



Bowmans Creek *Wind Farm*

Scoping Report | May 2019

EPURON

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Table of Contents

1	INTRODUCTION	1
1.1	Background	1
1.2	Proponent	1
1.2.1	Wind Energy in NSW	1
1.2.2	Solar Energy in Australia	2
1.3	Document Purpose	4
2	PLANNING FRAMEWORK	5
2.1	State Legislation	5
2.1.1	Environmental Planning and Assessment Act 1979	5
2.1.2	State Environmental Planning Policy (State and Regional Development) 2011	5
2.1.3	State Environmental Planning Policy (Infrastructure) 2007	5
2.1.4	Other State Environmental Planning Policies	5
2.1.5	Other Legislation	6
2.2	Local Planning Regulations	6
2.2.1	Muswellbrook Local Environmental Plan	6
2.2.2	Singleton Local Environmental Plan	6
2.2.3	Upper Hunter Local Environmental Plan	7
2.2.4	Other Relevant Policies	7
2.3	Federal Legislation	8
2.3.1	Environment Protection and Biodiversity Conservation Act (1999)	8
2.3.2	Native Title Act 1993	9
3	PROJECT DESCRIPTION	10
3.1	Site Context	10
3.2	Project Overview	10
3.2.1	Wind Turbines	12
3.2.2	Electrical Connections	12
3.2.3	Other Associated Infrastructure	12
3.2.4	Minor Local Road Upgrades	12
3.2.5	Ancillary Activities	13
3.3	Options Considered	13
3.3.1	Overview	13
3.3.2	Site Selection and Feasibility	13
3.3.3	Scoping Report Preliminary Layout	15
3.3.4	Refinement and Revision	16
4	PROJECT JUSTIFICATION	18
4.1	Project Viability	18
4.1.1	New Generation Requirement	19
4.1.2	Lowest Cost of New Generation	21
4.2	Federal Commitments	22
4.3	State Commitments	23
4.4	Project Benefits	23
5	STAKEHOLDER ENGAGEMENT	24
5.1	Consultation Objectives	24
5.2	Consultation Approach	26
5.2.1	Stakeholders	26

5.2.2	<i>Face to face visits and introduction letters</i>	26
5.2.3	<i>Community Meetings, Newsletters and Information Sessions</i>	26
5.2.4	<i>Community Consultation Committee</i>	27
5.3	Ongoing Engagement	27
5.4	Key Issues Raised	28
5.5	Government Agencies & Other Stakeholders	29
6	RISK ASSESSMENT	31
6.1	Introduction	31
6.2	Environmental and Social Risk Assessment	31
7	PRELIMINARY ENVIRONMENTAL ASSESSMENT	34
7.1	Assessment of Key Issues	34
7.1.1	<i>Visual Amenity</i>	34
7.1.2	<i>Noise Amenity</i>	41
7.1.3	<i>Biodiversity</i>	46
7.1.4	<i>Aboriginal Heritage</i>	49
7.1.5	<i>Historic Heritage</i>	50
7.1.6	<i>Traffic and Transport</i>	51
7.2	Minor Issues	51
8	GLOSSARY AND ACRONYMS	54
9	REFERENCES	56
10	APPENDIX A – PRELIMINARY LANDSCAPE AND VISUAL IMPACT ASSESSMENT	58

FIGURES LIST

Figure 1: Wind farm locality and Local Government Areas	3
Figure 2: Site context of the proposed Project	11
Figure 3: Site wind monitoring mast locations	14
Figure 4: Investigation Area	15
Figure 5: Scoping Report Preliminary Layout.....	16
Figure 6: Preliminary Layout on aerial background	17
Figure 7: Wind resource map illustrating the potential of the site for a wind energy project.....	19
Figure 8: NEM electricity consumption, actual and forecast, Neutral scenario	20
Figure 9: Scheduled retirement of NSW generation capacity	21
Figure 10: LCOE cost of building new generation by technology type	22
Figure 11: SSD Assessment and Determination Process and Engagement	25
Figure 12: Preliminary Assessment Tool 1 indicating potential visual impacts for further detailed consideration	34
Figure 13: Study Area for further detailed consideration in EIS.....	36
Figure 14: Residential dwellings Multiple Wind Turbine Tool	39
Figure 15: Noise Bulletin Average Distances for Different Noise Standards	42
Figure 16: Predicted noise levels based on preliminary layout	45
Figure 17: Mapped Vegetation (OEH).....	47
Figure 18: Key waterbodies and waterways	52

1 Introduction

1.1 Background

The Bowmans Creek Wind Farm will involve the construction, maintenance, operation and decommissioning of around 70 - 80 wind turbines, together with associated operation and maintenance buildings, civil works and electrical infrastructure required to connect it into the existing transmission network (Project).

The Project is located about 10 km east of Muswellbrook and 185 km north of Sydney, in NSW. The Project is located across three council boundaries as indicated in Figure 1. Wind turbines will be primarily located in the Muswellbrook Shire and Singleton Councils, with a small number of turbines proposed in the Upper Hunter Shire Council.

The Project land and surrounding area is used for farming and grazing operations. The region supports a number of active coal mines and two coal fired power stations. Historically, a number of mineral exploration licences have been granted over the proposed wind farm site, however, there are no current active exploration licences.

The Project is located primarily on freehold land within and adjacent to agricultural areas. There are a number of small parcels of Crown land within the Project Boundary.

A preliminary layout for the Project is provided in section 4. Refinement of the layout will be undertaken following further environmental assessment and community input. Generally, the wind turbines have been positioned along a series of ridges running north-south as described in Section 3.

There are a number of rural communities in proximity to the proposed wind farm including: Hebden, Muscle Creek, McCully's Gap, Rouchel Brook, Bowmans Creek and Goorangoola.

1.2 Proponent

The Proponent for the project is Epuron Projects Pty Ltd (Epuron), an Australian renewable energy company established in North Sydney in 2003. Epuron is one of the most experienced wind energy development companies in NSW, as well as a significant developer of solar projects across Australia.

Epuron is a leader in its field with 573 MW of wind turbines in operation or construction resulting from its development work, significantly more in NSW than any other developer.

Epuron owns and operates more off-grid utility-scale solar power stations than any other Australian company. Further details can be found at our website at www.epuron.com.au

1.2.1 Wind Energy in NSW

Epuron approved wind energy projects in NSW total 2,218 megawatts (MW) and include:

- ▶ Cullerin Range Wind Farm (15 turbines, 30 MW, operating);
- ▶ Gullen Range Wind Farm (73 turbines, 165 MW, operating);
- ▶ White Rock Wind Farm Stage 1 (70 turbines, 175 MW, operating);
- ▶ Silverton Wind Farm (58 turbines, 200 MW under operating);
- ▶ White Rock Wind Farm Stage 2 (49 turbines, 175 MW, approved);
- ▶ Coppabella Wind Farm (up to 75 turbines, 290 MW, approved);
- ▶ Rye Park Wind Farm (up to 92 wind turbines, 322 MW, approved); and
- ▶ Liverpool Range Wind Farm (up to 267 turbines, 960 MW, approved).

1.2.2 Solar Energy in Australia

Epuron solar energy projects in Australia total 296 MW and include:

- ▶ 7 MW of off-grid solar projects owned and operated by Epuron including:
 - TKLN Solar (NT);
 - Uterne Solar at Alice Springs (NT); and
 - Yulara Solar at Ayers Rock Resort (NT);
- ▶ Clermont Solar Farm (90 MW, operating, QLD);
- ▶ Nevertire Solar Farm (132 MW, under construction, NSW);
- ▶ Katherine Solar Farm (34 MW, under construction, NT); and
- ▶ Walgett Solar Farm (32.5 MW, approved, NSW).

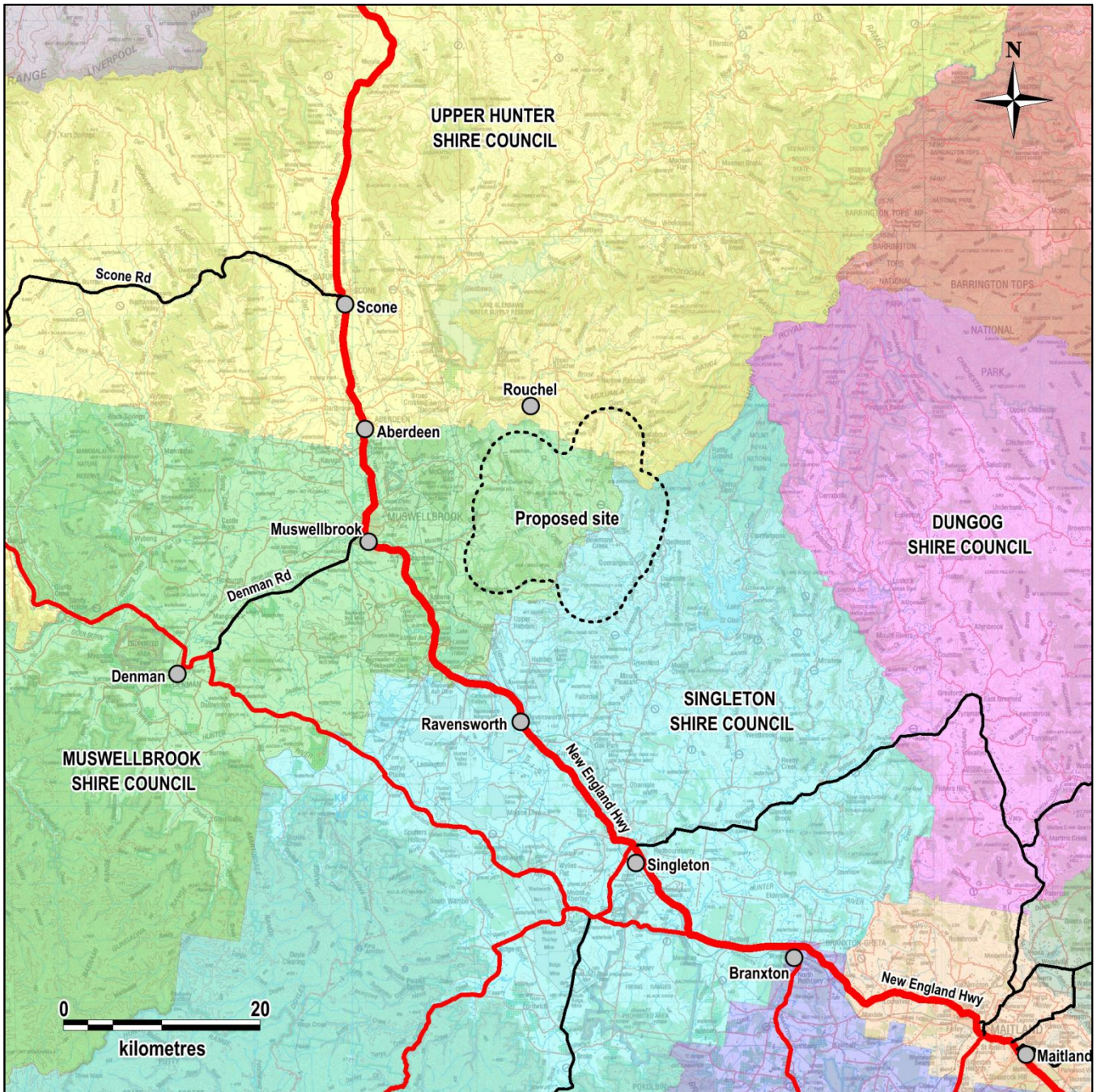


Figure 1: Wind farm locality and Local Government Areas

1.3 Document Purpose

Epuron is seeking State Significant Development (SSD) Consent under Division 4.7 of Part 4 of the *Environmental Planning & Assessment Act 1979* (EP&A Act) for the Project, which will be supported by an Environmental Impact Statement (EIS) to be prepared by independent environmental consultants.

