MURRA WARRA WIND FARM

PRELIMINARY LANDSCAPE AND VISUAL IMPACT ASSESSMENT

Prepared for:

Prepared by:

GREEN BEAN DESIGN
landscape architects

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December 2015

DOUCMENT CONTROL

ITEM	DETAIL
Project Name:	**Murra Warra Wind Farm**
Report Title:	**Preliminary Landscape and Visual Impact Assessment**
Project Number:	**15-192**
Version Number:	**v5**
Status:	**Final**
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Date	**1 December 2015**

Green Bean Design – Capability Statement

Green Bean Design (GBD) was established as a landscape architectural consultancy in 1999 and has specialised in landscape and visual impact assessment over the past 10 years. As an independent consultancy, GBD provide professional advice to a wide range of commercial and government clients involved in large infrastructure project development.

GBD owner, and principal landscape architect Andrew Homewood, is a registered landscape architect and member of the Australian Institute of Landscape Architects and the Environmental Institute of Australia and New Zealand. Andrew has over 21 years continuous employment in landscape consultancy and has completed numerous landscape and visual impact assessments for a variety of large scale and state significant infrastructure, including mines, transmission lines/substations, wind farms and solar power developments.

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Glossary

This Preliminary Landscape and Visual Impact Assessment has adopted and adapted the following definitions from Guidelines for Landscape and Visual Impact Assessment (2013).

Table 1 Glossary

Term	Definition
Cumulative effects	The summation of effects that result from changes caused by a development in conjunction with other past, present or reasonably foreseeable actions.
Magnitude	A combination of the scale, extent and duration of an effect.
Mitigation	Measures, including any processes, activity or design to avoid, reduce, remedy or compensate for adverse landscape and visual effects of a development project.
Photomontage (Visualisation)	Computer simulation or other technique to illustrate the appearance of a development.
Sensitivity	Susceptibility of a receiver to a specific type of change.
Visibility	A relative determination at which the proposal can be clearly discerned and described.
Visual amenity	The value of a particular area or view in terms of what is seen.
Visual envelope	Extent of potential visibility to or from a specific area or feature.
Visual Impact Assessment	A process of applied professional and methodical techniques to assess and determine the extent and nature of change to the composition of existing views that may result from a development.
View location	A place or situation from which a proposed development may be visible.
Visual receiver	Individual and/or defined groups of people who have the potential to be affected by a proposal.
Visual significance	A measure of the importance or gravity of the visual effect culminating from the degree of magnitude and receiver sensitivity.

Executive Summary

Green Bean Design Pty Ltd (GBD) was commissioned by RES Australia Pty Ltd (the Proponent) to undertake a Preliminary Landscape and Visual Impact Assessment (Preliminary LVIA) for the proposed Murra Warra Wind Farm and associated development infrastructure.

The Murra Warra Wind Farm will comprise up to 118 wind turbines, connection to the electricity grid and ancillary structures such as control room, operations and maintenance building, terminal substation and access tracks. The proposed wind turbines have been assessed with an overall height of up to 220 metres and would be the most visible component of the development.

This Preliminary LVIA has determined that the landscape surrounding the wind farm, as well as landscape in the broader viewshed, has a low visual sensitivity to change and represents a highly modified and productive agricultural landscape which is common to the Wimmera landscape region.

This Preliminary LVIA has determined that the visual impact of the Murra Wurra Wind Farm is likely to be low from publicly accessible locations and that the proposed Murra Warra Wind Farm:

- will have a negligible visual impact on the principal rural townships of Horsham, Dimboola and Warracknabeal;
- will result in no significant impact on views from highways (including the Henty and Borung Highways);
- will result in no significant impact on views from local roads; and
- will result in no significant visual impact from scenic areas, public reserves and recreational areas, including any available long distant views from Mount Arapiles and the Grampians National Park.

A cumulative visual assessment identified no additional operational and approved wind farms within a 50 kilometre (km) radius of the proposed Murra Warra Wind Farm. This Preliminary LVIA determined that there would no intervisibility between the proposed Murra Warra Wind Farm, and other publically listed wind farms within the proposed Murra Warra Wind Farm 50 km viewshed.

