Faculty of Science
School of Ecosystem and
Forest Sciences

Next Generation Plantation Investment Research Project

Land assessment

Report 5. Next Generation Forest Plantation Investment Research Project

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Key findings

1. There are approximately 6.21 million ha of private rural land above 600 mm annual rainfall in Victoria with no existing native vegetation or plantation, or other zoning restrictions.
2. Of this, between 1.9 M ha and 2.6 M ha meets commercial criteria for forest productivity, transport and harvest costs within 200 km of the processing centres of the four project industry partners.
3. For each centre there is between 460,000 and 925,000 ha of land that meets broad investment criteria. There is overlap between these areas.
4. Local level planning and operational constraints could reduce these areas by 10-20%.
5. Suitability does not indicate availability of land. This will depend on the decisions of individual landowners and their willingness to participate in partnerships with industry or investors.
6. The extent and location of existing plantation was difficult to determine. The Victorian plantation layer from the NFI identified 87% of project partners' estates. The Victorian Land Use layer identified only 59 to 67 % of the partners' estates.
7. The average property length of internal fence per ha is a potentially useful measure to assess opportunities for integrating tree plantings into existing land uses. This varied between 46 to 92 m/ha.
8. Replacing or extending existing shelter belts on properties could potentially incorporate trees on 9 to 17% of properties (8 to 18 ha per property). Fencing costs for shelter belts would need to be negotiated with farmers and could add to establishment costs.
9. Engaging landowners in partnerships will require intensive investment in relationship building through trusted intermediaries, such as an agricultural adviser.

Recommendations for assessing land suitability and availability

1. For broad planning purposes, assess land suitability for tree plantations using a combination of modelled tree growth, roading, transport costs and slope class.

2. Model tree growth and slope at the highest possible resolutions to identify smaller and more fragmented land parcels than traditionally considered commercially viable by large plantation operators.

3. Use verified spatial data for presence of existing plantations. Don't assume public domain data is accurate.

4. Land availability is constrained by landholder willingness to participate in tree planting. Therefore, to model availability there must be a clear focus on quantifying landholders' existing land uses and how much and what classes of land they are prepared to utilise for commercial tree planting, and under what business partnership conditions.

5. Identify volunteer landholders to provide design input through:
    - Building relationships with trusted advisors such as agricultural consultants
    - using a communication message that focusses on landholders' needs
    - being physically present and available at rural events to answer questions and build rapport.

6. Be ready for questions about potential partnership models that indicate "how much and when I might get paid", as the answers will determine potential land availability.

Introduction

"Globally there is a growing demand for wood. To meet this future demand, the global area of tree plantations may need to double by 2050. There is a considerable area of farmland in Australia where different types of forest would benefit agricultural production and provide environmental benefits. There are strong policy drivers for plantations but limited recent investment in new plantations. This lack of new investment is a constraint on expansion in the forest processing sector.

The Next Generation Plantation Investment (NGPI) project aims to bring a combination of interested people together to design and test new models of investment in planted forests. This approach presents an opportunity to learn from past experiences in order to design more sustainable and attractive models for planted forest investment that meet the requirements of industry, landowners, capital investors and other stakeholders."[1]

This report describes the approach and findings of a spatial study of private land in Victoria that may be "suitable" and "potentially available" for planting trees that can be profitably harvested for wood products and complement landholder objectives. It was undertaken as part of NGPI project. The focus was on the processing facilities of the industry partners in the project: AKD Softwoods Ltd, Australian Paper Ltd, Midway Ltd, and OneFortyOne Plantations Ltd. The aim was to provide a basis for identifying potential landowners, with which these forest products companies and investors might build mutually beneficial relationships. A secondary aim was to develop a methodology that might be used in other regions.

Methodologies

There were two phases to the land assessment. The first identified suitable land at a broad scale. The second explored the potential availability of land within that based on local-level constraints and landholder needs.

Identifying "suitable" land for commercial tree planting in Victoria involved assessing biophysical, regulatory and logistical variables, and prioritising that land based on its potential investment value. The constraints in determining suitability were:

- land in rural land use planning zone with no existing plantation, no other restricting overlays, legal or code-of-practice restrictions,
- high-enough expected tree growth to warrant planting for a commercial return,
- Positioned with due consideration to operational forest management and harvesting constraints.

The steps in identifying suitable land were:

1. Identifying private land across Victoria, unencumbered for commercial tree growing purposes
2. Quantifying the net plantable area within properties
3. Tree growth modelling
4. Assigning costs for harvesting and haulage and returns for selling logs.

The second phase, identifying "Potentially available" land, was explorative and considered landholder preferences with respect to planting trees. It included:

5. A desktop examination of existing land uses and plantation cover; and
6. landholder case studies.

[1] NGPI Interim report September 2018

1. Land identification

The process used for identifying suitable land is summarised in Appendix 1. All the spatial layers used in the study are available from Victoria's open data directory[2] (see Costello *et al* 2018).

In order to focus on the most common land uses, the minor land uses listed in the Victorian Land Use Information System 2016 layer (VLUIS2016) were aggregated as "other".

To begin, public land and areas with less than 600 mm rainfall were removed from the map of Victoria. The minimum of 600 mm rainfall was used both because it is considered the lower extreme for viable plantations of commercial timber species.

Land uses, cover and planning zones that were not applicable for tree planting, such as residential zones, public land, existing plantation and native vegetation were all removed from the suitable land base.

Properties smaller than 10 ha were removed from the suitable land base as they were not considered by the plantation industry partners to be viable for commercial tree planting.

The spatial layer used for removing existing plantation cover from the available land base was the VLUIS2016. An alternative was the plantation layer subset of the state vegetation layer (VMVEG_PLANTATION) because there was no data to indicate its accuracy compared to VLUIS2016.

The land use and plantation vegetation layers were compared for accuracy with estate spatial data provided by Hancock Victorian Plantations (HVP), Midway Pty Ltd (Midway) and OneFortyOne Plantations (OFO).

2. Net plantable area

Net plantable area specifications based on operational considerations and constraints, including the Code of Practice for Timber Production (DEPI 2014), were developed in consultation with the project partners (Severino & Hasanka 2018b). Not all elements of the specification could be automated in GIS. Therefore, a general net plantable area assessment was undertaken using buffers of 10 m on streams, property boundaries and roads for the whole estate.

Once the investment ranking was applied (*Assigning costs and returns*), a more detailed analysis of net plantable area was conducted on 150 properties that were randomly selected across regions and land uses, from within the higher investment ranks.

3. Tree growth modelling

A "Plantation Investment Index" (PII) was developed using a spatial surface of growth rates for three different wood production scenarios across Victoria provided by the CSIRO. Growth rates were modelled using 3-PG2 (Waterworth *et al* 2007). The wood production scenarios were hardwood sawlog, nominally *Eucalyptus globulus* (blue gum) on a 25-year rotation, *Pinus radiata* (radiata pine) sawlog on a 25-year rotation and blue gum pulp on a 10-year rotation.

Throughout the process the project partners made clear that there is a widely-held view that the 3-PG2 growth model overestimates tree growth, based on empirical observation and individuals' experience of likely growth rates in particular areas. This was suggested as a reason for the underperformance of many blue gum plantations established under Managed Investment Schemes in the last two decades.

[2] www.data.vic.gov.au

To address this concern, growth data (mean annual increment at harvest age, MAI) for radiata sawlog provided by HVP, OFO and AKD Softwoods (AKD) were compared with growth values predicted by the 3-PG2 model. The predicted values for blue gum pulp were compared with measured values of both blue gum and *E. nitens*[3] pulp provided by HVP and Midway. No hardwood sawlog growth data was available for comparison purposes in this study (Severino & Hasanka 2018a).

4. *Assigning costs and returns*

Harvesting and haulage costs, "mill door" product prices and discount rates were applied to the land base. Mill door price was estimated based on costs, including the use of a slope-dependent harvesting system, haulage distance and haulage type (single or b-double trailer)[4], moisture content and harvest volume losses. Net harvest returns for each 100-ha area were estimated using modelled tree growth, estimated timber-product split and mill door prices. These were verified with the project steering committee's industrial partners.

Haulage distances and costs were calculated relative to four wood processing points belonging to project partners:

- Australian Paper in Morwell (Maryvale)
- Midway Limited in Geelong
- AKD Timbers in Colac, and
- OneFortyOne Plantations in Mt Gambier

Establishment costs and management costs were not included because these vary between operators. It was assumed in this study that tree planting would be integrated with existing land uses. Harvest road and fence costs were not included because they depend on the tree planting arrangement at a property level. Harvest road building costs could possibly be generalised on a per hectare basis for a whole-property planting scenario.

Sensitivity to discount rates was assessed with harvest returns discounted to current values using rates of 5 and 7% (Costello *et al* 2018). Seven percent (PIInpv7) was the more conservative estimator of suitable land. These values were divided into four classes:

- <2,000 $/ha,
- 2,000–4,000 $/ha,
- 4,000–6,000 $/ha, and
- >6,000 $/ha.

5. *Existing land uses and plantation cover*

There is considerable understanding of the benefits of trees on farms (e.g. Hassall 2008, Baker *et al* 2018). There are also established paradigms about tree stand design and whole-farm planning. However, it became clear during the project that this knowledge was not necessarily relevant to the placement of trees in the landscape that landholders would consider ideal.

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[3] *E. nitens* (shining gum) is a higher-elevation analogue of blue gum
[4] Haulage costs provided by Braden Jenkin, Sylva Systems

For example, rather than tree plantings designed for optimum operational efficiency and economy of scale, or designed according to farm forestry principles and practices (e.g. Nuberg *et al* eds 2009), landholders' interests and priorities might include[5]:

- Retaining existing infrastructure that has been developed to facilitate and optimise their primary land use and management practices; or
- Utilising land that they consider "poor" for agriculture. This could mean land that is permanently or seasonally inaccessible, distant to operation centres, of low agricultural productivity, or otherwise difficult to manage e.g. steep or rocky.

With respect to identifying "poor" land, in the study less than 1,000 ha of slopes over 30 degrees were identified across the PIInpv7 >2,000 $/ha of 2 million ha. It is likely that the slopes were overgeneralised when calculated from the 30 m contour maps and then weighted in 1 km square grids in the Land Capability GIS Model. Information on other indicators of poor land such as rockiness or pasture growth rates was not readily available or was not at a high enough resolution to be useful.

As a starting point, it was decided that fence lines and laneways evident from satellite imagery could be used as a proxy for possible areas to integrate trees into farming. For example, cropping typically requires large un-interrupted tracts of land for efficient planting and management, whereas for grazing, networks of laneways and paddocks are used for directing stock movements and for pasture management. Shelter belts are a common and accepted planting design in many farming regions, and compared to block planting should least disrupt, and potentially benefit, existing farming and other land management practices. Shelter belts were the preferred scenario for all case study participants (*Case studies*). The shelter belt width was set at a minimum of 20 m for efficiency of machine harvesting and other operations. Point infrastructure such as troughs, sheds, tanks, windmills and dams were also retained in the design process and buffered where they intersected fence lines but were not considered to otherwise influence shelter belt design.