This scoping report has been prepared to support an application to the Secretary of DPE for Secretary's Environmental Assessment Requirements (SEARs) to guide the preparation of the EIS for the Project.

The scoping report has been prepared in consideration of the 'NSW Wind Energy Framework' which comprises:

- ▶ 'Wind Energy Guideline' (Wind Guideline) (DPE, 2016a);
- ▶ 'Wind Energy: Visual Assessment Bulletin' (Visual Bulletin) (DPE, 2016b);
- ▶ 'Wind Energy: Noise Assessment Bulletin' (Noise Bulletin) (DPE, 2016c);
- ▶ 'Standard Secretary's Environmental Assessment Requirement' (SEARs); and
- ▶ Wind Energy Framework Q&As.

It has also been prepared in accordance with Section 4.2 of the Wind Guideline and the DPE's PEA and SSD Scoping Report Requirements. Table 1 indicates where each requirement is addressed.

Table 1 – Wind Guideline PEA and DPE SSD Scoping Report Requirements and where Addressed

Item	Section
WIND GUIDELINE PEA REQUIREMENTS	
Describes the proposed wind energy project and its location in context (for example, it should identify the preliminary turbine layout, nearby dwellings, key public viewpoints and other key landscape features). Proponents should demonstrate the suitability of their chosen location and the viability of wind resources in that area.	3 4
Describes steps taken to assist potentially affected people and groups in understanding the proposed development and what it could mean for them.	5.2.2
Describes the proposed overall approach to stakeholder consultation for the EIS development process.	5
Identifies the key issues for the particular project.	6
Includes the results of the early consultation, including in relation to landscape values, and assesses the preliminary turbine layout against the preliminary assessment tools contained in the Visual Assessment Bulletin, including negotiations with landholders.	7.1.1
Provides a high-level assessment of the environmental impacts of the project (focusing on those key issues).	7
Reports on the outcomes of community consultation undertaken to date.	5.4
DPE 'SSD PROCESS'	
Describe the project	3
Identify the relevant strategic and statutory context	2
Summarise the results of any early community engagement	5
Identify the scale and nature of the impacts of the project	6
Outline the proposed approach to assessment and community engagement	7 and 5.3

2 Planning Framework

This section includes a description of the relevant state, local and federal legislation and policies relevant to the development of the Project.

2.1 State Legislation

2.1.1 Environmental Planning and Assessment Act 1979

This Project will be an SSD development to be assessed under Part 4 of the EP&A Act. The EP&A Act integrates the planning and assessment regime that requires approval from the Minister for Planning and Public Spaces and incorporates approvals and authorisations required under other NSW legislation.

The Project EIS will outline how the Project addresses 'Section 1.3 Objects of the EP&A Act', which relevantly include the:

- ▶ Encouragement of the proper management of natural resources, including minerals, for the purpose of promoting the social and economic welfare of the community;
- ▶ Promotion and co-ordination of the orderly and economic use and development of land; and
- ▶ Encouragement of Ecologically Sustainable Development (ESD).

Section 4.41 of the EP&A Act lists authorisations which are not required for SSD projects that are authorised by a development consent.

2.1.2 State Environmental Planning Policy (State and Regional Development) 2011

Clause 20 of Schedule 1 of the *State Environmental Planning Policy (State and Regional Development) 2011* states that if a development for the purpose of electricity generating works, has a capital investment value of more than \$30 million, it is considered to be SSD.

The Project will have a capital investment value of more than \$30 million and therefore is classified as SSD under Part 4 of the EP&A Act.

2.1.3 State Environmental Planning Policy (Infrastructure) 2007

The *State Environmental Planning Policy (Infrastructure) 2007* (Infrastructure SEPP) states that development for the purpose of electricity generating works may be carried out on any land in the prescribed rural, industrial or special use zones. The Project is entirely proposed on land in RU1 – Primary Production and is therefore permitted with consent as described in Section 2.2

2.1.4 Other State Environmental Planning Policies

Other State Environmental Planning Policy's (SEPP's) which will be considered in the preparation of the EIS include (but is not limited to):

- ▶ *State Environmental Planning Policy (SEPP) 44 – Koala Habitat Protection;*
- ▶ *SEPP 55 – Remediation of Land; and*
- ▶ *SEPP 33 – Hazardous and Offensive Development.*

2.1.5 Other Legislation

Section 4.42 of the EP&A Act lists authorisations which must be consistently applied to SSD projects that are authorised by a development consent.

For the Project, Section 4.42 approvals will be confirmed in the EIS however are likely to include:

- ▶ Environment Protection Licence under the POEO Act;
- ▶ Work in or over a public road approval under the *Roads Act 1993*;
- ▶ Approval for works over Crown Land under the *Crowns Land Management Act 2016*;
- ▶ Bushfire Management Plan under *Rural Fires Act 1997*;
- ▶ Water Access licence(s) under the *Water Management Act 2000*;
- ▶ Construction Certificates and Building Certificates under the EP&A Act; and
- ▶ Management plans and other conditions of development consent.

2.2 Local Planning Regulations

The Project is located across three local government areas as shown in Figure 1. Wind turbines will be primarily located within the Muswellbrook Shire Council and Singleton Council areas, with a small number also located in the Upper Hunter Shire Council area. Local Planning Regulations that apply to each of these shires is discussed below.

2.2.1 Muswellbrook Local Environmental Plan

The relevant Local Environmental Plan (LEP) for those parts of the Project in the Muswellbrook Shire is the *Muswellbrook Local Environmental Plan 2009* (Muswellbrook LEP). The land within the Project Boundary within this plan is zoned RU1 – Primary Production.

The permissibility of wind farm developments is governed by the relevant LEP and by the Infrastructure SEPP.

Clause 34 of the Infrastructure SEPP states that ‘electricity generating works’ may be carried out with development consent on any land within a prescribed rural, industrial or special use zone. RU1 is a prescribed rural zone.

The land use table in the Muswellbrook LEP lists the class of development that are permissible within each land zoning. The Muswellbrook LEP does not list ‘electricity generating works’ as a permissible class of development in zone RU1. That is, the Muswellbrook LEP is inconsistent with Clause 34 of the Infrastructure SEPP, which provides that ‘electricity generating works’ are permissible in any rural land zone.

Clause 1.9 of the Muswellbrook LEP states that the provisions of any SEPP will prevail over the LEP. Therefore, the Development is permissible with consent in zone RU1.

The zone objectives encourage sustainable primary industry production and the diversification of primary industry enterprises appropriate for the area. Whilst the Project land covers a larger area, the Project disturbance footprint will be very small and allows for traditional farming operations to continue. As such the Project is considered to be compatible with this land zoning.

2.2.2 Singleton Local Environmental Plan

The relevant LEP for those parts of the Project in the Singleton Council area is the *Singleton Local Environmental Plan 2013* (Singleton LEP). The land within the Project Boundary within this plan is also zoned RU1 – Primary Production and has objectives consistent with that of the Muswellbrook LEP. The Project is compatible with this land zoning. As such the Development is permissible with consent in zone RU1.

2.2.3 Upper Hunter Local Environmental Plan

The relevant LEP for those parts of the Project in the Upper Hunter Shire Council area is the *Upper Hunter Local Environmental Plan 2013* (UH LEP). The land within the Project Boundary with this plan is also zoned RU1 – Primary Production and has objectives consistent with that of the Muswellbrook LEP and Singleton LEP. The Project is compatible with this land zoning. As such the Development is permissible with consent in zone RU1.

2.2.4 Other Relevant Policies

The mitigation and management strategies for the Project will consider relevant State, Muswellbrook Shire Council (MSC), Singleton Shire Council (SSC) and Upper Hunter Shire Council (UHSC) Regional Policies.

2.2.4.1 State Policies

The justification for the Project (as discussed in **Section 4**) is consistent with the objectives of the ‘*Hunter Regional Plan 2036*’ (Regional Plan) (DPE, 2016d). The Regional Plan is the product of extensive consultation with councils, stakeholders and the wider community and will guide the NSW Government’s land use planning priorities and decisions over the next 20 years. The Regional Plan sets priorities and goals and provides a direction for regional planning decisions.

Goal 1 of the Regional Plan is to become “*the leading regional economy in Australia*”. Of particular relevance to the Project is Directions 5 and 12.

Direction 5 – Transform the Productivity of the Upper Hunter

The Upper Hunter is recognised as a major supplier of coal, energy, wine and thoroughbred horses to national and global markets. These industries have driven investment in transport and energy infrastructure, and will continue to underpin the growth and diversification of the Hunter’s economy and employment base.

In the coming decades, the growth and diversification of the Hunter’s mining and energy industries will be influenced by global and national energy demands and policies. Identifying land and infrastructure requirements that can support the future development of the region’s coal and alternative energy resources will enable the Upper Hunter to respond to new and emerging opportunities.

The Upper Hunter will undergo a transition in the context of a changing industry environment, particularly in mining and power generation.

Actions to attain Direction 5 include:

- ▶ Prepare for the diversification and innovation of the economy in response to long term industry restructuring in coal and power generation and the growth in new high-technology primary industry and associated specialist knowledge-based industries;
- ▶ Leverage the regional advantages of the Upper Hunter to create a diverse, thriving and prosperous economy built upon industry growth and investment; and
- ▶ Identify the land and infrastructure requirements to develop the Hunter’s coal and alternative energy resources.

Direction 12 - Diversity and Grow the Energy Sector

The Hunter accounts for 44% of power generation in NSW, however prospective closures of Liddell and Bayswater power stations in 2022 and 2035 respectively mean the transformation in the energy sector that is under way will need to be accelerated.

The Hunter has the solar, wind and geothermal resources to deliver large-scale projects. It is already home to some landmark projects including CSIRO’s solar farm in Newcastle. Energy efficient and renewable energy technologies can drive innovation, improve business and agricultural productivity and underpin long term economic growth.

With its energy industries and research base, the Hunter region has the potential to be a major hub for next-generation power.

Actions to attain Direction 12 include:

- ▶ Enable opportunities for renewable energy industries by reviewing local planning controls; and
- ▶ Promote new opportunities arising from the closure of coal-fired power stations that enable long term sustainable economic and employment growth in the region.