Although some mitigation measures are considered appropriate to minimise the visual effects for a number of the elements associated with the proposed Murra Warra Wind Farm, it is acknowledged that the degree to which the wind turbines may be visually mitigated is limited by their scale and position within the landscape relative to surrounding view locations.

Introduction

Section 1

1.1 Introduction

As part of the planning application process a referral to the Minister is required to determine whether an EES is required for the project. This Preliminary LVIA has been prepared by GBD on behalf of the Proponent to inform the assessment of the Murra Warra Wind Farm project site for suitability for a wind farm development, as well as accompanying a Referral of the proposed Murra Wurra Wind Farm project to the Minister of Planning for advice as to whether an Environment Effects Statement (EES) is required Under the Environmental Effects Act 1978.

GBD have prepared this Preliminary LVIA to comply with the information as required and outlined within the Environmental Effects Act 1978 Information Sheet No. 2, Information to accompany notification of proposals: Wind Energy Facilities. Information Sheet No.2 requires the preliminary landscape assessment to consider:

- *The landscape character of the site and surrounding areas including landform, vegetation types and coverage, water features, any other notable features and current land use;*
- *The location of nearby dwellings, townships, recreation areas, major roads, above-ground utilities, tourist routes and walking tracks;*
- *Views to the site and to the proposed location of wind turbines from key vantage points (including views showing existing nearby dwellings and views from major roads, walking tracks and tourist routes) sufficient to give a sense of the overall site in its setting; and*
- *The preliminary landscape assessment should include a notated plan (or aerial photograph) of the site and surrounding areas showing key features, including those identified above. Photographic images from key viewpoints (using a lens with a 50mm focal length) should also be provided.*

The purpose of this Preliminary LVIA is to address these landscape and visual issues to determine if an EES is required.

This Preliminary LVIA has used the following documents and guidelines to identify and consider potential landscape and visual impacts:

- National Wind Farm Development Guidelines (Draft July 2010) Issue for Public Consultation;
- Ministerial guidelines for assessment of environmental effects under the Environmental Effects Act 1978;
- Policy and planning guidelines for development of wind energy facilities in Victoria, June 2015; and
- Referral of a project for a decision on the need for assessment under the Environmental Effects Act 1978 – Referral Form.

In addition this Preliminary LVIA has also considered landscape and visual impact assessment guidance set out in:

- Guidelines for Landscape and Visual Impact Assessment, Third Edition, Landscape Institute and Institute of Environmental Management & Assessment, 2013;
- Siting and Designing Wind Farms in the Landscape, Version 2, Scottish Natural Heritage, May 2014; and
- Visual Representation of Wind Farms, Version 2.1, Scottish Natural Heritage, December 2014.

Methodology and report structure

Section 2

2.1 Methodology

The methodology employed for this Preliminary LVIA has been based on existing guidelines identified in the LVIA introduction. The methodology is also based on the assessment of multiple wind farm projects undertaken by GBD within Victoria, New South Wales, Queensland and Tasmania. The key tasks incorporated into the LVIA methodology are identified in **Table 2**.

2.2 Report structure

This Preliminary LVIA report been structured into 12 parts as follows:

Table 2 – Report structure

Report section	Description
1 – Introduction	This section provides an introductory section that describes the intent and purpose of the LVIA
2 – Report structure and methodology	This section sets out the structure and methodology employed in the LVIA preparation
3 – Project location and description	This section describes the regional and local position of the wind farm development relative to existing landscape features and places and describes the key visible components of the Murra Warra Wind Farm.
4 – Viewshed	This section identifies the area of land surrounding the wind farm which may be potentially affected by the proposed wind farm project.
5 – Legislative and planning frameworks	This section sets out the legislative and planning frameworks describe policies and provisions that apply to proposed wind farm areas within the viewshed.
6 – Panorama photographs	This section illustrates the LVIA with panorama photographs taken during the site inspection. The panorama photographs are provided to illustrate the general appearance of typical landscape characteristics that occur within and surrounding the wind farm site.
7 – Zone of visual influence and visibility	This section identifies a theoretical area of the landscape from which wind turbines may be visible within the viewshed, and describes a range of factors which may influence the wind farm visibility within the viewshed.