The potential tree planting opportunity in the form of shelter belts along these existing fence lines and laneways was then quantified. Of the 150 previously randomly selected properties, 61 were manually digitised to capture internal fences and laneways.

To describe the proportion, fragmentation and shape of existing plantations on agricultural land and look for trends that might inform likely landholder tree planting design preferences, plantation perimeter (edge) to area ratios were calculated for existing plantations on agricultural land. *Table 1* illustrates the relationships between edge and area of two different sized blocks, and two corresponding shelter belts, relative to the circumference of the same area expressed as a circle ("relative circularity") – theoretically as a measure of block versus belt planting. The "circularity" ratio is related to size; however, it is much less sensitive to size than the raw edge to area ratio.

[5] Glenn Marriott, Ag-Challenge; Luke Rolley, RMCG

Table 1 Effect of plantation shape on edge length, and plantation area on circle circumference and plantation edge.

	Plantation edge (m)	Edge to area (m/ha)	Circle circumf.	Circle to actual (%)	Actual to circle ratio
5-ha block (2 × 2.5 ha)	900	180	793	88	113
5-ha shelter belt (20 × 2,500 m)	5,040	1,008	793	16	636
10-ha block (3 × 3.3 ha)	1,260	126	1,121	89	112
10-ha shelter belt (20 × 5,000 m)	10,080	1,008	1,121	11	899

Using the VMVEG_PLANTATION layer, a total of 587 properties were identified with between 5 and 50% plantation cover[6] in the PII>2,000 $/ha zone. To remove some of the irregularity of plantation boundaries caused by retained paddock trees, point infrastructure, failed planting areas etc which would unnecessarily increase the amount of plantation edge, plantation edges were smoothed using an algorithm[7] before calculations were made.

6. Case studies

Case studies with landholders and their properties captured the spatial aspect of land availability at the property level, which is defined by landholder willingness to participate and cannot be interpreted remotely. Other parts of the NGPI project surveying landholders have not focussed on the quantity and design of tree plantings that could be incorporated into properties.

Case study participants were sought through contact with a number of land management organisations who disseminated the invitation to their members. Groups included land care, catchment management authorities, agricultural advisory groups and regional farm forestry networks affiliated with Australian Forest Growers. The request was described as an opportunity to participate in a landholder centred investigation into the potential for planting more trees on farms, with the benefits for involvement including a better understanding of the case for trees on their particular property and professional quality property maps in pdf format – which many property holders don't have[7].

Three landholders were interviewed. One was sourced as a contact from the NGPI landholder survey[8] ("Caldermeade"), and two via a Gippsland agricultural advisor[9] ("Thorpdale" and "Trafalgar"). Participants were presented with a plain language statement (Appendix 2) explaining the intent and process of the project and their rights. They were asked to sign an accompanying acknowledgement form (Appendix 3). The interview format was a semi-structured questionnaire (Appendix 4), conducted on site with the landholder/s. The Thorpdale and Trafalgar interviews were conducted with the agricultural advisor present to encourage open conversation using the trust relationship, and to provide additional personal and professional insights for both the interviewer and landholder.

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[6] Theoretically if plantation covered more than 50% of a particular lot it would be identified by VLUIS2016 as being entirely plantation.
[7] https://en.wikipedia.org/wiki/Ramer–Douglas–Peucker_algorithm, tolerance value of 10 was used
[8] Nerida Anderson
[9] Glenn Marriott, Ag-Challenge Consulting Pty Ltd

Results

1. Area of suitable land for plantation investment

There is 6.21 million ha of private land within properties larger than 10 ha, receiving more than 600 mm long-term annual rainfall and with no native vegetation, existing plantation or other exclusions.

Within the combined catchment of the four industry partners approximately one-third of that land was shown to be above the break-even threshold[10] of 2,000 $/ha for the Plantation Investment Index with a 7% discount rate (PIInpv7, *Table 2*).

Evidence from the NGPI Landholder Survey suggests that most landholders would be comfortable with up to 20% of their properties under trees[11]. If even 10% of the suitable land was planted with commercial trees it would equate to approximately 256,000 ha (hardwood sawlog), 209,000 ha (radiata sawlog) or 192,000 ha (blue gum pulp. This is in the order of half Victoria's estimated entire plantation estate[12].

Table 2 Gross area of suitable land in Victoria for plantation investment[1]

	PIInpv7 ($/ha)	**<2,000**	**2,000–4,000**	**4,000–6,000**	**>6,000**	**>2,000 total**
Scenario	Private land total (ha)	(ha)	(ha)	(ha)	(ha)	(ha)
Hardwood sawlog	6,205,300	3,642,000	984,900	627,000	951,300	2,563,300
Radiata sawlog	6,205,300	4,113,800	1,069,400	576,100	445,900	2,091,500
Blue gum pulp	6,205,300	4,288,400	1,150,500	509,700	256,700	1,916,900

[1] adapted from Severino & Hasanka 2018a

The wood production scenario that consistently appeared to show the highest potentially suitable area, relative to each project-partner's processing centre (*Table 3*) was hardwood sawlog on a 25-year rotation. However, the Investment Indices for the different wood production scenarios are not able to be directly compared because of differences in rotation length and assumptions about product prices and differences in management costs. The data is best used for ranking land within each wood production scenario.

Total suitable area differed between processing centres, and there were also relative differences between processing centres in the suitable area of each production scenario. For example, Midway and OFO both have decreasing suitable areas with increasing PIInpv7; however, Australian Paper and AKD Hardwoods have access to more suitable land in the PIInp7 >6,000 $/ha category than in the 4,000–6,000 $/ha category.

[10] Return equals first year establishment cost

[11] Nerida Anderson *pers comm*

[12] ABARES 2018 *Australian plantation statistics 2018 update*

Table 3 Gross area of suitable land for project partners' processing centres[1]

	PIInpv7 ($/ha)	2,000–4,000 (ha)	4,000–6,000 (ha)	>6,000 (ha)	Total (ha)
AKD Hardwoods	Hardwood sawlog 25 yrs	414,000	180,000	331,000	925,000
	Radiata sawlog 25 yrs	360,000	157,000	218,000	736,000
	Blue gum pulp 10 yrs	359,000	200,000	80,500	639,500
Australian Paper	Hardwood sawlog 25 yrs	260,000	205,000	423,000	888,000
	Radiata sawlog 25 yrs	350,000	190,000	191,000	731,000
	Blue gum pulp 10 yrs	362,000	198,000	170,000	730,000
Midway Ltd	Hardwood sawlog 25 yrs	402,000	206,000	121,000	729,000
	Radiata sawlog 25 yrs	355,000	167,000	10,000	532,000
	Blue gum pulp 10 yrs	380,000	57,770	10,000	448,000
OneFortyOne[2]	Hardwood sawlog 25 yrs	206,000	160,000	91,000	460,000
	Radiata sawlog 25 yrs	252,000	97,000	30,000	379,000
	Blue gum pulp 10 yrs	271,000	59,000	6,000	335,000

[1] not accounting for overlap
[2] OneFortyOne Plantations area statement for the Victorian side of the border

2. *Land use data for existing plantations*

Estate data provided by the project partners accounted for almost 259,000 ha of the estimated 421,700 ha of plantations in Victoria[13]. Overlaying that with the publicly available plantation layers highlighted the inconsistency in captured areas of plantation in public data (Severino & Hasanka 2018b).

The updated land use layer, VLUIS2016_2017 wasn't available when the initial assessment was carried out but was subsequently compared to other data sources for reliability. It identified 61 to 67% of the partners' estates as predominantly plantation land use parcels (Table 4). However, the older VLUIS2016, which was used in the GIS model here, was only less accurate for the HVP estate (down from 67 to 53%) and was in fact more accurate for the OFO and Midway estates (92 and 72% respectively). Therefore, VLUIS2016 was kept in the GIS model.

The plantation vegetation layer (VMVEG_PLANTATION) identified 87 to 98% of the estates. However, the 98% for HVP is likely due to it being an ex-government enterprise with pre-existing reliable maps available in the public domain. Therefore, 88% is probably the more broadly representative capture rate.

[13] ABARES 2018 *Australian plantation statistics 2018 update*

Table 4 Percentage of company estates mapped by statewide land use and plantation data

Company	Total lot area (ha)	VLUIS2016* (%)	Plantation* (%)	VLUIS2016_2017* (%)
HVP	236,932	53	98	67
OFO	6,367	92	87	59
Midway	15,435	72	88	61
Total	258,734			

** Area calculations are based on lot, not property*
VLUIS2016: Victorian Land use Information System (VLUIS) 2016
VLUIS2016_2017: Victorian Land use Information System (VLUIS) 2016_2017
Plantation: VMVEG_PLANTATION identifies softwood and hardwood plantations.

Of the 47% of the HVP estate that VLUIS2016 misidentified (*Table 5*), equating to 112,000 ha, 29% was classified as forest and 7% as mixed farming and grazing. The land use layer could conceivably be misinterpreting plantation as forest, and misinterpreting harvested areas waiting to be re-established as a farming enterprise. It is likely there is a similar case of misidentification for 33%, or nearly 79,000 ha of the HVP estate by VLUIS2016_2017 (*Table 6*).

Table 5 HVP plantation area incorrectly classified by VLUIS2016

Percentage of total HVP plantation lot area (%)	Lot area (ha)	VLUIS2016 land use
29	68,279	Forest – native/recreational
11	27,173	Other
7	16,189	Mixed farming and grazing
0.2	574	Livestock
Total	112,215	

*Table 6 HVP plantation area falsely classified by VLUIS2016_2017**

Percentage of total HVP plantation lot area (%)	Lot area (ha)	VLUIS2016_2017 land use*
22.9	54,298	Native woody cover
8.5	20,028	Pasture and grassland
0.9	2,058	Deciduous woody horticulture
0.4	983	Non-woody horticulture
0.4	939	Unknown
0.2	547	Evergreen woody horticulture
Total	78,853	

**Land use categories were revised from VLUIS2016 to VLUIS2016_2017*

There were also differences between the VLUIS layers and the vegetation layer (Appendix 2, *Table 12*). According to VMVEG_PLANTATION, the VLUIS2016 layer identified nearly 24,000 of non-plantation area as plantation and missed nearly 17,000 of plantation, which it identified as other land uses.

Comparison with company growth data indicated that 3-PG2 overestimated Radiata sawlog productivity was in Gippsland (Strezlecki ranges), but mostly underestimated productivity in western and North East Victoria (Severino & Hasanka 2018a).

The model underestimated blue gum MAI, and more so with increasing measured MAI values. Many of the measured MAI values were for pulp rotations between 10 and 15 years, while the 3-PG2 scenario is 10 years. A check of MAI with age indicated rotation length was not the major source of variability in this data set.

