Canopy cover of both exotic and native species is restricted to the windbreak vegetation along rural residential lot boundaries and sparse corridor vegetation along main roads / highways. Lakes and wetlands around the area support diverse riparian species.

5.7.4 Water form - rivers, creeks, lakes and wetlands

The Project Site and surrounds are traversed by a network of rivers, creeks, lakes and wetlands that drain the volcanic plain. Some of these water bodies are formed by low-lying depressions or as a result of ancient volcanic flows blocking creeks and river valleys (Planisphere, 2013). This character is predominant within the extents of the Western Plains.

The Hopkins River (refer to **Image 9**) is a perennial river of the Glenelg Hopkins catchment. It is located to the east of the Project Site and generally flows south to the Hopkins River Estuary and out into the Bass Strait at Warrnambool. The river system is a popular fishing area and is over 270km in length and is joined by twelve tributaries including Salt Creek, located further east of the Project Site. The area contains smaller creek lines and gullies such as Spring Creek, which is located to the west of the Project Site and runs southeast into the Merri River.

Lake Connewarren is a small lake located approximately 5km to the east of the Project Site near the Mortlake Power Station. Another prominent water form is Lake Keilambete, which is located approximately 20km to the southeast of the Project Site and occuppies a volcanic crater approximately 2km in diameter (Agriculture Victoria, 2020). A number of dams provide water supply for agricultural activities within and surrounding the Project Site.

5.7.5 Nature and Recreation Reserves

There are a number of nature reserves, recreation reserves and local parks within the area surrounding the Project Site. These are largely associated with local towns and include Cobra Killuc Wilflife Reserve to the northeast, Caramut Recreation Reserve and Jucaramut Conservation Reserve to the northwest, Hawkesdale Recreation Reserve to the west, Woolsthorpe Nature Conservation Reserve to the southwest, The Sisters Recreation Reserve to the southeast and Mortlake Common and Recreation Reserve to the east.

Recreation reserves are typically characterised by open grassland with scattered vegetation and sporting facilities, with several that adjoin a racecourse or golf course facility. Dense vegetation is more common across conservation reserves and plantation areas.

5.7.6 Agricultural Activity

A prevalence of fertile volcanic soils across the Western Plains has led to the development of extensive agricultural activity in this area (refer to **Image 11**), which is an important contributor to the region's economic growth. Agricultural lands within the Victorian Volcanic Plains Bioregion are used primarily for livestock grazing and cropping and are characteristic of existing land use patterns within the Project Site and surrounding area.

