

# HAWKESDALE WIND FARM AMENDMENT

Landscape and Visual Impact Assessment Review

*For: Ryan Corner Development Pty Ltd*

*REFERENCE: 0105123 HWF RPT4/ Final/ February 2017*



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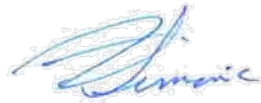
For and on behalf of

**Environmental Resources Management Australia**

Approved by: Alan Simonic

Position: Partner

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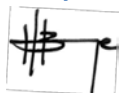


Date: 1 February 2017

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## 1 EXECUTIVE SUMMARY

Ryan Corner Development Pty Ltd (RDPL) seeks to amend the permit to allow an increase to the overall height of the wind turbines from 126.3 m to 180 m and to reduce the wind turbine numbers from 31 (approved) to 26 wind turbines.

Proposed changes to the approved Hawkesdale Wind Farm that may alter the visual impact include an increase in turbine heights and deletion of several turbines.

The comparative Seen Area Analysis discussed in 4.1 shows the theoretical change in turbine visibility from the area surrounding the HWF that would be brought about by the proposed turbine amendments. This mapping demonstrates that although there will be a change in turbine visibility, this would be small.

Photomontages assist to demonstrate the difference in turbine appearance between the approved wind turbine height of 126.3 m and the proposed wind turbine height of 180 m. This change is demonstrated in Figure 1-1, which shows the change in turbine appearance from a distance of approximately one kilometre from a turbine.

It is apparent that there will be a visual change brought about by the alteration in turbine height. For some viewers, the larger turbine is visually more slender and potentially more elegant than those at a lower height. It must be recognised that although a turbine may appear taller, the overall visual impact of wind turbine also considers the sensitivity of an area and its ability to accommodate visual change as well the number of viewers that may see a turbine. Because the landscape sensitivity and viewer numbers are consistent with the original assessment, the overall visual impact of the larger turbines from each location is consistent with that of the smaller turbines.

For similar reasons, the proposed reduction in the number of wind turbines may reduce the number of visible turbines from viewing locations; however the change in visual impact would be minor or insignificant as turbines may still be present in views.

The increase in height, the perceptual change to the scale of the overall wind farm and the resultant visual impact would not significantly change from the original assessment.

### 1.1 Mitigation measures

The original LVIA recommended that landscape mitigation measure be offered to non-participating landowners within a distance of 3.0 kilometres from the nearest turbines. This was because this distance represents an area of potentially high visual impact based on distance and that residential dwellings are considered to have a high sensitivity to visual change.

Given the increased height of the wind turbines, it is acknowledged that the amended wind turbines may be *“Highly visible and will usually dominate the landscape”* up to 4 km of the nearest wind turbines (refer to Section 4). It is recommended that landscape mitigation should be extended to residents within 4 km of the wind farm.

Figure 1-1 Comparative views of Approved turbine (above), Amended turbine (below)





## 2 INTRODUCTION

Ryan Corner Development Pty Ltd (RDPL) seeks to amend the Approved permit for the Hawkesdale Windfarm to allow an increase in wind turbine height from 126.3 m to 180 m. RDPL also seek to reduce the number of wind turbine numbers from 31 in the approved layout to 26 wind turbines.

## 3 PROPOSED AMENDMENT

The approved HWF comprises 31 wind turbines to an maximum height of 126.3 m of above ground level (Approved Layout) and connection to the state electricity network.

### 3.1 Wind Farm Layout

This amendment seeks to alter the approved layout to:

- Reduce the number of wind turbines from 31 to 26 (delete A6, A12, A16, A18 and A29).
- increase the overall wind turbine height to 180 m for 23 wind turbines;
- increase the overall turbine height to 160 m for turbines A10, A13 and A17; and
- Realign access tracks to suit the reduced turbine layout.

The location of all turbines will remain within the approved development and associated 100 m micro-siting envelope. The proposed changes will herein be referred to as the Amended Layout. Figure 2-1 (opposite) the proposed wind farm layout.

Table 2-1 below compares the relative changes in turbine heights and turbine numbers between the Approved Layout and this amendment.

Table 2-1 Wind turbine height change

	Min blade clearance to ground level	Overall height (m)	No of turbines
Approved Layout	36.3	126.3	31
Amended Layout			26
Turbine A10,A13 and A17	30	160	
All other turbines	40	180	

\* Maximum hub height will be 117 m. In order to make a conservative assessment, that is based on the maximum rotor diameter; a 115 m hub height has been used in this assessment

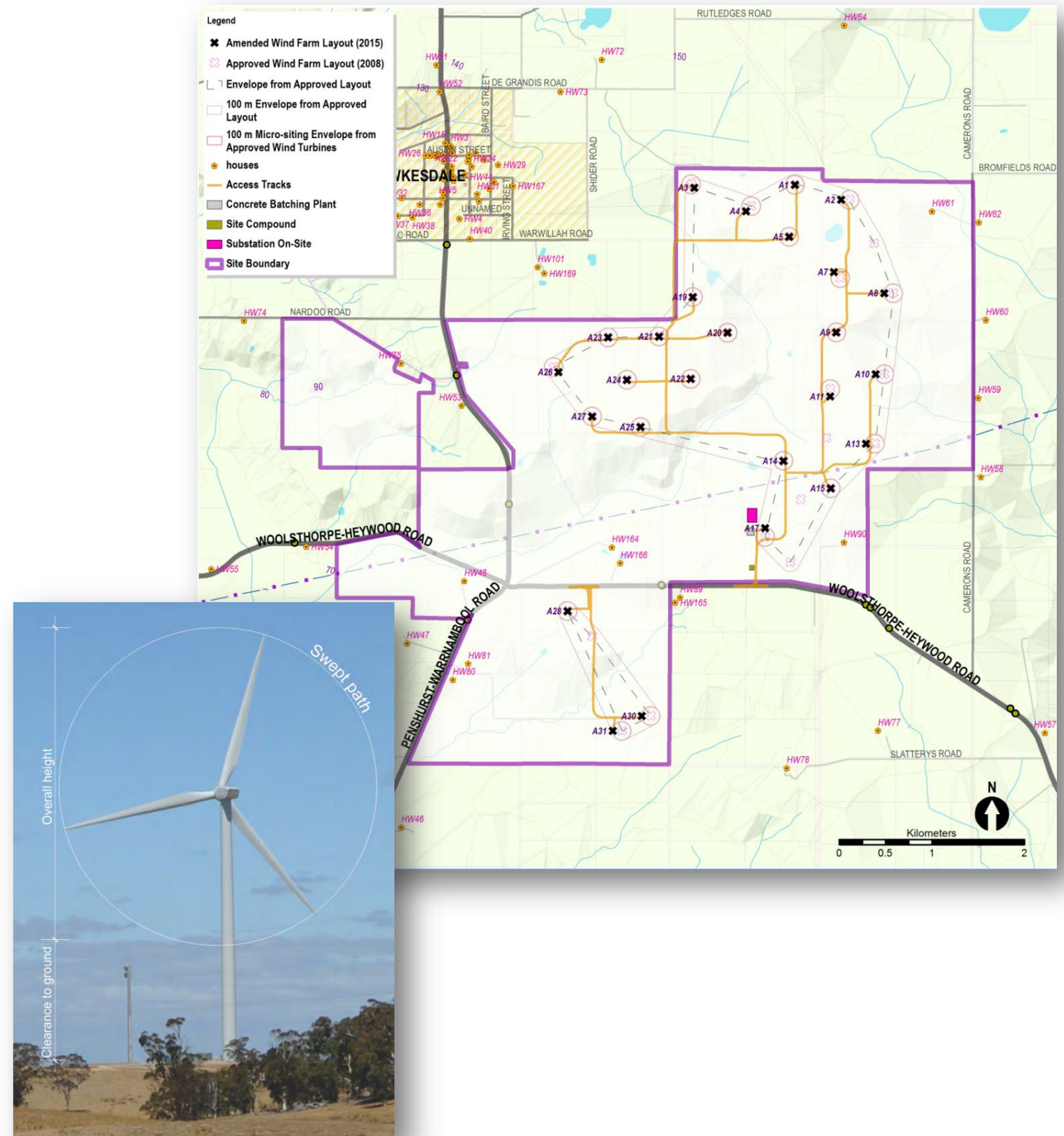
### 3.2 Transmission Line

The LVIA for the Approved Layout considered several options to connect the project to the National Electricity Grid. The preferred option is a joint Connection with the Macarthur Wind Farm project, to one of the 500 kV Moorabool-Heywood HV Transmission lines.

*“Option 2 comprises the construction of a 33kV/132 kV substation on the Hawkesdale site, the development of an easement and installation of a 132 kV overhead transmission line between the Hawkesdale site and the proposed substation for the Macarthur project, and connection to the 500 kV transmission line as part of the 132kV/500 kV substation to be constructed alongside the transmission line for the Macarthur Project.”*

This option was assessed in the LVIA and remains unchanged.

Figure 2-1 Amended wind farm layout



## 4 PLANNING BACKGROUND

A planning permit was issued on 12 August 2008 for the use and development of a wind energy facility at Hawkesdale. This approval allowed for the construction and operation of up to 31 wind turbines and associated facilities.

### 4.1.1 Secondary Consent

Secondary Consent was granted in August 2010 for an increase of the overall wind turbine height from 121.5 m to 126.3 m.

### 4.2 Planning Amendment

Ryan Corner Development Pty Ltd (RDPL) now seeks to amend the permit to allow an increase to the overall height of the wind turbines from 126.3 m to 180 m and a further reduction in wind turbine numbers from 31 (approved) to 26 wind turbines.

The following report will review and assess the change to the landscape and visual impacts resulting from the amendment to the proposed numbers and heights of the wind turbines.

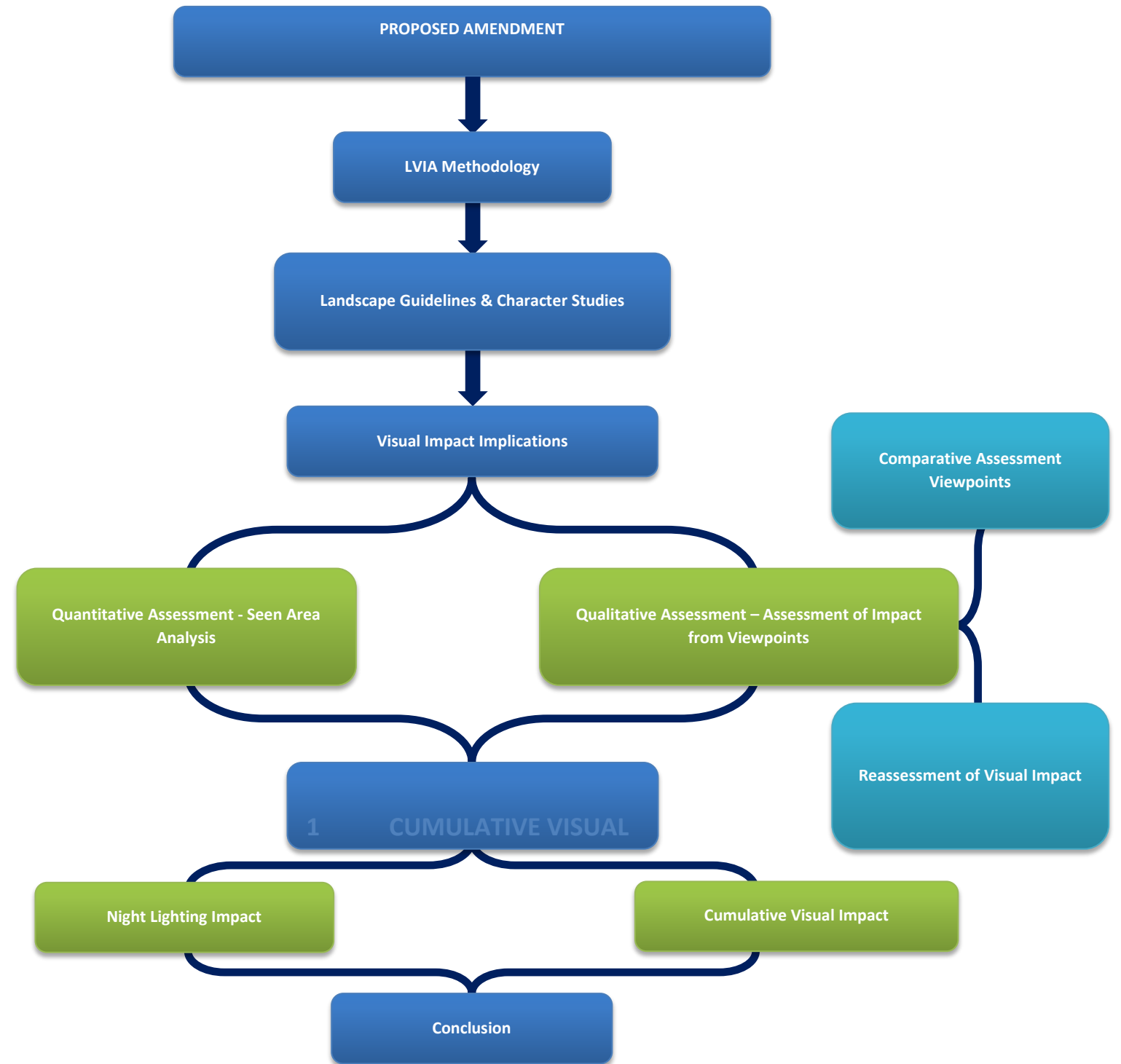
The Model Conditions within the Victorian Guidelines states that:

*“The responsible authority will not consent to an alteration or modification of the use and development as shown on the endorsed plans under condition 3 unless the responsible authority is satisfied that the alteration or modification will not give rise to an adverse change to assessed landscape, vegetation, cultural heritage, visual amenity, shadow flicker, noise, fire risk or aviation impacts.”*

This report will discuss the change to the landscape and visual impacts of the proposed amendment to Hawkesdale Wind Farm. The assessment structure is set out in Figure 3-1. Details of the methodology are set out later in this report.

## 4.3 Assessment Structure

Figure 3-1 Visual Impact Assessment Structure



Location	No. of Turbines	Distance and Direction (approx)	Status
Codrington	14	33 km south west	Operating
Yambuk	20	30 km south west	Operating
Macarthur	140	13 km north east	Operating
Portland Wind Energy project (Cape Bridgewater, Cape Nelson and Cape Sir William Grant)	52	>60 km south west	Operating

Assessment Structure



## 5 VIEW SHED AND ZONES OF VISUAL INFLUENCE

The region of the landscape that can potentially be visually affected is called the view shed. . The View shed and Zones of Visual Influence (ZVI) are based on the dimensions of the proposed wind turbines in the context of parameters of the human vision.