2.2.4.2 Local Policies

The EIS will include a consideration of (at least) the following relevant local policies:

- ▶ UHSC:
 - 'Upper Hunter Land Use Strategy' includes an objective for: "...Opportunities for the development of alternative energy production (including wind and solar power generation) and marketing of the clean green image of the LGA ..."; and
 - 'Community Strategic Plan 2027' states that it is "... structured around the pillars of sustainability; ... ' with a strategy to "... encourage a diverse economy whilst promoting and preserving agriculture and equine industries";
- ▶ MSC:
 - 'MSC Land Use Development Strategy';
 - 'MSC Contaminated Land Policy'; and
 - Strategic Regional Land Use Plan – Upper Hunter states "...The region's status as a major supplier of energy is being further extended by the new economic opportunities in renewable energy technologies being taken up in response to its strong potential for wind, solar and geothermal projects. The Upper Hunter is one of six renewable energy precincts that have been established across NSW to promote and encourage renewable energy development in NSW.

The region has relatively undeveloped potential to generate power from coal seam gas and renewable energy sources. Its potential for solar, geothermal and wind power generation also makes the Upper Hunter one of the State's key renewable energy regions.

Wind, solar, waste coal mine methane and geothermal resources provide opportunities for clean energy. The region has significant wind resources (particularly in the north). The region faces important climate change challenges, namely mitigating the impacts by reducing greenhouse gas emissions and adapting to the impacts such as the increasing intensity and frequency of storms, floods and bushfires. The challenges for reducing greenhouse gas emissions will be ensuring compatible land uses in areas with good renewable energy resources (particularly wind and solar). ...".
- ▶ SSC:
 - 'Singleton Land Use Strategy' which includes an objective "... to retain options for alternative land use strategies so that flexibility to allow economic, social and environmental change can be accommodated ...";
 - 'Singleton Community Strategic Plan 2017-2027';
 - 'Delivery Program 2017 – 2021'; and
 - 'Operational Plan 2018-2019'.

2.3 Federal Legislation

2.3.1 Environment Protection and Biodiversity Conservation Act (1999)

The *Environment Protection and Biodiversity Conservation Act (1999)* (EPBC Act) provides for a Commonwealth assessment and approval of proposals that have a significant impact on any of nine 'matters of national environmental significance' (MNES).

The EPBC Act advises the Commonwealth's role in environment assessment, biodiversity conservation and the management of protected areas of national significance. Approval from the Minister for DoEE is required for any action that may have a significant effect on one or more MNES. If the Minister declares the action a "controlled action", the action must be subject to an impact assessment under part 8 of the EPBC Act.

Should the Project be deemed a "controlled action" for potential impacts to migratory species and/or threatened species MNES, a separate Referral Application will be made to DoEE supported by relevant preliminary studies. Supplementary SEARS will be sought if the Project is deemed a "controlled action".

Should the Project be deemed "not a controlled action", no further action will be necessary.

2.3.2 Native Title Act 1993

The *Native Title Act 1993* (NT Act) facilitates the recognition and protection of Native Title. Under section 13 of the NT Act, a person can apply to the Federal Court for a determination of native title.

A review of the potential for Native Title will be undertaken for the Project.

3 Project Description

This Section provides a preliminary project description. It includes a brief description of the environmental setting and a discussion on the key components of the Project. The project description will be revised and expanded upon prior to inclusion in the EIS.

3.1 Site Context

The Project is located more than 15 km east of Muswellbrook in the Upper Hunter region of NSW. The town of Muswellbrook provides a strong infrastructure and facilities base as a result of servicing the coal mines and power station assets located in the region for many years. Scone is located over 30 km to the north-west from the closest proposed turbine.

Mount Royal National Park is located at least 5 km to the north – east of the Project Boundary. Lake St Clair is over 10 km to the south-east and Lake Liddell over 6 km to the south-west of the Project Boundary. Project components are at greater distances from these localities. The southern-most part of Glenbawn Dam is over 15 km from the closest proposed turbine.

The site is located in proximity to the existing Bayswater and Liddell Power Stations and a number of existing coal mines to the south.

There are a number of rural communities in proximity to the Project including; Hebden, Muscle Creek, McCully's Gap, Rouchel Brook and Goorangoola).

A combination of desktop searches and community consultation has identified a total of 44 residential dwellings within 3 km of a proposed turbine location (see Figure 13).

A total of 17 of these dwellings are owned by landowners associated with the Project. The approach to consultation with nearby residents and the proposed ongoing consultation plan is outlined in Section 5.

The Project is located predominantly on privately owned land mainly used for cattle grazing and other agriculture purposes. It is proposed that these existing uses will continue with minimal interruption from the Project's construction and operation.

3.2 Project Overview

The Project will involve the construction, operation and decommissioning of key components as follows:

- ▶ Wind turbines – around 70 to 80 wind turbines (rated at approximately 1.5 – 5 MW), each with:
 - Three blades mounted on a tubular steel tower with a combined height (blade plus tower) to tip not exceeding 220 m;
 - A crane hardstand area, and turbine laydown area;
- ▶ Substation and transmission connection – linking the turbines to the existing Ausgrid 132kV or TransGrid 330kV transmission line network, directly into the Liddell 330kV substation and/or the Muswellbrook 132kV substation.;
- ▶ Electrical Connections – between wind turbines and the on-site substation/s, which will be a combination of underground cable and overhead powerlines linking segments of the site;
- ▶ Other Associated Infrastructure;
- ▶ Minor local road upgrades to enable delivery access for installation and maintenance of wind turbines and related facilities; and
- ▶ Ancillary activities (including boundary adjustments and subdivision).

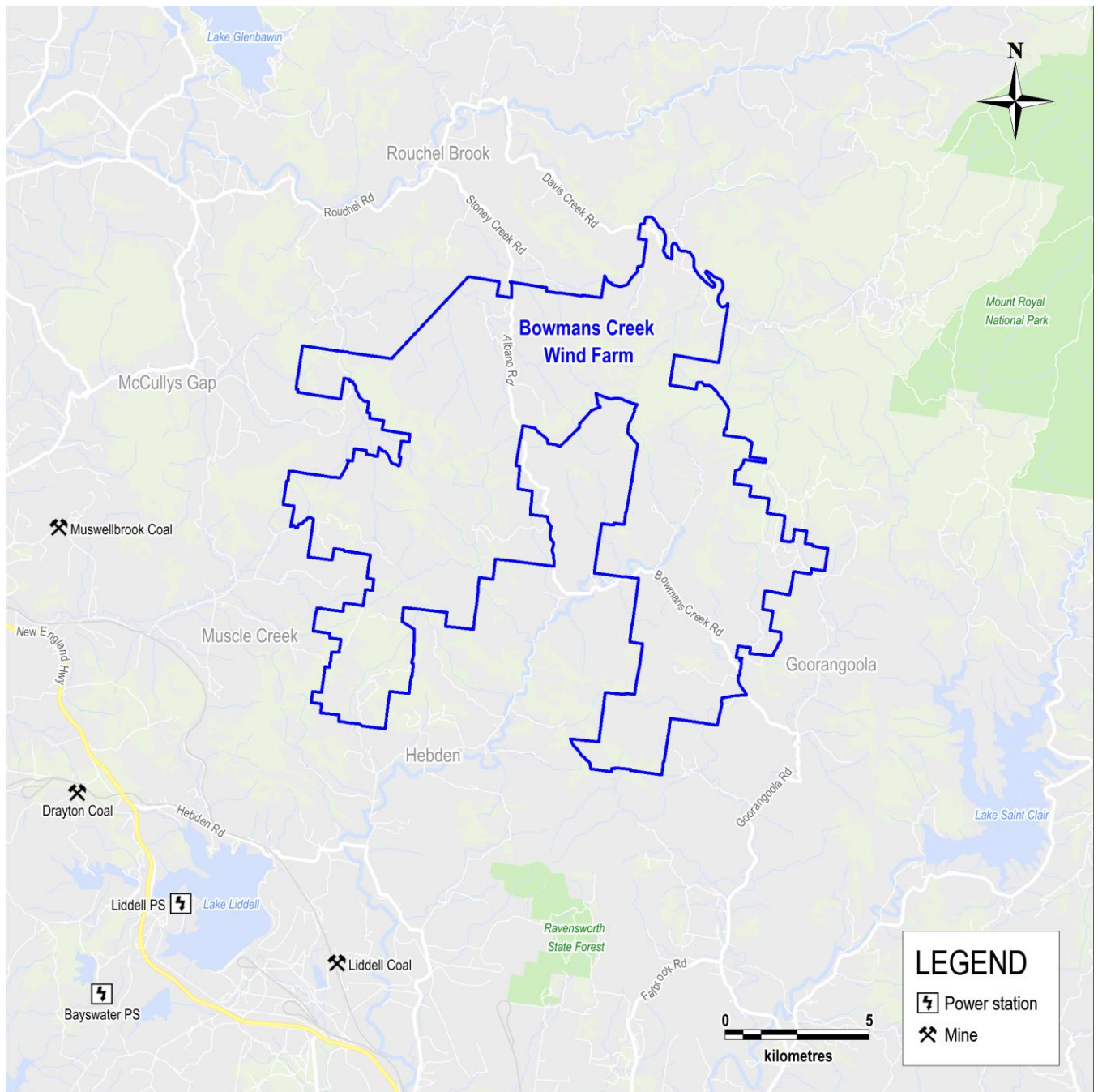


Figure 2: Site context of the proposed Project

3.2.1 Wind Turbines

The Project will include around 70 - 80 proposed wind turbines. Final turbine numbers and power output for the site is dependent on the outcomes of the various engineering and environmental studies and is subject to change.

3.2.2 Electrical Connections

To export the electricity generated from the Project, a new physical connection to the existing electricity network will be required. Sufficient capacity exists within the network to transmit the electricity to the required load centres.

The Muswellbrook Shire contains key components of the State's electricity network with transmission infrastructure in place to facilitate the transmission of electricity from Liddell and Bayswater power stations to the major load centres of Newcastle, Sydney and Brisbane.

A new powerline will be required to connect the Project to the existing electricity grid, which has multiple connection points within 10 km from the Project. Epuron is currently considering several connection options using powerlines which are located on or near the site including the 330kV Tamworth to Liddell line owned by Transgrid or the 132kV Muswellbrook to Singleton line owned by Ausgrid.

Alternatively, the Project could connect directly into the 330kV Liddell substation or the 132kV Muswellbrook substation. The final route/s selected will be shown and assessed in the EIS.

Connection enquiries for the Project were lodged with both Transgrid and Ausgrid. An initial response has been received and subsequent discussions have been held with both Network Service Providers about the proposed grid connection options as summarised in Section 5.5.

3.2.3 Other Associated Infrastructure

Various ancillary infrastructure will be required for the Project including (but not limited to): onsite operations building, equipment storage facilities, concrete batching plant facilities, rock crushing, temporary and permanent laydown pads, construction compounds, access tracks to each turbine, temporary and permanent wind monitoring masts and the other related facilities.

3.2.4 Minor Local Road Upgrades

Traffic associated with the construction phase of the Project will consist of both light vehicles for transporting workers and heavy and over-sized vehicles for delivery of plant and turbine components.

Upgrades to the existing road network will be required where necessary to facilitate the construction, ongoing maintenance and decommissioning of the Project.