Table 2 – Report structure

Report section	Description
8 – Landscape Character Assessment	This section describes the physical characteristics of the landscape surrounding the Murra Warra Wind Farm site and determines the overall sensitivity of the landscape to the wind farm development.
9 – Visual effects (key public view points)	This section describes and determines the potential visual effect of the wind farm on key public viewpoints within the Murra Warra Wind Farm viewshed.
10 – Cumulative assessment	This section describes the potential impact of alternate existing and/or known wind farm developments within proximity to the Murra Warra Wind Farm.
11 – Preliminary photomontages	This section presents preliminary photomontages to illustrate potential views toward the proposed wind farm from surrounding public view locations
12– Conclusion and EES Referral requirement	Conclusions are drawn on the overall impact of the Proposed Murra Warra Wind Farm within the viewshed and a determination on the requirement for an EES to assess the visual impact of the Murra Warra Wind Farm.

Project location and description

Section 3

3.1 Project location

The proposed Murra Warra Wind Farm project site is located in Western Victoria within the Horsham Rural City and Yarriambiack Shire Council local government areas. The project site is approximately 28 kilometres north to north east of Horsham and 20 kilometres east of Dimboola. Warracknabeal is approximately 15 kilometres to the north of the project site. The project site location in both regional and local contexts is illustrated in **Figures 1** and **2**.

3.2 Project description

The key visual components of the proposed Murra Warra Wind Farm are currently expected to comprise:

- up to one hundred and seventeen wind turbines to a maximum 220 metre tip height;
- a terminal substation and switch yard;
- night time aviation obstacle lighting (to be confirmed);
- overhead power line connection between the wind turbine clusters and terminal substation;
- operations and maintenance building with car parking;
- up to four permanent wind monitoring masts;
- crane hardstand areas;
- on site access tracks for construction, operation and ongoing maintenance; and
- signage.

Temporary works associated with the construction of the wind farm that may be visible during construction and operational phases include:

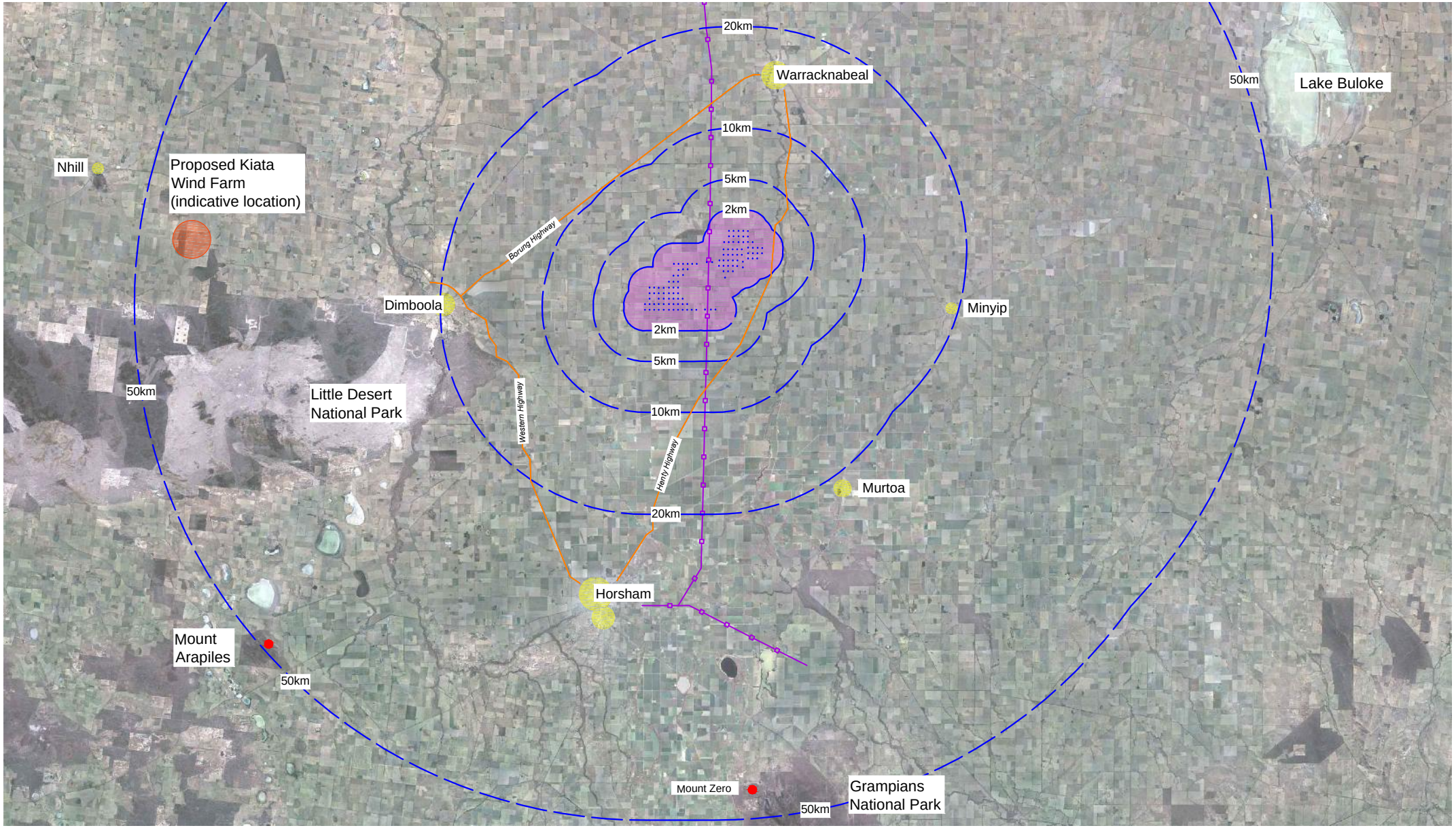
- temporary site office, parking and materials storage area; and
- mobile concrete batching plant and rock crushing facilities.