### 5.1 Changes to the View shed and Zones of Visual Influence

There are two proposed turbine heights for the HWF. To be conservative, changes the view shed and zones of visual influence of the proposed Amended Layout are based on the 180 m high turbine.

The area that may potentially be visually affected by development defines the project view shed. The view shed is the study area for assessing visual impact. The view shed is not the same as the extent of visibility as it may be possible to see the turbines from areas outside the view shed. The view shed is rather, the area within which the proposed development may cause impact. Zones of Visual Influence define areas within the view shed that assist to describe the effect that distance has on visual impact of the turbines.

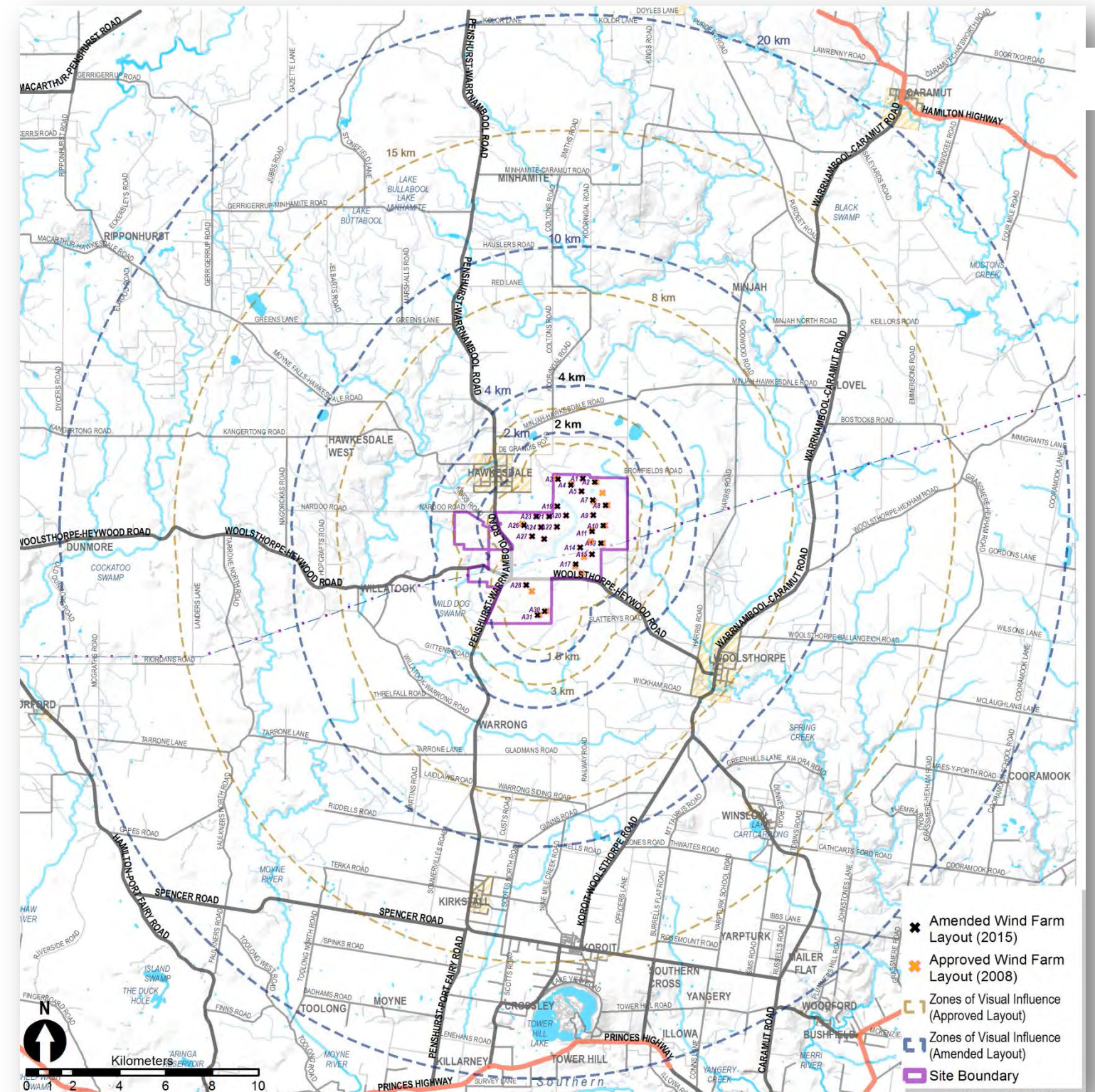
The proposed increased height of the turbines will redefine the extent of the view shed and the Zones of Visual Influence. The changes between the Approved and Amended Layouts are outlined in Table 4-1.

Table 4-1 Zones of Visual Influence

Distance to nearest turbine		Zones of visual influence
Approved Layout	Amended Layout	
> 15 km	>20 km	<b>Visually insignificant - Extent of the project view shed</b> A very small element in the view shed, which is difficult to discern and will be invisible in some lighting or weather circumstances.
8 - 15 km	10 - 20 km	<b>Potentially noticeable, but will not dominate the landscape</b> The degree of visual intrusion will depend on the landscape sensitivity and the sensitivity of the viewer; however, the wind turbines do not dominate the landscape.
3 - 8 km	4 - 10 km	<b>Potentially noticeable and can dominate the landscape</b> The degree of visual intrusion will depend on the landscape sensitivity and the sensitivity of the viewer
1.5 - 3 km	2 - 4 km	<b>Highly visible and will usually dominate the landscape</b> The degree of visual intrusion will depend on the wind turbines' placement within the landscape and factors such as foreground screening.
< 1.5 km	< 2 km	<b>Will always be visually dominant in the landscape</b> Dominates the landscape in which they are sited.

These distances are shown graphically in Figure 4-1 (Opposite).

Figure 4-1 Comparative view shed and ZVI of Approved and Amended Layout





## 6 LVIA METHODOLOGY

The explanation of the LVIA methodology has been clarified in response to Panel queries on past projects and to the issues raised within Guidelines since the initial LVIA was prepared in 2006. The methodology used within this assessment is set out in the following section.

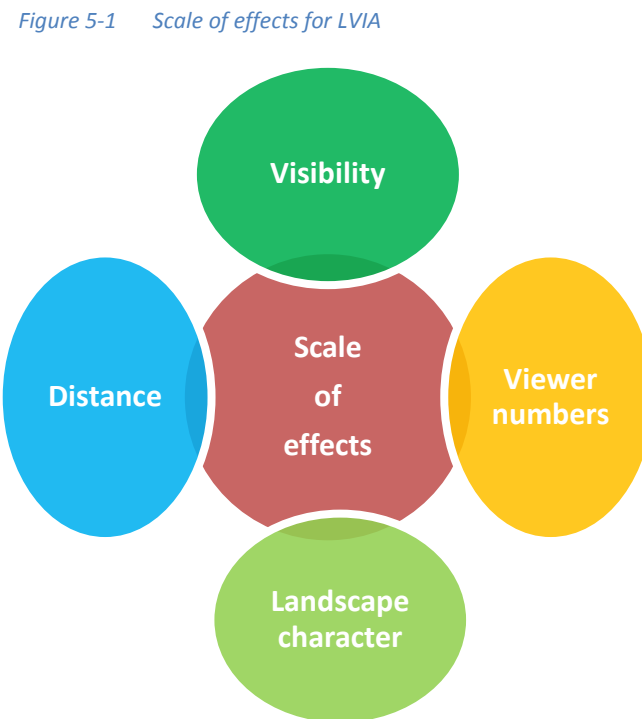
### 6.1 Assessment Criteria of Visual Impact

The assessment criteria used for publicly accessible viewpoints and those from the private domain differ. These are elaborated below.

#### 6.1.1 Public viewpoints

For public viewpoints the associated scale of effects are primarily based on the assessment of the following four criteria:

- **Visibility:** The visibility of a development which can be affected by intervening topography, vegetation and buildings.
- **Distance:** The distance of the viewer from the wind turbines. The level of visual impact decreases as distance increases.
- **Landscape character:** The character of the surrounding landscape, both around the site and adjacent to the viewing location, must be considered. Generally, a man-modified landscape is considered of low sensitivity and a pristine landscape is considered highly sensitive.
- **Number of viewers:** The level of visual impact decreases where there are fewer people able to view the development. Alternatively, the level of visual impact increases where views are from a recognised vantage point.



These four criteria need to be considered in the assessment of each viewpoint. However the ratings of each criteria are not numerically based and cannot be simply added together to arrive at an overall rating.

For example:

- If the distances to the wind turbines are great then even if the viewer numbers and the landscape sensitivity were high, the overall visual impact would be minor because the wind turbines are only just visible in the landscape.
- If viewer numbers were low (i.e. few people can see the wind turbines from the publicly accessible viewpoint), then even if the wind turbines were near the nominated viewpoint and the landscape sensitivity was high, the overall visual impact would be minor because the change to the landscape is not visible to many viewers.
- If landscape sensitivity was low (i.e. within a highly man-modified landscape) then even if the wind turbines were near the viewpoint and were visible to a large number of viewers, the overall visual impact would be low because the viewpoint is not in a landscape of such sensitivity that further change would be unacceptable.

Therefore, the assessment of the overall visual impact needs to be informed by these criteria and a balanced judgement made as to the overall visual impact.

#### 6.1.2 Residential viewpoints

The assessment of visual impact from residential properties is slightly different to one undertaken from publicly accessible viewpoints.

An assessment of viewer numbers is not applicable and the landscape sensitivity is always rated as “high”, as it must be recognised that people feel most strongly about the view from their house and from their outdoor living spaces.

Therefore, the visibility of a development and the distance between the residential location and the development are the two criteria that are used to assess a visual impact from a residential property.

#### Mitigation Measures for Residential Viewpoints

Mitigation measures may also include landscape treatments, both on the subject site and specifically targeted at residential dwellings.

### 6.2 Scale of Effects

The scale of effects for assessing the overall visual impact of the wind turbines from a publicly accessible viewpoint ranges from negligible to high visual impact.

#### **Negligible visual impact**

**Negligible** – minute level of effect that is barely discernible over ordinary day-to-day effects. The assessment of a “negligible” level of visual impact is usually based on distance. That is, the wind turbines are at such a distance that, when visible in good weather, it would be a minute element in the view within a man-modified landscape or will be predominantly screened by intervening topography and vegetation.

#### **Low visual impact**

**Low** – visual impacts that are noticeable but that will not cause any significant adverse impacts. The assessment of a “low” level of visual impact can be derived if the rating of any one of four criteria, that is visibility, distance, viewer numbers and landscape sensitivity, is assessed as low. Therefore, an additional piece of infrastructure in a landscape which is man-modified and which already contains many examples of existing infrastructure may be rated as a low level of visual impact.

#### **Medium visual impact**

**Medium** – visual impact occurs when significant effects may be able to be mitigated / remedied. The assessment of a “medium” visual impact will depend upon all four-assessment criteria being assessed as higher than “low.”

#### **High visual impact**

**High or unacceptable adverse effect** – extensive adverse effects that cannot be avoided, remedied or mitigated. The assessment of a “high or unacceptable adverse effect” from a publicly accessible viewpoint requires the assessment of all these elements to be high. For example, a highly sensitive landscape, viewed by many people, with the wind turbines in close proximity and largely visible would lead to an assessment of an unacceptable adverse effect.



### 6.3 Comparative photomontages

Photomontages have been used to assist the visual assessment and to illustrate the level of visual change due to the proposed amendment to wind turbine specifications, particularly the proposed heights of wind turbines. Examples include:

- Bald Hills Wind Farm - overall height increased from 110 m to 135 m. Approved by Minister of Planning on December 16, 2009 and development plans approved by VCAT in its decision dated 3 August 2012.
- Taralga Wind Farm, NSW. Height of the wind turbines increased from 110 m to 131.5 m was approved on August 21 2008 (see RES Southern Cross v Minister for Planning and Taralga Landscape Guardians Inc. [2008] NSWLEC 1333).

Photomontages have been prepared from three locations to assist in this re-assessment. These photomontages are discussed as part of the overall assessment later in this report.

### 6.4 Guidelines

Some of the planning policies guidelines have been changed since the issue of permit and therefore may be relevant to this amendment application.

#### 6.4.1 The Victorian Guidelines

*The Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria* (the Victorian Guidelines) by the Victorian Department of Environment, Land, Water and Planning (DELWP) was revised in April 2015 and in June 2015 and is a referral document in the Victorian Planning Scheme.

The recent changes to the Victorian Guidelines relate to

- Statements of consent from non-involved landowners within 1 km of a wind turbine;
- Changes to the definition of "wind energy facility" to include related transmission and distributions systems of power lines allowing a single integrated planning permit application.

The Victorian Guidelines have now stipulated that a Statement of Consent may be required as stated below:

*"Clause 52.32 Wind Energy Facilities was amended in April 2015. This amendment enables proponents to amend the wind farm without "a need for a dwelling owner consent where turbines are within one kilometre of a dwelling" provided the following conditions are met:*

- *it does not increase the number of proposed turbines, or*
- *the movement of a turbine does not result in it being located closer to a dwelling (within one kilometre of a turbine) than the closest permitted turbine to that dwelling. "*

In the Amended Layout there is a net reduction in the number of wind turbines. Further, there is no wind turbine proposed to be located closer to a dwelling within 1 km of the wind farm (refer to Figure 2-1).

#### 6.4.2 Draft National Guidelines

*The Draft National Wind Farm Development Guidelines* (The Draft National Guidelines) by the Environment Protection and Heritage Council (EPHC) was released in July 2010. The Draft National Guidelines are not yet to be finalised nor have they been adopted. While the Draft National Guidelines are mentioned as further guidance in the Victorian Guidelines they are not a referral document.

The Draft National Guidelines do not provide a framework for the assessment of impacts when seeking to modify an existing permit. There is no specific guidance on the planning amendment process within the Draft National Guidelines.

