



Leonards Hill Wind Operations Pty Ltd  
**Hepburn Community Wind Farm**

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On-site Landscape and Visual Screening Plan

12 August 2010

Prepared by Future Energy Pty Ltd  
On behalf of Hepburn Wind

Use and Development:	Hepburn Community Wind Farm
Address:	2040 Ballan-Daylesford Road, Leonards Hill CA'S B1 & B4, SEC Y, LOT 1 TP000671N, CA B2, CA A1 & A2, SEC 3B
Planning Permit No:	2006/9231
Responsible Authority:	Hepburn Shire Council
Submitted for:	Leonards Hill Wind Operations Pty Ltd
Prepared by:	Hepburn Wind
Version date:	12 August 2010 Revision 3 - FINAL

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# 1 Background Information

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## 1.1 Purpose

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This On-site Landscape and Visual Screening Plan details the process by which Leonards Hill Wind Operations Pty Ltd (LHWO) will ensure the Hepburn Community Wind Farm satisfies Permit Condition No. 4 a) through f) of the Development Approval No. 2006/9231 issued on 31 July 2007 by Hepburn Shire Council [signatory Christine Halstead, Team Leader Planning].

The condition is as follows:

Permit Condition No. 4 On-site landscape and visual screening plan:

*Before the use or any development starts, a Landscape and Visual Screening Plan must be submitted to the satisfaction of the Responsible Authority. When approved, the plan will be endorsed by the Responsible Authority. The Landscaping and Visual Screening Plan must include:*

- a) Visual screening of hard stand areas and the grid control booth from the Ballan-Daylesford Road.
- b) Planting along the site's perimeter to provide screening to dwellings #2, #3, #11, #12 and #19 (dwelling numbers from Map 5 – Neighbouring Residences in the Proposed Hepburn Community Wind Park Landscape and Visual Assessment Study by J Cleary 2006 at page 41)
- c) Details of species proposed to be used for landscaping including details of the height and size of species at maturity.
- d) Details of fencing to protect new vegetation from stock impacts.
- e) A maintenance program.
- f) A timetable for the implementation of landscaping and visual screening works that includes planting being completed prior to any turbine being commissioned.

The use and development must be carried out in accordance with the endorsed Landscaping and Visual Screening Plan to the satisfaction of the Responsible Authority.

## 1.2 Activity Description

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The wind farm will be constructed, owned and operated by Leonards Hill Wind Operations Pty Ltd (LHWO). It will be situated on open, cleared grazing and cropping land situated 10 km south of Daylesford. The subject land is designated Farming Zone (FZ) under the Hepburn Shire Planning Scheme. The address of the subject land is 2040 Ballan – Daylesford Road, Leonards Hill and is owned by one landowner, R & N Liversidge Pty Ltd, as trustee for the R & N Liversidge Family Trust. [See Figure 1]

The land is described by the following legal titles:

1. Certificate of Title Volume 9845 Folio 484
2. Certificate of Title Volume 10172 Folio 201
3. Certificate of Title Volume 10172 Folio 202
4. Certificate of Title Volume 10172 Folio 203

The Wind Farm will consist of two Repower MM82 wind turbine generators. Each wind turbine generator will be mounted atop towers with a height of 68m and consist of three blades measuring 41m. The towers will have a diameter at the base of between approximately 4 and 5 metres and will taper to the top.

As shown in Figure 1 an access track will be constructed from the site entrance on the Ballan–Daylesford Road to the turbines. The track will be approximately 5m wide. This track will be used during the construction period and thereafter for maintenance vehicles to access each wind turbine. The turbines will be connected to the local electricity grid via underground 22 kV cable. This underground cable will follow the route of the access track. The trench for the cables will measure approximately 300 mm wide and 600 mm deep and be dug alongside the access track. The layout of the access tracks can be seen in Figure 1.