The proposed Murra Warra Wind Farm indicative wind turbine layout is illustrated in **Figure 3.**

3.3 Wind turbines

The specific elements of the wind turbines typically comprise:

- concrete foundations;
- tubular tapering steel and/or concrete towers;
- nacelles at the top of the tower housing the gearbox and electrical generator;
- rotors comprising a hub (attached to the nacelle) with three blades; and



Source: Google Earth Pro 2015 CNES/Astrium

Legend

- Proposed wind turbine
- Existing transmission line
- Highway
- 2 km viewshed
- Township
- Distance from turbine

Figure 1
Regional location

0m 10km

Murra Warra Wind Farm

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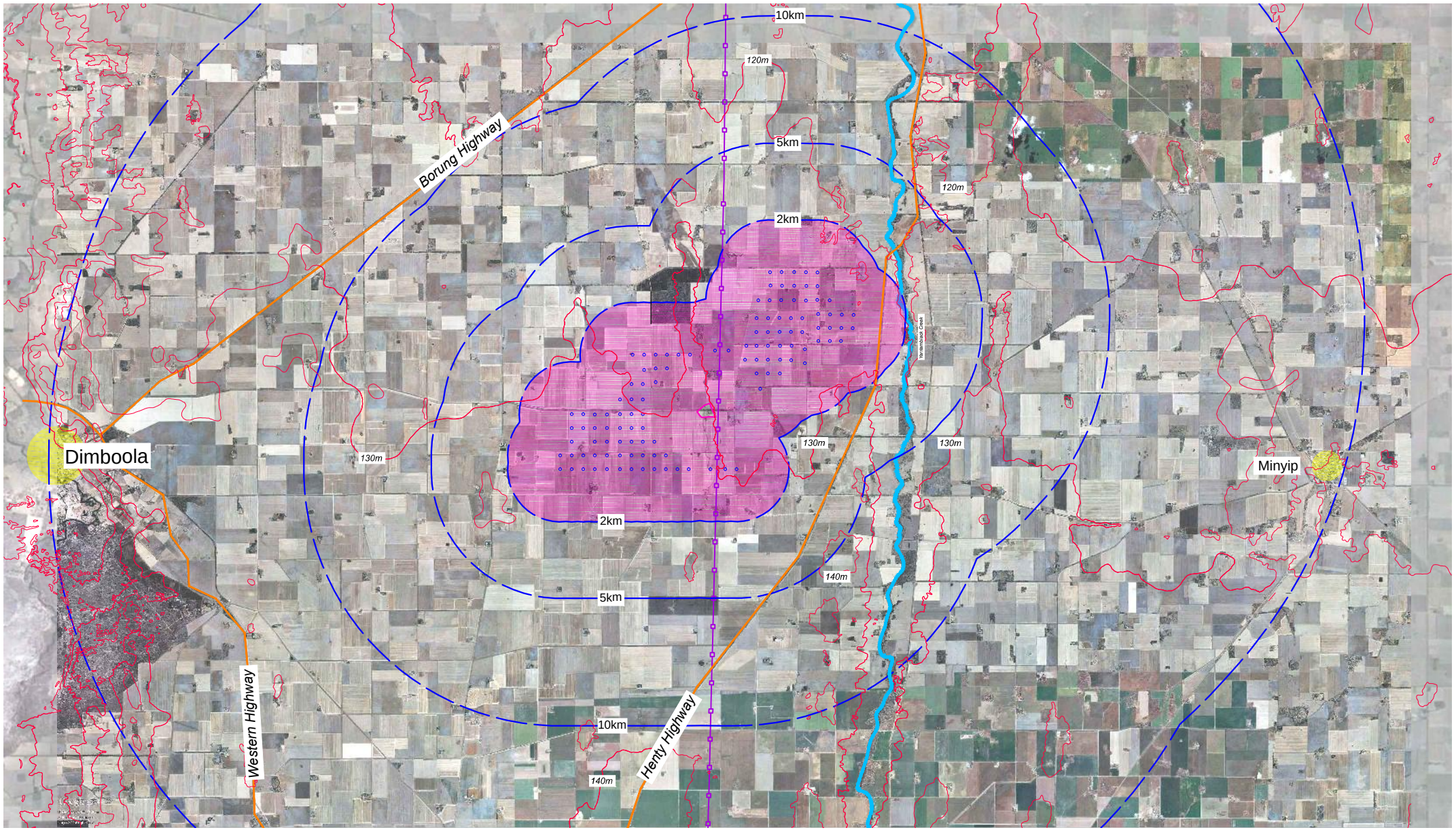

Source: Google Earth Pro 2015 CNES/Astrium

Legend

- Proposed wind turbine
- Existing transmission line
- Highway
- 2 km viewshed
- Township
- Ground contour (at 10 metre interval)

Figure 2
Project locality

Murra Warra Wind Farm

Preliminary Landscape and Visual Impact Assessment

0m 5km

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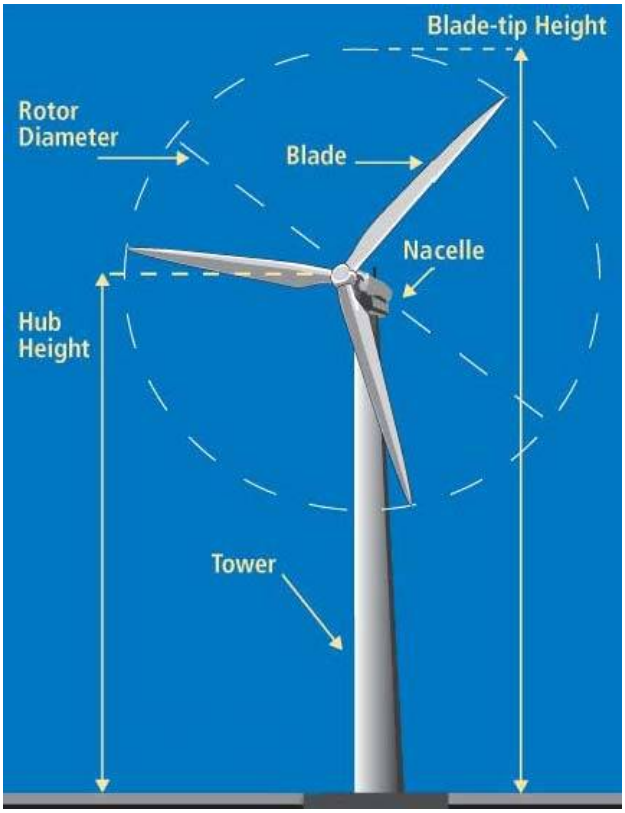
- three composite material blades attached to each hub.