The underestimation is possibly due to the CSIRO wood production scenarios all being "normalised" to a 20-year rotation (i.e. MAI at age 20), meaning blue gum MAI would likely have declined from its peak, which is commonly understood to be closer to 10 to 15 years.

3. *Assessing net plantable area*

The buffers applied to streams, laneways, boundaries and pipelines reduced net plantable area to an average of 83% of gross area. There was little variation in the average reduction in net plantable area between land uses and regions (*Table 7*), which doesn't allow for prioritising a land use or region based on potentially larger percentage areas of trees on individual properties.

Table 7 Summary of estimated net plantable percent for selected properties[1]

	Property count	Mean % plantable area
Plantation Investment Index		
2,000–4,000	304	83
4,000–6,000	276	84
> 6,000	277	83
Grand total	857	83
Land use		
Beef cattle	47	84
Dairy cattle	50	81
Domestic livestock grazing	18	83
Mixed farming and grazing	612	84
Other	102	82
Sheep	24	80
Grand total	853	83
CMA region		
Corangamite	193	85
East Gippsland	4	90
Glenelg Hopkins	296	85
North Central	23	84
Port Phillip and Westernport	119	81
West Gippsland	222	81
Grand total	857	83

[1] no existing plantation, and PIInpv7 >2,000 $/ha, split variously by PIInpv7 category, land use and Catchment Management Authority (CMA) region

4. Potential extent of integrated plantations

Average fencing rates ranged from 46 m/ha for "domestic livestock", and 52 m/ha for sheep, to 85 m/ha for beef cattle. Dairy cattle were 59 m/ha on average.

Assuming a belt of trees 20 m wide along each fence line resulted in between 9 and 17% of land area potentially planted (*Table 8*). The average area of potential shelter belt identified for each land use ranged from 8 to 18 ha.

Table 8 Average area of planted trees using 20 m-wide belts along existing fence lines[1]

	N obs	Property size (ha)	Net plantable (ha)	Shelter belt (ha)	Shelter belt (%)	Fence (m/ha)
Land use[2]						
Livestock domestic	1	83	75	8	9	46
Livestock sheep	1	89	81	9	11	52
Livestock dairy	11	153	135	18	12	59
Mixed farming and grazing	37	138	117	13	14	70
Other	5	67	52	9	17	80
Livestock beef	6	65	60	11	17	85
Grand total	61	126	108	13	14	70
CMA region						
Corangamite	16	156	142	16	14	71
Glenelg Hopkins	20	163	139	14	13	62
Port Phillip and Westernport	8	48	40	8	19	92
West Gippsland	17	90	72	11	14	67
Grand total	61	126	108	13	14	70

[1] Split by land use and Catchment Management Authority (CMA)
[2] Land use is a modified version of VLUIS2016 designations

There were differences in edge to area ratios for different land uses (*Table 9*). However, it is not clear what they mean. It would be expected that the most compact plantations, with the lowest ratios, would be dedicated, maximum area planted tree properties. Plantations as a land use were much higher (at 34 to 39 m/ha) than the small sample of sheep properties at 19 m/ha. The higher rate of fencing in Port Phillip and Westernport region is likely indicative of generally smaller and more intensively managed properties. There is more work required to interpret the data.

Table 9 Mean edge to area and circle circumference to plantation edge ratios[1]

	N obs	Total plantation area (ha)	Mean perimeter to area (m/ha)	Mean circumference to perimeter (%)
Land use				
Livestock sheep	3	110	19	48
Livestock domestic	10	529	27	41
Mixed farming and grazing	122	7,116	31	41
Livestock beef	6	182	41	40
Plantation softwood	377	23,296	34	39
Plantation hardwood	69	4,840	39	38
Grand total	587	36,072	34	39
CMA region				
North East	8	268	38	51
West Gippsland	89	6,724	27	41
Glenelg Hopkins	381	22,932	35	39
East Gippsland	13	875	27	39
Corangamite	59	2,982	40	38
North Central	2	54	47	34
Wimmera	25	1,298	37	34
Goulbourn Broken	10	939	39	30
Grand total	587	36,072	34	39

[1] for selected properties with 5 to 50% plantation cover according to VMVEG_PLANTATION, split by land use (VLUIS2016 modified) and Catchment Management Authority (CMA)

5. Case studies

Case study participants were identified through direct approaches to agricultural consultants. Three case studies were completed (*Table 10*). Two were in central Gippsland (Thorpdale and Trafalgar) and one in South Gippsland (Caldermeade). Property sizes ranged from 26 ha to 320 ha, and from quite flat (Caldermeade) to undulating and hilly (Thorpdale and Trafalgar). Interview notes and example maps are in the Appendices and data in **Error! Reference source not found.** to **Error! Reference source not found.**.

Table 10 Summary of case study properties and landholders

Locality	Region	Area (ha)	Landform	Land use	Tree planting priorities
Caldermeade	South Gippsland	26	Flat	Beef grazing	Commercial, shelter, amenity, wide belt design around property boundary
Thorpdale	Central Gippsland	320	Undulating	Cropping and sheep	Replace and extend existing shelter belts, plant out steep sides of gullies
Trafalgar	Central Gippsland	101 (plus 65 agisted)	Hilly	Dairy	Replace existing shelter belts, plant out least-performing paddocks on sandy northern aspects

The three land uses represented were mixed cropping (potatoes, onions, carrots) and grazing (sheep); beef grazing; and a dairy operation. There was one multi-generational farmer – who also has a son coming into the business, and two first generation landowners, who don't have succession plans.

The dairy farmer had a concern about reduced grazing capacity leading to a greater reduction in milk production than he could afford. All three landholders were similarly aware of past timber industry failures, and were interested to know about payment structures, guarantees and site clean-up in the event of pasture re-conversion.

All three landowners had pre-existing ideas of where and how trees would fit best into their land. These included utilising steep, less accessible and lower productivity areas, and increasing shelter and visual amenity.

The two higher-productivity landholders initially nominated approximately 15% of their property area (*Table 11*) as potentially available for tree planting (*Figure 6* and *Figure 10*), while the Caldermeade land holder nominated 40% (*Figure 4*). These varied due to land value and lifestyle factors. All three were open to the idea of more trees than they had originally considered, depending on the financial arrangements and viability relative to their existing enterprises.

Table 11 Area, fence and road requirements for planting scenarios on case study properties[1]

Locality	Tree planting scenario	Area (ha)	Estimated Fence[2] (m) (Cost)	Estimated road[3] (m) (Cost)	PIInpv7 Hardwood sawlog ($/ha)	PIInpv7 Radiata sawlog ($/ha)	PIInpv7 Blue gum pulp ($/ha)
Caldermeade		26	-	-	5,235	3,187	3,204
	Net plantable	17	0	200 ($4,200)	$89,000	$54,000	$54,000
	20-m shelter belt	6.8	4,080 ($40,800)	200 ($4,200)	$36,000	$21,000	$22,000
	Landholder	10	2,060 ($20,600)	200 ($4,200)	$52,000	$32,000	$32,000
Thorpdale		320	-	-	13,792	9,589	8,165
	Net plantable	246	0	1,200 ($25,200)	$3.393 M	$2.359 M	$2.009 M
	20-m shelter belt	50	26,100 ($261,000)	1,200 ($25,200)	$689,600	$479,400	$408,300
	Landholder	38	7,750 (77,500)	1,200 ($25,200)	$524,100	$364,400	$310,300
Trafalgar		100	-	-	13,185	8,046	7,723
	Net plantable	58	0	470 ($9,900)	$765,000	$467,000	$448,000
	20-m shelter belt	16	8,650 ($86,500)	470 ($9,900)	$211,000	$129,000	$124,000
	Landholder	15	5,130 ($51,300)	470 ($9,900)	$198,000	$121,000	$116,000

[1] nearest processing centre is Australian Paper
[2] Fence cost = $10/m
[3] Direct distance to farthest point on property from a major access, minus existing good roads; Harvest road cost = $21/m for a "once-off road for logging in the dry season"[14]

[14] Phil Whiteman, HVP, *pers comm*

The PIInpv7 values are an index rather than an accurate estimate of returns. However, they do illustrate the effect of property size and productivity on the economic viability of tree planting and the relative cost of fencing and roading. The 20-m shelter belt regime resulted in similar areas to the landholder preferred options (*Table 11*). However, the cost of fencing was maximised compared to the landholder options which were a combination of shelter belt replacement and utilising steeper or lower productivity areas. Estimated road, and road plus fence costs ranged from $100/ha for net plantable area at Thorpdale, to $6,600/ha to install fences and roads for shelter belts at Caldermeade. These numbers need to be added to the actual planting costs in a full financial assessment. Partnerships based around lower productivity sites or more spread out planting arrangements may need to be based on indirect benefits such as increased total wood flow to processing facilities for grower-processors, or additional infrastructure and non-financial tree benefits.

From a landholder design perspective, the semi-structured interview and discussion format highlighted the openness of landholders to planting areas of their properties they hadn't previously considered, particularly options related to extending and replacing existing shelter belts. It also highlighted their business focus, and willingness to consider other options or modifications – if a good business case could be made.

Discussion

Suitable land identification

The Plantation Investment Index produced by the statewide productivity and financial modelling provided a solid basis for analysis. The individual inputs were conservative. It was also conservative because it was not able to account for the benefits of aggregating small plantings. For example, a 5-ha plantation might not be viable by itself, but if one or more adjacent properties also have 5-ha plantations they can all become viable if managed together. The productivity of a plantation estate is an average, with more highly productive areas increasing the financial viability of adjacent lower productivity areas.

The highest average percentages of properties already planted to trees were in Corangamite, Southern Grampians and Western Wimmera CMA regions. This could possibly reflect the relative value of land for other types of farm production, higher uptake of farm forestry, or a simple need for shelter in those regions.

Having shown that the amount of suitable land is not an issue in reasonably high rainfall areas Availability, therefore, is ultimately constrained by the ability of land to either provide net harvest returns better than returns from other land uses, or similar returns plus other identifiable non-monetary benefits in order to be an attractive financial proposition to landholders. Future work need not focus as heavily as this project did on the modelling of investment value at the statewide scale. The financial modelling effort is better focussed at the property level, where it can inform landholder and investor decisions.

A further insight into the potential availability of land might be gained by using land values and expected percentage returns to benchmark the competitiveness of returns from growing trees. This would also account for increasing land values closer to population centres which aren't captured by this model.

An approach to targeting areas of opportunity for forming partnerships that wasn't investigated in this study was to identify land uses with the greatest total wood production potential. For example, sheep and other grazing land may have a lower investment index, and have lower growth rates than dairy country, but it may be more abundant, accessible, and more complementary with trees – thereby creating a larger potential wood "basket" than the highest ranked land. This could be assessed by productivity, and other weightings for different land uses derived from research such as survey responses.