## 7 LANDSCAPE GUIDELINES & CHARACTER STUDIES

The original LVIA for the HWF was prepared in 2006. In this time, there have been several studies undertaken which comment on landscape character. Those studies that are relevant to this amendment include:

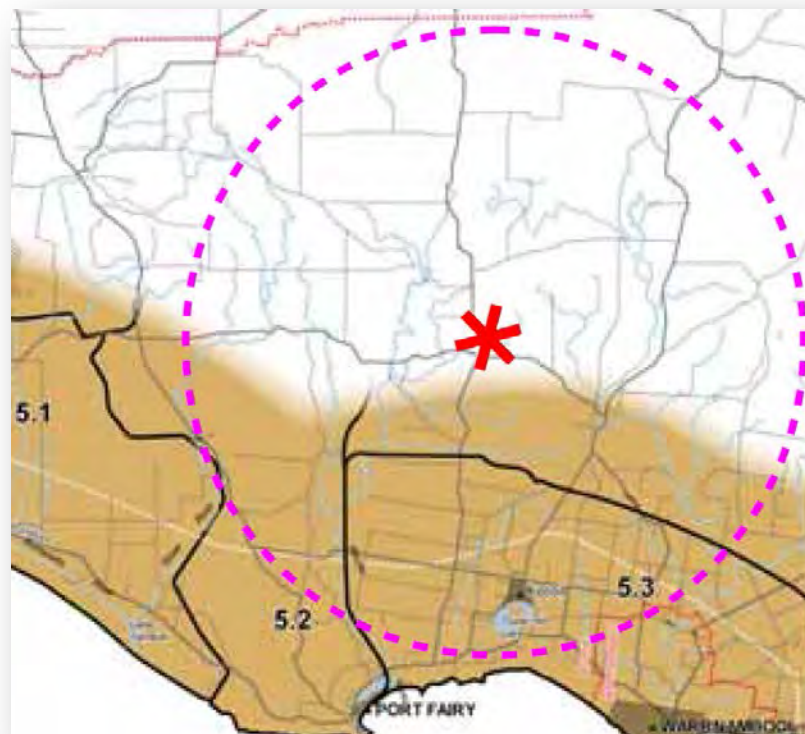
- *The Coastal Spaces Landscape Assessment Study – Protection and Management of Victoria’s Coastal Landscapes* (DSE, VCC and Planisphere, September 2006) (CSLAS).
- *The South West Victoria Landscape Assessment Study – Landscape Character of South West Victoria* (DPCD & Planisphere, June 2013), (SWVLAS); and
- Kanawinka Geopark.

The original LVIA considered the impact to features identified by the Kanawinka Geopark. Kanawinka Incorporated was cancelled in February 2016 and therefore no longer exists. The Kanawinka Geopark identifies landscape features within the project view shed that were considered in the original LVIA. For consistency, landscape features identified in the Kanawinka Geo Park will be discussed in this assessment.

### 7.1 Coastal Spaces Landscape Assessment Study

The Coastal Spaces Landscape Assessment Study (CSLAS) applies to a section of coast and hinterland to the south of the HWF. The Study proposes three regions for the Victorian Coastline, South West Victoria, Bellarine Peninsula and Gippsland Region. The view shed of the HWF overlays a small section of the South West Victoria coastal area. The coastal area extends from the South Australian border to the Great Ocean Road and inland to approximately 6 – 10 km. Figure 6-1 shows the CSLAS overlaid with the HWF view shed.

Figure 6-1 Significant Coastal Landscapes South West Victoria



Two Character Areas identified in the CLAS that are within the HWF view shed. These are:

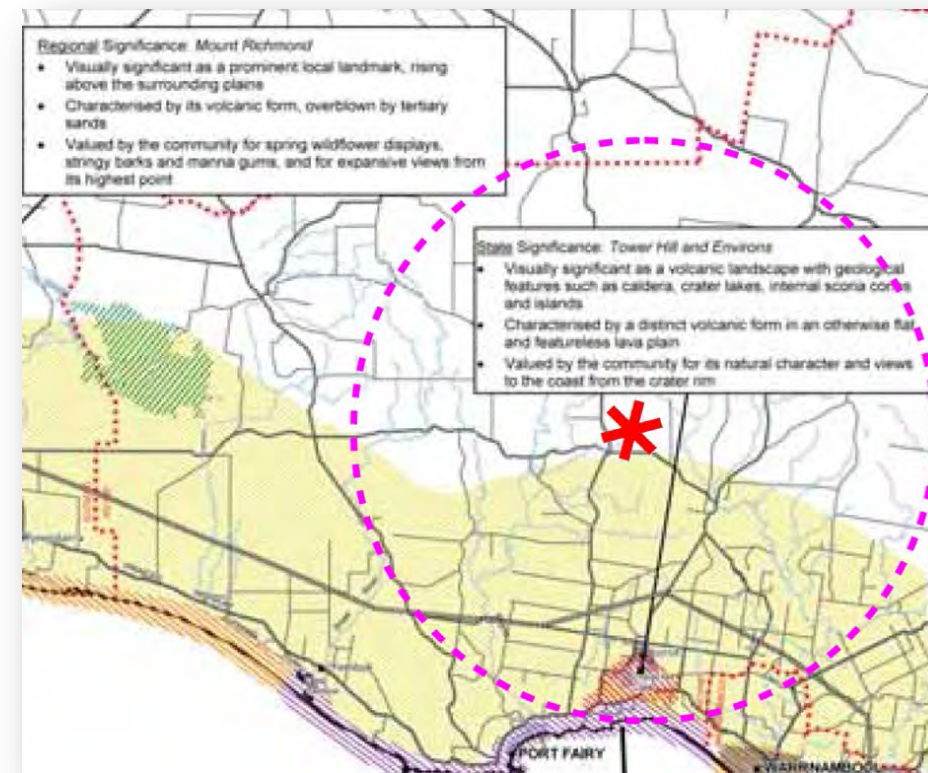
- **Landscape Character Area 5.2: Port Fairy Stony Rises**

*“... a region of more varied topography, characterised by small-scale hillocks with exposed basalt bedrock. Pastoral land use has led to the clearing of most remnant native vegetation, however ferny groundcover can be found at stony outcrops and mature coniferous shelterbelts are visible throughout the landscape.”*

- **Landscape Character Area 5.3: Pastoral Plains**

*“This open pastoral hinterland Character Area is part of the extensive volcanic plains that extend west of Geelong. Landform is consistently flat to gently undulating, with the unique and dramatic topographic feature of Tower Hill a product of the area’s volcanic origins. Flat topography provides long-range views across rural pastures bounded by shelterbelts and native vegetation towards the east of the Character Area.”*

Figure 6-1 shows the extent of significant landscapes of South West Victoria identified in the CSLAS with the HWF view shed overlaid.



The foreshore areas along the coast and the associated dunes are identified as landscapes of regional significance. Features include Lake Yambuk, The Crags, the Lady Julia Percy Island and the Port Fairy to Warrnambool Coast. The Tower Hill Environs is identified as an area of State significance.

Each location is at such a distance that they would not be visually affected by the turbines of the HWF



**7.2 South West Victoria Landscape Assessment Study**

The West Victorian Landscape Assessment Study (SWVLAS) lies to the north of CSLAS discussed above. The study area extends from the South Australian border to the west to the east of Ballarat. Ballarat The SWVLAS identifies eight Landscape Character types within the study area. These character types exclude urban or built up areas.

Figure 6-2 Landscape character types and areas South West Victoria with view shed of HWF

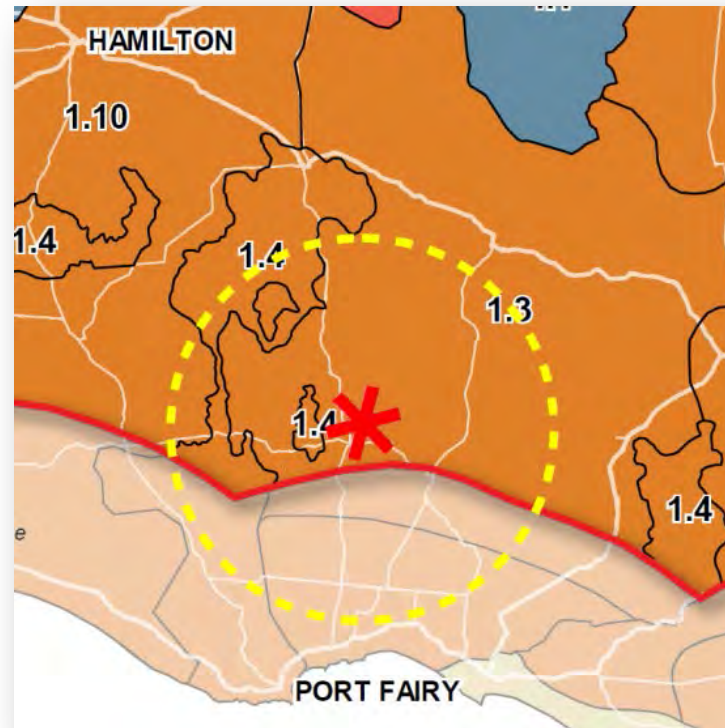


Figure 6-3 shows SWVLAS and approximate location of the HWF. The approved wind turbines and northern extent of the HWF view shed extends into Landscape Type 1 *The Western Volcanic Plain*.

The Western Volcanic Plain is the largest type identified in the SWVLAS. The Western Volcanic Plains is further defined by 11 sub-groups.

Key features of **Character area 1.3 - Volcanic agricultural** are:

*Open pastoral landscape with long distance views; Exotic shelterbelts and Stands of remnant vegetation.*

Key features of **Character type 1.4 - Stony rises and lava flows** are

Geology and geological features, Starkness and rough texture of the landscape, Exposed rocky outcrops and sinkholes and Textural contrast with adjacent paddocks

Figure 6-3 shows the HWF in relation to the Western Volcanic Plains landscape Type and areas identified as Volcanic Agricultural and Stony Rises & Lava Flows sub-groups.

**Significant landscapes**

Chapter 3 of the SWVLAS seeks to define landscape significance through cultural values which include Aesthetic, Historic, Environmental and Scenic, Social and Other.

Figure 6-4 shows the approximate location of the HWF and Significant landscapes defined in the SWVLAS.

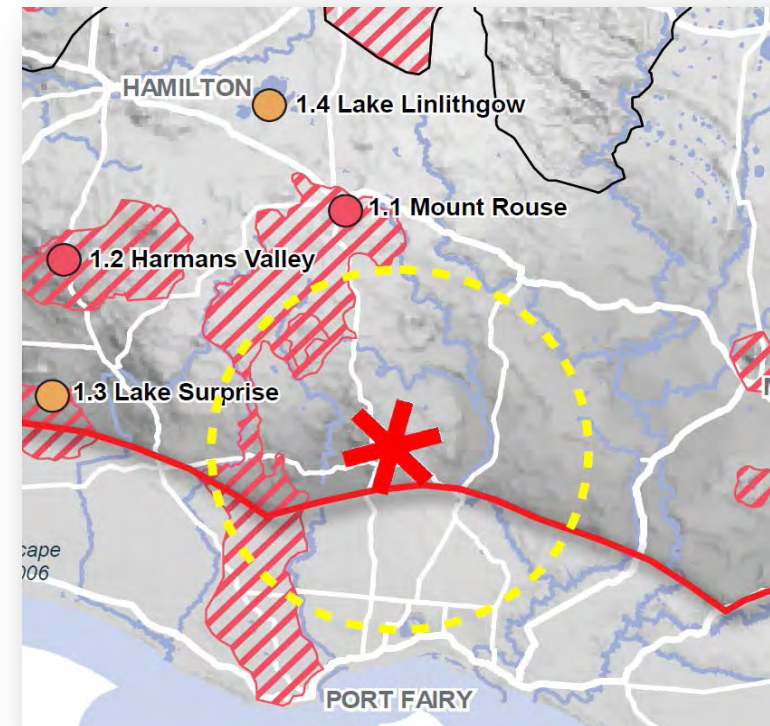


Figure 6-3 Significant Landscapes and Views in proximity to the HWF

Mount Rouse Lava Flows (1.7) is located to the western of the HWF. The Mount Rouse Lava Flows are considered to be of State level significant landscape. Mount Rouse Lava flows are described as:

*“The lava flow from Mount Rouse is one of the most intact and visually prominent flows found on the Victorian Volcanic Plain. It is composed of large, hummocky stony rises that churn across the open paddocks. Some of these are quite prominent, rising to up to 10 metres, while in other areas the texture is more subtle.”*

The Mount Rouse Lava Flows are at such a distance that the proposed amendment to the HWF would not be discernible.

**SWVLAS significant views**

Figure 6-4 shows the approximate location of the HWF in relation to Significant Views identified in the region. The nearest viewing location is at Mount Rouse which is over 20 km to the north of the HWF.

*“The landscape that we see today represents a hybrid of generally undisturbed underlying topography with patchwork remnants of the natural landscape, which are protected by national, and state parks. Intertwined with this lies the heavily modified landscape of exotic shelterbelts, dry stone walls, farming, infrastructure, rural development and wind farms.”*



7.2.1 Implications of SWVLAS

The SWVLAS attempts recognise landscape and values within the Western Volcanic Plains. The SWVLAS recognises the change that this landscape has undergone since European settlement and the anticipated increased level of development suggesting lower landscape sensitivity.

Most significant features within the Western Volcanic Plain are geological formations that remain intact even after extensive modifications such as farming and development of infrastructure such as power lines, wind farms and the built environment.

The proposed amendment does not impact the SWVLAS.

7.3 Kanawinka Global Geopark

Kanawinka Incorporated established the Kanawinka Geopark to promote tourism and job creation through an appreciation of a Geopark’s scientific, natural and cultural heritage values (<http://www.kanawinkageopark.org.au/global-geoparks/>).

*“A Geopark is a geological site or a collection of sites with specific geological heritage of international significance. It has clearly defined boundaries where sustainable economic development, mainly through tourism, can take place. Geoparks often feature spectacular scenery much appreciated by tourists who also benefit from insights into the history of the Earth and its natural resources.*

The Kanawinka Global Geopark comprises several precincts defined by prominent geological features across Western Victoria. The boundaries and regions defined by the Kanawinka Geopark are shown in Figure 6-5 (opposite).

The Kanawinka Geopark comprises five precincts:

- Craters and Limestone,
- Dundas Tablelands,
- Coasts and Caves,
- Lava Flows and Lakes: and
- Craters.

These areas are in the most part disconnected.

The view shed of the HWF takes in areas annexed by the Lava Flows Precinct. The HWF is located to the east of the Lava Flows Precinct and outside the Geopark.

Mount Rouse (Site 29) is approximately XX kms to the north fo the HWF. The Mount Rouse Summit is publicly accessible and provides panoramic views across the landscape.

Tower Hill (Site 34) is located approximately 18 km to the south of the HWF. Tower Hill is a former crater with a lake formation.

The distance to features identified in the Geopark are such that there will be no landscape impact bought about by the increased height to the HWF wind turbines.

Figure 6-4 Kanawinka Geopark and the location on the Hawkesdale Wind farm



### 7.4 Implications to Landscape Units and Sensitivity Identified within the LVIA

The LVIA which assessed the approved turbine configuration identified three landscape units within the view shed of the HWF:

- Unit 1 - Rural Plains;
- Unit 2 - Rural Communities and Townships; and
- Unit 3 - Coastal Dunes and Reserves

The above landscape units are not dissimilar to the landscape character types identified within the CSLAS and SWVLAS.

