Landscape Character Units			
LCU:	**Name:**	**General Character:**	**Preliminary Visual Impact Assessment**
LCU01	**Mortlake & Darlington flats**	*Comprises of flat parcels of land that are extensively used for grazing. Generally located on the northern side of the Hamilton Highway.*	Views from this LCU are generally open due to lack of canopy cover and topographical changes. Views towards the Project are likely to be available from most locations. However, existing roadside vegetation and planting around dwellings may help reduce visibility in those areas.
LCU02	**Glenormiston & Koorat farmlands**	*Gently sloping to generally flat grazing lands that are located on the southern side of the Hamilton Highway.*	Preliminary assessments based on topography alone indicates that highest visibility of turbines will be potentially around the flat farmlands and residences located near Glenormiston. Areas around Terang further to the south are likely to be have limited views due to the undulating topography. Patches of vegetation around dwellings and along roadsides would potentially filter views from residences.
LCU03	**Dundonnell farmlands**	*Gently undulating to flat lands located near Mt Fyans and Dundonnell. Vegetation character is highly modified to suit agricultural needs.*	Views from this LCU are likely to be limited from certain areas that are close to elevated points in the landscape. Vegetation character is partially modified to suit the agricultural setting. Existing roadside vegetation and windbreak plantations around dwellings is likely to limit views.
LCU04	**Creek corridors**	*Comprises of water bodies that traverse the landscape. Most creek corridors are seasonal.*	The LCU is characterised by gently sloping and level terrain in certain areas. Native vegetation lines the creek corridors and it is likely that this vegetation will play an important role in limiting views from this LCU towards the Project. It was also help in limiting views from dwellings further east of this corridor.
LCU05	**Wetlands & lakes**	*Sub-circular depressions with seasonal water. These are dispersed around the farmlands.*	Large, open expanses with partially modified vegetation located on the boundaries of sub-circular depressions. These areas will have views of the Project due to the lack of intervening elements such as vegetation and topographical changes.
LCU06	**Darlington settlement**	*Low density rural town settled near Mt Emu Creek. Rural dwellings are generally scattered around the town and the terrain is gently undulating to flat.*	The character of Darlington is defined by a flat to gently undulating terrain. Views to the Project are likely to be available due to the close proximity of this town to the Project. Existing vegetation around dwellings is likely to assist in limiting views.
LCU07	**Mortlake settlement**	*Historic town settled as a quarry town in the foothills of Mt Shadwell. Vegetation and topographic character have been modified to suit the town's needs.*	Set in the foothills of Mt Shadwell, Mortlake is located on a flat to gently undulating terrain. Certain land parcels in the eastern parts of the town are located on an undulating terrain. It is likely that existing vegetation and the buildings that form a part of this town will assist in limiting views of the Project.

Table 5 Overview of Preliminary Visual Impact Assessment of LCUs

06

Public Viewpoint Analysis

6.0 Public Viewpoint Analysis

6.1 Overview of Viewpoint Analysis

In addition to the analysis of the existing landscape character, viewpoint analysis has been undertaken from a total of **26** public locations during the field work process. Viewpoints have been carefully selected to be representative of the range of views within the Study Area. The selection of viewpoints is generally informed by topographical maps, field work observations and other relevant influences such as access, residences, landscape character and the popularity of vantage points. Viewpoints are selected to illustrate a combination of the following:

- viewpoints identified by the community in community consultation phase of scoping paper,
- present landscape character types,
- areas of potentially high landscape or scenic value,
- range of distances,
- varying aspects and elevations,
- varying extent of wind farm visibility (full and partial visibility), and
- sequential views along specific routes.

It is important to note that viewpoints for this PLVIA study have been taken predominantly accessible public land (typically roads) which were identified as having a potentially high potential for visibility of he Project impact through the desktop review process. Some viewpoints were recorded from private property with consent from landowners.

The viewpoint locations assessed for the Project have included key viewpoints identified through the extensive community engagement throughout the development.

Selected viewpoint assessment locations are shown on **Figure 14**.

6.2 Photography Methodology

Photographs used for viewpoints are taken on a level tripod at a height of 150 cm (to represent eye level). Photographs were taken with a Canon EOS 5D Mark IV Full Frame digital SLR through a 50mm fixed focal lens which closely represents the central field of vision of the human eye. Parameters for the photography is provided in **Table 6**.

The visual impact of the viewpoint was assessed both on site and through a desktop assessment utilising with the topographic and aerial information to ensure accuracy.

The locations of the viewpoints have been identified in **Figure 14** and the general viewing direction of each viewpoint is identified on the map on each viewpoint.

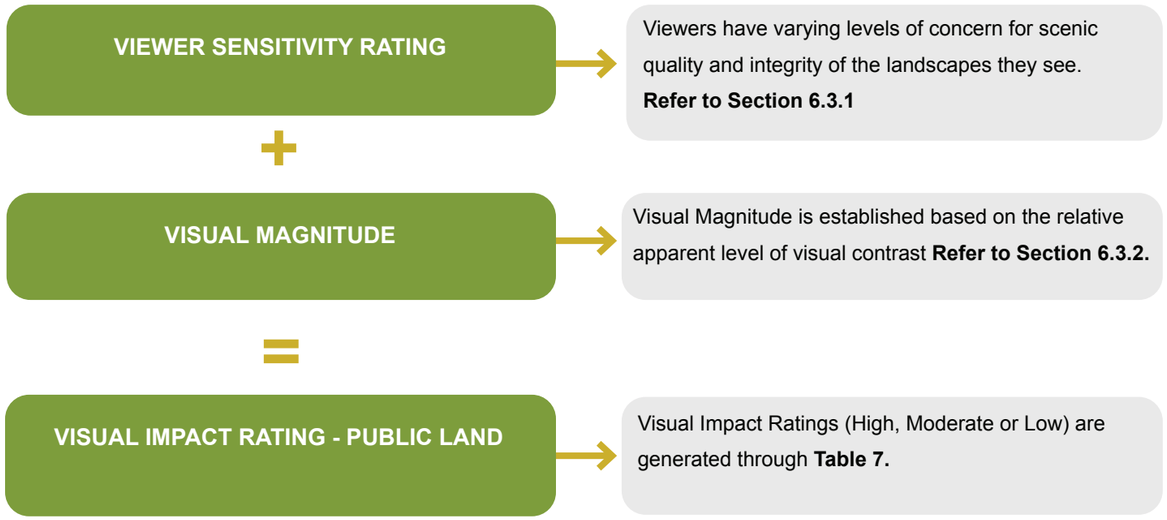
Viewpoint analysis prepared for the Project has been included as Appendix B.

Photography Specifications:	
Camera Make and Model:	**Canon EOS 5D Mark IV Full Frame Digital SLR**
Lens:	**EF50mm f/1.2L USM**
Focal Length:	**50mm f/0**
Aperture Setting:	**f/6.3 - 10**
Tripod Height:	**150cm**

Table 6 Photography Specifications

6.3 Public Viewpoint Analysis Study Method

The visual impact assessment for each public viewpoint location is assessed based on the relationship between the visual sensitivity (refer to **Section 6.3.1)** and visual magnitude (refer to **Section 6.3.2**). The following section provides an overview of the methodology implemented to determine the level of visual impact at each public viewpoint location.



6.3.1 Viewer Sensitivity

Visual sensitivity is a measure of how critically a change to the existing landscape is viewed by people from different areas. The assessment is based on the number of people affected, land use, and the distance of the viewer from the proposal (EDAW, 2000).