The following diagram identifies the main components of a typical wind turbine:



Configuration and components of a typical wind turbine

3.4 Aviation obstacle lighting

Given the overall height of the proposed wind turbines, aviation obstacle lighting may be required. Aviation lighting is visible at night for greater distances than are typically used as the viewshed of a wind farm.

Civil Aviation Safety Authority (CASA) currently assesses the requirement for aviation obstacle lighting. At this stage, CASA has not determined the requirement for aviation obstacle lighting for the Murra Warra Wind Farm. Therefore, this report will not examine the night-time visual impacts of aviation obstacle lighting.

Should CASA determine aviation obstacle lighting be required, a separate assessment of the night-time visual impacts of proposed lighting will be undertaken as part of the Planning Permit Application.

3.5 Wind monitoring masts

Up to four permanent wind monitoring masts would be installed on-site, extending up to the wind turbine hub height. The permanent wind monitoring masts are expected to be of a guyed, narrow lattice or tubular steel design.

The permanent wind monitoring masts would not create a significant visual impact in the context of the overall wind farm development, and are structures similar in scale, or smaller than a number of surrounding communication masts visible in the landscape surrounding the wind farm project area.

3.6 On-site access tracks

On-site access tracks would be constructed to provide access to turbine locations across the site during construction and operation. During construction the majority of access tracks would be approximately 6 m wide to allow for vehicle manoeuvring.

The final access track design would be developed on a number of environmental grounds, including minimising the potential for visual impact by considering:

- the overall length and extent;
- the use of existing farm track route and laneways;
- the need for clearing vegetation;
- the potential for erosion;
- the extent of cut and fill; and
- the potential to maximise rehabilitation at the completion of the construction phase.