#### 7.4.1 Unit 1 Rural Plains

The LVIA described the Rural Plains Landscape Unit as:

*“This landscape unit is characterised by gently sloping farmland that is largely cleared and is the most common landscape unit within the view shed.”*

*“There are slight variations in the landscape character of this unit where stony rises are more frequent or where there are differences in the underlying geology, however generally the rural plains landscape unit has little variation in topography and is largely cleared.”*

The Stony Rises, while discussed within the LVIA, were not differentiated as a separate landscape unit. The CSLAS and SWVLAS, as well as more recent studies undertaken by ERM provide more granularity for this landscape unit.

Landscape Unit1 – Rural Plains Landscape Character Type is retained, however is has been expanded as follows:

- *Landscape Unit 1 – Rural Plains, Sub-unit 1a –Plains.*  
This landscape sub-unit is characterised by gently sloping farmland that is largely cleared.
- *Landscape Unit 1 – Rural Plains, Sub-unit 1b -Stony Rises.*  
This landscape sub-unit is characterised by gently sloping farmland that is largely cleared where exposed rocky outcrops and sinkholes are visible and these are in contrast with adjacent paddocks.

This is appropriate as the Stony Rises are not typically dramatic changes in the Rural Plains with clear boundaries, but rather are contiguous with the surrounding plain. The landscape sensitivity of Stony Rises also has a greater than the Plains sub unit as stony rises can sometimes be more prominent. .

#### 7.4.2 Unit 2 - Rural Communities and Townships

The sensitivity of the Rural Communities and Townships is rated as medium. This is the same rating that was used within the LVIA.

#### 7.4.3 Unit 3 -Coastal Dunes and Reserves

The sensitivity of the Coastal Dunes and Reserves is rated as medium. This is the same rating that was used within the LVIA.

### 7.5 Community input into landscape values

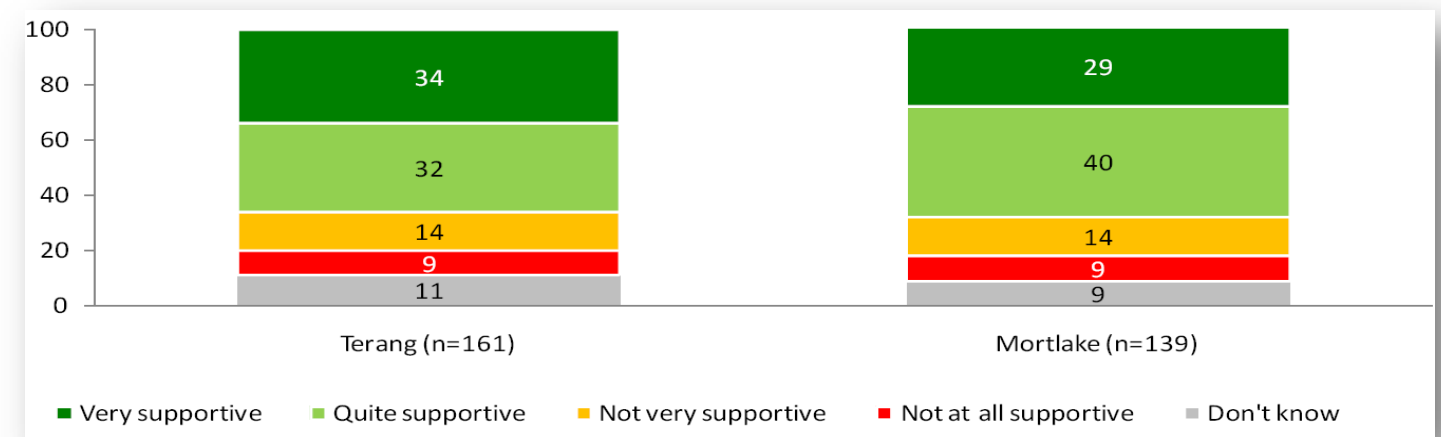
The Draft National Guidelines recommends community input into landscape values.

#### 7.5.1 Landscape values in the public domain

Community perception studies can provide supporting evidence for the landscape values within the view shed from the public domain.

Perception studies continually show that the majority of respondents find the appearance of WTGs in a rural landscape acceptable. These studies have also shown that the majority of those surveyed supported the presence of wind turbines in scenic landscapes (refer to Figure 6-6). Studies undertaken from early 2000 by the Department of Natural Resources and Environment (Kanos & Quint, 2000) showed support for wind farms of 65-68% on coastal headlands adjacent to the Great Ocean Road one of Victoria’s most scenic landscapes (bottom image Figure 6-6).

Figure 6-5 Wind farm acceptance in the landscape



Later studies conducted in less scenic landscapes, continue to show that the level of acceptance of wind turbines increases over time. In some studies, this has increased from 65% to approximately 80% (top image of Figure 6-6). However, acceptance levels for wind turbines within one kilometre of a residence remained at the 65% level.

Overall, the visual impact of wind turbines in a landscape is acceptable to the majority of respondents in scenic landscapes and in landscapes that are considered less attractive (Andrew Lothian, 2000 & 2005).

The CSIRO study entitled ‘Acceptance of rural wind farms in Australia’ (2012) found, in part, that

*“There is strong community support for the development of wind farms, including support from rural residents who do not seek media attention or political engagement to express their views. This finding contrasts with the level of opposition that may be assumed from the typically ‘conflict-orientated’ portrayal of wind farm proposals in the popular media. This media coverage frequently gives significant attention to legal challenges, political protests and vocal opponents including ‘Landscape Guardian’ and high profile individuals, but fails to balance this with coverage of middle ground views, or with equivalent attention to the potential benefits of wind farms.” (Summary: Acceptance of rural wind farms in Australia, Nina Hall, Peta Ashworth and Hayden Shaw, CSIRO Science into Society Group, 2012, p67).*

This study has not been relied upon as a basis for the visual assessment, but their findings are similar to the community perception studies and provide independent validation to those presented within the LVIA.

It is recognised that this is a complex issue and the degree of visual impact depends on how the viewer perceives renewable energy, the wind turbines and the landscape. The presence of wind turbines will change the existing landscape character of this locality, however to assume that these will cause damage to the landscape values and negatively impact the amenity of the area as perceived by visitors and residents is not substantiated on the basis of perception studies undertaken in Australia and overseas.

For these reasons, the sensitivity ratings that have been used provide a reasonable basis for the assessment.



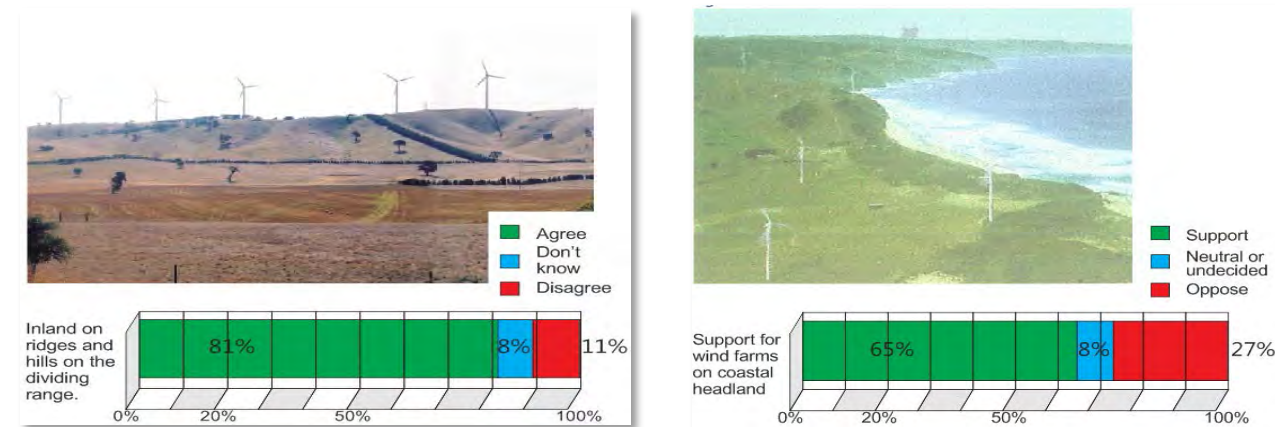
### 7.5.2 Landscape values in the private domain

It is noted that the LVIA supports the view that views from residential properties have a high level of sensitivity. Studies for residential viewing locations for the Ararat Wind Farm (ERM & Reark Pty Ltd, 2007) and Lal Lal Wind Farm (ERM & Reark Pty Ltd, 2006) as well as other studies in Victoria (Offer Sharp and Associates 2000 & 2002) have shown that between 68-71% of viewers are supportive of WTGs within 1 km of their dwelling. These acceptance levels are confirmed by similar studies for wind farms in New South Wales (Reark Pty Ltd 2008) and New Zealand (Charmain A Watts 2008) which showed similar levels of support.

The above studies indicate that acceptability of wind farms increases when the residence is further away. Acceptance levels of between 77-79% were rerecorded for wind turbines at distances greater than 3.0 km from a dwelling.

Apart from the acceptance aspect, when assessing a residential viewpoint it is necessary to examine issues such as direction of view, screening, topographic intervention etc. Once all these issues are understood, an assessment of the potential impact can be derived and sometimes this can be mitigated through landscape treatments.

### 7.5.3 Stakeholder consultation for the Project



The following Stakeholder consultation for the Project has been undertaken as part of the current permit amendment process:

- September 7th 2015 – Briefing of DELWP for permit amendment;
- September 8th 2015 – Presentation for permit amendment to the Moyne Shire Council;
- September 8th 2015 – Meeting with host landowners to explain permit amendment details and process;
- September 9th 2015 – Moyne Shire Community Engagement Committee Meeting to explain permit amendment details and process;
- October 8th 2015 – Call owner of new dwelling on 159 Camerons Road and provide brief details on permit amendment and seek details of new house location;
- December 2015 – Permit amendment summary would be provided to Moyne Shire Council to be included in newsletter distribution.

No significant landscape and visual Impact concerns were raised over and above the scope discussed within this LVIA assessment review.



account for vegetation such as wind breaks, shelterbelts and other plantings which are found in many areas within the viewshed.

## 8 VISUAL IMPACT IMPLICATIONS

This chapter will identify that areas surrounding that will theoretically see a change in turbine visibility and discuss those areas through a view analysis.

A Geographical Information System (GIS) analysis will map locations where the proposed amended will result in a change in turbine visibility. An assessment of those locations will then describe the impact through views to form a conservative assessment based on “worst case” locations.

### 8.1 Quantitative Assessment - Seen Area Analysis

The visual implications of the proposed amendment can be quantified or demonstrated using GIS to prepare a Seen Area Analysis (SAA). A Seen Area Analysis shows areas surrounding the proposed wind farm from which wind turbines may be visible.

The GIS mapping is based the physical parameters of the proposed wind turbines and topography of the surrounding landscape. This study does not take into account screening by minor topographic changes, vegetation and buildings.

The SAA of the HWS, maps the following turbine parameters:

- Zone A Visibility of one or more entire turbine (i.e. Mast, nacelle and rotors)
- Zone B The entire rotor diameter of one or more wind turbine(turbine blades and their swept path)
- Zone C Half the swept path of one or more wind turbine (Nacelle and above); and
- Zone D Any part of a turbine (including the tip of one or more wind turbine)

These parameters are identical to those mapped in the permit application for the approved turbine layout to enable a direct comparison between the Approved HWF and this amendment.

Figure 7-1 shows the SAA of the Approved wind turbine layout. Figure 7-2 shows the SAA of the proposed amendment.

This “side by side” analysis shows that turbine visibility of both the Approved and the proposed Amendment are largely consistent. This is notwithstanding the proposed amendment comprises fewer albeit larger wind turbines that the approved layout.