For example, a significant change that is not frequently seen may result in a low visual sensitivity although its impact on a landscape may be high. Generally the following principles apply:

• Visual sensitivity decreases as the viewing time decreases.
• Visual sensitivity decreases as the number of potential viewers decreases.
• Visual sensitivity can also be related to viewer activity (e.g. A person viewing an affected site whilst engaged in recreational activities will be more strongly affected by change than someone passing a scene in a car travelling to a desired destination).

6.3.2 Visual Magnitude

Visual magnitude refers to the extent of change that will be experienced by receptors. Factors that are considered when assessing the magnitude of change include:

- the proportion of the view / landscape affected;
- extent of the area over which the change occurs;
- the size and scale of the change;
- the rate and duration of the change;
- the level of contrast and compatibility.

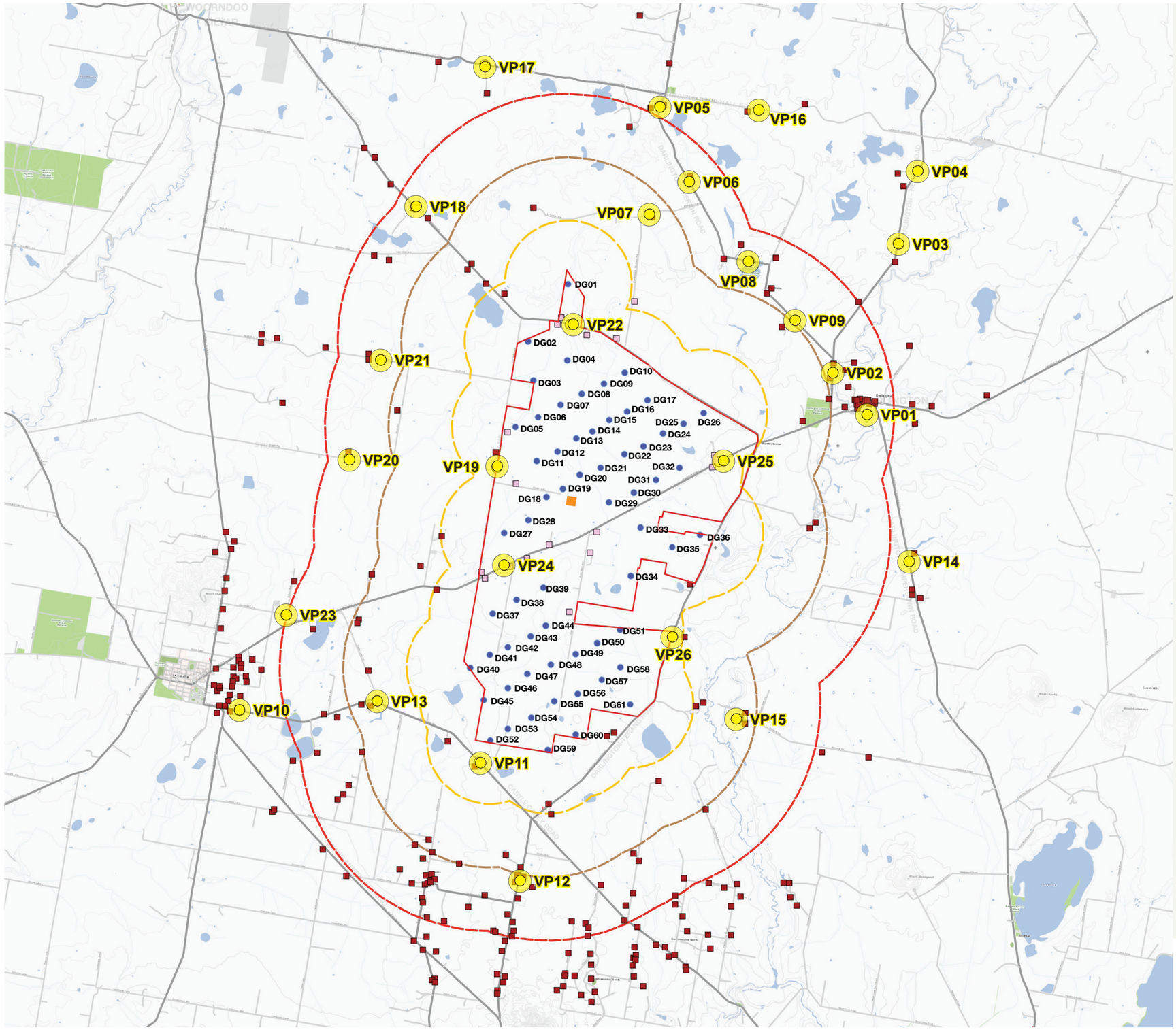
(Source: AILA, 2018)

6.3.3 Visual Impact

Visual impact refers to the change in appearance of the landscape as a result of development. (EPHC, 2010). Visual impact is the combined effect of visual sensitivity and visual magnitude. Various combinations of visual sensitivity and visual magnitude will result in high, moderate and low overall visual impacts as suggested in **Table 7** below (Transport for NSW, 2020).

VISUAL IMPACT RATING					
		VISUAL MAGNITUDE			
		HIGH	MODERATE	LOW	NEGLIGIBLE
VISUAL SENSITIVITY	HIGH	HIGH	HIGH-MODERATE	MODERATE	NEGLIGIBLE
	MODERATE	HIGH-MODERATE	MODERATE	MODERATE-LOW	NEGLIGIBLE
	LOW	MODERATE	MODERATE-LOW	LOW	NEGLIGIBLE
	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE

Table 7 Visual Impact Rating Table (Adapted from Transport for NSW, 2020)



Public Viewpoint Analysis Locations

Darlington Wind Farm

LEGEND

- Project Boundary
- Proposed 240 m Turbine Location
- Involved Dwelling
- Non-involved Dwelling
- Roads
- 2000 m from turbines
- 4000 m from turbines
- 6000 m from turbines
- Public Viewpoint Analysis Location - **Refer to Appendix B**

N

0 2 4 6 8 10km

Figure 14 Public Viewpoint Analysis Locations (Map Source: VicPlan 2022)

6.4 Summary of Viewpoint Analysis

26 public viewpoints assessed for the purpose of this PLVIA were taken from varying distances and locations surrounding the Project. A summary of the visual impact ratings for each of the public viewpoint location assessed has been provided as **Table 8.**

Of the 26 viewpoints:

- Eight (8) public viewpoint locations were assessed as having a Low visual impact rating.
- 10 public viewpoint locations were assessed as having a Moderate-Low visual impact rating.
- Seven (7) public viewpoint locations were assessed as having a Moderate visual impact rating.
- One (1) public viewpoint location was assessed as having a High-Moderate visual impact rating.

Generally, those with a visual impact rating of Moderate and High-Moderate are due to the higher visual magnitude which is deteremined of the magnitude of change to the landscape character. Only one (1) viewpoint has high visual sensitvity which has led to the moderate visual impact rating.