Image 9 Hopkins River and adjacent agricultural lands for livestock grazing

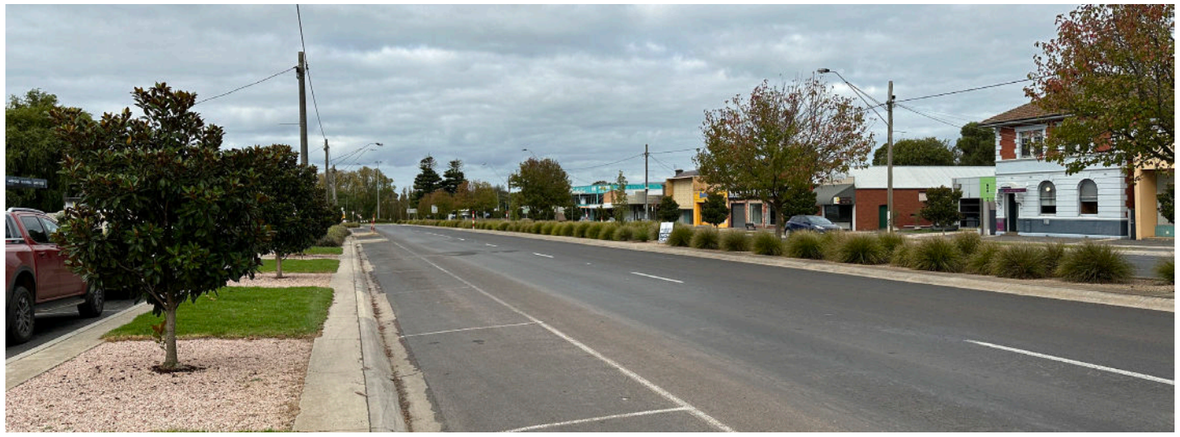
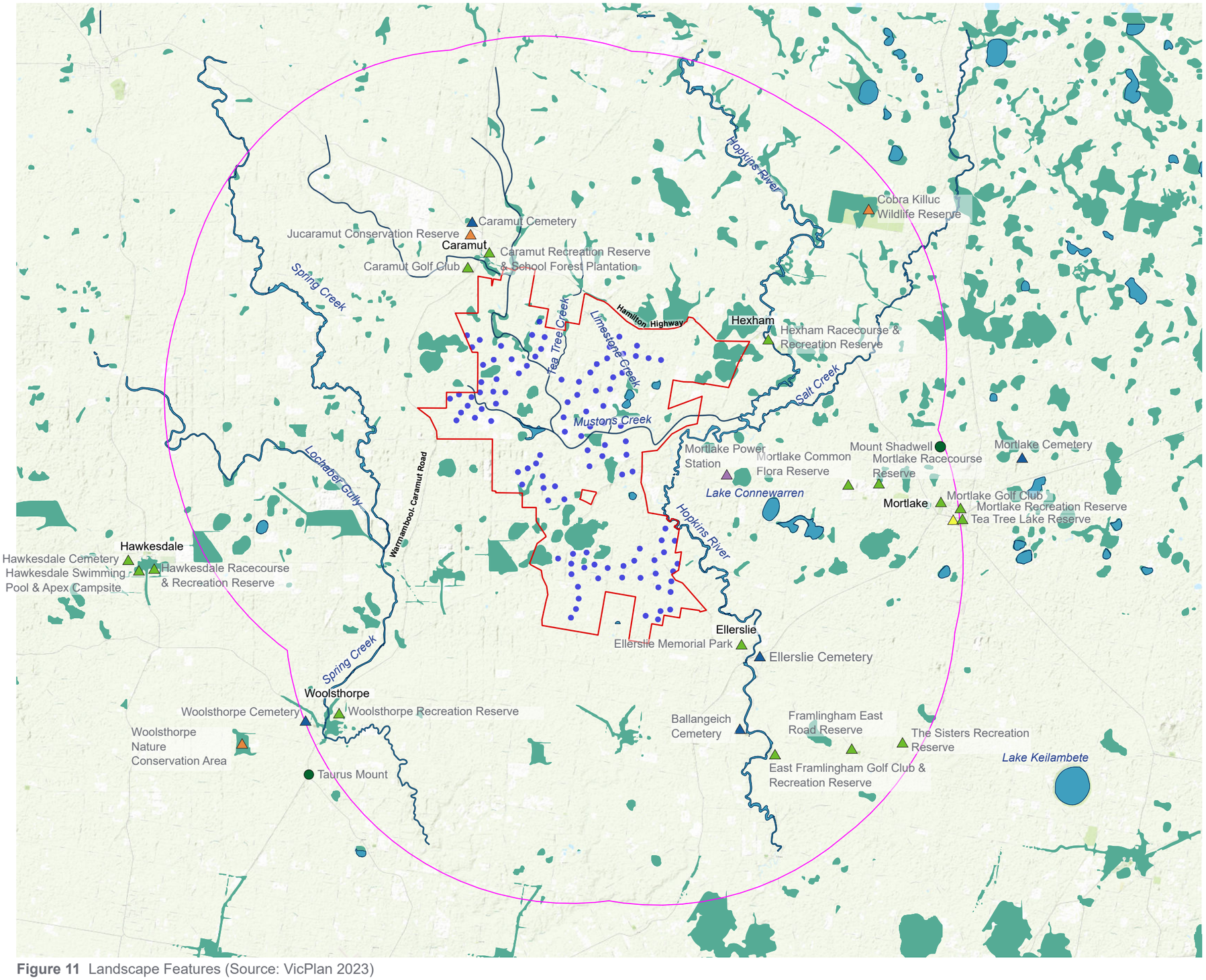


Image 10 Mortlake Township

Image 11 Bird eye view of expansive flat plains with agricultural activity

Landscape Features & Key Viewpoints

Hexham Wind Farm



LEGEND

- Project Boundary
- Proposed WTG Locations
- 15,000 m Study Area
- Roads
- Major waterways
- Wetlands
- High points
- Parks / recreation reserves
- Nature reserve
- Cemetery
- Campground
- Infrastructure

Figure 11 Landscape Features (Source: VicPlan 2023)

5.8 Landscape Character Unit Classification

Due to the diversity of landscape character types within the Study Area, Moir Studio has been categorised the Study Area into six (6) LCUs to assist in determining the visual baseline for the assessment. For the purpose of this assessment, landscape character units were identified in excess of the 6 km Study Area, approximately 25 km from the proposed development as per the NSW Department of Planning, Housing and Infrastructure (DPHI)'s Wind Energy Guideline: Technical Supplement.