Further, it must be recognised that this view analysis does not

Figure 7-1 SAA Approved Turbine Layout

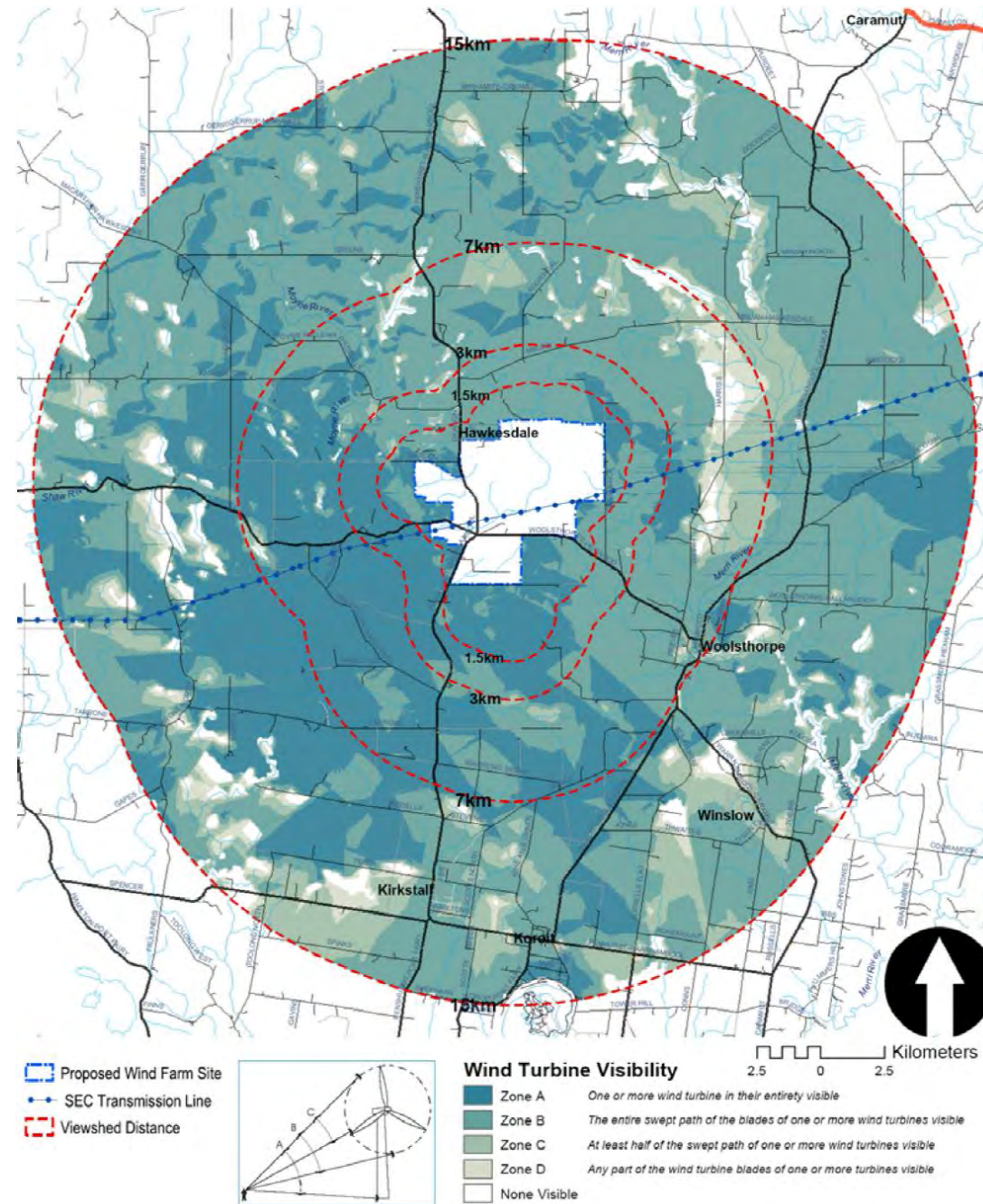
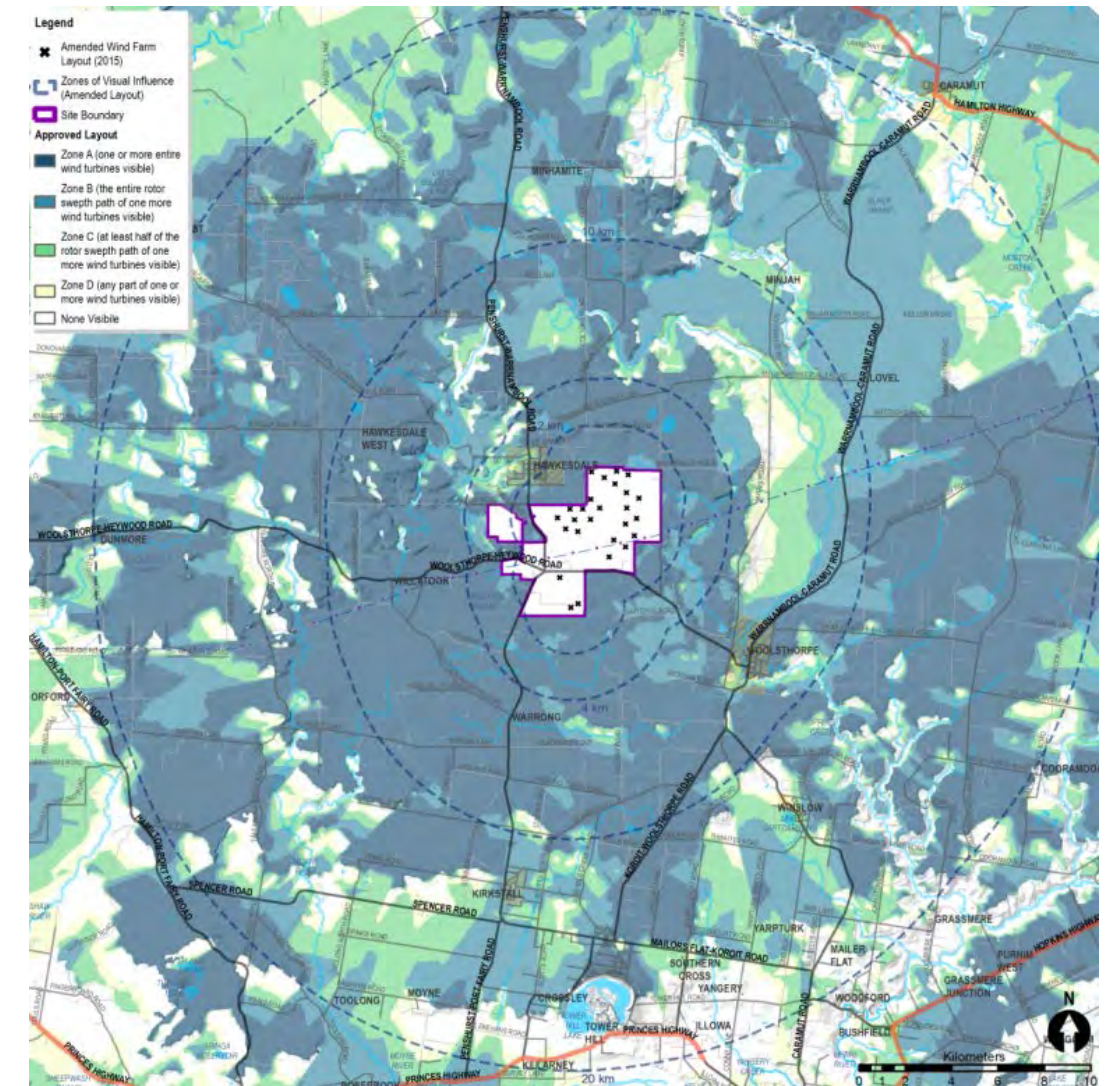


Figure 7-2 SAA of Amended Layout





A more useful assessment to understanding the extent of visual change that may be brought about by the proposed amendments is one which maps those areas where turbine visibility has changed.

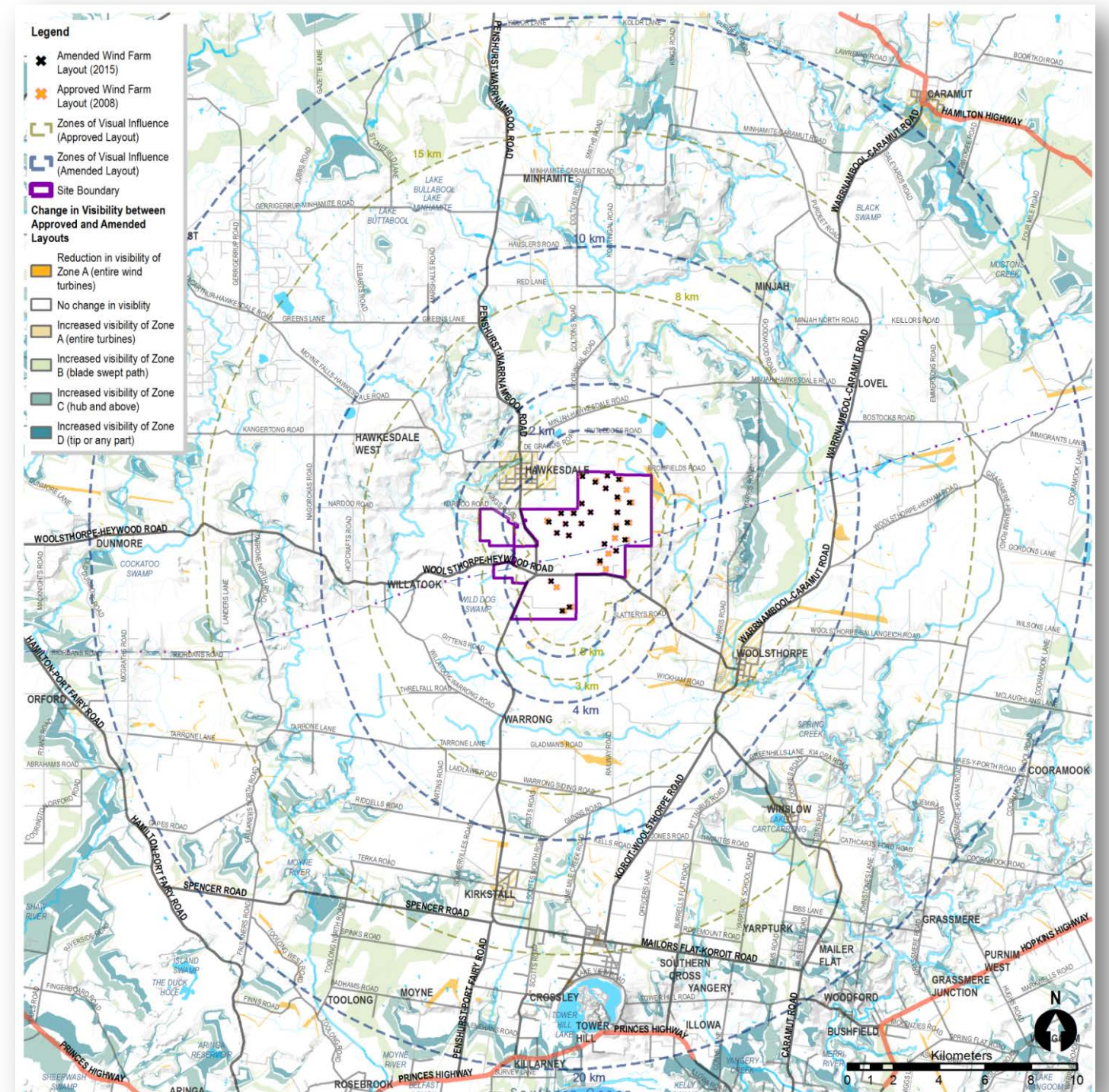
Figure 7-3 shows the net change in turbine visibility between the Approved layout and the proposed amendment. These changes take into account the reduction in turbine numbers, change in height and proposed micro-siting. This map also shows the change in view shed and Zones of Visual Influence between the Approved and Amended turbine layouts.

It is clear that that very few areas will experience a change in turbine visibility as a result of the proposed amendment. Narrow bands of increased turbine visibility exist predominantly in areas to the south and east of the HWF. These areas of increased visibility are on the margins or areas where turbines would theoretically be visible in the approved layout.

There few locations to the north and west where increased turbine visibility may be experienced. These are few and isolated in occurrence. Similar to areas to the south and east, these locations are on the margins or within areas that would theoretically have visibility of one or more turbines within the approved layout.

The following section will undertake an assessment of the impact to views taken from locations within the HWF view shed.

Figure 7-3 Net change to the visibility of wind turbines between Approved and Amended Layouts





## 8.2 Qualitative Assessment – Assessment of Impact from Viewpoints

The LVIA for the approved HWF assessed a number of publicly accessible locations. These viewpoints provided an assessment of a range of viewing opportunities and landscape settings for views towards the HWF. The selected viewpoints were taken from the surrounding road network and nearby towns where breaks in vegetation or limited structures would enable views to the Project.

### 8.2.1 LVIA Approved Layout

The LVIA for the approved layout assessed 17 publicly accessible viewing locations and nine residential viewpoints. A new dwelling (HW170) has been constructed at 159 Camerons Road to the south east of the HDF. An assessment of the visual impact from this dwelling has been included in the comparative assessment.

Due to the time that has elapsed between the LVIA of the approved layout and this Amendment, ERM undertook a site visit to re photograph the viewpoints captured within the original LVIA. This allowed for changes that may have taken place in the landscape such as vegetation growth or clearing, and a true understanding of the effects of increased wind turbine heights for a viewer.

Figure 7-4 shows the location of the 17 publicly accessible viewpoints (Yellow) and Residential viewpoints (Blue). The impact at each of these viewing locations is discussed below.

### 8.2.2 Comparative Assessment Viewpoints

Three locations were selected from which to demonstrate the proposed changes brought about by this amendment. The selected locations demonstrate the range of viewing angles towards the HWF and a range of distances. The locations are:

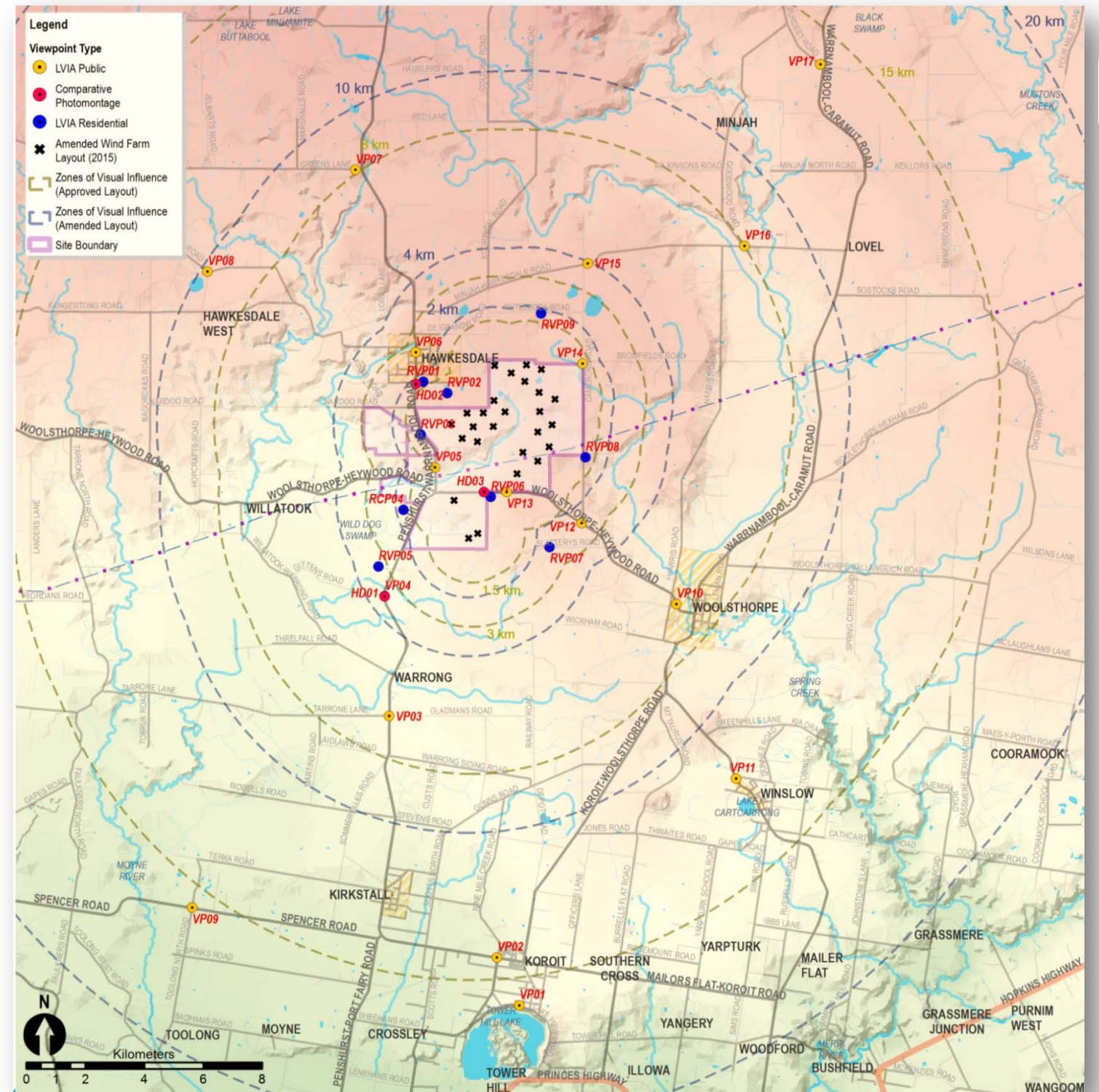
- Viewpoint HD01 – Peshurst-Warrnambool Road near Gittens Road intersection
- Viewpoint HD02 - Peshurst-Warrnambool Road near Warwillah Road intersection;
- Viewpoint HD03 – Woolsthorpe-Heywood Road

Photomontages have been prepared from each of the selected viewpoints to assist with demonstrating the visual change. The locations of the comparative viewpoints and photomontages are shown in red in Figure 7-4. A3 versions of the comparative photomontages (HD01, HD02 and HD03) are included in Annex A.