A number of options are currently under consideration to provide access from the New England Highway including:

- ▶ Hebden Road to the south;
- ▶ Muscle Creek Road to the west; and
- ▶ Rouchel Road and Stoney Creek Road to the north.

The preferred Heavy Vehicle access route will be identified and assessed in the EIS.

3.2.5 Ancillary Activities

Materials will need to be sourced for the construction, ongoing maintenance and decommissioning of the Project (including but not limited to): road and construction materials, water and concrete.

Geotechnical assessments will be required to inform detailed engineering design in relation to the positioning of Project infrastructure. Boundary adjustments and subdivision may also be required to assist in detailed design for infrastructure.

3.3 Options Considered

3.3.1 Overview

Epuron has conducted a number of design iterations during the development of the Project layout which considered:

- ▶ Results from the preliminary assessments;
- ▶ Feedback from associated and neighbouring landowners;
- ▶ Wind resource monitoring data;
- ▶ Additional desktop assessments; and
- ▶ The principles outlined in the Wind Energy Guideline.

The development of a wind farm layout is, by nature an iterative process, with opportunity for refinement and revision as more information is obtained from environmental studies, ongoing feedback from consultation and updated wind monitoring.

The design process is focused around three core principles:

- ▶ Minimising and/or avoiding negative environmental and community impacts;
- ▶ Maximising positive impacts (clean energy production resulting in greenhouse gas reduction); and
- ▶ Incorporating practical and economic limitations in relation to the construction and operation of the site.

3.3.2 Site Selection and Feasibility

In 2017 Epuron commenced discussions with landowners in relation to their interest in being involved in a wind energy project in the region. In October 2017, Epuron commenced wind monitoring onsite with a portable SoDAR device and since then has deployed additional SoDAR devices and installed two wind monitoring masts as shown on Figure 3.

An early assessment of the wind resource identified an investigation area comprising several elevated ridgelines that had the potential for hosting wind turbines. This “investigation area” was used as the basis for early consultation activities and to get feedback from the community and other stakeholders over the Project. This feedback was then worked into the design of the scoping report preliminary layout.

A map showing the investigation area was presented at community information sessions and meetings as shown in Figure 4. A full description of the consultation process and preliminary responses to the issues raised is outlined in Section 5.

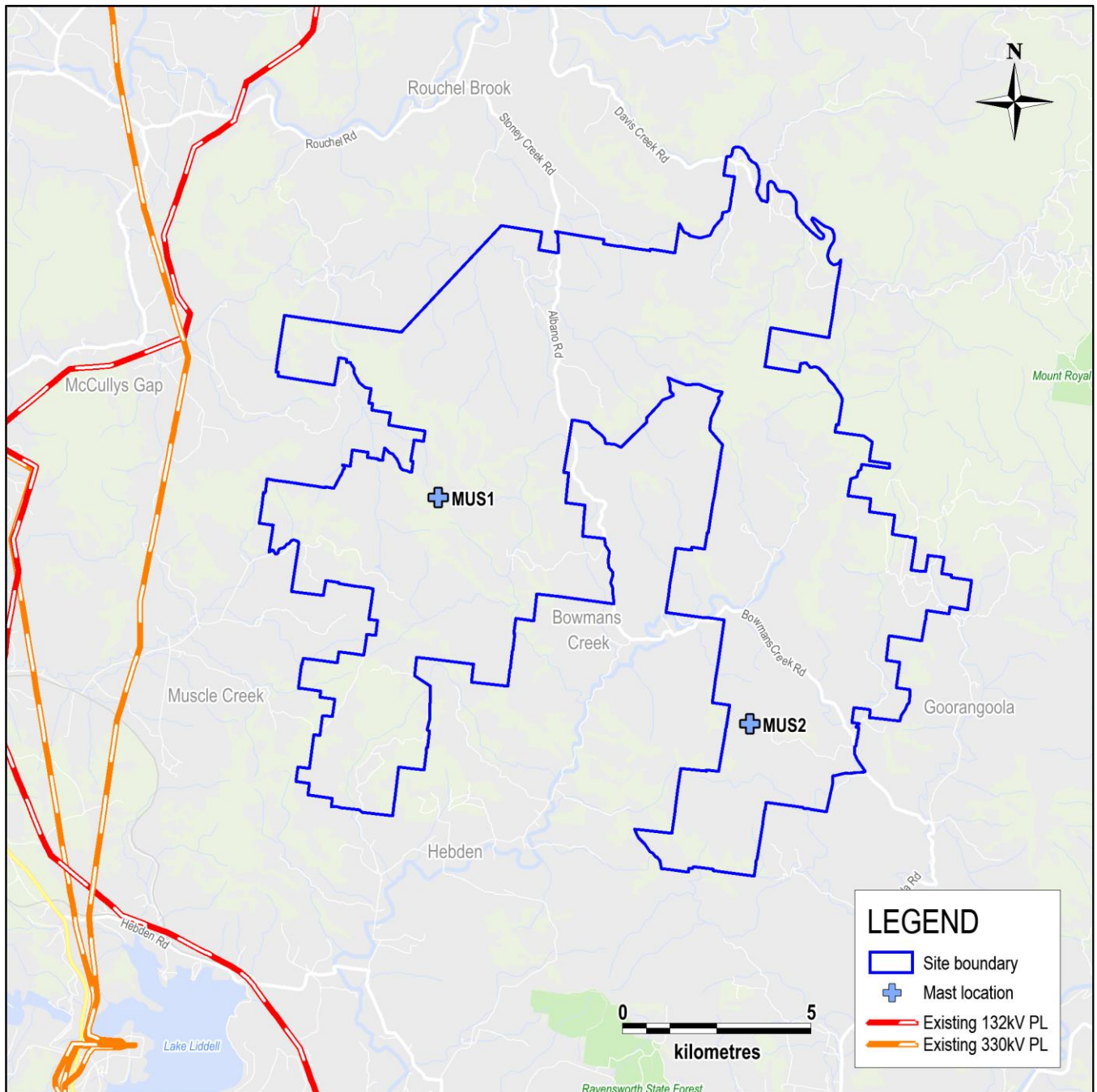


Figure 3: Site wind monitoring mast locations

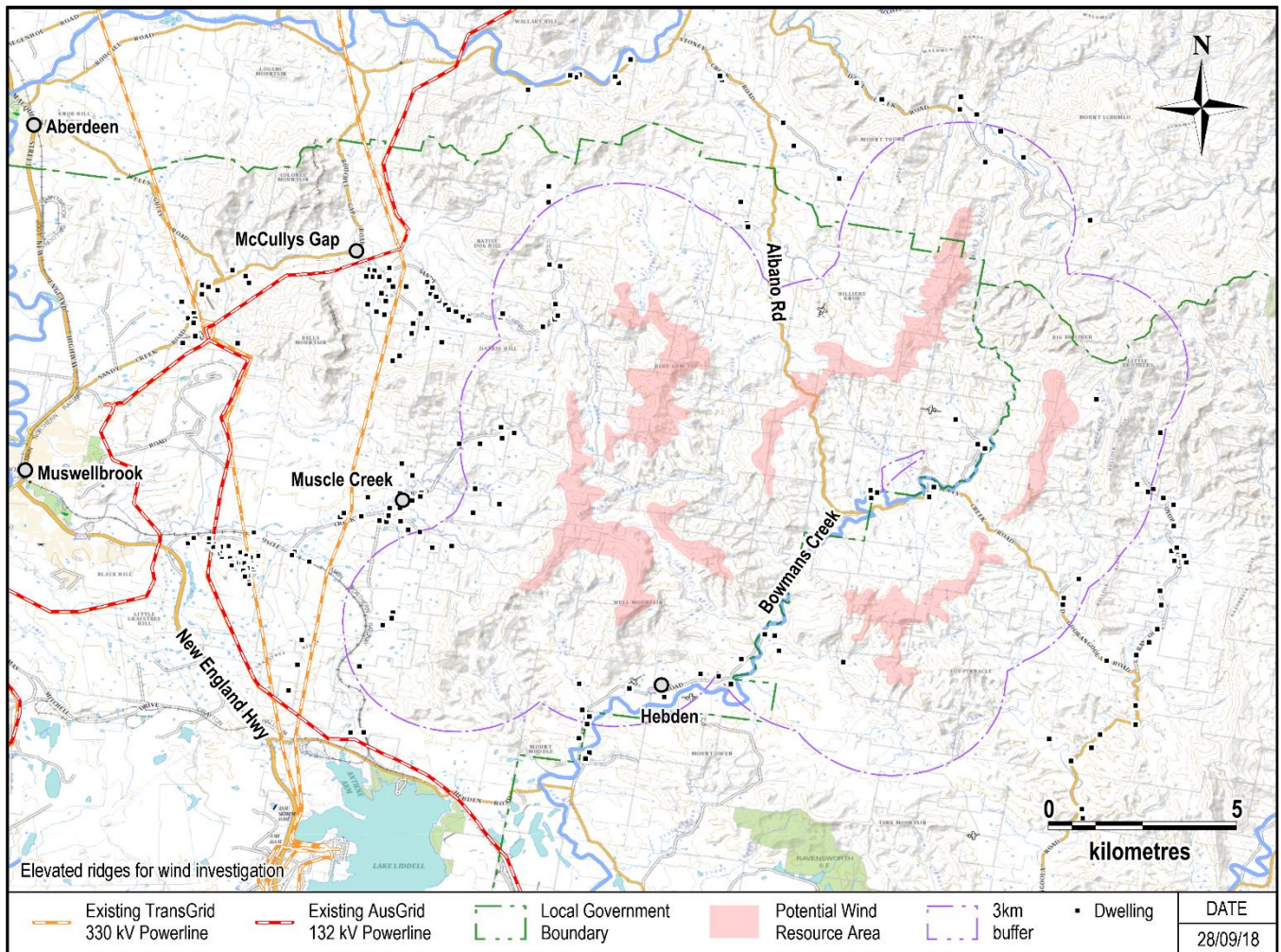


Figure 4: Investigation Area

3.3.3 Scoping Report Preliminary Layout

Using the investigation area as a starting point, a concept layout identified 98 locations suitable for wind turbines.

Following the iterative design process outlined above the concept layout was revised as shown in Figure 5 taking into consideration the following:

- ▶ The principles outlined in the Wind Energy Guideline;
- ▶ Landowner and community feedback in relation to the investigation area;
- ▶ Revised wind speed assessments based on additional wind data;
- ▶ Results from the preliminary noise impact assessment (NIA) (Section 7.1.2);
- ▶ Results from the preliminary visual impact assessment (VIA) (Section 7.1.1);
- ▶ Technical constraints including in relation to access; and
- ▶ Consideration of commercial viability.