Summary of Public Viewpoint Analysis

Viewpoint	Location	Distance to Nearest Turbine	Visual Sensitivity	Visual Magnitude	Visual Impact Rating
VP01	Darlington Cemetery Reserve, Darlington	7.80 km	HIGH	LOW	MODERATE
VP02	Darlington-Carranballc Road, Darlington	4.40 km	LOW	MODERATE	MODERATE-LOW
VP03	Darlington-Carranballc Road, Darlington	8.80 km	LOW	LOW	LOW
VP04	Darlington-Carranballc Road, Darlington	10.30 km	LOW	LOW	LOW
VP05	Darlington-Nerrin Road, Dundonnell	6.20 km	LOW	LOW	LOW
VP06	Darlington-Nerrin Road, Dundonnell	5.00 km	LOW	LOW	LOW
VP07	Mt Fyans Lane, Dundonnell	3.50 km	LOW	MODERATE	MODERATE-LOW
VP08	Darlington-Nerrin Road, Darlington	5.00 km	LOW	MODERATE	MODERATE-LOW
VP09	Darlington-Nerrin Road, Darlington	4.00 km	LOW	MODERATE	MODERATE-LOW
VP10	Purcells Lane, Mortlake	7.40 km	LOW	LOW	LOW
VP11	Castle Carey Road, Kolora	0.70 km	LOW	HIGH	MODERATE
VP12	Darlington-Terang Road, Kolora	4.20 km	LOW	MODERATE	MODERATE-LOW
VP13	Castle Carey Road, Mortlake	3.10 km	LOW	MODERATE	MODERATE-LOW
VP14	Darlington-Camperdown Road, Darlington	6.60 km	LOW	LOW	LOW
VP15	Kilnoorat Road, Bookaar	8.05 km	MODERATE	MODERATE	MODERATE
VP16	Darlington-Derrinallum Road, Dundonnell	3.40 km	LOW	LOW	LOW
VP17	Worndoo-Dundonnell Road, Dundonnell	7.30 km	LOW	LOW	LOW
VP18	Worndoo-Darlington Road, Worndoo	5.20 km	LOW	MODERATE	MODERATE-LOW
VP19	Six Mile Lane, Mortlake	1.20 km	LOW	HIGH	MODERATE
VP20	South Road, Mortlake	5.30 km	LOW	MODERATE	MODERATE-LOW
VP21	North Road, Mortlake	4.60 km	LOW	MODERATE	MODERATE-LOW
VP22	Worndoo-Darlington Road, Darlington	1.10 km	LOW	HIGH	MODERATE
VP23	Dales Lane, Mortlake	6.00 km	LOW	MODERATE	MODERATE-LOW
VP24	Hamilton Highway, Mortlake	1.00 km	MODERATE	HIGH	HIGH-MODERATE
VP25	Hamilton Highway, Darlington	1.20 km	MODERATE	MODERATE	MODERATE
VP26	Darlington-Terang Road, Kilnoorat	1.60 km	LOW	HIGH	MODERATE

Table 8 Visual Impact Rating Table (Adapted from Transport for NSW, 2020)

07

Dwelling Analysis

7.0 Dwelling Analysis

7.1 Overview of Dwelling Assessment

Section 3.0 of this report defines the 'visual catchment' of this Project and identified that non-involved dwellings within the Study Area that require detailed assessment. Due to the large scale of the Project, relatively flat topography around the Project Site and number of dwellings within the visual catchment, representative dwellings within 6,000m of the Project have been assessed to provide an indication of the potential visual impacts from surrounding dwellings (See **Figure 16**).

The following dwellings have been assessed and included in **Appendix A**:

- Two (2) non-involved dwellings within 2,000m metres of the nearest turbine associated with the Project.
- Six (6) non-involved dwellings between 2,000 - 4,000 metres of the nearest turbine associated with the Project.
- Seven (7) non-involved dwellings between 4,000 - 6,000 metres of the nearest turbine associated with the Project.

7.2 Study Method for Dwelling Assessment

Further detailed assessment identified a number of dwellings within the visual catchment are likely to have limited or no views to the Project due to screening factors such as vegetation and/or existing structures. **Figure 15** provides an overview of the vegetation character around all non-involved dwellings within approximately 6,000 m of the Project.

Table 9 provides an overview of the study method for undertaking the dwelling assessment for each dwelling identified within the visual catchment.

Study Method	Process
Step 1. 3D Assessment (based on topography alone)	Using 3D modelling, Moir LA identified turbines which will be visible from the dwelling based on topography alone. Where turbines are likely to be visible, additional analysis has been undertake to determine the extent of visibility.
Step 2. Aerial Imagery	Information on the extent of visibility extracted from the 3D model is overlaid onto a recent aerial image of the dwelling and its surrounds. This provides a detailed assessment of the direction and extent of potentially visible turbines and identifies any intervening elements (such as structures, wind break planting or vegetation) which may reduce the potential visibility.
Step 3. Consideration of mitigation methods	For non-involved dwellings where the Project has the potential to cause visual impact, mitigation methods have been suggested. **Refer to Section 10.0.**

Table 9 Dwelling Assessment Process

Character of Nearby Dwellings

Darlington Wind Farm

LEGEND

- Project Boundary
- DG32 Proposed 240 m Turbine Location
- 153 Non-involved Dwellings
- Non-involved Dwellings surrounded by moderate to dense screening vegetation
- Non-involved Dwellings with potential to view a part of the Project
- Roads
- 2000 m from turbines
- 4000 m from turbines
- 6000 m from turbines

N

0 2 4 6 8 10km

Figure 15 Character of nearby dwellings (Map Source: VicPlan 2022)

Dwelling Analysis Locations

Darlington Wind Farm

LEGEND

- Project Boundary
- DG32 Proposed 240 m Turbine Location
- 39 Involved Dwellings
- 41 Non-involved Dwellings
- Roads
- 2000 m from turbines
- 4000 m from turbines
- 6000 m from turbines
- Dwelling Analysis Location - **Refer to Appendix A**

N

0 2 4 6 8 10km

Figure 16 Character of nearby dwellings (Map Source: VicPlan 2022)

7.3 Summary of Preliminary Dwelling Assessment

7.3.1 Dwellings located within 2,000 metres of the nearest turbine

A total of 10 non-involved dwellings were identified within 2,000 metres of a proposed turbine. Of these, eight (8) dwellings are surrounded by screening elements such as vegetation and / or structures which will help limit views of the Project.

Representative dwelling assessments have been undertaken for the remaining two (2) non-involved dwellings within the 2,000 m of the nearest turbine (dwellings 69 and 108). An overview of the visual assessment for two (2) these dwellings have been included in **Appendix A**.

7.3.2 Dwellings located within 2,000 - 4,000 metres of the nearest turbine

A total of 30 non-involved dwellings were identified within 2,000 - 4,000 metres of a proposed turbine. Of these, 24 dwellings are surrounded by screening elements such as vegetation and/or structures which will help limit views of the Project.

Dwelling assessments have been undertaken for the remaining six (6) non-involved dwellings within the 2,000 - 4,000 m of the nearest turbine (dwellings 30, 42, 78, 127, 141 and 269). An overview of the visual assessment has been included in **Appendix A**.

7.3.3 Dwellings located within 4,000 - 6,000 metres of the nearest turbine

A total of 84 non-involved dwellings were identified within 4,000 - 6,000 metres of a proposed turbine. Of these, 77 dwellings are surrounded by screening elements such as vegetation and/or structures which will help limit views of the Project.

Representative dwelling assessments have been undertaken for seven (7) non-involved dwellings within the 4,000 - 6,000 m of the nearest turbine (dwellings 32, 44, 64, 81, 122, 189 and 230). An overview of the visual assessment for these seven (7) dwellings has been included in **Appendix A**.