The LCUs are classified by slight variations in the landscapes geology, topography, land use and vegetation which create distinct character areas within the Study Area. This mapping was informed by an integrated review of land use patterns, vegetation cover, topographical data, site imagery, relevant background research and findings from site inspections conducted by Moir Studio.

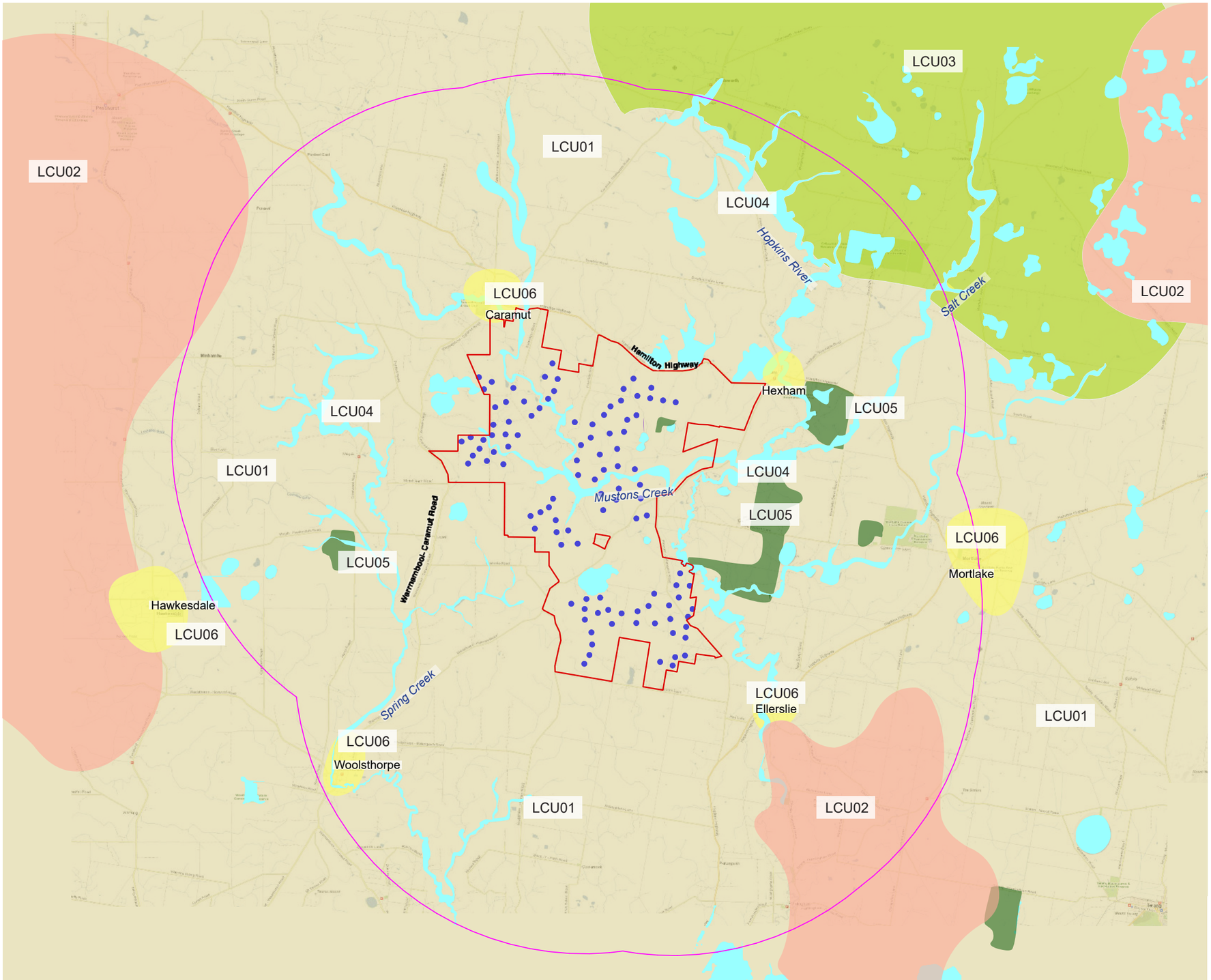
A Scenic Quality refers to the 'relative scenic, cultural or aesthetic value of the landscape within the viewshed based on the presence or absence of key landscape features' (DPE, 2023). **Table 5** shows the scenic quality frame of reference as per the NSW Department of Planning, Housing and Infrastructure (DPHI)'s Wind Energy Guideline: Technical Supplement.