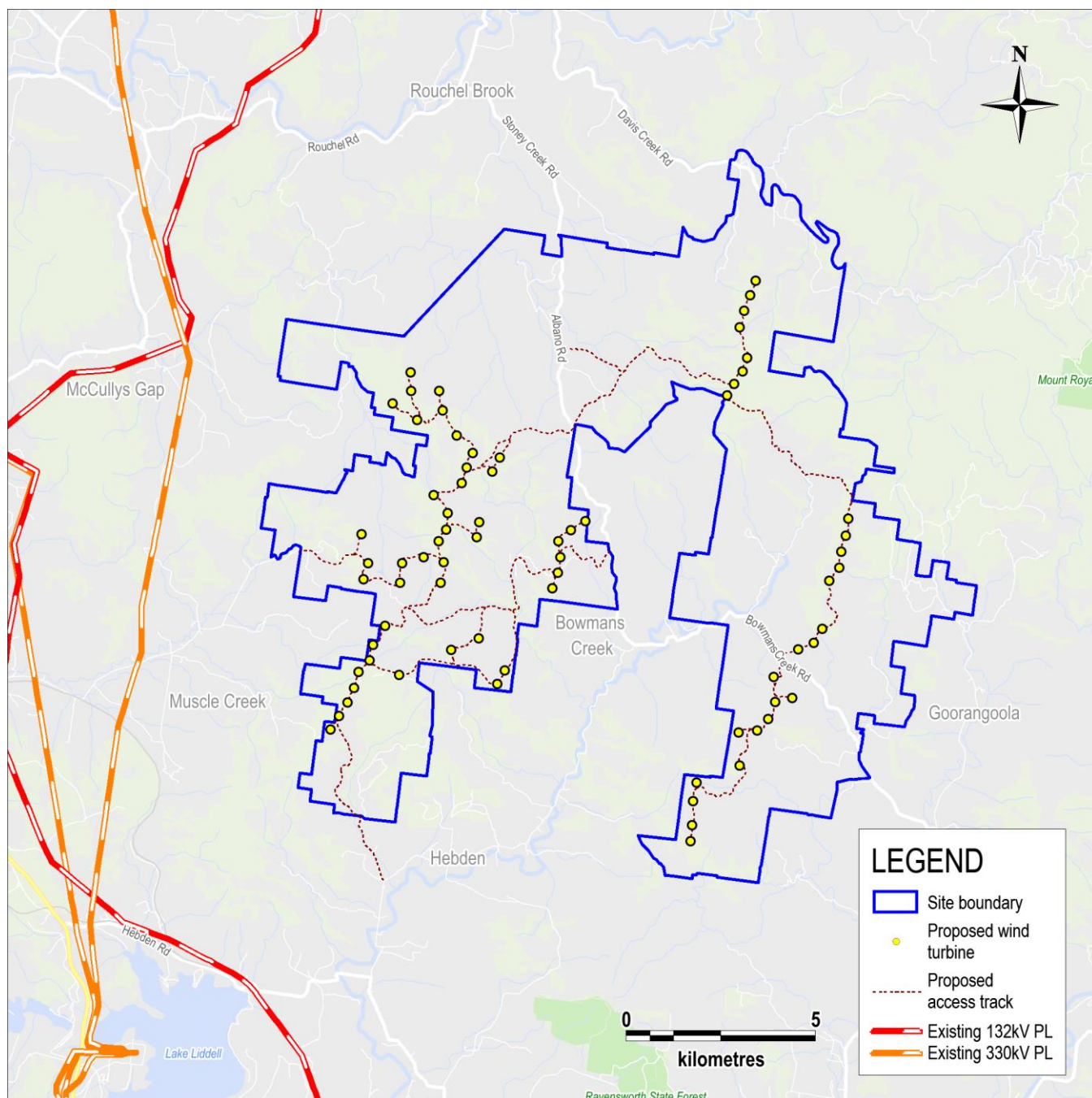


Figure 5: Scoping Report Preliminary Layout

3.3.4 Refinement and Revision

EIS studies will provide further information in determining the optimised locations for Project infrastructure. Additional considerations will include, but will not be limited to, the identification of any environmental constraints and the outcome of geotechnical investigations and the ongoing community and stakeholder consultation process.

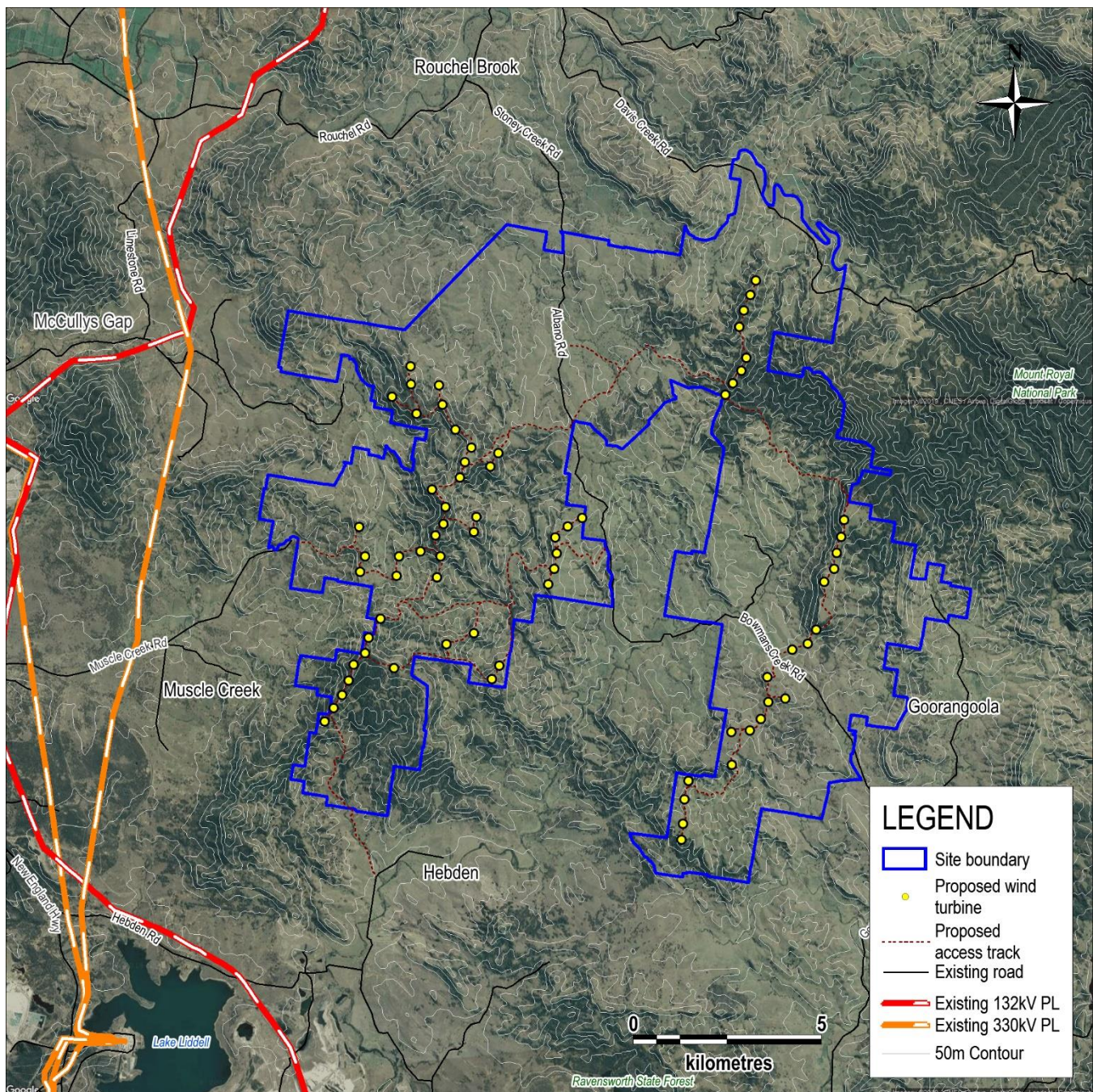


Figure 6: Preliminary Layout on aerial background

4 Project Justification

This Section provides a detailed justification of the Project including a discussion on the suitability of the site and the need for additional renewable energy generation consistent with both the Australian and NSW Government's climate change policies. It also provides a summary of the Project's socio-economic benefits.

4.1 Project Viability

Epuron has been developing wind energy projects in NSW for the past 15 years and over that period has developed considerable experience in site identification and selection. There are several key areas of consideration when selecting a site for development, including:

- ▶ Wind resource – To confirm the viability of wind projects, Epuron has established a vast network of wind monitoring masts across NSW, including a number of masts and other monitoring devices in the vicinity of the Project. These masts, including wind monitoring towers on site, have confirmed that wind speeds at the site are sufficient for a viable wind farm.
- ▶ Environmental impact on the land – the properties selected for involvement in the Project are generally used for cattle grazing and other agricultural purposes. Ridgelines where turbines are proposed are mostly cleared of vegetation.
- ▶ Access to the local electricity network – The proposed site is less than 10 kilometres from multiple connection points to the electricity network which have sufficient capacity to export the design output from the Project.
- ▶ Local communities – The properties selected for involvement are large land holdings and naturally provide a considerable buffer to non-involved (or neighbouring) residences. The low population density of the surrounding area will assist in reducing any residual noise or visual impacts from the Project.
- ▶ Proximity to resources – During the construction phase it will be necessary to source water and materials for the construction of roads and turbine foundations. In the local area there are a number of active quarries and water sources that will be able to accommodate the requirements for construction of a project of this size.
- ▶ Economic impact – The local population centres of Muswellbrook and Singleton are well established to cater for an increase in workforce having serviced the mining and energy industry. The region is preparing to enter a transitional period beginning with the retirement of Liddell Power Station in 2022.