7.3.4 Dwellings located outside 6,000 metres of the nearest turbine

A total of 127 non-involved dwellings were identified outside 6,000 metres of a proposed turbine. Of these, 114 dwellings are surrounded by screening elements such as vegetation and/or structures which will help limit views of the Project. An overview of the potential impact on the remaining 13 dwellings has been discussed in **Table 10**.

In addition to the detailed assessment of dwellings identified within the visual catchment, Moir LA undertook an extensive Viewpoint Analysis which provides representative visual assessments that are around the Project (refer to **Appendix B**).

Non involved dwellings outside of 6000 metres of nearest WTG

Dwelling ID:	Location	Approx distance to nearest WTG (km)	Nearest WTG	Approx. number of potentially visible WTGs (Based on ZVI)	Summary of assessment
43	Darlington - Nerrin Road	6.13 km	DG01	61	*Views of Project likely to be available in the south Existing vegetation along lot boundary will help reduce potential visual impact.*
95	Worndoo - Dundonnell Road	6.54 km	DG01	61	*Views of Project likely to be available in the southern direction. Existing structures and vegetation along lot boundary will help reduce potential visual impact.*
97	Worndoo - Dundonnell Road	6.96 km	DG01	61	*Views likely to be available in the south. Existing vegetation in foreground likely to help fragment views.*
147-148	North Road	6.38 km	DG02	61	*Views generally available in southeast. Existing structures, roadside and lot boundary vegetation is likely to fragment views.*
153	Mortlake - Ararat Road	8.01 km	DG40	61	*Fragmented views of Project likely to be available in the east. Existing vegetation along lot boundary will help reduce potential visual impact.*
162	Kolora Lane	6.50 km	DG52	61	*Fragmented views of Project likely to be available in the north. Existing windbreak vegetation along lot boundary will help reduce potential visual impact.*
177	Darlington - Terang Road	7.44 km	DG59	61	*Existing vegetation and structures in dwelling's foreground likely to reduce potential visual impact. Fragmented views of Project available in the north.*
188	Hinkleys Lane	7.14 km	DG52	61	*Views of entire Project likely to be available in the northeast. Combination of distance and existing vegetation along other lots will help reduce potential visual impact.*
234-236	Darlington - Camperdown Road	6.89 km	DG36	61	*Views of entire Project likely to be available in the west. Lack of screening elements will allow open views of Project. Screening is recommended.*
249	Worndoo - Dundonnell Road	8.10 km	DG01	61	*Views of entire Project likely to be available in the south. Combination of distance and existing vegetation along other lots will help reduce potential visual impact.*
251	Worndoo - Darlington Road	7.28 km	DG01	61	*Views of entire Project likely to be available in the southeast. Existing roadside vegetation along Worndoo-Darlington Road will help fragment some of the views. Views will be distant and likely to be fleeting.*

Table 10 Overview of Preliminary Assessment for non involved dwellings outside 6,000 metres

08

Cumulative Visual Impact Assessment

8.0 Cumulative Visual Impact Assessment

8.1 Overview of Cumulative Visual Impacts

Cumulative landscape and visual effects result from additional changes to the landscape or visual amenity caused by the proposed development in conjunction with other developments (associated with or separate to it) or actions that occurred in the past, present or are likely to occur in the foreseeable future (Landscape Institute et al, 2002). Cumulative effects may also affect the way a landscape is experienced and can be positive or negative. Where they comprise benefits, they may be considered to form part of the mitigation measures.

It is important the proposed Darlington Wind Farm considers the potential cumulative effects on the immediate and broader regional context it forms part of.

A cumulative impact assessment has several dimensions:

- The impact of the wind farm, when added to the combined impacts of all other existing developments and environmental characteristics of the area.
- The impact of this development in the context of the potential for development of wind energy developments in the local, regional and national context.
- The impact of developments which are ancillary to or otherwise associated with the proposed wind farm eg. the development of transmission lines.
- The potential for future development of wind farms in the region.

8.2 Nearby Wind Farm Projects

The Project is located within Victoria's South West Renewable Energy Zone (REZ). The REZ has been identified by the Victorian Government through its Climate Change Strategy. The REZ is expected to play a vital role in providing clean energy to communities across Victoria (DELWP, 2021). See **Figure 17**.

The Project is located within close proximity to five (5) wind farm projects:

- Dundonnell Wind Farm (Operating)
- Mortlake South Wind Farm (Approved)
- Salt Creek Wind Farm (Operating)
- Mt Fyans Wind Farm (Under Construction)
- Hexham Wind Farm (EES currently being prepared for lodgement)

In addition to the above mentioned wind farm projects, a total of 10 proposed, approved and operational wind farms are located within 100 kilometres of the Project. **Table 11** lists all wind farm projects in close proximity and their approximate size and planning status. **Figure 18** shows the location of most of these projects**.** A detailed assessment of the potential cumulative visual impact has been undertaken for Mount Fyans Wind Farm which is located approximately five (5) kilometres west and Dundonnell Wind Farm which is located eight (8) kilometres north of the Project has been discussed in the following section of this report.

Project	Distance and direction of Wind Farm from the Project	Project Size *Estimated	Planning Status
Operational Wind Farms			
Dundonnell Wind Farm	5 km North	80 turbines	Operational
Salt Creek Wind Farm	13 km Northwest	15 turbines	Operational
Mortlake South Wind Farm	7 km Southwest	35 turbines	Operational
Mortons Lane Wind Farm	42 km Northwest	13 turbines	Operational
Oaklands Hill Wind Farm	45 km North	32 turbines	Operational
Macarthur Wind Farm	65 km West	140 turbines	Operational
Approved Wind Farms			
Hawkesdale Wind Farm	60 km West	*23 turbines	Approved in August 2008, amended in October 2020
Ryan Corner Wind Farm	65 km Southwest	*52 turbines	Approved in August 2008, amended in January 2018
Woolsthorpe Wind Farm	52 km Southwest	*20 turbines	Approved in April 2008, amended in October 2019
Proposed Wind Farms			
Mount Fyans Wind Farm	West (adjoining boundaries)	*85 turbines	Planning Permit Application lodged and process underway
Hexham Wind Farm	25 km West	*108 turbines	Planning Permit Application lodged and process underway

Table 11 Summary of nearby Wind Farm Projects

*Note: Information available on DELWP Permits and Applications Database accessed July 2022 (DELWP, 2020).

8.3 Cumulative Impact on the Broader Landscape Character and Surrounding Dwellings

The Victorian Government has identified six (6) key Renewable Energy Zones (REZ) in the State's South West, West, Central North, Murray River, Ovens Murray and Gippsland regions. The Project is located centrally within the extents of the land defined as the South West Victoria REZ. The existing landscape character of the region allows for optimum harvest of wind energy due to the flat, planar topography and minimal obstructions in the landscape. These characteristics are beneficial to the output of wind energy and it is inevitable that overtime this will be utilised for the development of wind farm projects.

The re-occurrence of wind farms within a region has the potential to alter the perception of the overall landscape character irrespective of being viewed in a single viewshed. As wind farm developments prevail it is important to determine whether the effect of multiple wind farms and other major infrastructure within the region would combine to become the dominant visual element, altering the perception of the general landscape character.

The potential cumulative visual impact must also be considered in relation to the potential visual impact when viewed sequentially. If a number of wind farms are viewed in succession as a traveller moves through the landscape (eg. motorist travel routes or walking tracks) this may result in a change in the overall perception of the landscape character. The viewer may only see one wind farm at a time, but if each successive stretch of the road is dominated by views of a wind farm, then that can be argued to be a cumulative visual impact (EPHC, 2010).