Each category of the frame of reference has been rated for each LCU (summarised in **Table 6**) to determine an overall Scenic Quality Rating of low, moderate or high.

The general extent of the LCUs are shown on **Figure 12**. The Scenic Quality 'frame of reference' has been applied to each LCU (refer to **Table 6**).

SCENIC QUALITY RATING FRAME OF REFERENCE			
VERY LOW	LOW	MODERATE	HIGH
LANDFORM			
Large expanses of flat or gently undulating terrain Indistinct, dissected or broken landforms that provide little illusion of spatial definition or landmarks with which to orient	Mostly flat or gently undulating terrain with isolated areas of undulating topography	Steep, hilly and undulating ranges that are not visually dominant Broad, shallow valleys Moderately deep gorges or moderately steep valley walls Minor rock outcrops	Isolated peaks, steep rocky ridges, cones or escarpments with distinctive form and colour contrast that become focal points Large areas of distinctive rock outcrops or boulders Well-defined, steep valley gorges
VEGETATION			
Extensively cleared and cropped areas with very limited variation in colour and texture Pastoral areas, human-created paddocks, pastures or grasslands and associated buildings typical of grazing lands	Predominantly cleared and cropped areas with small areas of variation in colour and texture Most pastures or grasslands with small blocks of distinct native vegetation	Predominantly open forest or woodland combined with some natural openings in patterns that offer some visual relief Vegetative stands ranging in size, form, colour, texture and spacing, including human-influenced vegetation (for example, vineyards, plantation forests and orchards)	Strongly defined natural patterns with combinations of native forest, naturally appearing openings, streamside vegetation and scattered exotics Distinctive stands of vegetation that may create unusual forms, colours or textures compared with surrounding vegetation
WATER FORMS			
Absence of natural waterbody Farm dams, irrigation canals or stormwater infrastructure	Minor water forms, such as creeks and streams	Intermittent streams, lakes, rivers, swamps and reservoirs	Visually prominent lakes, reservoirs, rivers, streams, wetlands and swamps Presence of harbour inlet, bay or open ocean
SOCIAL AND CULTURAL			
Places of worship, cemeteries, memorial parks, private open spaces	Places of worship, cemeteries, memorial parks, private open spaces Local heritage sites	Local or state heritage sites Distinguishable entry ways to a regional city identified in the State Environmental Planning Policy (Transport and Infrastructure) 2021	Culturally important sites, wilderness, world heritage areas and protected areas World, national and state heritage sites
HUMAN PRESENCE			
Dominating presence of infrastructure, human settlements, highly modified landscapes and higher density populations, such as regional cities, industrial areas, agricultural transport or electricity infrastructure	Highly modified landscapes with visible infrastructure, such as transmission lines and railway corridors	Dispersed yet evident presence of human settlement, such as villages, small towns, isolated pockets of production and industry, lower scale and trafficked transport infrastructure	Natural, undisturbed landscape Minimal evidence of human presence and production

Table 5 Scenic Quality Rating Frame of Reference



Landscape Character Units

Hexham Wind Farm

- Project Boundary
- Proposed WTG Locations
- 15,000 m Study Area

Landscape Character Units:

- LCU01. Volcanic Plains
- LCU02. Stony Rises
- LCU03. Volcanic Lakes and Swamps
- LCU04. Waterways and Wetlands
- LCU05. Plantations
- LCU06. Townships

N

0 2 4 6 8 10km

Figure 12 Landscape Character Units (Source: VicPlan 2023)

Image 12 Bird eye view of agricultural lands with planted windbreaks

LCU01: Volcanic Plains

The LCU is characterised by flat to gently undulating windswept plains. Due to the prevalence of fertile volcanic soils, the area is predominantly used for agricultural purposes such as livestock grazing and cropping. The landscape character of these areas are modified due to agricultural activity. There is minimal vegetation, however rows of exotic or native planting planted as windbreaks are visible along property boundaries and fence lines. Native grassland species are generally replaced with exotic pasture species and monocultural crops. Remnant, low lying rock and boulders clusters feature within paddocks.