Summary assessment from each viewpoint discussed within the LVIA is provided in Section 7.2.2.

The visual impact implications of the wind farm amendment from these locations are discussed in the following section.

Figure 7-4 Viewpoint Locations





### 8.3 Viewpoint HD01 – Peshurst-Warrnambool Road near Gittens Road intersection

Viewpoint HD01 is located at Peshurst-Warrnambool Road near Gittens Road intersection. This viewpoint is also near Viewpoint 04 assessed within the LVIA for the approved layout.

The nearest approved wind turbine (A31) will be located approximately 3.5 km north east. The nearest wind turbine (A31) in the amended layout will be located approximately 3.4 km to the north east.

Figure 7-5 Photomontage - Approved Layout



Figure 7-6 Photomontage - Amended Layout



The rural plains landscape unit is evident at this location. Cypress hedgerows and other vegetation along property boundaries filter views towards the wind turbines as seen in both photomontages.

Given the landscape sensitivity and the low viewer numbers, the overall visual impact of the wind farm is assessed as Low. This is consistent with the original assessment.

Even though the turbines are larger, and several are closer to this viewing location the change in the assessed level remains low. The change in visual impact is nil.



#### 8.4 Viewpoint HD02 - Peshurst-Warrnambool Road near Warwillah Road intersection

Viewpoint HD02 – Peshurst-Warrnambool Road, is taken from the southern edge of Hawkesdale near its intersection with Warwillah Road. This view was taken where a break in roadside vegetation permits. The nearest approved wind turbine (A26) will be located approximately 1.7 km south east. The nearest amended wind turbine (A26) will be located approximately 1.8 km to the south east.

Figure 7-7 Photomontage - Approved Layout



Figure 7-8 Photomontage - Amended Layout



Existing roadside vegetation, hedgerows and boundary plantations filter views towards the wind turbines. Landscape unit 1 – Rural Plains is the dominant landscape unit which has low sensitivity to visual change. Given the landscape sensitivity and the low viewer numbers, the overall visual impact of the Approved was assessed as Low.

While the amended wind turbines are larger, the level of visual impact remains low given the low landscape sensitivity of the rural plains. On balance, the net change to the level of visual impact due to the amendments is negligible.



### 8.5 Viewpoint HD03 - Woolsthorpe-Heywood Road

Viewpoint HD03 is located on Woolsthorpe-Heywood Road. The nearest approved wind turbine (A29) will be located approximately 0.9 km to the north east. The nearest amended is wind turbine (A28) located approximately 1.0 km to the north east. The Amended layout deleted turbine (A29).

Views at this location also take an existing 500 kVA transmission line which bisects the HWF site.

Views to the wind turbines are over Landscape Unit 1, Rural Plains which has a low sensitivity to visual change. The

Figure 7-9 Photomontage - Approved Layout



Figure 7-10 Photomontage - Amended Layout



Woolsthorpe – Heywood Road is a local road with few users. For these reasons the overall visual impact of the Approved Layout was assessed as Low. As recognised above, it is the landscape sensitivity and relative viewer number that provided the primary weighting for a low level of visual impact. Even though the proposed increase in turbine height would result in larger turbines, the overall visual impact would remain as low. Therefore the change in impact between the Approved and Amended layouts is nil.

The comparative photomontages shown in Figure 7-7 show that although the amended wind turbines are larger or more visible, for most viewers the change in height would be barely discernible as will the net reduction in wind turbines.



### 8.6 New dwelling HW170 - Cameron’s Road

The greatest potential for visual impact to occur is from neighbouring, non-participating residential properties. A new dwelling has been constructed at 159 Cameron’s Road. This dwelling has been constructed following approval of the HWF. It is therefore understood that the dwelling has been constructed in knowledge of the HWF.

This viewpoint assesses the change in visual impact that may be brought about by the proposed Amendment the recently constructed dwelling at 159 Cameron’s Road.

The nearest approved turbine is (A13) which is approximately 1.3 km to the north west of the dwelling. Several other turbines including (A12), (A14), (A15),(A16). (A17) and (A18) are located to the north west of the dwelling and within 2.0 km. The amended layout seeks to delete turbines A12, A16 and A18 and increase turbine heights of the remaining turbines. Figure 7-11 shows proximity of the dwelling in relation to the HWF and nearest turbines.

Figure 7-12 shows the view west from Cameron’s Road towards the new dwelling and the HWF. This view shows the context of the dwelling in relation to the HWF, the existing 500 kVA transmission line and vegetation.

The dwelling is rectangular in layout and is orientated east west with the long edges of the dwelling facing north and south. Figure 7-11 shows the elevations of each façade and windows along each edge. A garage attached western façade which faces the nearest turbines contains no windows. A portico attached to the norther façade enjoys views over farmland to the north. These northerly views will contain partial or oblique, views to the turbines behind the existing 500 kVA transmission line.

Therefore, the overall visual impact of the approved and / or wind turbine from just outside the dwelling will be **High**. The proposed turbines will be dominant in the views beyond the dwelling and in close proximity to the house. This is due in part to the dwelling is relatively new with no little landscaping and the set back to existing fences and boundaries that would ordinarily contain such vegetation.

With the reduction in the number of wind turbines and the proposed increased setback through micro siting, there will be no additional impact resulting from approval of the Amended Layout. In fact these proposed changes may improve the effectiveness of mitigation options available at this dwelling such as foreground landscape planting to the north and west near the dwelling would be effective in filtering and screening views to the wind farm. For these reason, the net change to visual impact due from the approved layout to the amended layout is therefore assessed as **Negligible**.

Figure 7-12 New Dwelling HW170 – Existing view west towards dwelling and HWF from Camerons Road (Source: RDPL)

Figure 7-11 Dwelling HW170 in relation to HWF



## 8.6.1 Reassessment of Visual Impact

This section will provide a description of the change in visual impact assessed in the LVIA for the approved turbine layout. This discussion is based on the conclusions that supported the initial assessment as well as the assessment and reasoning discussed above. This comparison will also include the additional viewing location discussed above.

The results are presented in a table Table 7-1 and include the assessment criteria adopted in the LVIA of the approved layout.

Table 7-1 Comparison summary assessment of publicly accessible viewpoints, the change in the assessment of overall visual impact is highlighted in yellow

Viewpoint (VP)	Visibility of proposed wind farm	Viewers	Landscape sensitivity	Dist. to nearest approved turbine (approx.)	Overall Visual Impact Approved Layout	Updated landscape sensitivity	Dist. to nearest amended turbine (approx.)	Overall Visual Impact Amended Layout
<b>PUBLIC VIEWPOINTS</b>								
<b>1 - Tower Hill</b>	Not visible from most locations within the reserve due to intervening topography. Distant views of the wind farm may be available from the Tower Hill Road but will not affect the views to the Tower Hill reserve.	High	Unit 3, High	16 km N (A31)	Negligible (Tower Hill Road) Nil (from lookout)	No change	16 km N (A31)	<b>Negligible (Tower Hill Road)</b> <b>Nil (from lookout)</b>
<b>2 - Koroit</b>	Not visible due to intervening topography, buildings and vegetation.	Medium	Unit 2, Medium	14.3 km N (A31)	Negligible	No change	14.3 km N (A31)	<b>Negligible</b>
<b>3 - Peshurst-Warrnambool Rd near Tarrone Lane intersection</b>	Wind Farm will be visible across rural plains.	Medium	Unit 1, Low	6.7 km N (A31)	Low	No change	<u>6.6 km N (A31)</u>	<b>Low</b>
<b>4* - Peshurst-Warrnambool Rd near Gittens Rd intersection</b>	Filtered views	Medium	Unit 1, Low	3.5 km NE (A31)	Low	No change	3.5 km NE (A31)	<b>Low</b>
<b>5* - Peshurst-Warrnambool Rd near the Moorabool-Heywood 500 kV Transmission Line</b>	Filtered views	Medium	Unit 1, Low	1.3 km SE (A28)	Low	No change	1.3 km SE (A28)	<b>Low</b>
<b>6 - Hawkesdale</b>	Not visible due to intervening topography, buildings and vegetation.	Medium	Unit 2, Low	2.7 km SE (A26)	Low	No change	2.7 km SE (A23)	<b>Low</b>
<b>7 - Greens Lane (Gerrigerrup Rd) near Peshurst-Warrnambool Rd intersection</b>	Wind Farm will be visible across rural plains.	Medium	Unit 1, Medium	8.1 km SE (A3)	Low	No change	<u>8.2 km SE (A3)</u>	<b>Low</b>
<b>8 - Moyne Falls-Hawkesdale Rd near Fitzgerald Rd intersection</b>	Wind Farm will be visible across rural plains	Low	Unit 1, Low	9.7 km SE (A26)	Low	No change	<u>9.8 km SE (A26)</u>	<b>Low</b>
<b>9 - Faulkners Rd near Tarrone Lane junction</b>	Distant views over the vegetation.	Low	Unit 1, Low	15.7 km NE (A31)	Low	Unit 1b stony rises – Low to Medium	15.7 km NE (A31)	<b>Low</b>
<b>10 - Winslow</b>	Wind Farm will be visible across rural plains and adjacent rural settlement in the distance.	Medium	Unit 2, Medium	6.5 km NW (A18)	Low	No change	<u>6.8 km NW (A15)</u>	<b>Low</b>
<b>11 - Woolsthorpe-Heywood Rd near Woolsthorpe</b>	Wind Farm will be visible across rural plains	Low	Unit 1, Low	12 km NW (A30)	Low	No change	<u>12.1 km NW (A30)</u>	<b>Low</b>
<b>12* - Woolsthorpe-Heywood Rd near Camerons Rd intersection</b>	Wind Farm will be visible across rural plains	Low	Unit 1, Low	2.3 km NW (A18)	Low	No change	<u>2.6 km NW (A15)</u>	<b>Low</b>
<b>13* -Woolsthorpe-Heywood Rd</b>	Wind Farm will be visible across rural plains	Low	Unit 1, Low	0.6 km NE (A17)	Low	No change	<u>0.7 km NE (A17)</u>	<b>Low</b>
<b>14 - Camerons Rd near Bromfields Rd intersection</b>	Wind Farm will be visible across rural plains	Low	Unit 1, Low	1.2 km SW (A6)	Low	No change	<u>1.4 km W (A2)</u>	<b>Low</b>
<b>15 - Minjah-Hawkesdale Rd near Camerons Rd intersection</b>	Wind Farm will be visible across rural plains.	Low	Unit 1, Low	3.9 km S (A2)	Low	No change	3.9 km S (A2)	<b>Low</b>



Viewpoint (VP)	Visibility of proposed wind farm	Viewers	Landscape sensitivity	Dist. to nearest approved turbine (approx.)	Overall Visual Impact Approved Layout	Updated landscape sensitivity	Dist. to nearest amended turbine (approx.)	Overall Visual Impact Amended Layout
<b>16 - Minjah-Hawkesdale Rd near Goodwood Rd intersection</b>	Wind Farm will be visible across rural plains and over vegetation.	Low	Unit 1, Low	8 km SW (A2)	Low	No change	<u>8.1 km SW (A2)</u>	<b>Low</b>
<b>17 - Purdeet Rd west of Caramut Rd intersection</b>	Wind Farm will be visible across rural plains in the distance.	Low	Unit 1, Low	14 km SW (A2)	Low	No change	14 km SW (A2)	<b>Low</b>
<b>COMPARATIVE VIEWPOINTS</b>								
<b>HD01 - Peshurst-Warrnambool Rd near Gittens Rd intersection</b>		Medium	Not Assessed	3.5 km NE (A31)	Not Assessed	Unit 1, Low	<u>3.4 km NE (A31)</u>	<b>Low</b>
<b>HD02 - Peshurst-Warrnambool Rd near Warwillah Rd intersection</b>		Medium	Not Assessed	1.7 km SE (A26)	Not Assessed	Unit 1, Low	<u>1.8 km SE (A26)</u>	<b>Low</b>
<b>HD03 - Woolsthorpe-Heywood Rd</b>	Wind Farm will be visible across cleared farmland with stony rises in the distance.	Low	Not Assessed	0.9 km SW (A29)	Not Assessed	Unit 1, Low	<u>1.0 km SW (A28)</u>	<b>Low</b>
<b>RESIDENTIAL VIEWPOINTS</b>								
<b>RVP01 - House HW40</b>	Views to nearest wind turbines are filtered due to intervening garden vegetation.	NA	High	1.7 km SE (A26)	Low - from areas facing north High - from areas facing south with no screening	No change	1.7 km SE (A26)	<b>Low - from areas facing north High - from areas facing south with no screening</b>
<b>RVP02 - House HW101</b>	Views to nearest wind turbines are filtered due to intervening garden vegetation.	NA	High	1 km SE (A23)	High for studio and derelict farmhouse without screening. High to medium for occupied residence, depending upon view availability.	No change	1 km SE (A23)	<b>High for studio and derelict farmhouse without screening. High to medium for occupied residence, depending upon view availability.</b>
<b>RVP03 - House HW53</b>	Views to nearest wind turbines are screened from view due to intervening hedgerow vegetation.	NA	High	1.1 km NE (A26)	Medium (Moderate) - existing vegetation screening Low - with additional screening	No change	1.1 km NE (A26)	<b>Medium (Moderate) - existing vegetation screening Low - with additional screening</b>
<b>RVP04 - House HW47</b>	Views to nearest wind turbines are filtered due to intervening garden vegetation.	NA	High	1.8 km E (A28)	Medium - existing vegetation screening Low - with additional screening	No change	1.8 km E (A28)	<b>Medium - existing vegetation screening Low - with additional screening</b>
<b>RVP05 - House HW45</b>	Views to nearest wind turbines are filtered due to intervening garden vegetation.	NA	High	3.3 km E (A31)	Medium (Moderate) - existing vegetation screening Low - with additional planting	No change	<u>3.2 km E (A31)</u>	<b>Medium (Moderate) - existing vegetation screening Low - with additional planting</b>
<b>RVP06 - House HW89</b>	Views to nearest wind turbines are filtered due to intervening garden vegetation.	NA	High	1.1 km SW (A29)	High (from kitchen garden) - without screening Low (from kitchen	No change	<u>1.2 km NE (A17)</u>	<b>High (from kitchen garden) - without screening Low (from kitchen</b>

Viewpoint (VP)	Visibility of proposed wind farm	Viewers	Landscape sensitivity	Dist. to nearest approved turbine (approx.)	Overall Visual Impact Approved Layout	Updated landscape sensitivity	Dist. to nearest amended turbine (approx.)	Overall Visual Impact Amended Layout
					garden) – with additional screening			garden) – with additional screening
RVP07 - House HW77	Views to wind turbines are screened due to intervening garden vegetation.	NA	High	2.3 km NW (A18)	Low - existing screening		2.3 km NW (A18)	Low - existing screening
RVP08 - House HW58	Views to wind turbines are screened due to intervening garden vegetation.			1.2 km W (A13)	Low - existing screening		1.2 km W (A13)	Low - existing screening
RVP09- House HW64	Views to wind turbines are screened due to intervening garden vegetation.	NA	High	1.8 km S (A1)	Low - existing screening		1.8 km S (A1)	Low - existing screening
New viewpoint HW170	No views from living areas. Potential views from just outside the dwelling.	NA	High	1.3 km NW (A13)	Low – if any, oblique views from living areas as no windows in west towards wind farm High – from northern areas just outside the dwelling Negligible – with additional planting to northern garden		1.3 km NW (A13)	Low – if any, oblique views from living areas as no windows in west towards wind farm Negligible – with additional planting to northern garden

## 8.7 Summary of the change in visual impacts

The above assessment has reviewed the potential change in visual impact to 30 viewing locations,. These viewpoints include publicly accessible and residential viewing locations and provide for a range of viewing angles distance and settings.