The Project is located on a generally flat terrain that is surrounded by scattered dwellings. Section 8.0 of this report highlights that most dwellings near the Project are surrounded by moderate to dense vegetation which will help limit views of the Project. It is, therefore, highly likely that the impact on private viewing locations will be limited. Considering the likely impact on public viewing locations and important travel corridors such as the Hamilton Highway, it is likely that the turbines will be visible as a key feature in the landscape. However, the position of these turbines is setback significantly from the travel corridor.

Due to the close proximity of Mt Fyans and Dundonnell Wind Farms, it is likely that the Project will be viewed as an extension of the existing and operating wind farm projects in the region. The height of the proposed turbines (tip height 240 m) is generally consistent with the height of the turbines associated with Mt Fyans (200m tip height), and therefore, the regions broader character is likely to be perceived as a landscape that is characterised by operations that harness wind energy.

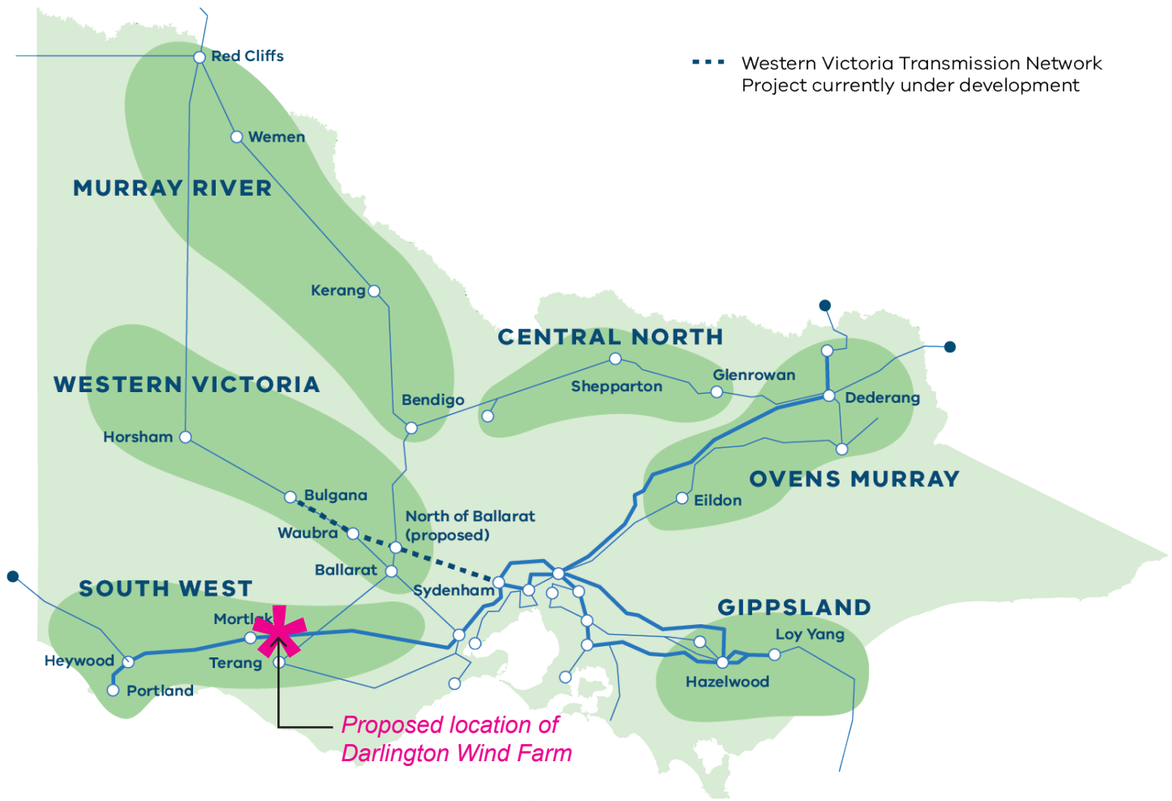
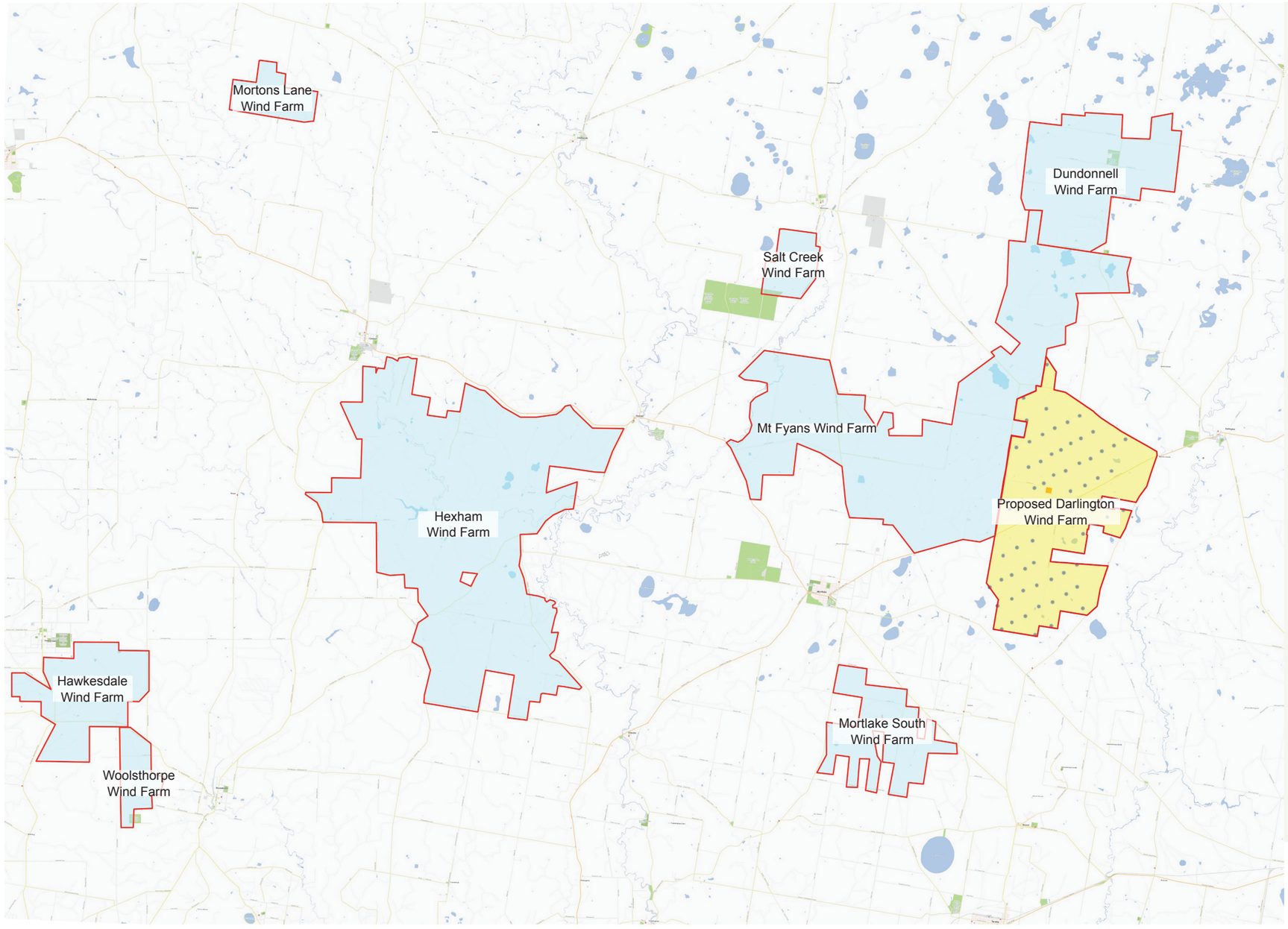