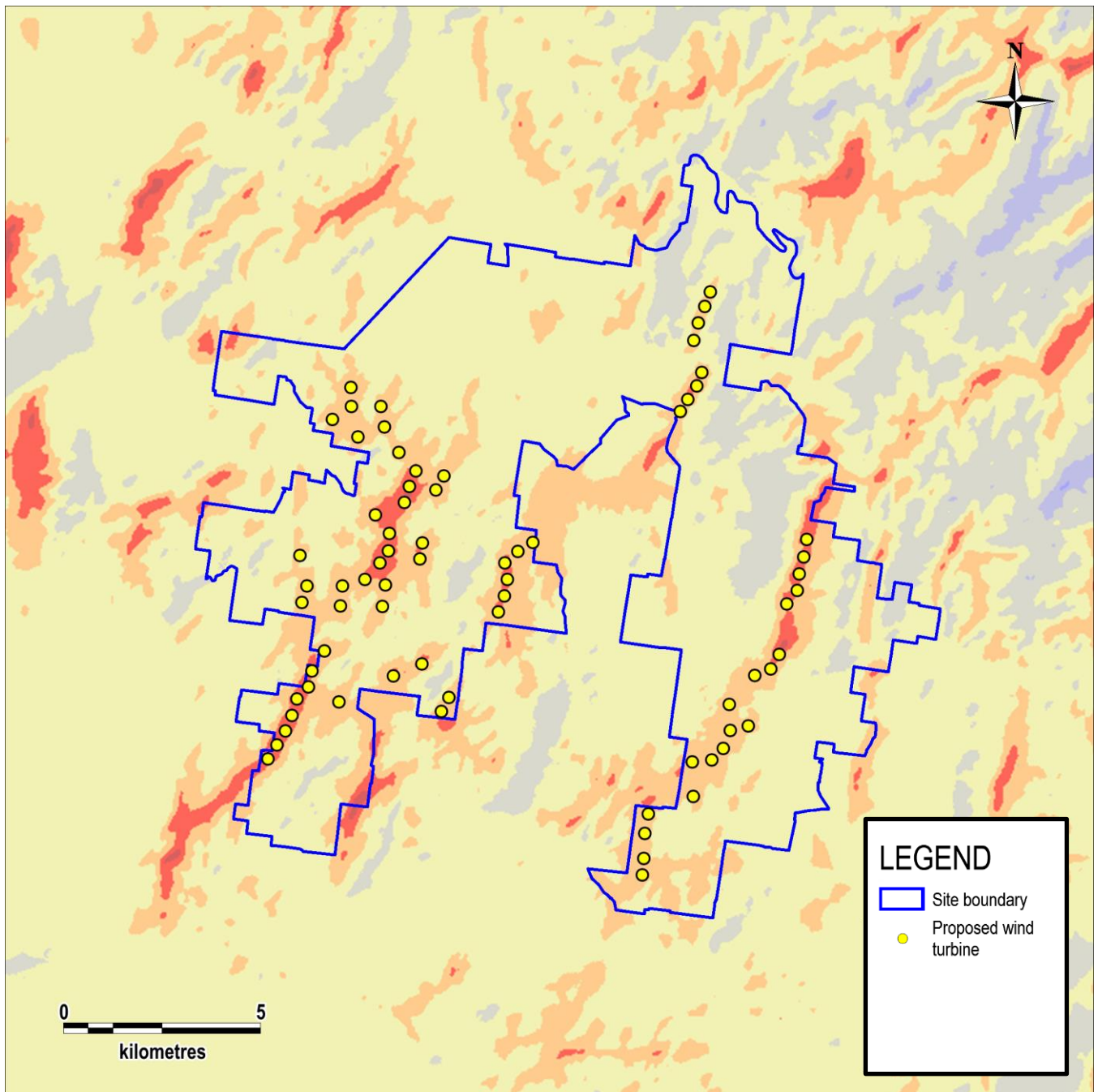


Figure 7: Wind resource map illustrating the potential of the site for a wind energy project

4.1.1 New Generation Requirement

For the vast majority of people in NSW, electricity is supplied from large scale power plants, transported along transmission wires and eventually distributed to houses and businesses for use. NSW participates in the National Electricity Market (NEM), sometimes referred to as “The Grid”. This supply and use of electricity in the NEM is managed by the Australian Energy Market Operator (AEMO).

Each year AEMO releases a key planning document called the 'Electricity Statement of Opportunities' (AEMO, 2019) (ESOO) and in 2018, due to the comprehensive and transformational changes occurring throughout the energy sector, released its 'Integrated System Plan' (ISP), a road map for the next 20 years to facilitate the smooth transition of Australia's evolving power system.

According to the ES00, consumption on the NEM over the next 10 years is expected to remain flat. While there is projected to be underlying growth in consumption across the NEM, partly due to the uptake in electric vehicles, further improvements in energy efficiency, changes in consumer behaviour and more rooftop solar will balance out these projected increases as shown in Figure 8.

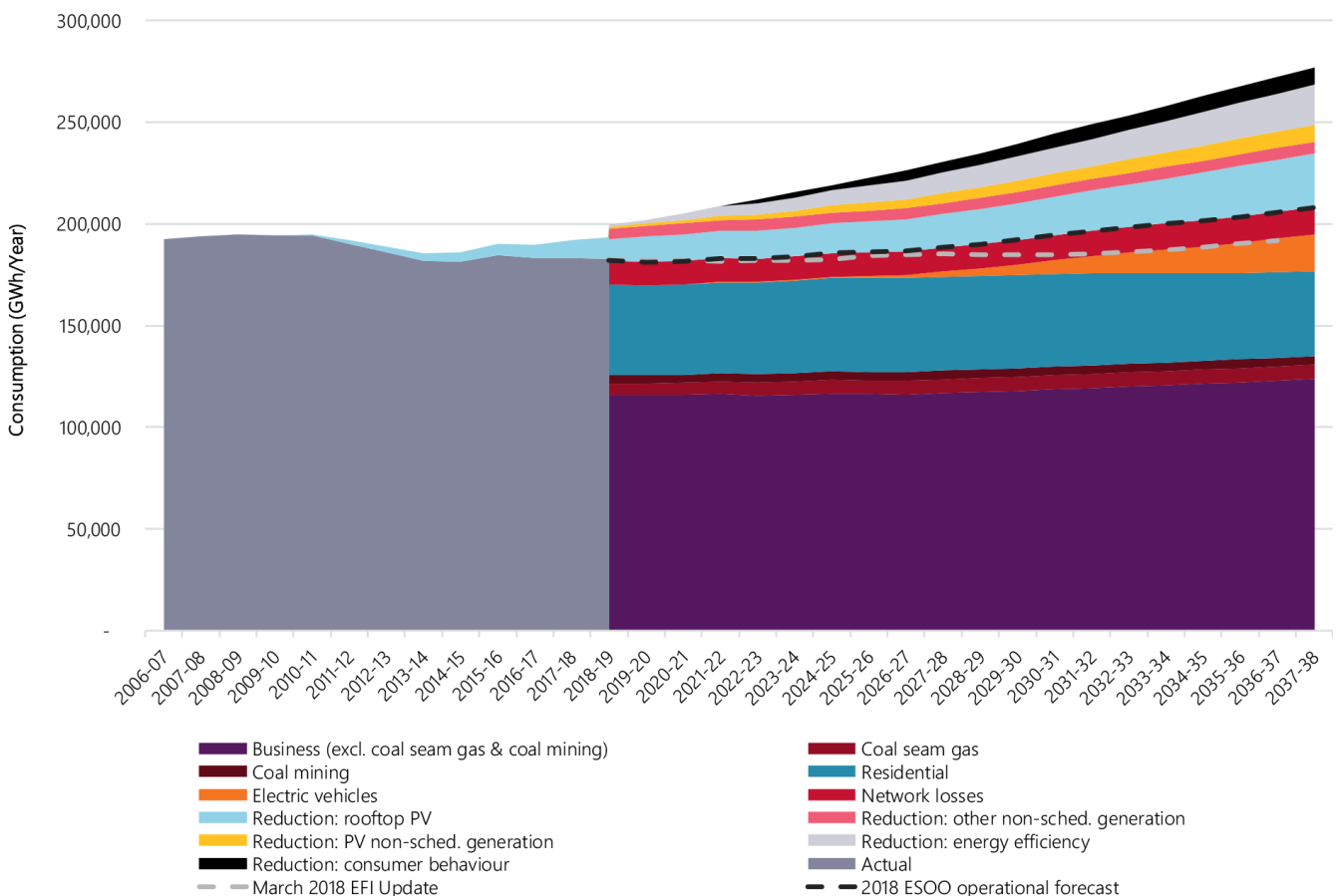


Figure 8: NEM electricity consumption, actual and forecast, Neutral scenario

In NSW, electricity is mainly supplied by coal-fired power stations with contributions from gas and hydro plants at certain times of day plus a growing proportion of renewable energy (wind and solar). Coal-fired power plants typically have a life span of around 50 years before requiring major refurbishment or replacement. The market operator, AEMO, concluded the following in the ES00:

"The existing thermal generation fleet is aging, and analysis of historical unplanned generation outages has highlighted a gradual deterioration in plant reliability in aggregate, most evident over the past three years. Market participants have announced retirement of over 2,300 MW of dispatchable generation within the next 10 years"

One of these retirement announcements came from AGL in relation to their Liddell Power Station in NSW, with a summer capacity of 1,800 MW. Liddell is scheduled to retire in 2022.

The ES00 also projects the following scenarios:

- ▶ The risks of load shedding remain relatively low in NSW over the next three years, although drought impacts on generation availability are being closely monitored;
- ▶ The risk increases after the retirement of Liddell Power Station in 2022-23 and continues to increase from that point onwards. Without further development, the reliability standard is forecast not to be met by 2023-24; and
- ▶ A reliability gap of 150 MW is forecast from 2023-24, increasing to 700 MW by 2027-28.

In addition to the announced retirement of Liddell Power Station, the remaining coal-fired power stations are forecast to retire over the next 10-15 years as shown by the declining installed capacity in Figure 9. Without additional generation capacity being installed in NSW it is forecast by the network operator that reliability issues will occur by 2022-23 with a noticeable shortfall between supply and demand by 2028.

SCHEDULED RETIREMENT OF NSW GENERATION CAPACITY

GW, NSW installed capacity and announced retirements

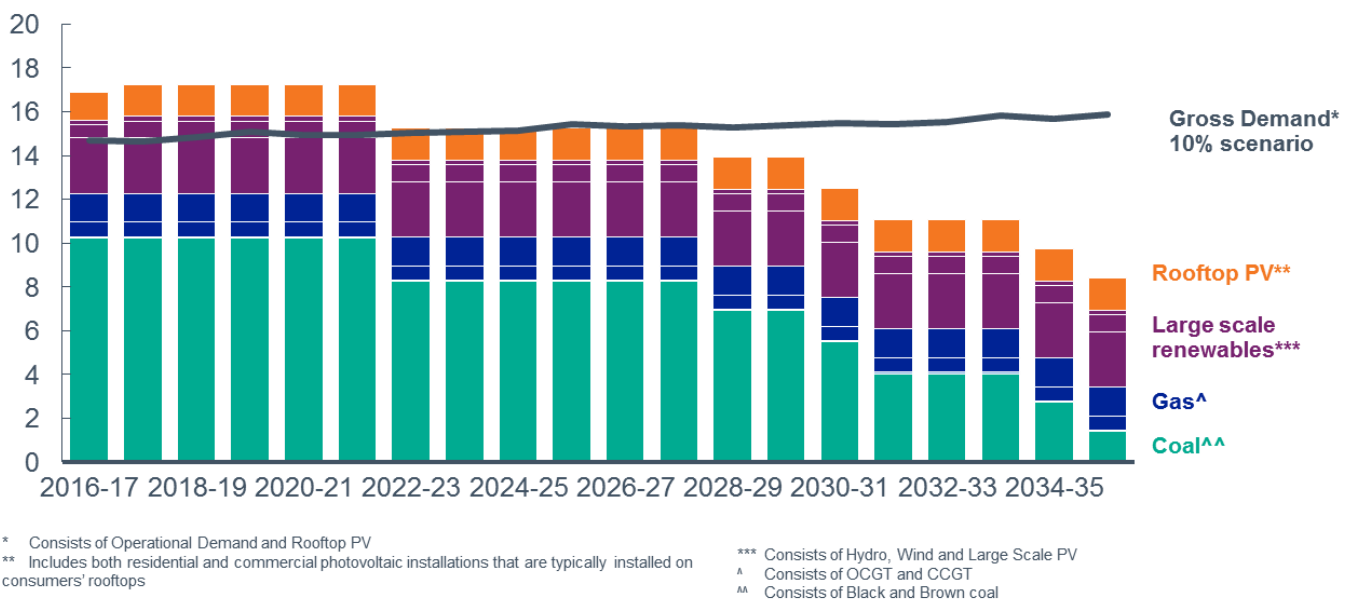


Figure 9: Scheduled retirement of NSW generation capacity

4.1.2 Lowest Cost of New Generation

The Integrated System Plan (ISP) developed by AEMO in 2018 takes a holistic and technology neutral approach when considering the future generation mix of the NEM at the lowest overall consumer expense. Modelling in the ISP shows that once the existing fleet of coal fired power plants reaches retirement age, the most cost-effective replacement generation source is renewables, primarily wind and solar PV.

