Shire; and
- Facilitate a more **sustainable logging industry**, as farm forestry will:
 - Increase the stock of sustainable timber in the Shire, which will substitute native logging; and
 - Increase the volume of timber plantations without needing to access dedicated land; and
 - Promote more sustainable tree management without harming existing rural farming land.

¹⁰ Direct jobs are typically local while indirect jobs are created as part of the broader supply chain.

¹¹ Assumes average prices without price sensitivity analysis.

¹² Assumes average ACCU spot price of \$30 per unit.

6. RISK ASSESSMENT

6.1. OVERVIEW

This section identifies some of the key risks associated with the pilot project. A risk assessment framework is summarised in the table below including the category of risk, probability and scale of impact.

Key points to note are that the prices for timber and especially carbon trading have the potential to be volatile, as it relies on external market forces. This is a key risk that needs to be considered when undertaking the farm forestry project, as there are limited mitigation techniques to overcome price decreases.

T10. RISK ASSESSMENT FRAMEWORK

Category	Risk	Probability (Low/ Medium/ High)	Impact (Low/ Medium/ High)
Environmental and Establishment	Low rate of tree survival due to a combination of external environmental factors, including extreme weather events (i.e. bushfires, floods), as well as low take-up of planted seedlings, causing the number of mature trees to decrease and reducing the income generating potential.	Medium	High
Pest Grazing	Destruction of trees or tree damage caused by pests (e.g. kangaroos) may limit the level of income generated from carbon capture or harvesting	Low	Medium
Governance	The management of the farm forestry project is time consuming and requires out-sourcing to a specialist manager/ organisation.	Low	Medium
Continuity	Lack of continuity over the life of the model as Councillors and Council staff change over time, which could impact project management	Medium	Medium
Market	The market for timber prices and carbon unit spot prices becomes volatile and decreases below the estimates in the model (causing revenue and overall profit to decrease).	High	High
Reputational	Reputational risk for Council if farm forestry initiative fails, given the upfront development costs required and ongoing use of resources to manage and support farm forestry.	Medium	Medium

7. KEY FINDINGS

The key findings from the feasibility assessment can be synthesised as follows:

- In terms of operating cashflow, Scenario 2 (timber harvesting) provides the largest operating profit to Council at an estimate of \$37,712 p.a. (see Table T11).

T11. AVERAGE OPERATING PROFIT COMPARISONS

	Scenario 1 (Base case)	Scenario 2 (Timber harvesting) ¹³	Scenario 3 (Carbon trading) ¹⁴
Average annual operating profit	\$11,186 p.a.	\$37,712 p.a.	\$2,278 p.a.

- Scenario 2 provides more favourable financial benefits (compared to Scenario 3) in terms of NPV/BCR, as well as average profit and ongoing economic benefits (such as job creation). However, after factoring in high establishment costs, the average ROI for both Scenarios 2 and 3 are *negative*, demonstrated by a negative NPV and BCR less than 1.
- As such, the Base Case will provide more certainty in terms of ongoing financial benefits, albeit at a relatively minor scale.
- The scale of land at the subject site is currently too small to justify the implementation of a farm forestry pilot – either for commercial harvesting or carbon trading. Therefore, it is recommended that a larger parcel of land is identified and examined for its suitability to undertake farm forestry. However, if this was to be undertaken, the following issues would need to be considered and investigated:
 - The scale of land required to achieve economies of scale and ensure that revenue increases outweigh any increases in costs;
 - The operating model and whether the project should be managed in-house or outsourced to a specialist entity/committee. It would ideally be outsourced so that the farm forestry project can continue over the long-term without impeding on Council operations;
 - The volatility of the ACCU carbon spot price, which has experienced recent fluctuations and is dependent on external market forces;
 - The set-up accreditation requirements for carbon trading are time consuming and costly, which can impact the financial outcomes;
 - The length of time for carbon trading – with a 100-year permanence model providing improved financial outcomes; and
 - The stability of the asset – with timber currently being a more reliable asset as carbon trading is relatively new and subject to potential regulatory changes.
- There is also the possibility of combining both carbon trading and timber harvesting on-site, which has occurred in other municipalities whereby a smaller percentage of timber is harvesting so as not to detract from the level of carbon units provided. This has the potential to increase revenue generation, however, further investigation is required to examine how this could be implemented and achieve a positive financial outcome.
- An alternative to help Council achieve organisational net carbon neutrality is *carbon offsetting* (i.e. purchasing ACCUs to offset emissions). This would, however, need to be examined further and tested against the financial outcomes of the carbon trading scenario.

Overall, there is a degree of uncertainty in the farm forestry project and potential impact on revenue for Council. However, with further investigation into on larger parcels of land and adopting best practice principles, there are future opportunities to successfully implement this project.

¹³ Assumes average prices without price sensitivity analysis.

¹⁴ Assumes average ACCU spot price of \$30 per unit.