Figure 17 Renewable Energy Zones of Victoria (Source: AEMO 2021)



Cumulative Visual Impacts
Darlington Wind Farm

LEGEND

- Project Boundary
- Proposed 240 m Turbine Location (Darlington Wind Farm)
- Project Site
- Surrounding wind farm projects

N

0 2 4 6 8 10km

Figure 18 Cumulative Visual Impacts (Map Source: VicPlan 2022)

09

Associated Infrastructure

9.0 Associated Infrastructure

9.1 Overview of Associated Infrastructure

In addition to the proposed wind turbines, the associated infrastructure is likely to contrast with the existing visual landscape. Due to the large scale and relatively flat topography of the Project Site, it is likely that access roads and other ancillary structures have the potential to alter the existing visual landscape. An overview of the potential visual impact resulting from associated infrastructure and project components is provided in this section of the report.

9.2 Access Roads

Access roads are proposed on site between the wind turbines. Two main entrances to the Project Site are proposed - one on Six Mile Lane and another on Darlington - Terang Road. Currently these roads convey moderate to low vehicular traffic and it is likely some upgrades to these roads would be completed to allow access to the Project. Temporary road crossings will be constructed at Worndoo-Darlington Road in the northern parts of the Project to allow access for constructing the Project.

Access for maintenance of the Project will be via private access roads as per the preliminary design layout. Concept designs identified the most suitable location for roads and hardstands to avoid earth works where practicable. The benefits this brings to the Project is that the associated infrastructure is integrated, where possible, with existing land parcels that would be suitable for accommodating infrastructure amenities and can be accessed via existing roads in the Project. Where possible, the internal road network will be aligned on the route of existing farm or other access roads with localised widening where required to support transportation of the WTG components.

Generally, internal roads have been sited to reduce potential vegetation loss and limit earth work requirements. Due to the existing agricultural land use of the Study Area, farm roads traversing the landscape form a significant part of the existing landscape character. The proposed access roads are likely to be viewed as part of the existing character of the landscape and therefore visual impact would be low.

Mitigation measures for reducing residual visual impact resulting from the construction of access roads include:

- *Where possible utilise or upgrade existing roads, trails or tracks to provide access to the proposed turbines to reduce the need for new roads.*
- *Allow for the provision for downsizing roads or restoring roads to existing condition following construction where possible.*
- *Any new roads must minimise cut and fill and avoid the loss of vegetation.*
- *Utilise local materials where possible and practical.*

9.3 Transmission Lines

9.3.1 Internal Transmission lines

Each of the WTG clusters will be internally connected to an on-site substation via electrical cables. It is anticipated that connections will be predominantly be via underground cables. The specifications of the electrical cables will be addressed as part of the detailed design stage, and considered as part of the LVIA.

9.3.2 External Transmission lines

The turbines will be connected to an on-site substation which will supply electricity to the existing 500kV transmission line. One (1) 132/500kV transformer (420 MVA) and three (3) 22/132 kV transformers (140 MVA) will also be required for the connection. This existing high voltage transmission line runs through the South West Victorian REZ. The siting of the Project, therefore, eliminates the need for additional external transmission lines. **Figure 19** provides an overview of the potential visual impacts resulting from the ancillary structures that will be required to manage the Project operations.

Proposed mitigation methods to be considered during detailed design phase for any potential transmission line connections include:

- *Where possible underground cabling is to be used to connect wind turbines to the electricity grid.*
- *Utilise existing transmission lines where possible.*
- *The route for any proposed overhead transmission lines should be chosen to reduce visibility from surrounding areas.*
- *Plan route to minimise vegetation loss.*
- *Use of subtle colours and a low reflectivity surface treatment on power poles to ensure that glint is minimised.*

9.4 Ancillary Structures

9.4.1 Substation and Control Room

There would be one ‘collector’ substation and control room (monitoring equipment, warehouse and amenities) which will feed the power generated from the turbines into the existing electricity transmission grid. The location of the proposed substation has been selected to minimise the distance between the existing transmission line and the Project. It covers an approximate area of 250m x 250m. Generally, the substation is located within the Project and set back from nearby dwellings and major transport corridors.

Although there is a possibility that the substation would be visible on the southern side along the Hamilton Highway, the visual impacts of the ancillary structure can be mitigated. If deemed necessary during the detailed design phase, screen planting could be employed to reduce any potential visual impacts. Views in all other directions are likely to be screened by existing roadside vegetation.

9.4.2 Temporary Site Construction Office

A temporary site construction office for management of the operations would also be required. Its proposed location is immediately north of the substation. The office is likely to cover 100m x 200m area and it is likely that a connector road from Prices Lane will provide access to the ancillary infrastructure. The site office area is likely to have monitoring equipment, storage facility, amenities for workers and parking. The office is proposed to be located within the project boundary, set back from non-involved dwellings and large road corridors.

9.4.3 Site Concrete Batching Boxes (temporary construction facilities)

A concrete batching plant will also be established temporarily during construction to help with the construction of access tracks and hardstands around the Project as shown in **Figure 19**. The concrete batching plant is likely to be accommodated near the proposed substation and site office locations in an area of 100m x 200m and accessible via Prices Lane.

9.4.4 Meteorological Mast

The Project also includes installation of up to three (3) new wind monitoring towers (anemometers) for power testing as a part of the permanent infrastructure. A temporary wind monitoring tower is also proposed. The monitoring towers will be located close to a WTG location and will have same height as the WTG hub height. The exact location will be defined at the detailed design stage.