### Distance to nearest turbines

For 14 of the 30 viewpoints assessed, the distance to the nearest wind turbines has changed (usually increased) due to the reduction in the number of wind turbines. And micro siting

The decrease in the level of visual impact due to increased distance to the nearest wind turbines in the Amended Layout is not significant. The level of visual impact remains unchanged.

### Increase in height

Of the viewpoints reassessed, the change in turbine height has not contributed to any appreciable difference to the overall visual impact assessed in the original LVIA and considered by the panel in granting the approval.

This conclusion is supported by the comparative photomontages prepared from the three viewpoint locations (HD01, HD02 and HD03) included in Annex A of this report. Although the turbines would be larger, the change in height is of the same impact as moving nearer to a turbine. The change in turbine height does not alter other contributing assessment criteria such as viewer number or landscape sensitivity.

### Change in sensitivity ratings

There are no locations from which the overall visual impact rating will change due to an increased sensitivity rating given to the Stony Rises Sub unit.

### 8.7.1 Mitigation Measures

Given the low level of visual impact from publicly accessible locations of the Amended Layout that is comparable to that of Approved Layout, there is no additional mitigation required.

The LVIA suggested the following mitigation measure for residential locations

*“Planting may be undertaken on dwellings within 3 km of the wind farm, after consultation and agreement with affected landowners. Any such offer should remain in place for a period of 1 year after construction, to allow people time to either adjust or to decide that landscape filtering or screening is warranted.”*

Given the increased height of the wind turbines, it is acknowledged that the amended wind turbines may be “Highly visible and will usually dominate the landscape” up to 4 km of the nearest wind turbines. Therefore, landscape mitigation should be extended to residents within 4 km of the wind farm.



## 9 CUMULATIVE VISUAL IMPACT

This chapter will assess the change in cumulative visual impact resulting from the proposed Amendment to the HWF turbine layout. This assessment will consider the implications of increase in turbine height and broadening of the view shed from 15 km to 20 km.

Cumulative visual impact can occur by either Simultaneous or Sequential views to WTGs from publicly accessible viewpoints or from private viewing locations. This is most likely to occur where there are multiple wind farms in close proximity and where wind farm view sheds overlap. Figure 8-1 shows the location and approximate view shed of known wind farm projects in south west Victoria. View sheds of nearby wind farms are indicative only and are based on publicly accessible information.

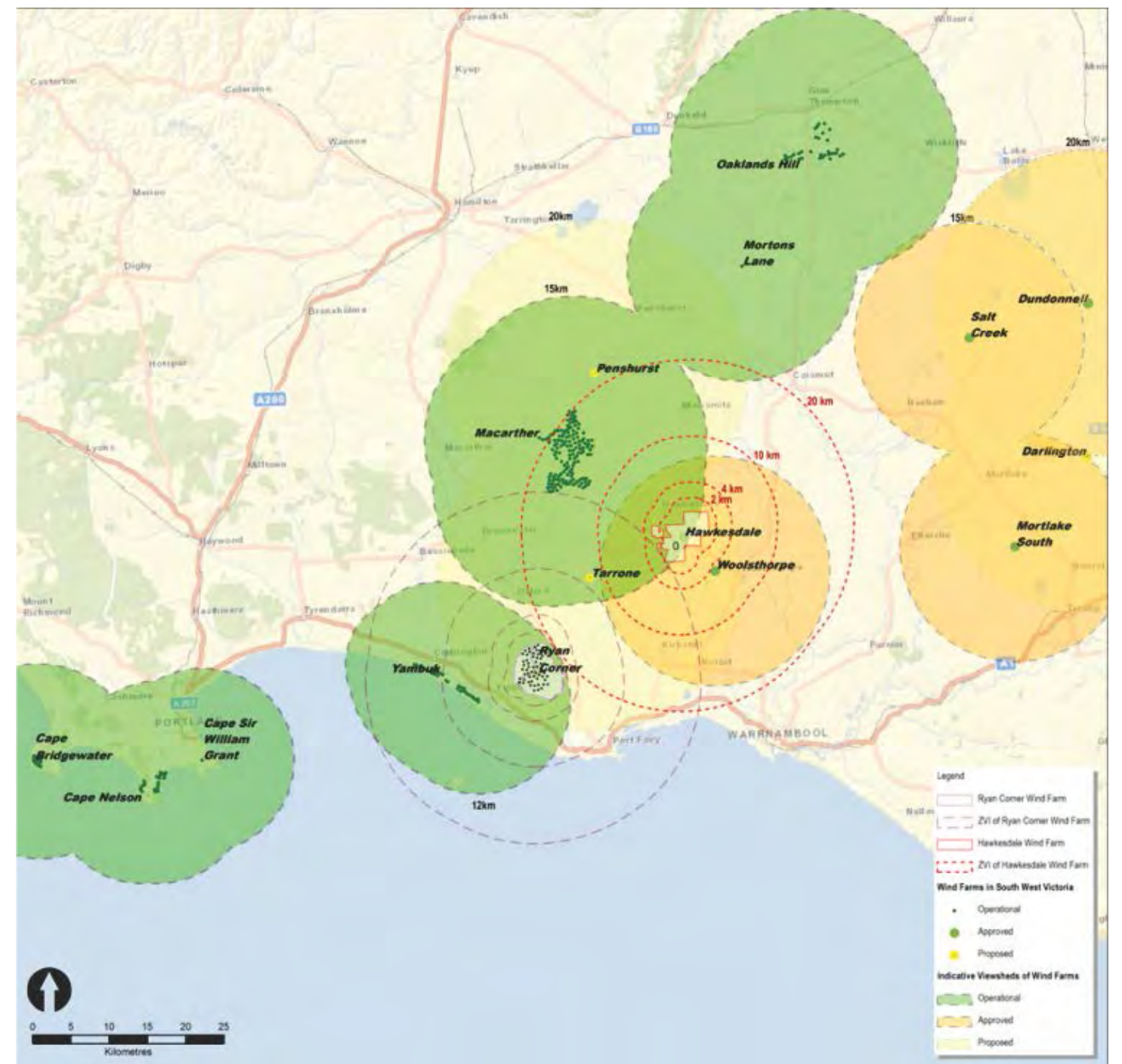
The location and view shed of each of the known wind farms within 50 km of the HWF are summarised in Table 8-2. Again the information is based on publicly available data regarding their location and maximum WTG heights applied for and provide a broad overview of the view shed overlaps for assessing the cumulative visual impact.

Table 8-1 Wind Farms in the vicinity of the Project

Location	No. of Turbines	Distance and Direction (approx.)	Status
Codrington	14	33 km south west	Operating
Yambuk	20	30 km south west	Operating
Macarthur	140	13 km north west	Operating
Mortons Lane	13	35 km north	Operating
Oaklands Hill	32	50 km north	Operating
Ryan Corner (Amendment Application)	67 (56)	20 km south west	Approved / Amending
Woolsthorpe (Amendment Application)	20	1 km south east	Approved
Salt Creek	15	40 km north east	Approved
Mortlake South	51	40 km east	Approved
Tarrone	17	11 km south west	Proposed
Penshurst	223	20 km north	Proposed
Dundonnell	104	50 km north east	Approved
Darlington	80	50 km east	Proposed

The nearest operating wind farms to the HWF are the Macarthur to the north west, Yambuk and Codrington to the south and Morton’s Lane and Oakland’s Hill to the north. Construction has commenced on Berrybank and Salt Creek Wind Farms. Stockyard Hill is yet to commence construction.

Figure 8-1 Wind Farms in South West Victoria





### 9.1 Simultaneous visual impact

Simultaneous visual impact occurs when turbines from two or more wind farm are perceptible in a view.

The potential for simultaneous visual impact is therefore limited to locations where overlapping view sheds include turbines from two or more wind farms. Turbines that are beyond the view shed may be visible; however they would be barely discernible.

Figure 8-2 shows the view shed overlap between the HFW and nearby wind farms. Wind farms with the greatest view shed overlap include Woolsthorpe to the east, Macarthur to the north west and Ryan Corner to the south west. All three windfarms were assessed for cumulative impacts in the LVIA for the approved layout.

Figure 8-2 View shed overlap

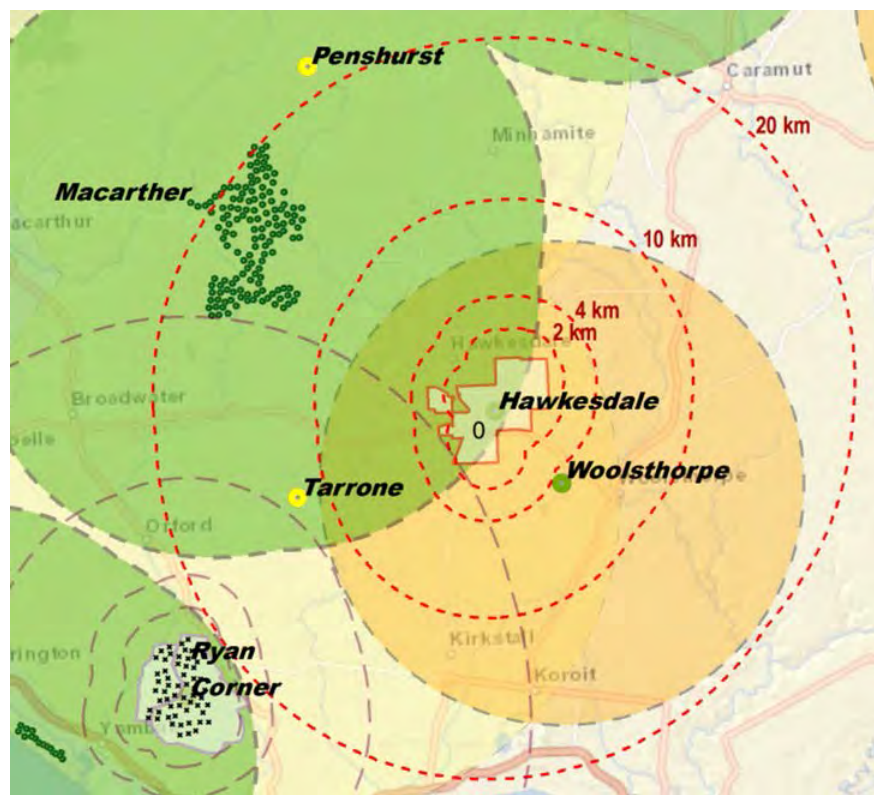


Figure 8-2 shows that the wind turbines of the Ryan Corner Wind Farm are outside even the larger 20 km view shed of the Amended HFW and therefore would not contribute to Simultaneous Visual Impact.

The view shed of the HFW does however include turbines of the Macarthur and Woolsthorpe Wind Farms.

For simultaneous views to occur between the HFW and Macarthur Wind Farm a viewer would need to be behind or near to either wind farm. The turbines in the distance wind farm would be at such a distance that the turbines would recede into the view.

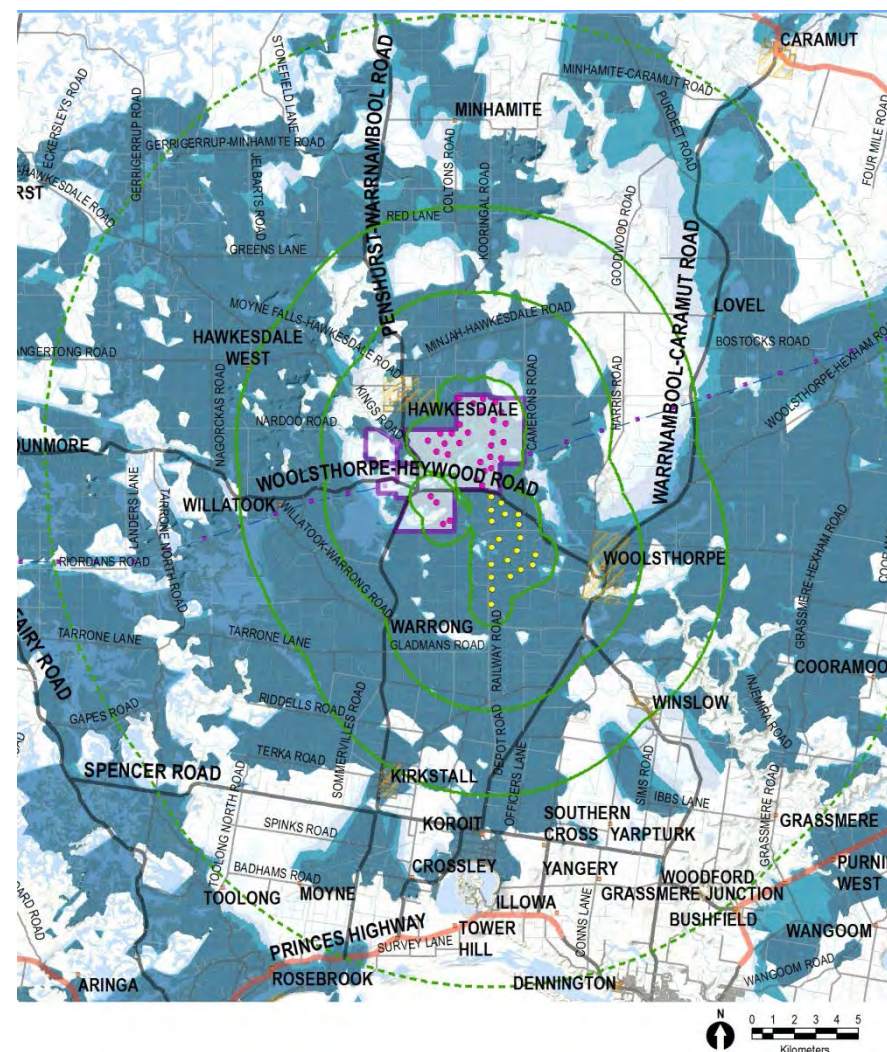
Turbines of the Woolsthorpe Wind Farm however are approximately 700 m to the south east of those in the HFW and at a distance where simultaneous views are possible.