Simply targeting the highest Plantation Investment Index land will likely require competing with the highest value agricultural uses such as dairy and beef cattle operations for example the radiata sawlog scenario identified 159,000 ha in the PII>6000 $/ha category being used for dairy and cattle. Whereas, there are also 169,000 ha in the PIInpv7>6000 $/ha zone classed as "mixed farming and grazing" which could provide more opportunities for competitive pricing of integrated tree plantings.

Using a 20-m shelter belt provided a simple indicator of the opportunity for integrated plantings on farms. The average area of potential shelter belt identified for each land use ranging from 8 to 18 ha, or 9 to 17% of land area. However, the associated additional fencing cost could be greater than the returns, and cost more than harvest roading. For example, assuming a fencing cost of $10 /m, placing fence along one side of a 20-m wide shelter belt will cost $5,000 /ha. The value of fewer but wider shelter belts quickly becomes apparent; a 40-m shelter belt halves the fencing cost of a 20-m shelter belt arrangement.

Harvest roading requirements should also always be considered in plantation design. The cost can range from $10/m for once-off dry season harvesting on flat land, to $78/m for all season, steep slope (>40%) harvesting[15]. A shelter belt scenario, or a small back of property planting will require a similar amount of good road to a completely planted property, but the cost can't be spread over as many hectares. Lower-impact harvesting systems, such as rubber-wheeled harvesters, for smaller and more dispersed plantings, together with seasonal timing of machine operations could reduce the requirement for highly engineered and expensive roads[16].

Opportunity for tree planting through adversity was not tested in this study. However, given the expense of fences and roads, there may be instances where, for example:

- Landholders require better roading for management purposes, or new or replacement fencing, and are prepared to offset their share of tree profits in return for the infrastructure.
- Difficult circumstances for landholders such as currently being faced in south-west Victoria where many are rebuilding after fires could be an opportunity to assist with the expense of rebuilding fences in combination with tree plantings[17], or
- Fencing off is required to manage environmental issues such as wind and water erosion or water quality, which could include both permanent and commercial tree planting.

Data verification

Estimates of suitable and potentially available land in Victoria for planting valuable trees were necessarily conservative due to uncertainty in the available data. There are discrepancies in the identification of plantation between the latest Victorian land use spatial data (VLUIS2016_2017), the native vegetation layer plantation extract (VMVEG_PLANTATION) and the data provided by industry.

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[15] Phil Whiteman, HVP, pers. comm.
[16] Jon Lambert, Heartwood Plantations pers. comm.
[17] WestVic Dairy adviser, pers. comm.

That is despite much recent work by the Victorian Department of Economic Development, Jobs, Transport and Resources to produce VLUIS2016_2017[18]. Depending on the required degree of accuracy, the possible solutions include inspecting imagery of all of the conflicts and making manual corrections as a starting point, or applying correction factors to plantation area estimates, or simply acknowledging the bias in order to produce a conservative estimate of the potentially available area for plantation development, as was done here.

The comparisons between data sources here has highlighted the lack of reliable and authoritative information on Victoria's private plantation estate, which has been commented on many times (e.g. PFSQ and Stewart, H. 2013). There is very little data on tree species beyond their classification as softwood or hardwood, which is important information for informing the strategic planting of new trees in the right places. Currently the most reliable source of information on existing plantations in Victoria is from industry itself. Three of the four NGPI project partners alone provided data accounting for over 60% of the estimated Victorian plantation estate. It would ideally be straight forward to assemble an industry-wide database, to provide confidence for new growers that they are growing trees in the right places, and also for policy makers to target tree planning initiatives appropriately. However, data for smaller company and individual property private growers are more difficult to capture.

When interpreting third-party spatial data, government generated in this case, it is important to understand the derivation of the data and the assumptions behind it. A range of data sources were used as a baseline for VLUIS2016 and VLUIS2016_2017, before a proportion of the land use categorisations were manually checked using satellite imagery. It cannot be assumed the use has been correctly interpreted based on a snapshot in time. In addition, because entire title lots are assigned a single land use when it appears more than 50% of the lot is being used a particular way another source of error is introduced. Both VLUIS2016 and VLUIS2016_2017 underestimate the existing plantation resource and overestimate the area of potentially available land (Appendix 2, *Table 12*).

The figures are made more difficult to interpret with respect to the opportunity for creating new plantation resource because it is difficult to tell whether the private ownership is corporate, private individual or another institution such as a water authority.

Landholder engagement

Identifying suitable and available properties need someone to hold discussions with individual landholders with a good understanding of the potential benefits of trees on farms, and a working understanding of the finance options and operational constraints .

Two of the three case-study participants were recruited through pre-existing relationships. In other settings, there has often been minimal uptake of undirected and open offers of assistance on planning and carrying out tree planting on private property – either by industry or by government[19]. This lack of response was confirmed in the approach used in this study.

It was anticipated that six months would be enough time to source and carry out numerous property-level inspections and landholder interviews. However, once contact was made with a

[18] Elizabeth Morse-McNabb, Vic Dept EDJTR pers. comm.

[19] For example, Australian Paper (forward sale agreements) and the Victorian Government (Gippsland Trees for Salinity) have attempted to stimulate tree planting in recent years with little uptake, and older plantings established under previous agreements that are being harvested are not being returned to trees.

landholder group and the request accepted, it was often a case of the contact person then send out the invitation to the group or take it to a meeting or field day. Group coordinators approached in this study were reluctant to actively encourage landholders to participate without being confident of the project’s worth to their members, which makes it important to emphasise the focus on, and benefit to landholders.

There is no substitute for face-to-face conversations with landholders to plan mutually beneficial tree plantings. The support of the landholder’s trusted agricultural adviser was also very useful in creating good will and enabling an open discussion of options and ideas. Attending farm field days and other gatherings, providing basic information and inviting interested parties to give their contact details on the day would potentially lead to more participants.

Engagement requires long-term personal relationships and reputation building to realise large areas of sustainable new tree planting. This could be through regular involvement, such as contributing to community groups directly related to tree planting and land management, or being involved more broadly at schools, sporting groups, good neighbour programs, or seeking introductions through trusted others such as agricultural advisers.

Appendices

1. Appendix: A flow diagram of the land suitability assessment

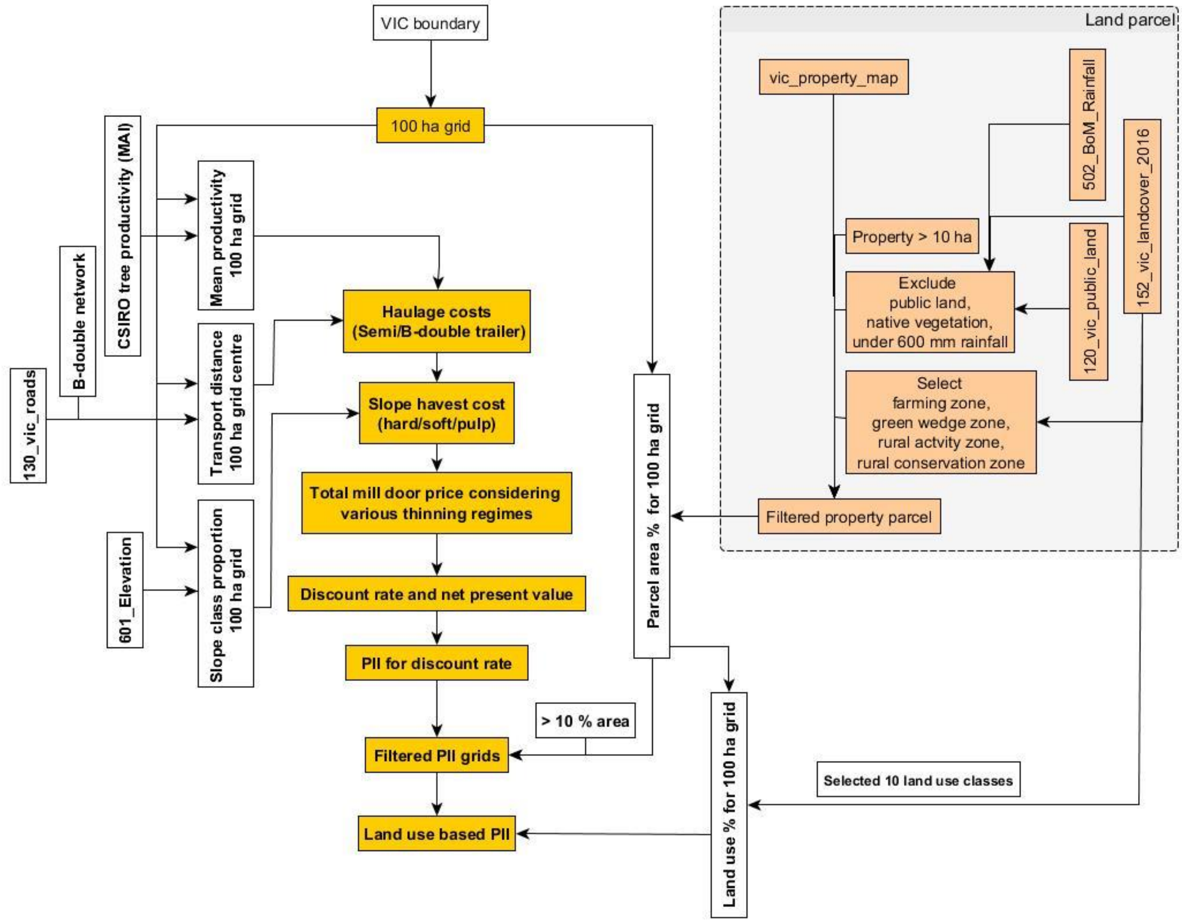

Figure 1 GIS flow diagram for identifying and ranking suitable tree planting land in Victoria

2. Appendix: VLUIS2016 compared to VMVEG_PLANTATION layers

Table 12 Comparison of plantation area identified by VMVEG_PLANTATION layer[1] and other land uses by VLUIS2016

VLUIS2016 Land use*	Number of lots	Total Lot area (ha)	Mean % plantation	Non-plantation area (ha)	Plantation area (ha)
Plantation softwood	271	19,073	34	12,440	6,633
Forestry (commercial)	59	13,670	30	8,980	4,690
Plantation hardwood	44	3,469	29	2,505	963
Subtotal		36,112		23,924	12,286
Mixed farming and grazing	184	17,053	24	12,985	4,068
Livestock (domestic)	10	1,005	29	701	303
Livestock (sheep)	6	320	30	232	88
General cropping	2	247	7	230	17
Other	1	228	8	210	18
Livestock (beef)	4	318	28	204	113
Livestock (dairy)	2	150	40	92	57
Subtotal		19,321		14,654	4,666
Grand total	583	55,530	30	38,578	16,952

[1] containing 5 to 50% plantation cover

3. Appendix: Landholder case studies for integrating trees in rural landscapes

School of Ecosystem and Forest Sciences

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Tel: +61 3 9035 8227 Email: rkeenan@unimelb.edu.au
Dr Dean Severino (Researcher) Tel: +61 429 205393 Email: severino@unimelb.edu.au
mailto:XX@unimelb.edu.au

Introduction

Thank you for your interest in participating in this research project. This statement will provide you with further information about the project, so that you can decide if you would like to take part in this research. Please take the time to read this information carefully. You may ask questions about anything you don't understand or want to know more about.