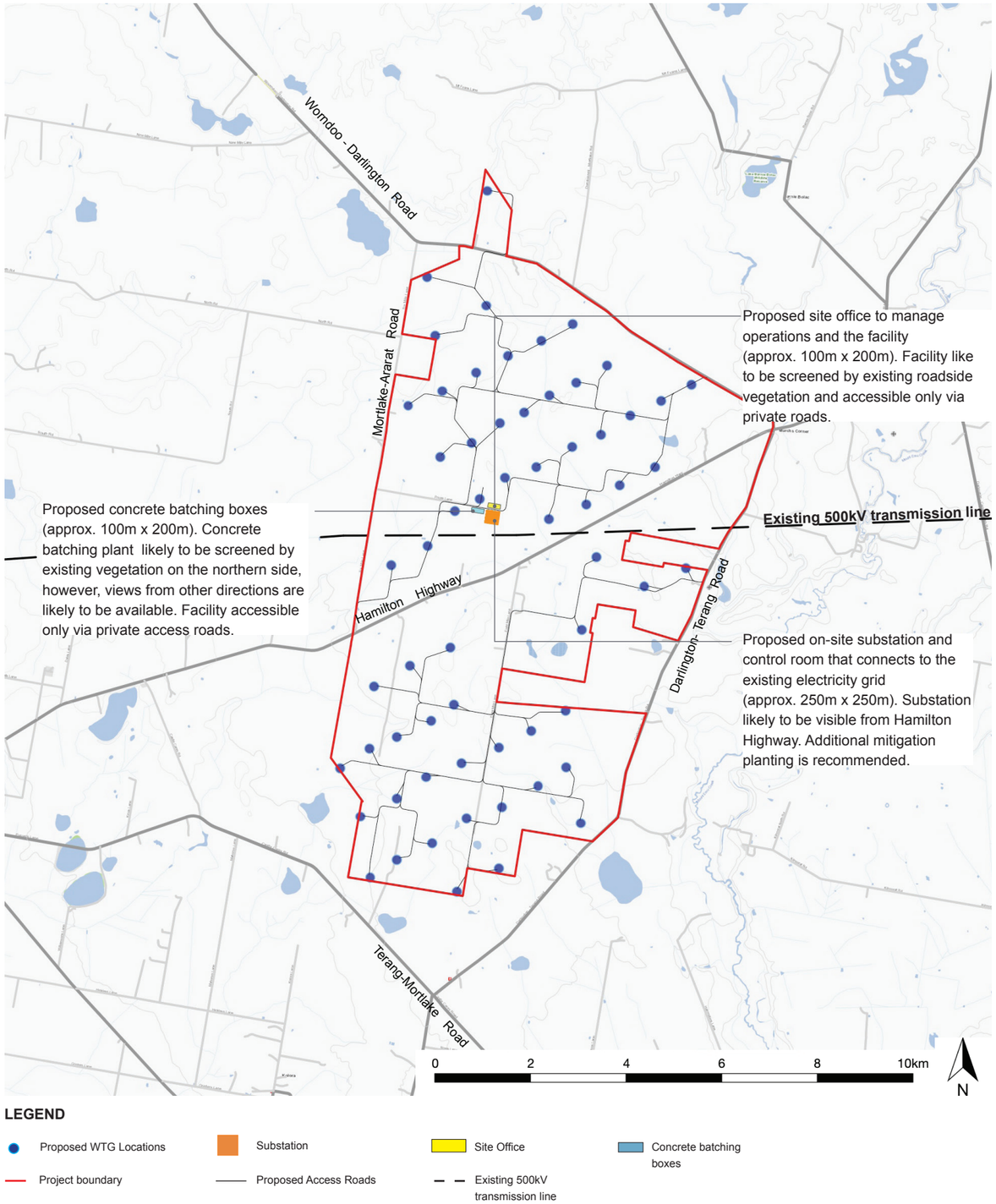


Figure 19 Overview of potential visual impacts of Associated Infrastructure (Map Source: VicPlan 2022)

9.5 Mitigation Methods for Associated Infrastructure

All elements of the ancillary infrastructure have been sited in areas that are currently utilised for grazing and are devoid of any vegetated woodlands, thus eliminating the need for tree removal. The proposed sites are surrounded by tracts of existing roadside vegetation which will help limit some views towards these sites. If deemed necessary, the ancillary infrastructure can be screened through the provision of mitigation planting. The following mitigation measures would assist in reducing any residual visual impacts:

- *Siting to ensure minimal vegetation loss.*
- *Screen planting to further reduce any residual visual impacts.*
- *Consideration should be given to controlling the type and colour of building materials used. Where possible a recessive colour palette is to be used which blends into the existing landscape*
- *Avoidance of unnecessary lighting, signage on fences, logos etc.*
- *Any proposed buildings to be sympathetic to existing architectural elements in the landscape.*
- *Minimise cut and fill and loss of existing vegetation throughout the construction process.*
- *Boundary screen planting is an effective mitigation method which could be utilised to ameliorate potential visual impacts resulting from the construction of ancillary structures with a small vertical scale such as collector substations, switching stations and the operations facilities building.*

10

Mitigation Recommendations

10.0 Mitigation Recommendations

10.1 Overview of Mitigation Methods

This section of the report provides recommendations which seek to achieve a better visual integration of the Project and the existing visual character at both local and regional scales. The mitigation measures attempt to lessen the visual impact of the proposed wind farm whilst enhancing the visual character of the surrounding environment.

Mitigation measures are best considered as two separate phases. These include:

- Primary measures that form part of the development of the wind farm design through an interactive process; and
- Secondary measures designed to specifically address the remaining (residual) negative (adverse) effects of the final development proposals (The Landscape Institute et al 2008).

It is important to note that the mitigation methods proposed in this report are made notwithstanding issues raised by other consultants (eg. engineering, ecology, geology etc.). During the planning and design phase of a wind farm mitigation strategies should also be considered to lessen the visual impact of the proposal. This is by no means an exhaustive list, however the adoption of these recommendations will assist considerably in minimising potential visual impacts of the Project.

Mitigation methods considered for associated infrastructure have been included in ***Section 9.0***.

10.2 Project Layout and Design

The design of the proposed wind farm is a primary measure of mitigation. The general principles employed through the project design phase can significantly reduce the visual impact. These include siting, access, layout and other principles which directly impact the appearance of the proposed development. General guidelines for the design development of the Project have been outlined in the following section.

10.2.1 Wind Farm Layout and Size

The layout and size of the wind farm is a significant factor in the visual impact on the landscape. According to Stanton (1995) the intrusiveness of a wind farm is not directly proportional to the number of turbines in an array, but rather, more a factor of design and layout. For example, large wind farms may appear less dominating than a smaller project when the large wind farm is subdivided into several visually comprehensible units.

It is suggested that fewer and more widely spaced turbines present a more pleasing appearance than tightly packed arrays (Urbis, 2009). The following principles should guide the design process of the wind farm:

- Controlling the location of different turbine types, densities and layout geometry to minimise the visual impacts.
- The lines of turbines should reflect the contours of the natural landscape as best as possible.
- Ensure the turbines are evenly spaced to give a regular pattern creating a better balance within the landscape.
- Consideration of surrounding wind farm projects (including the layout and size of turbines) to ensure consistency in the project layout and turbine design in instances where projects are views concurrently.

It is important to note that as a result of community consultation during the development period, the Project has undergone many changes. The resulting layout has a smaller development footprint to those previously considered. The above design principles have been considered in the siting of the proposed turbines to provide a balanced appearance within the landscape.

10.2.2 Wind Turbine Design and Colouring

Turbine design and colouring are an important factor. The turbines will have a matte white finish and consist of three blades which is consistent with the current turbine models being considered.

The important factors to achieving a visual consistency through the landscape include:

- Uniformity in the colour, design, rotational speed, height and rotor diameter.
- The use of simple muted colours and non-reflective materials to reduce distant visibility and avoid drawing the eye.
- Blades, nacelle and tower to appear as the same colour.
- Avoidance of unnecessary lighting, signage, logos etc.

10.3 Off-site screen planting - Residences

In circumstances where residences are subject to a moderate or high level of visual impact, off-site screen planting is an option proposed to assist in mitigating views of turbines from residential properties. As the viewing location of the proposal would be generally fixed there is opportunity to significantly reduce potential visual impact from the Project.

In order to achieve visual screening planting between the intrusive element and the homestead, tree planting could be undertaken in consultation with the relevant landowners to ensure that desirable views are not inadvertently eroded or lost in the effort to mitigate views of the turbines.

An example of how screen planting could be used to mitigate potential views towards visible turbines from **Dwelling 72** (Refer to **Figure 20**). Note this is an example only and a detailed analysis would be required to determine the extent of visibility, existing planting and orientation of the residence.