This is supported by modelling done by CSIRO and AEMO of the projected electricity generation technology costs (CSIRO, 2018). By 2020 the overall cost to produce one unit of electricity (MWh), referred to as the levelised cost of electricity (LCOE), for wind and solar PV is expected to be significantly less than new coal or gas fired power plants. This will also be the case if wind and solar PV plants were required to install firming capacity (battery storage) to complement the variable renewable energy resource (CSIRO, 2018).

Figure 10 shows the projected costs for installation of new generation for each technology (CSIRO, 2018).

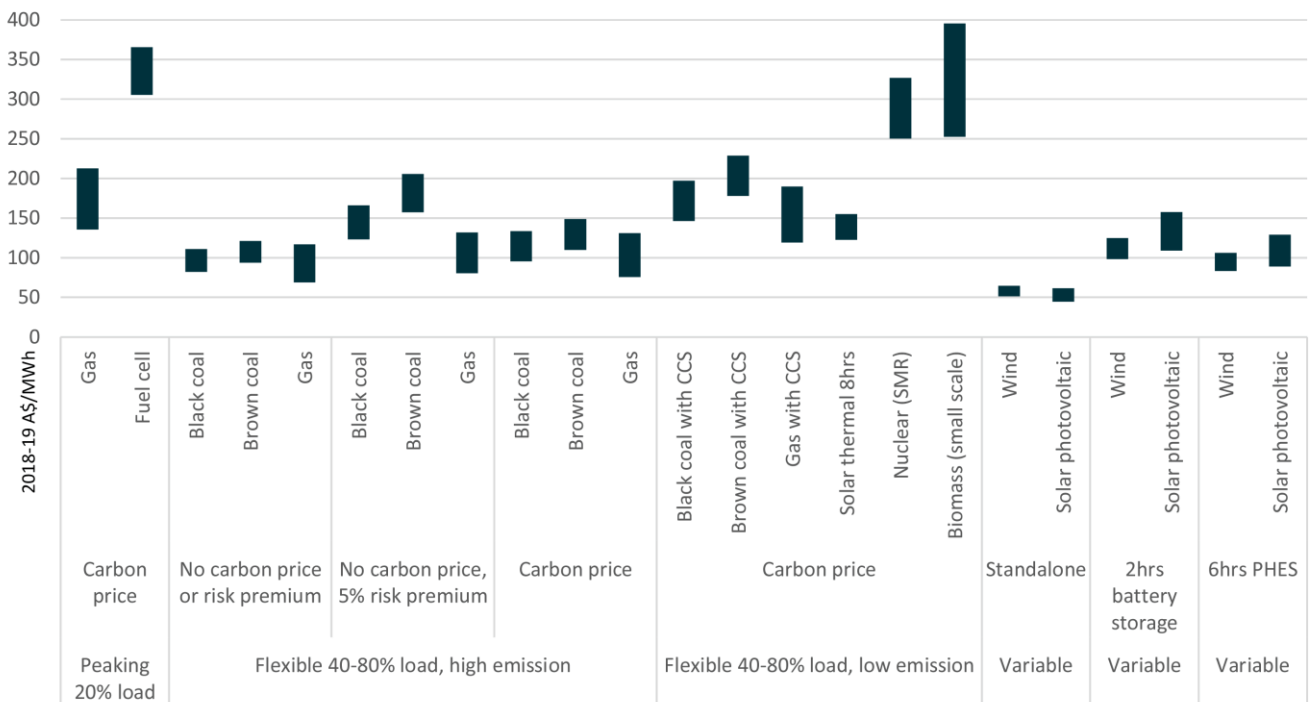


Figure 10: LCOE cost of building new generation by technology type

4.2 Federal Commitments

Australia is one of 195 countries that signed on to the United Nations Paris Agreement on climate change (Paris Agreement). The Paris Agreement sets in place a durable and dynamic framework for all countries to take climate action from 2020, building on existing international efforts in the period up to 2020. The aim of the Paris Agreement is to limit emissions globally to net-zero in the second half of this century.

Key outcomes of the agreement include:

- ▶ A global goal to hold average temperature increase to well below 2°C and pursue efforts to keep warming below 1.5°C above pre-industrial levels; and
- ▶ All countries to set mitigation targets from 2020 and review targets every 5 years to build ambition over time, informed by a global stocktake.

Australia has set a target to reduce emissions by 26-28 per cent below 2005 levels by 2030, which builds on the 2020 target of reducing emissions by five per cent below 2000 levels.

The current efforts to achieve this goal are reflected in the Renewable Energy Target (RET) Scheme. The RET was implemented in 2009 with an initial target of 44,000 GWh (later reduced to 33,000 GWh) of renewable energy generation by 2020.

In 2018 over 5,600 MWs of large-scale renewable energy projects were under construction or due to start, creating 6,080 jobs and contributing \$11,190 million in investment (CEC, 2018). The RET has been an extremely successful initiative, contributing to the more than halving of the cost of large-scale wind and solar projects over the past 10 years.

4.3 State Commitments

In September 2013, the NSW Government released the NSW Renewable Energy Action Plan (REA).

The REA has 24 actions under three goals that detail the Government's intention to increase renewable energy generation in NSW.

The REA was implemented alongside a separate Energy Efficiency Action Plan (EEAP) consisting of 30 actions to strengthen the energy efficiency market and aims to reach the following targets:

- ▶ Achieve 16,000 GWh in energy savings per year by 2020;
- ▶ Support 220,000 low income households to reduce energy use by up to 20 per cent by 2014; and
- ▶ Assist 50 % of NSW commercial floor space achieve a four-star NABERS energy and water rating by 2020, through the delivery of high-standard building retrofit programs.

The 'NSW Climate Change Policy Framework' (OEH, 2016) commits NSW to the aspirational objectives of achieving net-zero emissions by 2050.

The Project is consistent with the NSW Government's objectives and will contribute towards achieving the target by reducing emissions by an estimated 708,000 tonnes per annum.

4.4 Project Benefits

The Project offers several strategic and long-term benefits to the state of NSW and its people, including to:

- ▶ Reduce greenhouse gas emissions, contributing towards cleaner electricity generation and reduce the impact of climate change in a carbon-constrained environment;
- ▶ Supply renewable energy that will assist electricity retailers to fulfil their obligations under state and federal renewable energy targets, and will otherwise lead to increased burning of fossil fuels;
- ▶ Provide additional generation capacity into the NSW grid that will assist in meeting load demand as a result of retiring thermal generators and provide a clean, reliable generation mix; and
- ▶ Provide an opportunity for regional investment as the renewable energy sector grows in NSW and the Hunter Valley.

The Project offers several specific benefits to the environment and local community:

- ▶ Direct injection of funds into the local economy through:
 - The provision of jobs in construction and operation;
 - Use of local services in both the construction and operation phases; and,
 - Ongoing landowner payments and financial contributions to the local community being re-injected in the local community; and
 - Agreement of and payments consistent with a Voluntary Planning Agreement (VPA) with Council;
- ▶ In a typical year, based on a typical capacity factor of 35% (and assuming 72 turbines at 3.5 megawatts each), the wind farm could produce around 772,000 megawatt-hours of clean, renewable energy, enough for the average consumption of around 110,000 homes (greater than the total existing houses in the three LGAs); which
- ▶ In turn will lead to a significant reduction in greenhouse gas emissions through the avoidance of carbon dioxide from coal fired power stations.

5 Stakeholder Engagement

This section describes stakeholder engagement undertaken generally in accordance with Section 5 of the Wind Guideline, the Visual Bulletin and the DPE SSD Process. It describes consultation objectives, the engagement approach to date, proposed ongoing engagement and issues raised to date.

5.1 Consultation Objectives

Wind farms in NSW are limited to sites with elevated land, good wind speeds, usually in rural areas, and with good transmission line access. Such sites are relatively rare, and often, these sites are located in the vicinity of rural dwellings and in some cases in the vicinity of small to medium sized regional communities. This can cause conflict where local community members feel impacted by the development and yet do not see any direct benefits from the development.

While unfortunate, the limited number of appropriate wind farm sites means that this conflict is often unavoidable and cannot be eliminated by simply moving the wind farm to a different location.

Accordingly, community engagement is focused on understanding and mitigating the impacts of the wind farm, and on maximising its benefits to the local community.

Epuron has prepared a Stakeholder Engagement Plan (SEP) for the Project, the objectives of which are to:

- ▶ Ensure the community is fully informed about the Project, its likely impacts, and its likely benefits;
- ▶ Engage with stakeholders so their views, concerns and aspirations can be heard and understood;
- ▶ Ensure that the team developing the Project fully understands the local context, including any local impacts that it may have or opportunities that it could provide;
- ▶ Provide multiple opportunities for dialogue in various forms to allow the community to receive information and provide feedback about the proposal;
- ▶ Incorporate the feedback into the design of the wind farm where possible;
- ▶ Explain where and how this feedback can be and has been incorporated; and,
- ▶ Build positive, trust-based relationships with members of the local community.

Epuron's consultation process will also look at how best to maximise the local and regional benefit of the Project.

Further specific consultation will be carried out with key stakeholders including the local Aboriginal representatives (see Section 7.1.4), other affected parties (e.g. telecommunications carriers), as well as representatives from relevant government agencies.

As shown on Figure 11, the scoping report represents the first stage of many for the Project assessment process. Figure 11 also illustrates the various consultation opportunities that the community will have in relation to having input in the assessment process.



Source: DPE (2019)

Figure 11: SSD Assessment and Determination Process and Engagement

5.2 Consultation Approach

The Wind Energy Guideline and Visual Bulletin outline an expectation for early and meaningful consultation with the local community and other stakeholders to enable feedback that can be incorporated into the design of the Project.

Epuron conducted a review of the Wind Energy Guideline along with the relevant Stakeholder Engagement Plans (SEP) from its previous wind farm proposals to update and refine its approach to consultation and to develop a site-specific SEP.

The independent stakeholder engagement specialist company, Plancom was engaged to review the consultation approach, the draft SEP and to assist Epuron with its implementation.

The following section describes the consultation conducted to date for the Project.

5.2.1 Stakeholders

The SEP identified the following preliminary Stakeholder groups:

- ▶ Landowners with the potential to host infrastructure;
- ▶ Neighbouring dwellings within 3km of a potential turbine location;
- ▶ Surrounding communities;
- ▶ Local councils;
- ▶ Local sporting and business organisations;
- ▶ State and Federal Government Agencies; and
- ▶ Local media.

A focus of the SEP is to ensure that those with the potential to have the greatest impact are given every opportunity to provide early and meaningful feedback on the proposal.

A variety of methods has been implemented to consult with the stakeholders above to date and are proposed going forward. A summary is provided below.