Image 13 Detail view of stony rises

LCU02: Stony Rises

The Stony Rises LCU is defined by areas of exposed basalt rock that appear as stony rises, exposed across farmland, as a result of past volcanic activity. Bracken and other low lying grass species feature within the rocky outcrops of the stony rises, where agricultural development is unsuitable. The topography of these areas is generally flat to gently undulating with scattered vegetation (Planisphere, 2013).

Image 14 Agricultural land within volcanic lakes and swamps area

LCU03: Volcanic Lakes and Swamps

The LCU is characterised by a concentration of volcanic lakes and swamps. The landform is flat to gently undulating, with marshy areas located at low points, forming more defined bodies of water. As in LCU01, the landscape character of these areas is modified as a result of the introduced agricultural activity that is the dominant land use.

Image 15 Hopkins River at Ellerslie Bridge

Image 16 Lake Connewarren

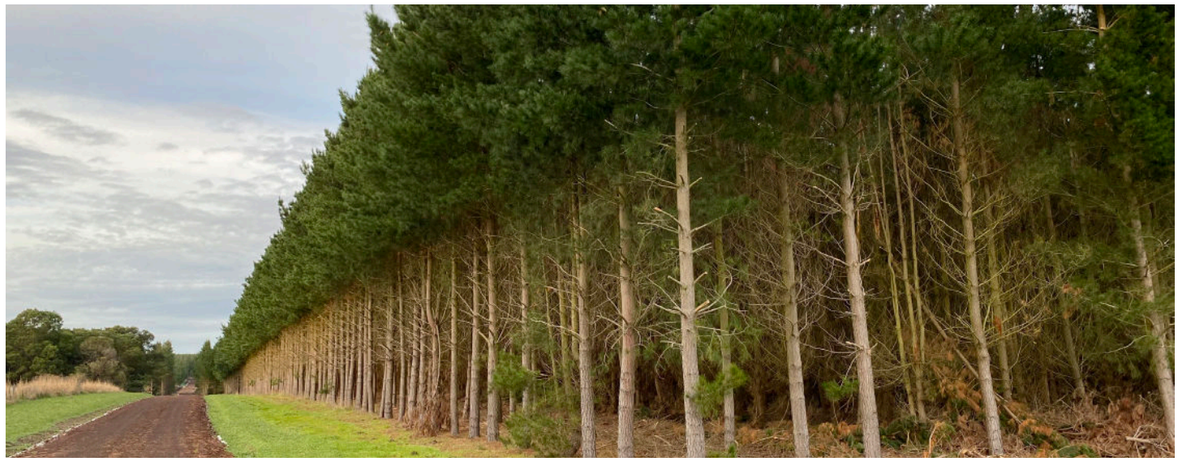


Image 17 Pine tree plantation

Image 18 Screening vegetation at Ellerslie

Image 19 Planted verges in Mortlake

LCU04: Waterways and Wetlands

This LCU contains the landscape corridors defined by rivers, creeks, lakes and wetlands that traverse the Project Site and surrounds. The Hopkins River is located to the east of the Project Site and is joined by twelve tributaries including Salt Creek. Other smaller creeks and gullies that pass through the Project Site include Mustons Creek, Limestone Creek and Tea Tree Creek. Adjacent land is generally cleared, flat and used for agricultural purposes with the exception of riparian vegetation.

Water bodies are generally broad and shallow and contain either saline, brackish or fresh water (Planisphere, 2013). Lakes found in the vicinity include Lake Connewarren, located within 5km of the Project Site and Lake Keilambete, which sits within a volcanic crater and is located approximately 20km to the southeast of the Project (Agriculture Victoria, 2020).

LCU05: Tree Plantations

The Tree Plantations LCU is characterised by areas of dense vegetation, found within tree plantations. Typically, the plantations have a formal arrangement, where rows of trees are evenly spaced and are generally uniform in size and shape. Each area contains a single tree species, such as pine or blue gum, with minimal undergrowth. It is noted that the character of these areas may vary at different stages of the plantation process, which involves a rotation cycle of planting, gradual thinning and clear felling over a period ranging from 10-50 years (Department of Agriculture, Fisheries and Forestry, 2008).