Hard standing areas next to the base of each wind turbine will be used for turbine assembly during the construction of the Wind Park and will measure approximately 20 m by 40 m. A small enclosed area housing metering and grid control equipment as well as maintenance facilities will be located alongside the point of connection into the electricity grid. This control booth or switchyard is shown in Figure 1.

## 2 Screening of Control Booth and Hard Stand Areas

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According to the Planning Permit condition, the On-site Landscape and Visual Screening Plan must provide for the screening of hard stand areas and the grid control booth/switchyard, as seen from Ballan-Daylesford Rd. These features of the development are shown in Figure 1 below. Because the hard stand areas are located either on or over the crest of Leonards Hill, the surface elevation of the landscape ensures they are not visible from Ballan-Daylesford Rd. The hard stand areas are therefore naturally fully screened from Ballan-Daylesford Road. Consequently, it is not necessary to plant screening vegetation around them. However, the switchyard will be visible from Ballan-Daylesford Rd and, as such, its screening is detailed in this plan.

### 2.1 Location of Screening Trees

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In order to screen views to the switchyard the screening vegetation needs to interrupt the line of sight between Ballan-Daylesford Rd and the switchyard. Figure 2 shows the site lines between the switchyard and Ballan-Daylesford Rd, and indicates where screening will be located.

The vegetation will be positioned to achieve effective screening (when mature). Exact positioning may change and will be subject to the preparation of a detailed design taking into account:

- final switchyard dimensions and exact siting
- clearances from switchyard and power lines as required by statute and best practice
- landowner preferences
- road and fence layout

## 2.2 Species

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LHWO propose to utilise the tree species, *Banksia Marginata* for the purposes of providing the necessary screening around the switchyard. *Banksia Marginata*, or Silver Banksia<sup>1</sup>, will reach a height of approximately 4m at maturity and will provide ample screening of views of the switchyard from Ballan-Daylesford Road. This screening will also provide screening of views of the switchyard from nearby dwellings.

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<sup>1</sup> Alternative species with equally or more effective attributes may be selected subject to availability, further expert advice and consultation. The Responsible Authority will be consulted as part of any required change of species