Figure 8-3 shows a combined Seen Area Analysis of the approved turbine Layouts for the HFW and Woolsthorpe Wind Farms. The turbine heights used for this assessment were:

- HFW - 126.5 m;
- Woolsthorpe – 170 m

The SAA maps Zone B, or the entire swept path.

Figure 8-3 Visible Turbines HFW and Woolsthorpe Wind Farms - Approved



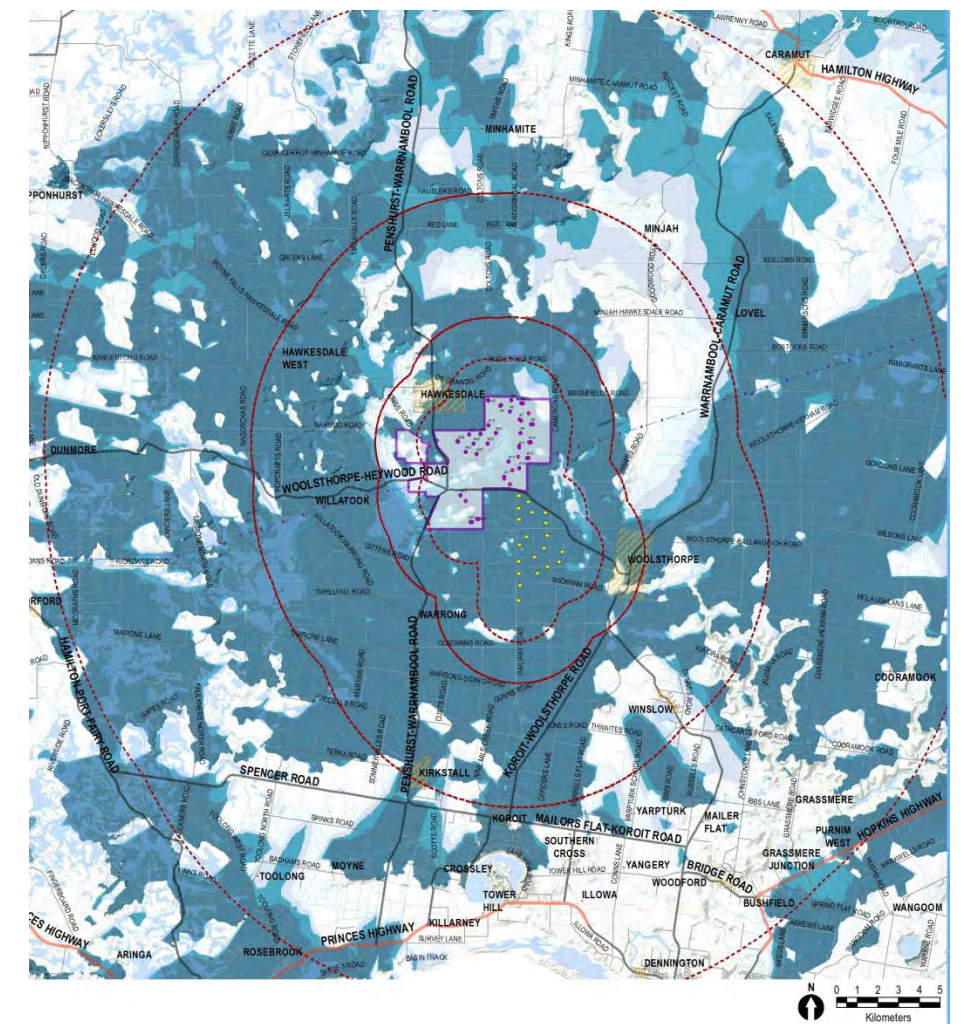
The results of the combined SAA of turbines in both the HWS and Woolsthorpe Wind Farms are similar to the Seen Area Analysis for the HFW by itself.

Figure 8-4 shows the combined visibility of the Amended HFW which includes the increased turbine height, deleted and adjusted turbines. The turbine heights used for this assessment were

- HFW - 180 m;
- Woolsthorpe – 170 m

Again the SAA maps zone B, the entire swept path. This map also shows the extend view shed of the HFW.

Figure 8-4 Visible Turbines HFW and Woolsthorpe Wind Farms – HFW Amended



The patterns of turbine visibility between the Approved layout seen in Figure 8-3 and the Amended Layout in Figure 8-4 are similar.



Figure 8-5 (Opposite) shows the areas where visibility of Amended HWF turbines has changed. Areas of change are highlighted in orange. Figure 8-5 also shows the altered view shed and zones of visual influence.

The turbine heights used for this assessment were

- HWF - 180 m:
- Woolsthorpe – 170 m

Figure 8-5 shows the areas where an increase in cumulative visual impact between the HWF and Woolsthorpe wind farm is likely to occur. These locations are typically removed from both wind farms, and in areas that have been previously assessed as have a low sensitivity to visual change.

The change in simultaneous visible impact resulting from this proposed amended would be low to negligible.

### 9.2 Sequential visual impact

The development of wind farms may lead to a change in people’s perception of a region and will be evident as they travel through the road network. Alteration to the perception of a landscape will occur when a visitor is able to view two or more wind farms.

The increase in sequential visual impact of the Amended HWF is discussed below.

#### 9.2.1 Highways

The expanded view shed of the HWF brought about by this Amendment now includes a section of the Princes Highway, over 18 km to the south.

The Princes Highway passes through the southern extent of the HWF, Ryan Corner, Yambuk and Codrington Wind Farms. The Seen Area Analysis for the Amended Layout (Section 7.1) shows that the Amended Turbines of the HWF are not visible from the Princes Highway.

Therefore, the cumulative visual impact brought about by sequential views along the Princes Highway would be assessed as Negligible. Even if views were available, they would be at such a distance that the turbines of either wind farm would be barely noticeable.

#### 9.2.2 Regional Roads

Penshurst-Warrnambool Road runs along the HWF western boundary, the Koroit-Woolsthorpe Road along the eastern boundary and the Woolsthorpe-Heywood Road bisects the site.

The comparative SAA has shown in Figure 8-5 shows that there are very few if any locations along regional roads where there will be an increase in turbine visibility.

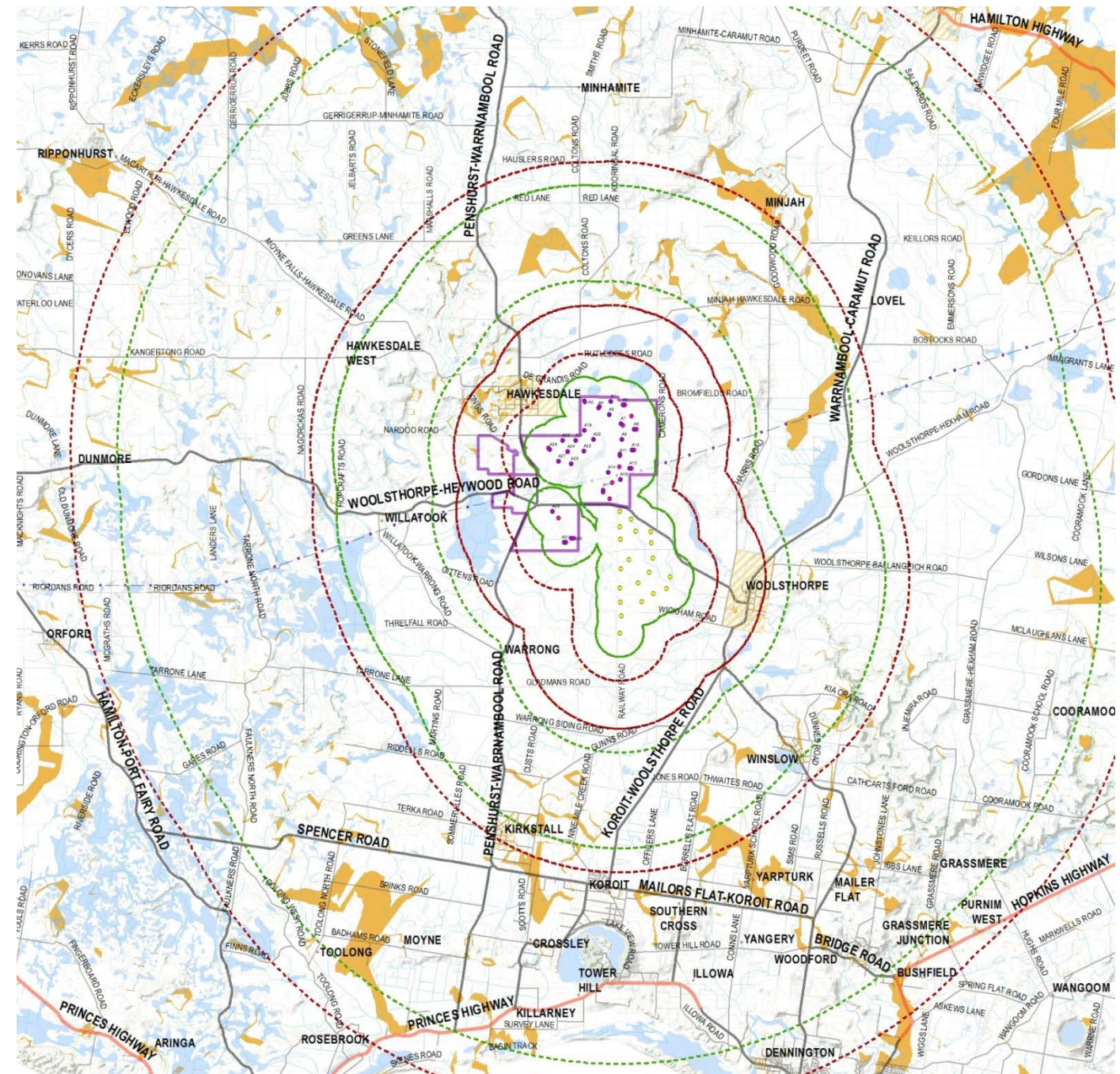
#### 9.2.3 Local Roads

Similar to Regional Roads, there are very few if any local roads that will see an increase in turbine visibility resulting from the proposed amendments to the HWF.

In some instances, multiple wind farms will be visible from the local road network. For the users of these local roads there may be a degree of perception change. For those who find wind farms unattractive, this will be a negative change to their cognitive landscape. For those users who find wind farms attractive, this will be a positive change to their cognitive landscape. Apart from the variable sensitivity of the users, this assessment also considers the low viewer numbers on local roads.

One balance, the cumulative visual impact brought about by sequential views to wind farms in the area is assessed as **Negligible** for local road users.

Figure 8-5 Change in visibility



## 10 OTHER CONSIDERATIONS

Other relevant considerations are discussed below.

### 10.1 Night Lighting Impact

In accordance with Condition 9 of the approved planning permit, night lighting may be required. Given the changes to the Amended Layout, the *Aeronautical Impact Assessment for Hawkesdale Wind Farm* prepared by Aviation Projects dated December 2015 have concluded that

*"If obstacle lighting is required, obstacle lighting would be installed on the following 18 turbines (without the 'A' as the identification prefix): 1, 2, 3, 4, 7, 8, 10, 13, 15, 17, 19, 23, 25, 26, 27, 28, 30 and 31."*

Should night-lighting be required, the visual impact brought about by increased turbine heights will be imperceptible.

## 11 CONCLUSION

This assessment has assessed the likely change in visual impact that might be attributed to the proposed turbine layout changes to the HWF. This assessment applied the same methodology to assess the potential for change as used in the original LVIA for the Approved HWF.

This assessment has demonstrated that the visual impact assessment of the HWF would remain unchanged and are consistent with those discussed in the LVIA.

### 11.1 Changes to the wind turbine numbers

Even though there is a reduction in wind turbines proposed within the Amended Layout, the change in visual impact would be negligible. This is due in part to the landscape sensitivity to visual change and viewer numbers which have not changed.

### 11.2 Changes to the wind turbine heights

This assessment has also shown that although the increased turbine heights may marginally increase areas in which wind turbines can be potentially be seen.

The comparative SAA shows that overall the visibility of the Amended Layout is similar to that of the Approved Layout; this increased visibility would be in areas that would see wind turbines in the approved layout. Additionally, the areas of increased turbine visibility would be in areas of farmland where there are few viewers.

There is a minor change to the visibility of the turbines at the edge of the view shed, however at such a distance where the wind turbines will not be dominant in the landscape.

Photomontages from three locations show that the change to the visual impact based on 126.3 m wind turbines (approved) and 180 m high wind turbines (amended) will appear similar. The overall change to the visual impact will be negligible.

### 11.3 Policy changes and guidelines

Recent studies and more recent assessments by ERM have identified the Stony Rises as a Sub-unit within the Rural Plains Landscape Unit. Consequently the landscape sensitivity ratings for this landscape Sub-unit have been increased from **low to medium**.

The Stony Rises landscape subunit occurs and the edge of the HWF view shed, there are very few locations on the local road network from which the level of impact will be marginally greater. However, this is not because of the Amended Layout but rather because of the increased sensitivity attached to the Stony Rises Landscape Sub-unit.

### 11.4 Mitigation measures

Given the increased height of the wind turbines, it is acknowledged that the amended wind turbines may be *"Highly visible and will usually dominate the landscape"* up to 4 km of the nearest wind turbines. Therefore, landscape mitigation should be extended to residents within 4 km of the wind farm.

In summary, the landscape and visual impact assessment supports the planning amendment proposed for HWF.



## ***ANNEX A COMPARATIVE PHOTOMONTAGES***

ERM HAS OFFICES WORLD WIDE

AUSTRALIA  
ARGENTINA  
BELGIUM  
BRAZIL  
CHINA  
FRANCE  
GERMANY  
HONG KONG  
HUNGARY  
INDIA  
INDONESIA  
IRELAND  
ITALY  
JAPAN  
KOREA  
MALAYSIA  
MEXICO  
NETHERLANDS  
NEW ZEALAND  
PERU  
POLAND  
PORTUGAL  
PUERTO RICO  
SINGAPORE  
SPAIN  
SRI LANKA  
SWEDEN  
TAIWAN  
THAILAND  
UK  
USA  
VENEZUELA  
VIETNAM



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