LCU06: Townships

The LCU comprises towns including Mortlake, Woolsthorpe, Caramut, Hawkesdale and smaller villages such as Ellerslie and Hexham. Mortlake is the largest of the towns, with an estimated population of 1,477 people (ABS, 2021). Generally the villages are surrounded by scattered vegetation which provides a visual screen. The character of the landscape is highly modified in these small scale rural settlements.

Landscape Character Units

LCU:	Name:	Key Landscape Features:	Application of Scenic Quality Rating Frame of Reference: Landform	Waterforms	Vegetation	Human Presence	Social and Cultural	Scenic Quality Rating
LCU01	Volcanic Plains	Flat to gently undulating Agricultural land Fertile volcanic soils	L	L	L	L	L	LOW
LCU02	Stony Rises	Rocky outcrops	M	L	L	M	L	MODERATE
LCU03	Volcanic Lakes and Swamps	Concentration of lakes and swamps Agricultural land	L	M	L	L	L	LOW
LCU04	Waterways and Wetlands	Rivers, creeks, lakes and wetlands Riparian vegetation	L	M	L	M	M	MODERATE
LCU05	Tree Plantations	Dense plantation of singular tree species	L	L	M	L	L	LOW
LCU06	Townships	Highly modified landscapes Scattered vegetation	M	L	M	L	L	LOW

Table 6 Overview of Landscape Character Unit Scenic Quality Ratings

06

Defining the Visual Catchment

6.0 Defining the Visual Catchment

6.1 Defining the Visual Catchment

The visual catchment of the Project has been defined based on the parameters of the accepted extents human vision which include vertical field of view (refer to **Section 6.1.1**). In order to facilitate objective assessment of visibility, **Section 6.1.2** provides an outline on the potential visual prominence of the Project in relation to its distance from a receptor. The extent of the Study Area is, therefore, determined by the distance within which the proposed 260 m high turbines have the potential to be a significant object in the view (refer to **Section 6.1.3**).

6.1.1 Viewshed Calculation

Distance zones have been calculated using the parameters of the human eye and are based on the typical line of sight for a person standing at ground level (Tilley and Henry Dreyfuss Associates, 1993 and Panero and Zelnik, 1979). Given the spatial arrangement and layout of the Project, the vertical field of view provides a basis for calculating the extent of the viewshed.

Figure 13 shows that generally, the vertical field of view for a person standing at ground level is between 10^0 - 15^0. The theoretical extent of the viewshed is considered to be a distance at which the tallest component of the Project would take up less than 5% or 0.5^0 of the general 10^0 field of view (Torrejon, Callaghan and Hagras, 2013).

It should be noted that this methodology for calculation of the viewshed considers the viewer is in a static position.

With an overall height of up to 260 m, the distance at which a 260 m high turbine would comprise 5% (0.5°) of the vertical field of view is up to 29.8 km.

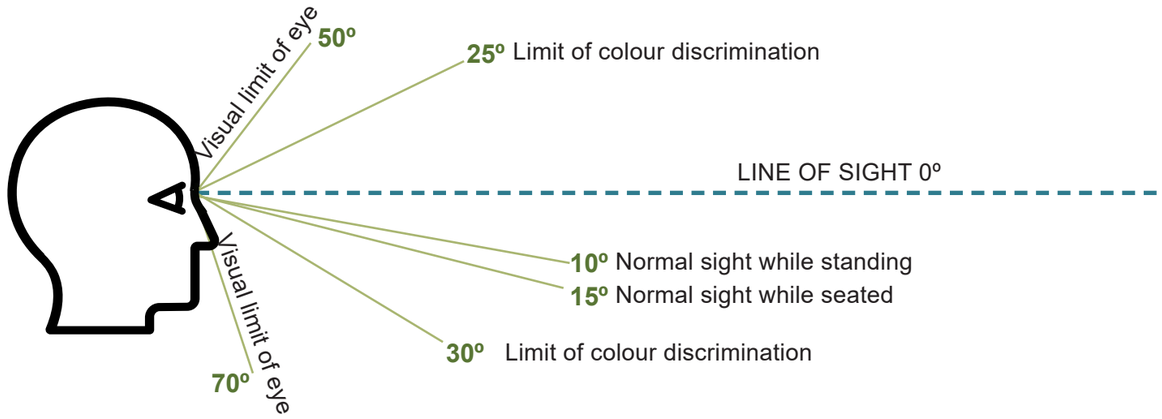


Figure 13: Human Eye Vertical Line of Sight **(Source: Torrejon, Callaghan and Hagras, 2013)**