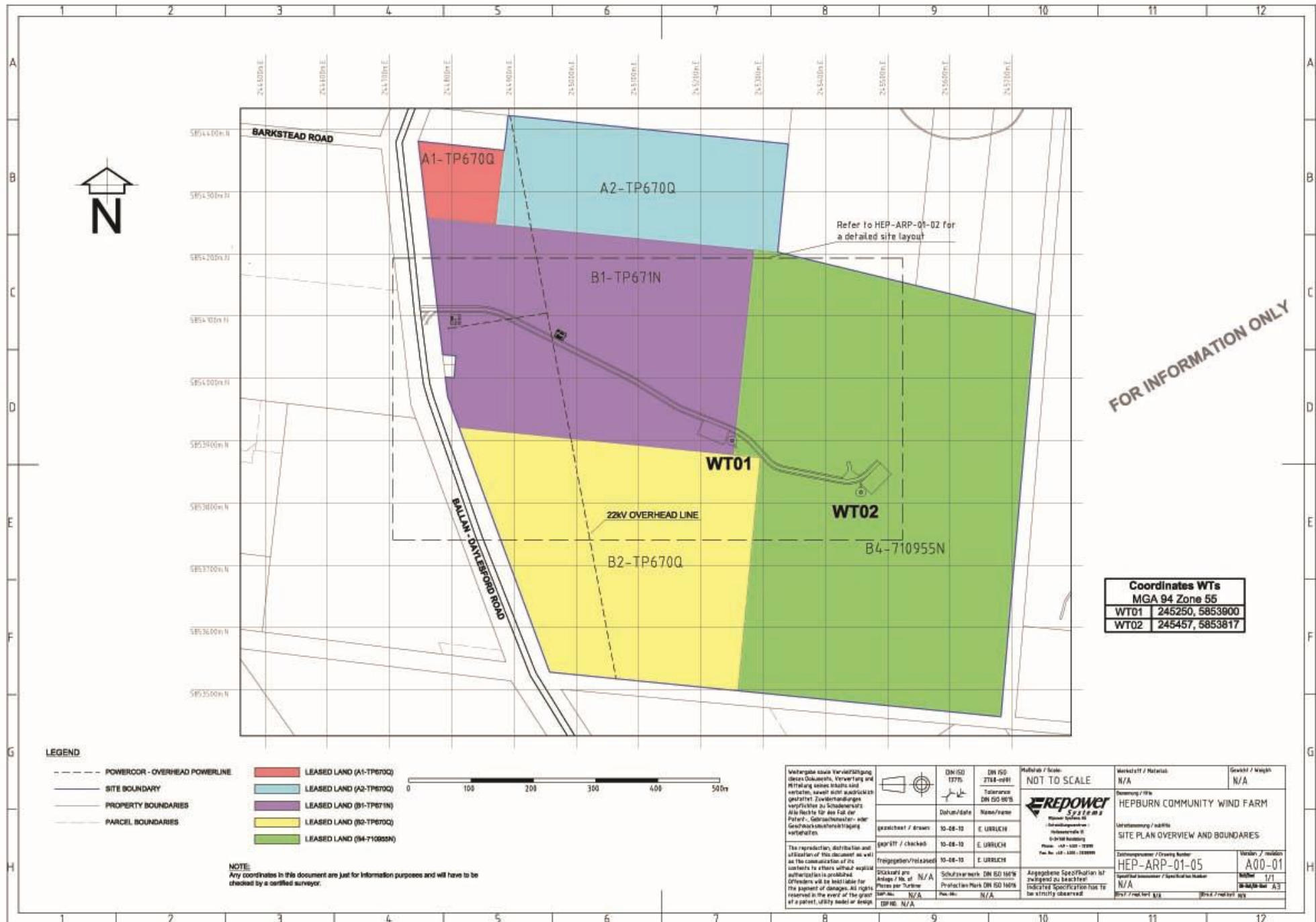


Figure 1: Switchyard and Hardstand Areas



Figure 2: Switchyard Viewshed

### 3 Screening of Views from Dwellings

This On-site Landscape and Visual Screening Plan is also designed to provide for the screening of views from dwellings 2, 3, 11, 12 and 19 via on-site planting. These dwellings are highlighted in Figure 3 below, together with their site lines to the wind farm and the boundary of the wind farm site. The details of these dwellings are summarised in Table 1 below.

**Table 1: Dwelling Details**

Dwelling No	Address	Distance to Nearest Turbine (m)
2	1914 Ballan-Daylesford Road	696
3	1881 Ballan-Daylesford Road	654
11	2084 Ballan-Daylesford Road	745
12	2095 Ballan-Daylesford Road	968
19	2101 Ballan-Daylesford Road	957

#### 3.1 Location of Screening Trees

Because the height requirement of a screening tree increases as the distance between it and the relevant house increases, the most effective location for on-site screening is the perimeter of the site. Clearly the screening tree also has to be located within the sight line of the dwelling. Hence screening trees need to be located at the intersection of the sight lines and the site boundary as they are shown in Figure 3. Alternatively, screening trees can be placed off-site for those residences where an on-site screening solution would lead to an impractical solution or non- timely solution.

A closer inspection of this area of intersection is provided by Figure 4 and Figure 5. In all figures the area of fence line requiring trees for screening is highlighted in red.

These two tree lines follow the line plotted by points shown in Table 2. Tree Line 1 amounts to approximately 270 m of fence line requiring planting, and Tree Line 2 amounts to approximately 200 m of fence line requiring planting.