What is this research about?

There is an increasing demand for wood and wood-based products globally. However, although planted forests are a major source of wood products in Australia there has been an overall decline in Australia's planted forest area in the past 5 years, with almost no new forests established during this period. As well as providing timber, trees can provide a range of benefits to landowners, such as stabilising soil, serving as wind breaks, improving agricultural productivity, and/or diversifying farm income.

The aim of this research is to understand how trees planted with the intention to harvest in the future could be integrated with other land uses in a way that provides multiple on-farm benefits to landholders as well as providing a commercial return from the trees.

This study is being conducted by Professor Rod Keenan (Responsible Researcher), Dr Dean Severino, Dr Nerida Anderson (School of Ecosystem and Forests Sciences), Dr Jodi York, Dr Krzysztof (Chris) Dembek (Faculty of Business and Economics), Dr Lyndall Bull (Lynea Advisory), Braden Jenkin (Sylva Systems Pty Ltd.) and Mr Chathura Hasanka (GIS analyst).

What will I be asked to do?

Should you agree to participate you will be asked to describe where you think it would best suit you to plant trees on your land, and the reasons why you think these areas would be suitable to you. We will also ask you about your current agricultural enterprises, land management practices and goals, and details of the physical nature and infrastructure on the property.

The interview will include producing a sketch map to help identify important property features, such as tracks, buildings, gullies, waterways, fences, existing trees and shelter belts etc. This information will be used to develop one or more tree integration options ("plans") based on your needs. The plans will include species and management suggestions, and estimates of growth rates, and costs (costs will be included to help understand the effects of design options). With your consent members of the research team may contact you for your feedback on the plans.

It is anticipated that the initial interview will take no more than two hours, which includes a farm walk to help us better understand your property, its characteristics, and your farming or other land management enterprises.

What are the possible benefits?

Benefits of participating include identifying how trees planted with the intention to harvest in the future could be integrated on your land in a way that provides multiple benefits to you. The research also has benefits for the wider farming community by helping to understand the views of landholders about integrating trees on farms for commercial harvest.

What are the possible risks?

The research includes conversations about your property and a farm walk and as such there are no foreseeable risks to you, other than requiring your time.

Do I have to take part?

No. Participation is completely voluntary. You can withdraw at any time. You are also free to withdraw any information gathered about yourself and your property.

Will I hear about the results of this project?

If you participate we will provide you with a summary of the findings at the completion of the research. Details of the project will be made available on the project website http://go.unimelb.edu.au/zp56 . Results of the research will also be provided to our research partners and may be published in peer-reviewed journals and presented at conferences.

What will happen to information about me?

Your anonymity will be protected by the removal of any identifying details (names, location etc) from notes of the interviews and details of your property. Only the researchers named above will have access to the information you provide. No identifying details will be used in future publications; however, as the number of people involved in the interviews is very small, it is not possible to guarantee complete anonymity. The confidentiality of information provided is subject to legal limitations. Transcripts of the interviews will be stored securely for five years from the date of publication before being destroyed. All computer files will be password protected.

Who is funding this project?

Funding for the project is provided by Forest and Wood Products, Australia (FWPA), a not-for-profit company that provides national, integrated research and development services to the Australian forest and wood products industry, and industry partners, Hancock Victoria Plantations Ltd, Midway Ltd, Australian Paper, Australian Kiln Dried Hardwoods and OneFortyOne Plantations Ltd.

Where can I get further information?

Please contact the researchers listed above if you would like more information about the project.

Who can I contact if I have any concerns about the project?

This research project has been approved by the Human Research Ethics Committee of The University of Melbourne. If you have any concerns or complaints about the conduct of this research project, which you do not wish to discuss with the research team, you should contact the Manager, Human Research Ethics, Research Ethics and Integrity, University of Melbourne, VIC 3010. Tel: +61 3 8344

2073 or Email: HumanEthics-complaints@unimelb.edu.au. All complaints will be treated confidentially. In any correspondence please provide the name of the research team or the name or ethics ID (ID: 1750585.2) of the research project.

4. Appendix: Consent form

School of Ecosystem and Forest Sciences

THE UNIVERSITY OF MELBOURNE

Project: Next Generation Plantations: Integrating trees in rural landscapes: Landholder case studies

Responsible Researcher: Prof Rodney Keenan

Additional Researchers: Dr Dean Severino, Dr Krzysztof Dembek, Dr Lyndall Bull, Dr Jodi York, Dr Nerida Anderson, Mr Braden Jenkin and Mr Chathura Hasanka (GIS analyst)

Name of Participant:

____

3. I consent to participate in this project, the details of which have been explained to me, and I have been provided with a written plain language statement to keep.
4. I understand that the purpose of this research is to *investigate landholder goals and objectives for trees on their properties, and the potential for investors to cater to those needs.*
5. I understand that my participation in this project is for research purposes only
6. I acknowledge that the possible effects of participating in this research project have been explained to my satisfaction.
7. I understand that in this project I will be required to take part in an interview expected to last not more than 2 hours, to take place at a time and place that is convenient to me. During the interview I will be asked amongst other things about my attitudes towards establishing trees for commercial harvest on my property, management details relating to my land and enterprises, physical details of the property, and how I would make decisions around planting trees to integrate with existing agricultural land uses.
8. I understand that my participation is voluntary and that I am free to withdraw from this project anytime without explanation or prejudice and to withdraw any unprocessed data that I have provided.
9. I understand that the data from this research will be stored at the University of Melbourne and will be destroyed after 5 years.
10. I have been informed that the confidentiality of the information I provide will be safeguarded subject to any legal requirements; my data will be password protected and accessible only by the named researchers.
11. I understand that given the small number of participants involved in the study, it may not be possible to guarantee my anonymity.
12. I understand that after I sign and return this consent form, it will be retained by the researcher.

Participant Signature: **Date:**

5. Appendix: Questions for the landholder semi-structured interview as presented

- Intended to take up to two hours including on-site property inspection farm walk around
- Participants will be provided with the Plain Language Statement and Consent forms before hand

Points for discussion and information gathering:

1. Provide verbal recap of the interview purpose, proposed format, why their input is important
   "A bit on me - my background is in plantation forest research and management, mostly working with the less mainstream options on private properties. I've grown up around, and have a love of farming, but don't profess to being a farmer.
   I'm working for the University of Melbourne. We have both private and public funds for this project. The goal of the project is to see more trees integrated into the landscape that provide benefits for everyone, on and off the farm.
   The simple aim of this interview is for me to learn as much as I can about where you would like to see trees on your property and what those trees would mean to you and ideally do for you. And also, to ask you to help me understand your management practices, and your land as much as possible.
   This project is undeniably driven by the growing demand for wood and limited options for large scale expansion. There is finally a recognition that the low hanging fruit - the mass land grab approaches of the past – haven't worked and certainly hasn't endeared the forest industry to the community.
   So, while there is certainly an interest in growing more harvestable trees, the conversation is absolutely not limited to trees for that purpose alone. Indeed, there are likely to be a whole lot of non-timber related reasons to plant more trees, and we hope, some win-win combinations.
   I have a list of questions that hopefully cover off on all of that, but don't want to limit the conversation at any point. If it's alright I'll get us started by looking at what you have in the way of property maps, or what we can sketch up, so that we can refer to it as we're going through.
   I won't try and answer all your questions today – I hope you have a lot as your concerns and perceived knowledge gaps are a big part of what we want to know - I'll take what you've told me, and any further questions you have, and assess the potential for tree growing partnerships that are beneficial both for everyone. When I've had a crack at that, I'll bring what I've put together back to you, both for your feedback and for your information and records".
   "**Do you have any initial questions about the goals and intended outcomes of the exercise?**
   "Is there anything you would like to be included in the conversation that I haven't mentioned so far?"
2. Look at laptop or other device to define property extents (data connection allowing), sketch property on paper, identify land uses where landholder either sees opportunities (ie direct and co benefits) for trees or has concerns (access etc?) about trees
   "can we please start with a run down on how you're using the property currently – what are your main enterprises and seasonal activities"?
   "where do you see trees fitting into your land use, and why?"

"are there areas you're particularly concerned about putting trees?"
"Have you seriously considered trees in the past, and how much do you feel you know already?"

3. **"For my understanding and to help me decide which species and plantation regimes might work, where, can you please tell me more of what you know about your property?" (prompt on below points)**
   "Will it be alright if I get other relevant information from the internet etc that will be helpful for designing?"
   - soil types and depth
   - soil improvement history
   - pasture type
   - wind
   - frost
   - rainfall
   - waterlogging
   - rocks
   - exposure
   - most and least productive areas for current activities
   - general "problem" areas
   - any areas with particular conservation/preservation value (current or future opportunities eg reveg waterways)
4. *Infrastructure*
   - access points and limitations such as low powerlines, load limited culverts etc
   - Roads and lanes and trafficability
   - "unofficial" utilities such as drainage and irrigation networks
   - critical infrastructure such as fences, stock routes and crossing points, holding areas, watering points etc
5. *Current and future business activities and management regime – goals and objectives*
   "How do you see trees fitting with your lifestyle aspirations?"
   - general discussion to understand the requirements and timing of annual agricultural and other (eg recreation?) activities
6. Plans for future changes, up or down-scaling of activities
   "how hard do you hope to be working on the farm/property in the next ten to twenty years?"
7. *Other hopes and concerns for trees on the property*
   "Having discussed trees and your property, what further information would you like to know before deciding to plant trees?"
   - logistics
   - finances/inputs/returns etc
   - ongoing management, end of agreement clean up
   - etc?
   "Are there any absolute deal breakers, either for trees generally, or with respect to particular areas of the property, that you'd like to emphasise?"
8. What would they need to know, to be comfortable considering greater areas of trees for timber production on the property?
   "This is an important point for the other project stakeholders to be able to understand:- given the above discussion, and having identified the areas you're most comfortable

considering trees on your property, can I ask what you would want to know in order to commit more area to trees?"