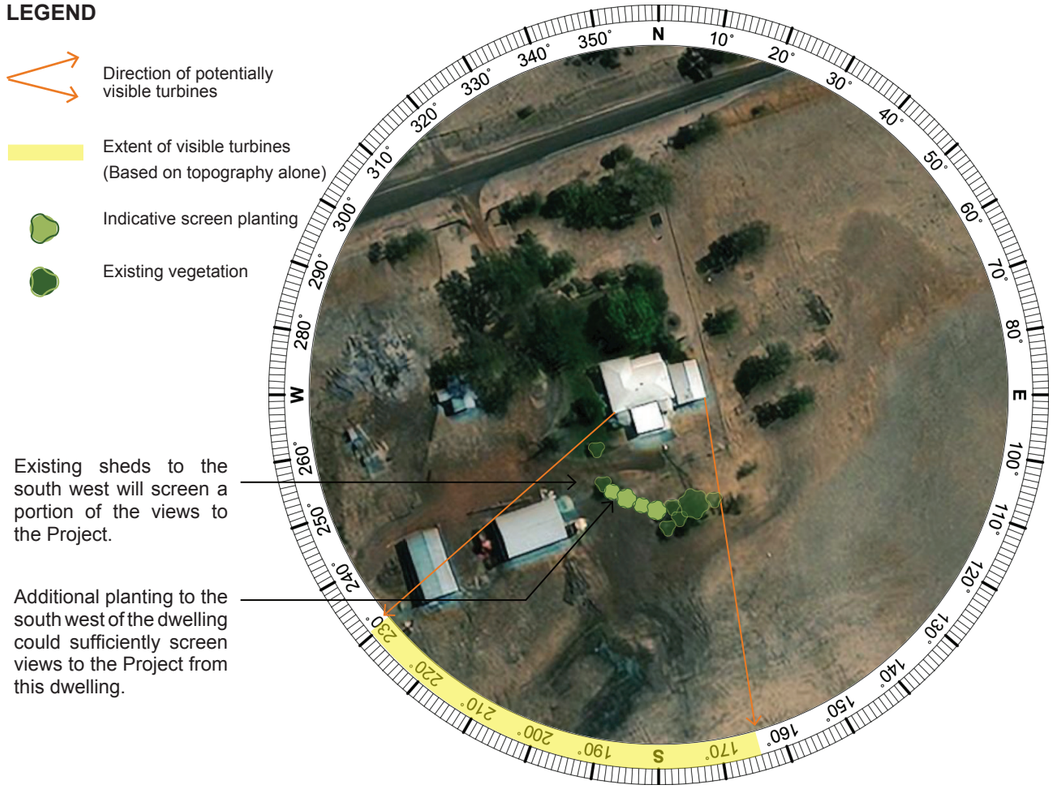


Figure 20 Example of on-site screen planting at dwelling

10.4 Off-site screen planting - Roadside

In circumstances where there is the potential for a moderate or high level of visual impact from public viewing locations, roadside planting in keeping with the existing landscape character of the area could be undertaken to assist in mitigating impacts. These measures are addressed for key public viewpoints, if required, in the detail design phase.

Image 37 Example of roadside vegetation, typical of the area

10.5 Landscaping Principles

The existing character of the landscape allows for a variety of methods of landscaping and visual screening which will remain in keeping with the landscape character. General guidelines to adhere to when planning for landscaping and visual screening include:

- Planting is recommended post construction in consultation with the landowner.
- Planting should remain in keeping with existing landscape character.
- Species selection is to be typical of the area.
- Planting layout should avoid screening views of the broader landscape.
- Avoid the clearing of existing vegetation. Where appropriate reinstate any lost vegetation.
- Allow natural vegetation to regrow over any areas of disturbance.

Locally native plant species are preferred, as they help to preserve the landscape character and scenic quality of the area as well as building habitat for local fauna. Native species are also well-suited to local conditions (ie. soil, climate, etc.) and will build on the existing vegetation assemblages in the area.

11.1 Summary of Findings

This PLVIA report has been undertaken to accompany a referral under the Environment Effects Act 1978 and is based on the guidelines set by the *Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria.* The following provides a brief summary of the PLVIA and outlines the steps that will be undertaken in the Landscape and Visual Impact Assessment (LVIA) which will be undertaken as part of the next phases of the project approvals.

Existing Landscape Character

This PLVIA provided a detailed assessment of the existing landscape character of the Study Area through the following:

- Identified land uses, key landscape features and key viewpoints,
- Categorisation of seven (7) preliminary Landscape Character Units (LCUs),
- Application of preliminary scenic quality ratings to each of the LCUs ranging from Low - Moderate,
- A brief preliminary overview of the potential visual impacts has been provided for each LCU.

Zone of Visual Influence

A Zone of Visual Influence (ZVI) has been prepared to illustrate the theoretical visibility of the Project and to assist in defining the visual catchment. A Preliminary ZVI have been prepared from the blade tip height of 240 m to illustrate areas which have potential visibility of the Project.

Next Steps:

- The LVIA will require further detailed assessment from areas identified as having potential visibility in the Preliminary ZVI.
- Graphic representations of the Project using GIS technology including wire frame diagrams and photomontages will be provided in the next phases of project approvals.

Public Viewpoint Analysis

Assessment of potential visual impact on public viewing areas across the Study Area was carried out for 26 public viewpoints. These viewpoints were taken from varying distances and locations. The following results were identified:

- Eight (8) public viewpoint locations were assessed as having a Low visual impact rating.
- 10 public viewpoint locations were assessed as having a Moderate-Low visual impact rating.
- Seven (7) public viewpoint locations were assessed as having a Moderate visual impact rating.
- One (1) public viewpoint location was assessed as having a High-Moderate visual impact rating.

Next Steps:

- Identify any additional key features, key viewpoints valued by the community through ongoing consultation during the development approvals process.
- Determine the impact on various viewing locations and measures for mitigating impact on the key viewing locations identified through community consultation.

Dwelling Analysis

A desktop assessment of all non-involved dwellings found that majority of dwellings are likely to have limited views to the Project due to existing dense wind break planting and structures that surround the dwellings. The following provides a summary of dwellings that were assessed:

- 10 non-involved dwellings were identified within 2000m of a proposed turbine. Of these, eight (8) are surrounded by vegetation and the remaining two (2) dwellings were assessed.
- 30 non-involved dwellings were identified within 2000 - 4000 m of a proposed turbine. Of these, 24 dwellings are surrounded by vegetation and/or structures. The remaining six (6) dwellings were assessed.
- 84 non-involved dwellings were identified within 4000 - 6000 m of a proposed turbine. Of these, 77 dwellings are surrounded by vegetation and/or structures. The remaining seven (7) dwellings were assessed.
- Additionally, 127 non-involved dwellings were identified beyond 6000 m of a proposed turbine. Of these, 114 dwellings are surrounded by vegetation and / or structures. An overview of the assessment for the remaining 13 dwellings has been included.

Next Steps:

- Conduct detailed dwelling assessments by preparing photomontages and wire frame diagrams from key viewing locations around the dwelling. This would be undertaken during approvals phase.
- Determine the impact and measures for mitigating views from dwellings.

Cumulative Visual Impacts of Surrounding Wind Farms

The Project is located within Victoria's South West REZ and is potentially located in close proximity of five (5) other wind farms (Dundonnell Wind Farm, Mortlake South Wind Farm, Salt Creek Wind Farm, My Fyans Wind Farm and Hexham Wind Farm). It is important that the Project considers potential cumulative effects on the immediate and broader regional context that it forms a part of.

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