**Table 2: Tree Line Locations**

	Tree Line 1	Tree Line 2
1	244865/5854365	245177/5853509
2	244888/5854363	245375/5853490
3	244894/5854418	
4	245081/5854400	



Figure 3: Dwelling Site Lines



Figure 4: Tree Line 1

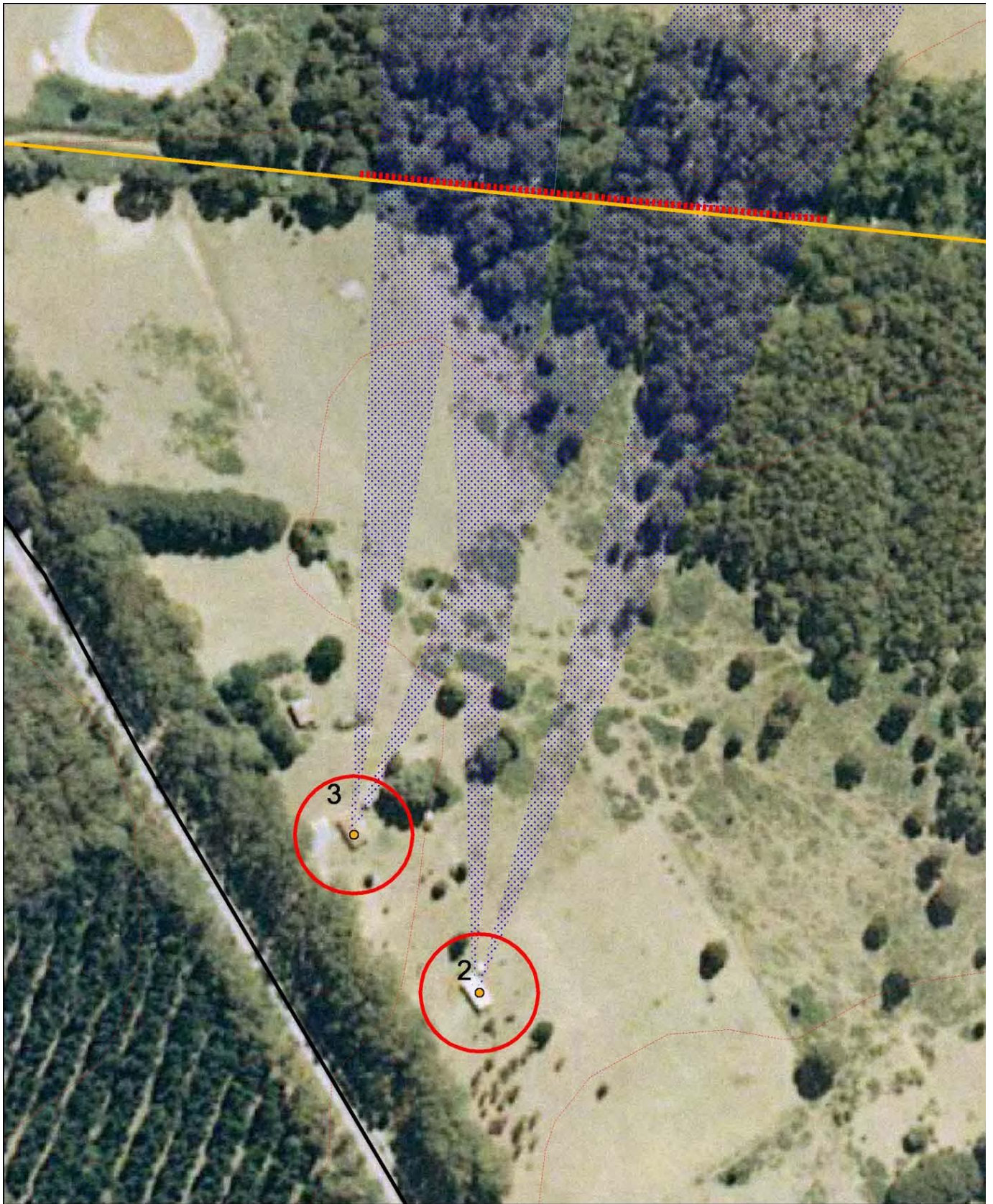


Figure 5: Tree Line 2

## 3.2 Tree Height Requirement

Screening trees also need to be of a minimum height in order to be effective. This height can be determined via simple geometrical equations, as the sight line from a house to a particular turbine is a straight line. The calculations used in this plan are based on the following points:

- The elevation of each dwelling at ground level;
- The elevation of the tip of each turbine blade, at its highest point;
- The shortest distance between a dwelling and a turbine;
- The distance between a dwelling and the site boundary; and
- The elevation at the point the site line crosses the site boundary.