Case studies

1. Caldermeade

Attended: Dean Severino

- 63 acres (25.5 ha), presently almost entirely clear of trees other than feature trees on the driveway
- Main source of income is off farm
- Initially described cattle as a hobby during phone discussion; however, emphasised the importance of income during the interview
- Interested in establishment and ongoing costs including fencing, and potential returns
- Sees a proportion of trees on the property as adding value

Property:

- 35 inches (800 mm) rainfall, 2 or 3 frosts a year. Loamy clay soils, flat, surrounded by a lot of market gardens pushing out from Melbourne, possibly in the proposed airport zone
- Farm income approximately $40 k/year from running approximately 55 head of cattle (private slaughter)

Questions and concerns:

- Thinking of moving and/or selling the property when retired
- Doesn't like pine trees (personal preference for eucalypt), is concerned by the lack of undergrowth
- Recognises the shelter and aesthetic benefits of trees, particularly if wanting to appeal to Melbourne lifestyle buyers down the track
- What's the return and how long?
- Tax implications?
- Believes that at least one neighbour, with 85 acres, *could* be interested depending on the terms

Other:

A lump sum payment at the end would not be attractive because of the perceived poor record of the forest industry on following through. The landholder would prefer an up-front payment primarily as insurance against the company going out of business or otherwise disappearing before the end of the contract term.

The landholder would be tentatively comfortable with around a third of the area around the border of the property planted, returns-dependent, including along the river.

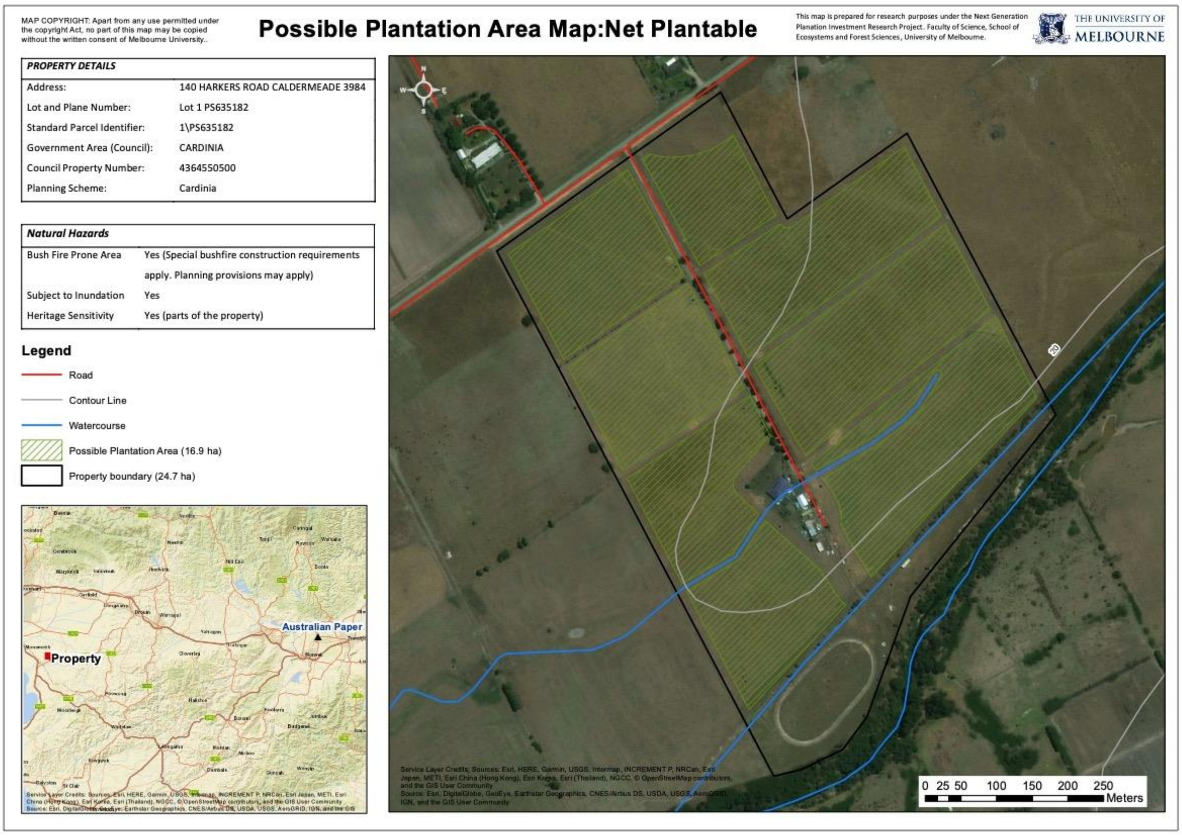

Figure 2 Caldermeade net plantable area

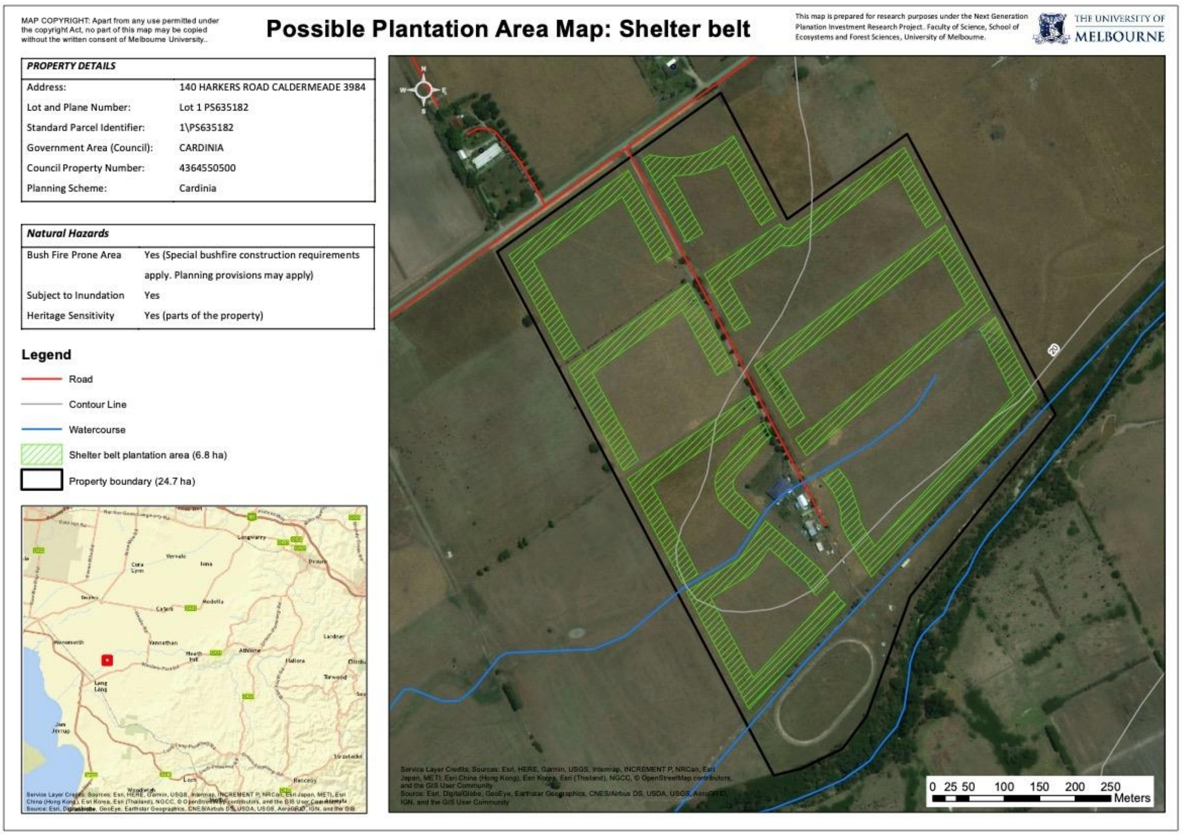

Figure 3 Caldermeade possible shelter belt scenario

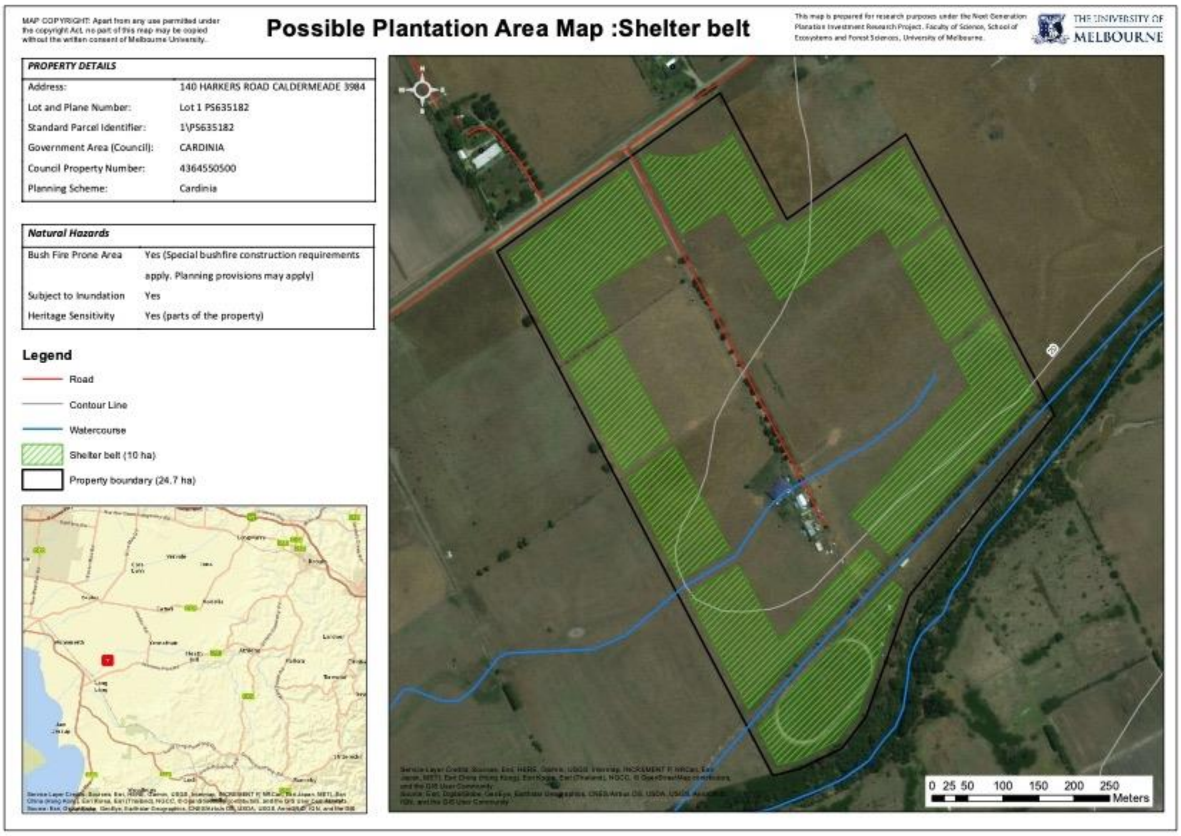

Figure 4 Caldermeade landholder tree planting design

2. Thorpdale

Attended: Dean Severino, Glenn Marriott (Ag Consultant)

Property:

- Main enterprise is potatoes, trialling onions and carrots (main issue is that Plant Breeders' Rights controls the varieties and the potential profits)
- Also runs 1,500 sheep across fallow paddocks
- Undulating to steep
- Good clay loam soils

Multi-generational farmer, with a son coming into the business.