6.1.2 Visual Prominence and Distance from the Wind Farm

Assessment of the visual scale and prominence of turbines over a range of distances establishes whether objects are likely to be dominant, noticeable, discernible or insignificant in the viewshed. This has also been demonstrated in photomontages that have been prepared by Moir Studio as part of landscape and visual impact assessments for wind farm developments of a similar scale. ***Images 20 - 23*** illustrate that visual prominence of turbines varies based on the distance between receptors and turbines.

The relative visual prominence of turbines is also based on the parameters of the human eye and the vertical angle of view. The theoretical dominance of an object in a view can be assumed. For example, if a receptor is located closer to a turbine, the turbine is likely to take up a greater vertical field of view for the receptor. **Figure 14** and **Table 7** demonstrate how increasing distance from a Project reduces the potential visual prominence and visibility of turbines based on vertical field of view.

This is a preliminary tool used solely to determine distances from the Project to aid in defining the study area for assessment. Detailed assessment considers the horizontal extent of visibility, number of visible turbines, existing landscape character and viewer sensitivity.

Image 20 *Turbines located at a distance of 2 km are highly visible and are dominant in scale relative to elements such as fence posts and vegetation visible in the foreground (Source: Moir Studio, 2022; NSW Major Projects website).*

Image 21 *Turbines located at a distance of 4 km are likely to diminish in scale relative to other elements such as fence posts and intervening vegetation in the foreground (Source: Moir studio, 2022; NSW Major Projects website).*

Image 22 *Turbines located at a distance of 6 km are likely to be appear smaller in scale relative to vegetation and structures in the foreground (Source: Moir Studio, 2022; NSW Major Projects website).*

Image 23 *Turbines located at a distance beyond 6 km are likely to be visible. They appear smaller in scale relative to vegetation and structures in the foreground and middleground (Source: Moir Studio, 2022; NSW Major Projects).*

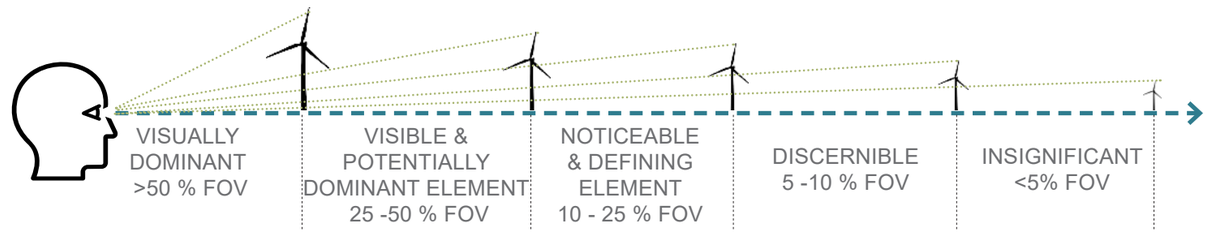


Figure 14: Vertical Field of View and potential visual dominance (Adapted from Landform Architects, 2022)

Vertical Field of View - Zone of Visibility		
Visual catchment (vertical angle of view)	**Distance from viewer to turbine for this Project**	**Potential visual dominance:**
0.5º (< 5% FOV)	**> 29.8 km**	**Insignificant** A small thin line in the landscape.
0.5 - 1.0º (5 - 10% FOV)	**14.9 - 29.8 km**	**Potentially Noticeable or Discernible** The Project may be noticeable. The degree that it intrudes on the view will be dependent on how well it integrates with the landscape setting.
1.0 - 2.5º (10 - 25% FOV)	**6.0 - 14.9 km**	**Noticeable and potentially a visible element in the landscape** The degree that it intrudes on the view will be dependent on sensitivity of the viewer and the landscape.
2.5 - 5º (25 - 50% FOV)	**3.0 - 6.0 km**	**Visible and Potentially Dominant** The development will be visible, although the degree of visual intrusion will depend on the landscape setting, intervening elements and the extent of visibility.
> 5º (> 50% FOV)	**<3.0 km**	**Will always be visually dominant** The Project will always be a dominant element in the landscape, unless screened by intervening vegetation or structures.