3.7 Electrical works

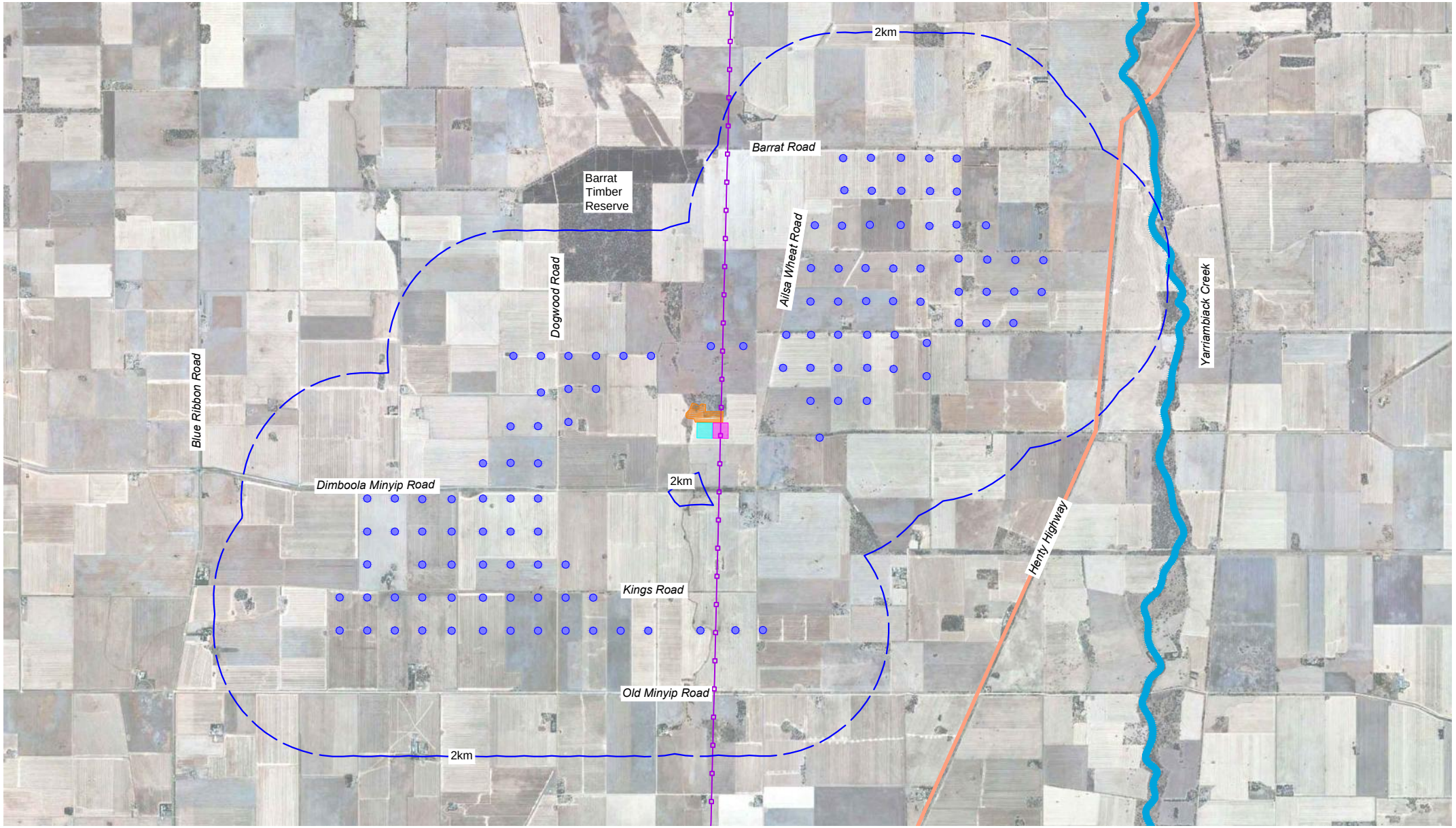
Electrical infrastructure would include 33 kV to 132 or 220 kV power lines and transformers. Each wind turbine will have its own transformer to step up the voltage to the cables on-site distribution voltage of 33 kV. In general, the wind turbine interconnecting cables will be underground. Clusters of wind turbines would be connected by underground and/or overhead cabling to the terminal substation.

The terminal substation compound, located adjacent to the existing 220kV grid transmission line, would be approximately 150 m x 150 m with the highest structures within it being at locations where overhead cables leave and enter the compound. Most other structures within the compound will be less than 6 metres in height. Plantings at the terminal substation perimeter can be used to mitigate visual impacts of the compound. A permanent site control and operations building will be constructed. This building would serve as the operational hub of the wind farm when it is commissioned. The control building will serve as a joint facility for the operation of the wind farm and the electrical terminal substation.

3.8 Construction

There are potential visual impacts that could occur during both pre-construction and construction phases of the project. The wind farm construction phase is likely to occur over a period of around 24 months, although the extent and nature of pre-construction and construction activities will vary at different locations within the project area. The key pre-construction and construction activities that will be visible from areas surrounding the proposed wind farm include:

- ongoing detailed site assessment including sub surface geotechnical investigations;



Source: Google Earth Pro 2015 CNES/Astrium

Legend

- Proposed wind turbine
- 2 km viewshed
- Existing transmission line
- Highway
- Potential quarry
- Preliminary construction compound
- Preliminary terminal substation

Figure 3
Project layout

Murra Warra Wind Farm

Preliminary Landscape and Visual Impact Assessment

0m 2km

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- various civil works to upgrade local roads and access point;
- construction compound buildings and facilities;
- construction facilities, including portable structures and laydown areas;
- various construction and directional signage;
- mobilisation of rock crushing equipment and concrete batching plant (if required);
- on-site quarry;
- excavation and earthworks; and
- various construction activities including erection of wind turbines, monitoring masts and terminal substation with associated electrical infrastructure works.

The majority of pre-construction and construction activities, some of which will result in physical changes to the landscape, are generally temporary in nature and for the most restricted to various discrete areas within or beyond the immediate wind farm project area. The majority of pre-construction and construction activities will be unlikely to result in an unacceptable level of visual impact for their duration and temporary nature.