They're busy all year round, for better or worse.

Sees opportunities for:

- planting out steep areas with reasonable access
- renewing and extending old cypress shelter belts
- other shelter belts (north–south winds, and east–west for shade), 20 m would be acceptable
- more area would depend on the potential income

Concerns

"What's going to happen in 25 years?"

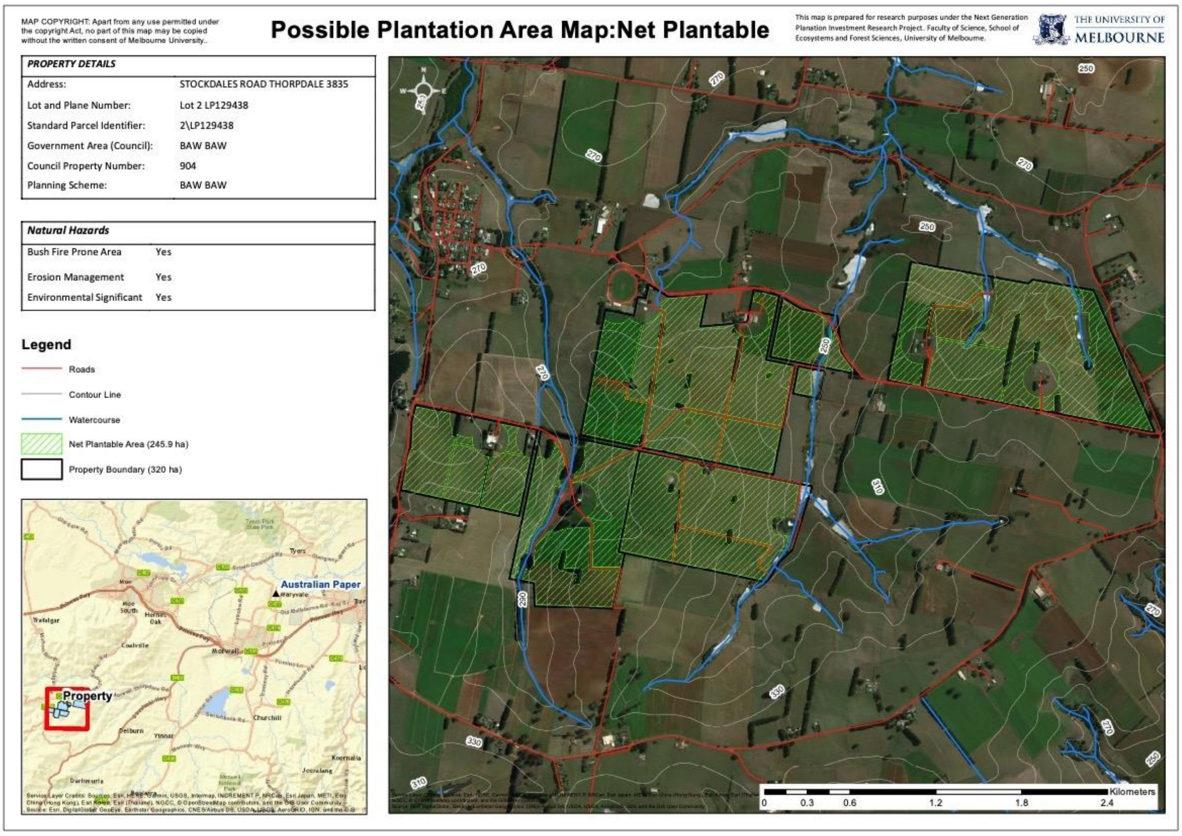

Figure 5 Thorpdale net plantable area

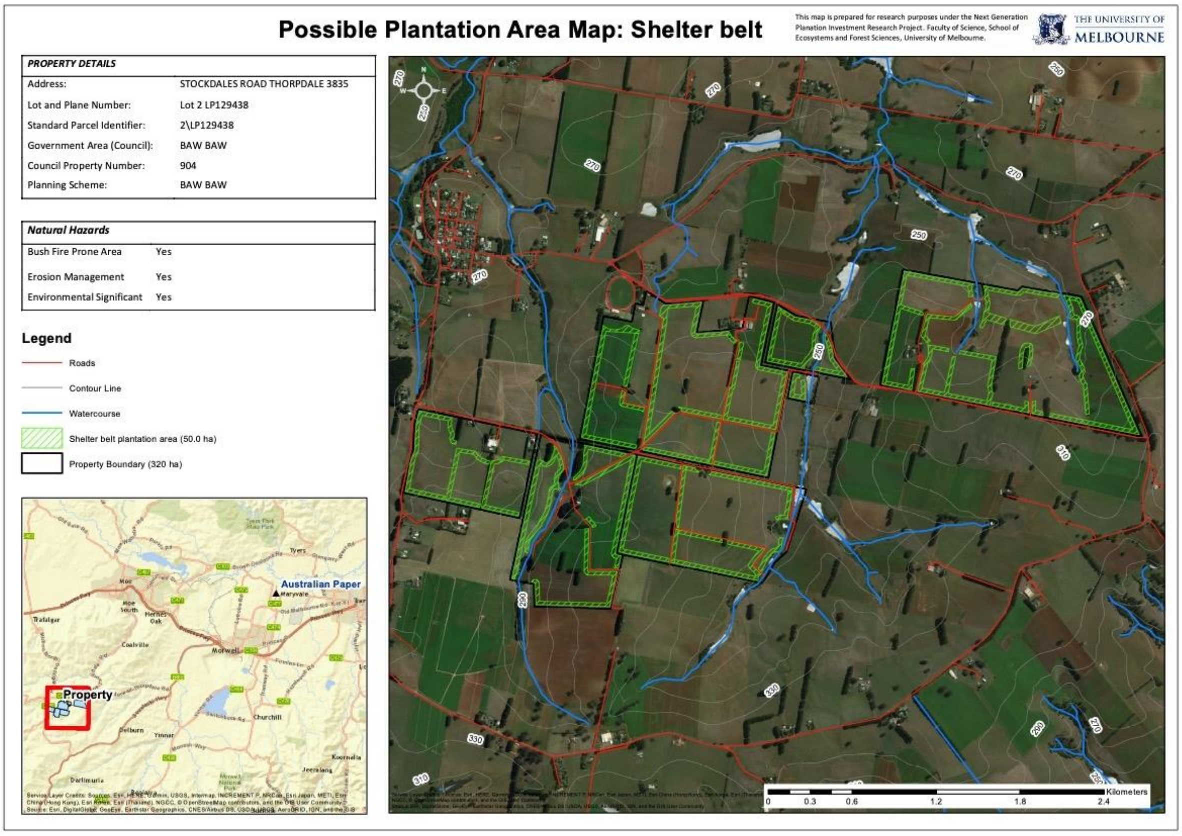

Figure 6 Thorpdale possible shelter belt scenario

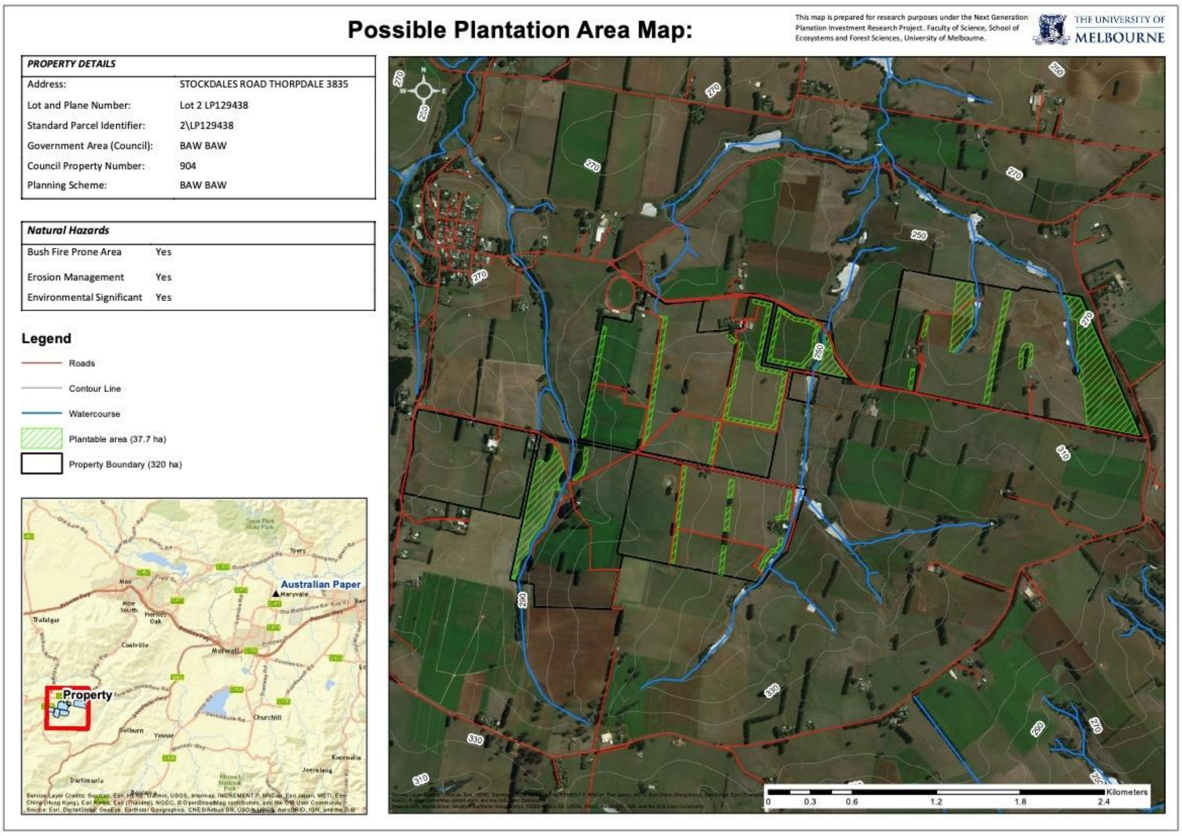

Figure 7 Thorpdale landholder tree planting design

3. Trafalgar

Attended: Dean Severino, Glenn Marriott (Ag Consultant)

Property:

- 100 ha (250 acres) plus lease 160 acres from neighbour
- Split by road, recently installed underpass, highly irregularly shaped boundary
- Difficult areas are stony, hard to work, furthest from milking infrastructure (up to 2 km walk for cows to dairy) and with deer intrusion issues

Current land use:

- Dairy farming, one milking per day
- 300 head of dairy cattle
- Already has a lot of shelter and non-driveable parts of the property, plus a lot of cypress shelter belts

Management and personal:

- Has previously worked as a plantation harvesting forwarder driver so has some first-hand experience of forestry operations
- Struggling for viability on marginal dairy country
- Sees decreasing productivity for dairy due to climate change as a serious issue
- Has been dairying since he was 16 and ready to transition to another land use if possible to maintain his income level e.g. beef – has a 5-year goal to get out of dairy
- “would stop dairying tomorrow if he could”

- Not interested in potentially keeping trees rather than harvesting them

Concerns and questions about planting trees for income:

- Chances of stranded asset if local market disappears
- Ability to market small separate block of trees if necessary
- Per ha monetary return
- Having to carry the upfront cost in the short term
- Would want to know the risk versus reward opportunities in terms of getting more profits for doing more of the management work on the trees
- How much mess would be left after harvesting
- The effect on the capital value of the land
- Has not been involved in the “growing trees” side of the plantation industry before
- What would the pasture re-conversion costs be if he didn’t want to replant

Opportunities:

- On the harder, least productive pasture country (possibly 9 ha, 6-m wide laneway access)
- Replacement of cypress shelter belts (eating the cypresses can cause pregnant stock to abort)
- Shelter on north–south fence lines, and on the south side of the laneways so they don’t stay wet
- More area would depend on the return, and how it affected the grazing capacity of the property

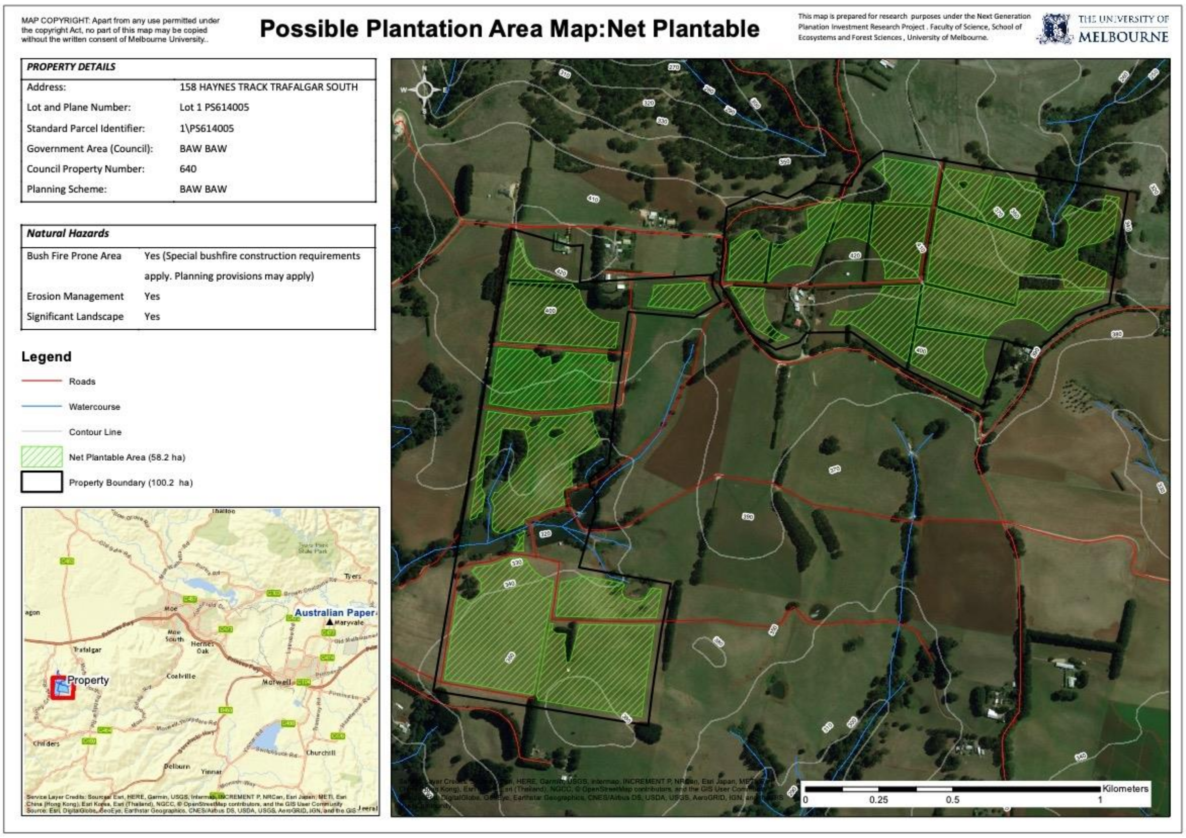

Figure 8 Trafalgar net plantable area

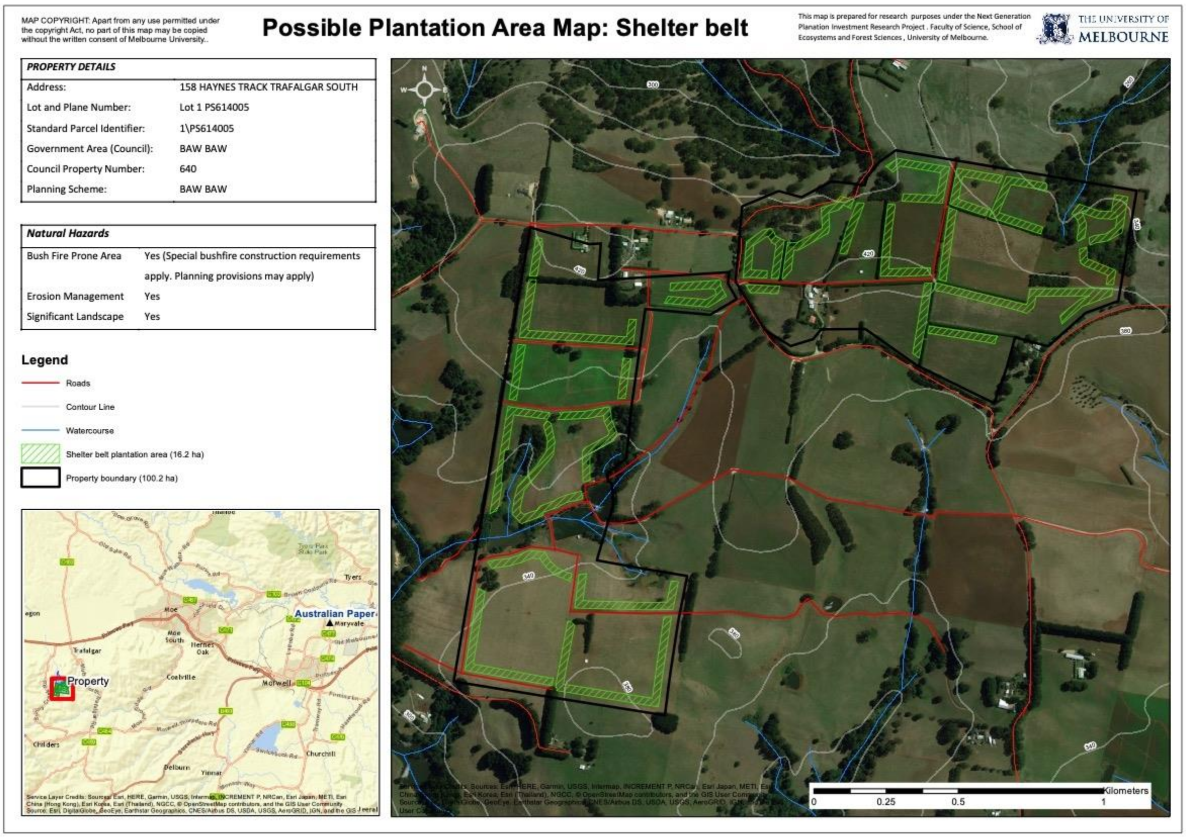

Figure 9 Trafalgar possible shelter belt scenario

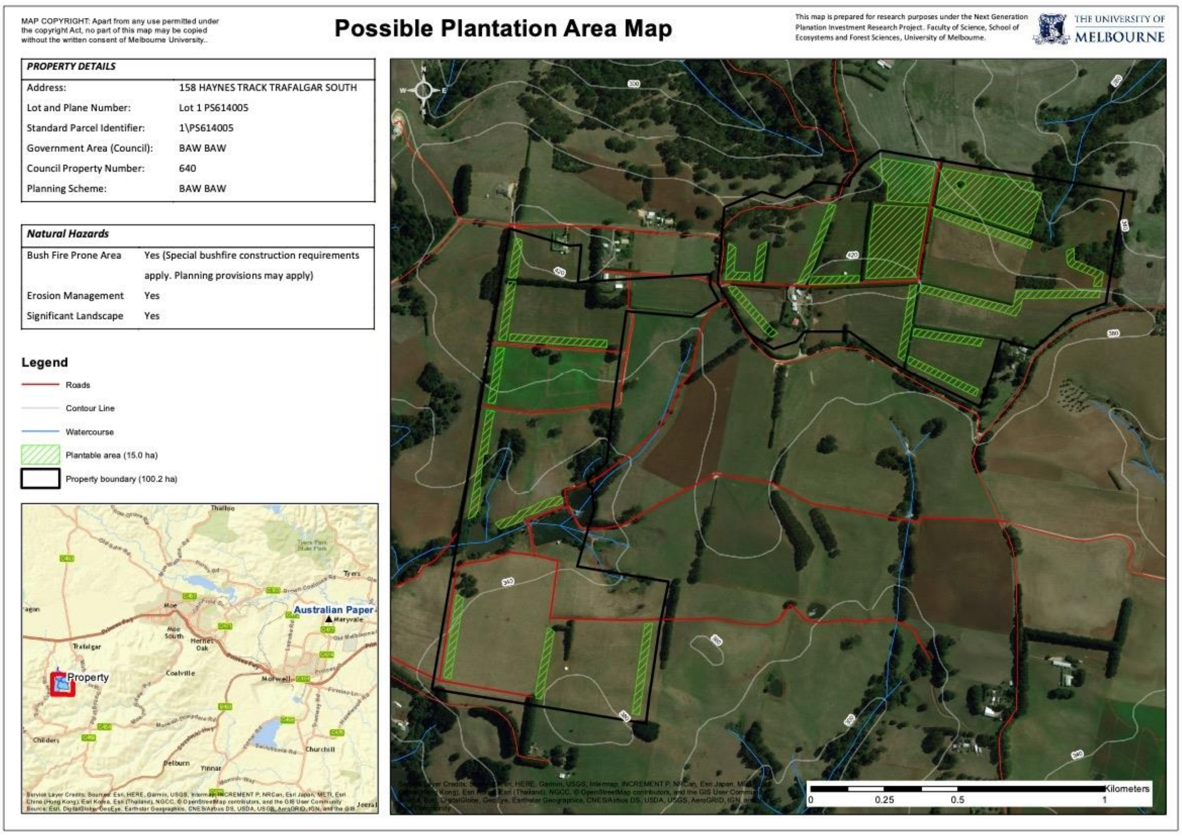

Figure 10 Trafalgar landholder tree planting design

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