Table 7: Vertical Field of View and Zone of Visibility (Adapted from Landform Architects, 2022)

6.1.3 Zone of Visibility

The zone of visibility has been used to determined the ‘visual catchment’ also referred to as the study area for the project. This is defined using the methodology to ensure the assessment focuses on the locations most likely to experience perceptible visual impact from the proposed development. While it is acknowledged that visibility may extend beyond the defined study area under certain conditions, a boundary must be established to provide a reasonable and practical scope for analysis. The study area reflects a balance between capturing potential views of the development and maintaining an efficient and targeted assessment process.

Study Area for Private Dwelling Assessment:

Table 7 provides an overview of the distances based on the vertical field of view occupied by a turbine height at 260 m. It states that generally, turbines are discernible but are not likely to dominate the existing visual setting when they are visible in 0.50 - 2.50 of the field of view, or in this case, if the receptor is located at a distance beyond 6 km from a turbine that has a height of 260 m. Based on the thresholds for visual prominence identified in **Section 6.1.2**, the assessment identifies receptor locations within 6 km from the nearest turbine that are likely to view the turbines as noticeable, visible or dominant elements in the existing landscape setting. For the purpose of this assessment, the study area for dwelling receptors has been defined as 6 km from the nearest turbine. Dwellings located within 3 km are more likely to experience visual impacts due to their proximity, even where existing vegetation or structures provide some screening. To capture this higher potential for impact, these dwellings have been assessed in detail in **Section 9.0**. Dwellings located between 3 – 6 km have been assessed through representative public viewpoints in **Section 8.0**.

Study Area for Landscape Character Assessment:

The degree of intrusion of a development to a view depends on the way it integrates with the existing landscape setting. At a distance of up to 14.9 km the Project may be discernible, but it will not be a dominant visual element in the landscape.

Considering the existing topographical conditions, the surrounding context, and the visual prominence thresholds identified, the Study Area for landscape character assessment and public viewpoint assessments has been defined as 15 km (rounded up from 14.9 km) to provide a conservative and inclusive boundary for evaluating potential visual impacts associated with the proposed development.

The Study Area has been determined using a methodology that aligns with best practice, ensuring that the LVIA focuses on areas most likely to experience a visual impact. While it is possible that views of the Project may be visible and ‘noticeable’ beyond the defined Study Area, visibility alone does not equate to visual impact.

07

Zone of Visual Influence

7.0 Zone of Visual Influence

7.1 Zone of Visual Influence

A Zone of Visual Influence (ZVI) diagram has been prepared for the Project to illustrate the theoretical visibility of the proposed turbines.

Figure 15 depicts the areas of land from which the proposed development may be visible at a blade tip height of 260 m and provides an indicative number of visible wind turbines.

The ZVI Diagram represents the area over which a development can theoretically be seen, and is based on a Digital Terrain Model (DTM). The ZVI usually presents a bare ground scenario - ie. A landscape without screening, structures or vegetation, and is usually presented on a base map. It is also referred to as a zone of theoretical visibility (The Landscape Institute and the institute of Environmental Management and Assessment, 2002).

The ZVI has been determined through the use of digital topographic information and 3D modelling software WindPro. The ZVI has been assessed to capture areas in excess of the Study Area (up to 29.8 km from the WTGs).

7.2 Summary of Zone of Visual Influence

The following provides a brief summary of the Zone of Visual Influence diagrams prepared for Project:

- Due to the relatively flat topography of the Study Area, the ZVI indicates the Project is theoretically visible in its entirety from most land within close proximity to the Project.
- Topography is likely to contain views in pockets, particularly to the east of the Project in excess of 6 km.
- Views from some areas on the outskirts of Hexham, Caramut and Ellerslie are likely to contain views to the Project due to topography. Existing tree cover is also likely to limit views from many parts of the townships.
- A number of dwellings are scattered within 6km and surround the Project. Based on topography alone, the majority of dwellings will have some views of the turbines.

It is important to reiterate this is a preliminary ZVI is based on a worst case scenario assessment based on topography alone with no vegetation or structures. The ZVI figures have been utilised to identify areas which require additional analysis. Ground truthing has been undertaken from these locations during the field work analysis. Public viewpoint locations with potential to view the Project have been assessed and are presented in **Section 8.0**.