All distances and elevations were determined using GIS software and current Vicmap datasets. The results of these calculations are summarised in Table 3 below. From these calculations it is apparent that Tree Line 1 would be required to have a height ranging from 8–33 m, and Tree Line 2 a height ranging from 56–61 m. These heights are quite specific however, and also only represent a minimum requirement. As a result it is more appropriate to consider the height requirements of the two tree lines as 10–35 m and 55–65 m respectively. Given the heights considered however, it may be more appropriate to rely on the offsite screening to mitigate these effects.

**Table 3: Screening Tree Height Requirements**

Dwelling No.	Elevation (m)	Distance to Nearest Turbine (m)	Turbine Elevation (m)	Distance to Boundary (m)	Total Elevation Requirement at Boundary (m)	Elevation at Boundary (m)	Final Tree Height Requirement (m)
2	696	696	730	340	766 (+70)	707–709	59–61
3	708	654	730	278	763 (+56)	707–709	56–58
11	682	745	730	112	706 (+24)	692–698	8–14
12	673	968	730	303	725 (+52)	692–698	27–33
19	673	957	730	336	731 (+58)	700–720	11–31

## 3.3 Impact of Existing Trees

The figures above reveal that the sight lines from dwellings 2 and 3 are interrupted by mature forest. According to local knowledge and site inspections, this forest has a total height of approximately 30 m. While this height is insufficient to meet the requirements of dwellings 2 and 3, it should be noted that it is unlikely that newly planted trees will surpass the height of this established forest in the 25 year lifetime of the wind farm. Planting new trees along the site boundary would also require clearing of this mature forest, which is an extension of Wombat State Forest and is therefore of relatively high ecological value. Therefore Tree Line 2 is unlikely to be effective, is likely to be difficult from a planning perspective, and would also involve environmental disbenefits. As a result, this On-site Landscape and Visual Screening Plan implements Tree Line 1 solely. The screening of any remaining views from dwellings 2 and 3 will be catered for via the Off-site Landscape and Visual Screening Plan.

### 3.4 Species

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LHWO propose to utilise a combination of two species to provide the screening discussed earlier. These species will be Acacia Melanoxylon and Eucalyptus Dives<sup>2</sup>. The Acacia Melanoxylon, or Blackwood, is a tall bushy tree reaching heights of approximately 25m at maturity. The Eucalyptus Dives, or Broad-leafed Peppermint, will reach heights of over 30m at maturity.

## 4 Protection and Maintenance

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The planting will be designed, planned, implemented and managed by experienced landscaping professionals. Plantings will be scheduled and co-ordinated having regard to the most advantageous seasons. Trees will have appropriate protection against the potentially negative effects of the elements and interference from livestock. This will incorporate protection for individual trees as well as specific fencing as appropriate.

Trees will be inspected on a regular basis to assess their ongoing health and requirements. According to the determinations of these assessments LHWO will ensure the necessary requirements of the trees are administered in a timely fashion to ensure the continuing health of the trees.

## 5 Implementation

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The design and implementation of the vegetation planting will be based on professional advice to ensure it is timed according to the most appropriate times of the year. Additionally, the schedule will be designed not to conflict with the construction works taking place on site.

The broad timetable for the implementation of the landscaping and screening works is as follows:

Phase	Approximate Dates	
	Boundary screening	Switchyard screening
Design	September 2010	September 2010
Planting	October 2010	February 2010
Protection/Fencing	November 2010	April 2010

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<sup>2</sup> Alternative species with equally or more effective attributes may be selected subject to availability, further expert advice and consultation. The Responsible Authority will be consulted as part of any required change of species