5.2.2 Face to face visits and introduction letters

Introductory letters were sent to landowners within 5km of the investigation area, where details could be obtained. Epuron will continue regular mail-outs to all interested parties.

Face to face meetings were offered to the identified neighbouring residences within 3km of a potential turbine location. The intention of the meetings has been to introduce the Project and provide as much information as possible, to allow for questions and issues to be raised and for feedback to be given.

Face to face meetings with near-by residences will continue to be offered throughout the assessment of the Project along with additional activities to engage the wider community.

Where possible any feedback received has been incorporated into the design of the Project (see a summary of issues and further discussion in Section 5.4).

5.2.3 Community Meetings, Newsletters and Information Sessions

In July 2018 the MSC held a Community Meeting at the McCully's Gap Community Hall and invited Epuron to attend and provide an update on the feasibility study over the Project it had been conducting.

Members of the development team from Epuron presented to approximately 60 attendees and fielded questions on the potential development, approval process and estimated timings. Attendees were invited to leave contact details for future communications regarding the Project.

A newsletter containing the information provided was subsequently distributed and uploaded to the Project website.

Further to the MSC meeting in McCully's Gap, Epuron arranged a series of 'drop-in' information sessions at four locations around the site to introduce the Project to the wider community at:

- ▶ Muscle Creek Fire Station;
- ▶ Mt Pleasant Public School;
- ▶ McCully's Gap Community Hall; and
- ▶ Hebden Community Hall.

The information sessions sought to inform the community about the Project as well as seeking individual and community views on issues.

A map showing the area of investigation for the Project was presented along with an outline of the development approval process.

Several members of the development team from Epuron were on hand to respond to queries and understand issues raised.

Feedback forms were available at each of the information sessions and were subsequently uploaded onto the project website. To date Epuron has received a total of 10 returned feedback forms.

Comments from the information sessions, the feedback forms, conversations at the information sessions and meetings with neighbouring residents have been summarised in Section 5.4 along with Epuron's responses to date.

5.2.4 Community Consultation Committee

Epuron recognises that Community Consultation Committees (CCC) play an important role in providing regular updates and receiving feedback from stakeholders in relation to a Project and its development.

Epuron has committed to establishing a CCC for the Project in consultation with DPE in accordance with the '*Community Consultative Committee Guideline State Significant Projects*' (DPE, 2019) (CCC Guideline).

5.3 Ongoing Engagement

Epuron will continue to consult with the local community and other stakeholders through a variety of means generally in accordance with its SEP and as outlined in Table 2.

Table 2 – Consultation objectives and activities

Stage	Objectives	Consultation Activities
Site Selection	<ol style="list-style-type: none"> 1. Identify a boundary within which the site might be located. 2. Identify and introduce project to key stakeholders locally; host landowners, neighbours, local council and other interested stakeholders. 	<ul style="list-style-type: none"> • Phone calls • Face to face meetings • Introductory letters • Gather contact details for future communications
Project Feasibility	<ol style="list-style-type: none"> 1. Firm up the boundary of the site 2. Document engagement interactions 3. Introduce the project to the local community 4. Introduce the process to be followed 5. Explain which aspects of the project can be influenced by the community 6. Identify the benefits and impacts of the wind farm 7. Gather information and use it in the design of the project 	<ul style="list-style-type: none"> • Face to face visits • Letter of introduction • Baseline landscape and visual study • Newsletter • Community Information Sessions • Establish Project Website

Stage	Objectives	Consultation Activities
Planning and Approvals	<ol style="list-style-type: none"> 1. Maintain communication channels for enquiries and information 2. Proactively gather views and expectation and address queries 3. Prepare a Social Impact Assessment (SIA) 4. Keep communications flowing to update the community 	<ul style="list-style-type: none"> • Face to face meetings • Phone calls • Updates on project website • Establish CCC • Newsletters • Community Information Sessions • Exploration of community partnerships
Construction	<ol style="list-style-type: none"> 1. Reduce community concerns by open dialogue and acknowledging and responding to issues 2. Demonstrate commitment to the wellbeing of the community 3. Avoid, minimise or remediate impacts 4. Maximise the opportunities of construction for communities 	<ul style="list-style-type: none"> • Face to face visits • Phone calls • Updates on project website • CCC • Community partnerships • Complaints management mechanisms
Commissioning and Operation	<ol style="list-style-type: none"> 1. Be an active member of the community 2. Strengthen collaboration through partnerships 3. Build a sense of community pride in a well-run wind farm 	<ul style="list-style-type: none"> • CCC • Community partnerships • Ongoing consultation • Community events • Evaluation of engagement and improvements as required • Complaints management mechanisms
Decommissioning	<ol style="list-style-type: none"> 1. Reduce community stress and concerns 2. Acknowledge and respond to issues 	<ul style="list-style-type: none"> • Ongoing consultation • Easy access to plans and information • Complaints management mechanisms

5.4 Key Issues Raised

Key comments made during face to face meetings, information sessions and as provided in the feedback forms are summarised below.

5.4.1.1 Approval Process and Timing

- ▶ What stage of the process the project was at and what activities were involved in the following stages.
- ▶ Expected timings for the development and approval process and also the expected duration that it will take to construct the project.
- ▶ Strong desire to have regular communication and information provided on the project status and ongoing activities. Newsletters and individual letters were suggested as good options for regular updates, along with information sessions when more information was available, for example once results of the EIS is available.
- ▶ Expressed a desire to be part of a CCC as a non-involved landowner.

Proposed consultation is discussed in Section 5.2.

5.4.1.2 Visual Amenity

- ▶ The communities surrounding the Project were interested to understand the proposed locations for wind turbines. During the consultation process maps were prepared showing the area of investigation and identifying elevated ridges that had the potential to host wind turbines as discussed in Section 3.3.2. This was done to allow for feedback to be incorporated into the design of the layout at the earliest stage.
- ▶ Specific landscape features were requested to be included in an assessment of visual impact during the EIS phase including:

- Yellow Rock;
- Well Mountain; and
- Native Dog Mountain.

Epuron will conduct a visual impact assessment as part of the EIS which shall include consideration of these localities (see Section 7.1.1).

- ▶ Viewing photomontages of the proposed turbine locations from residences on:
 - Muscle Creek Road;
 - Sandy Creek Road; and
 - Scrumlo Road.
- ▶ Residents generally within 3km of proposed turbine locations expressed a desire for visual impact to be minimised and keen to understand where turbines may be visible.

Epuron will conduct a visual impact assessment as part of the EIS which shall include consideration of representative localities and shall seek to reduce visual impact where practicable (see Section 7.1.1).

5.4.1.3 Traffic and Transportation

- ▶ Construction traffic on Sandy Creek Road, particularly where it approaches the proposed project site due to the narrow and windy nature of this section; and
- ▶ Noise, traffic volumes and timing from construction traffic on Muscle Creek Road.

Epuron will conduct a traffic and transport impact assessment as part of the EIS which shall include consideration of construction and operational traffic and noise in relation to Sandy Creek Road and Muscle Creek Road (see Section 7.1.6).

5.4.1.4 Amenity

- ▶ Potential noise and health impacts that may result from the operation of the wind farm.

Epuron will conduct a noise impact assessment as part of the EIS which shall consider noise impacts against relevant NSW Guidelines (see Section 7.1.2).

5.4.1.5 Economic and Social Impact

- ▶ Support for the Project and the potential benefits available to the local area (such as jobs and investment), including general support for renewable energy and wind farms. In particular benefits that will flow to the local businesses including, local trades and contractors, hotels, restaurants and other services;
- ▶ Further information about how a community enhancement fund will be established and the criteria for grants or funding for local projects; and
- ▶ Perceived impact to property values in the vicinity of the wind farm.

Epuron will conduct a relevant assessment as part of the EIS which shall include consideration of the economic and social impacts and benefits of the Project (see Section 7.2.1.4).

A VPA will be established with the relevant Council/s.

5.5 Government Agencies & Other Stakeholders

A preliminary meeting was held with DPE on 9 January 2019 prior to preparation of the scoping report where the following issues were requested to be included in the scoping report:

- ▶ Project description: transmission corridor options, confirmation of turbine height, and conceptual site access routes (to be confirmed in EIS);

- ▶ VPA;
- ▶ Consideration of any existing, known Aboriginal heritage;
- ▶ Discussion on construction traffic;
- ▶ Visual assessment scope (particularly Mt Royal or other tourist/recreational views); and
- ▶ Noise assessment to confirm receivers where > 35 dBA are conservatively predicted.

These issues are considered in relevant parts of Section 7.

Epuron will continue to consult throughout the planning process with government agencies and statutory stakeholders including at least:

- ▶ DPE;
- ▶ Councils –MSC, SSC and UHSC;
- ▶ Office of Environment and Heritage (OEH);
- ▶ Environment Protection Authority (EPA);
- ▶ Division of Resources and Geoscience (DRG);
- ▶ Roads and Maritime Services (RMS);
- ▶ Local Land Services (LLS);
- ▶ NSW Rural Fire Service (RFS);
- ▶ Civil Aviation Safety Authority (CASA);
- ▶ Air services Australia; and
- ▶ Federal Department of the Environment and Energy (DoEE).

Epuron sent a Grid connection enquiry to TransGrid and AusGrid on 10 November 2016.

6 Risk Assessment

This section identifies the currently identified potential environmental and social impacts associated with the Project and identifies high and moderate priorities for further assessment in the EIS.

6.1 Introduction

Epuron has used its experience in wind farm development, together with a preliminary assessment of the site, to identify the key issues to be assessed in relation to the Project.

The risk assessment included a review of the Wind Energy Framework as well as the SEARs for recent wind farm projects.

Potential environmental and social impacts identified include:

- ▶ Visual amenity (including landscape and lighting)
- ▶ Noise and vibration
- ▶ Biodiversity (flora and fauna)
- ▶ Aboriginal Heritage
- ▶ Historic heritage
- ▶ Traffic and transport
- ▶ Water
- ▶ Soil and Landforms
- ▶ Dust management
- ▶ Safety (including aviation, bushfire, fire and blade throw)
- ▶ Telecommunications
- ▶ Social and Economic
- ▶ Waste management
- ▶ Health (including infrasound and Electromagnetic frequencies (EMF))
- ▶ Decommissioning
- ▶ Cumulative Impacts

The EIS will be prepared generally in accordance with the SEARs to be issued by DPE in response to this scoping report. All assessments (including specialist assessments) will be completed taking into consideration experience from other wind farm projects, consultation with stakeholders, and industry best practice guidelines.

6.2 Environmental and Social Risk Assessment

Epuron has carried out its environmental and social risk assessment based on information collected to date on site, at nearby sites, generally within the region and based on similar proposals in other regions. The assessment separates the issues into three priorities;

- ▶ High Priority (Key) - addressed through use of an independent specialist assessment;
- ▶ Moderate Priority - addressed via desktop assessment, precedent and consultation;
- ▶ Low Priority – addressed via minor desktop assessment.

In relation to each risk, Epuron has established the Priority by taking into consideration:

- ▶ The level of information already available about that issue;
- ▶ The extent to which site-specific assessment is required to define that issue;
- ▶ The likelihood of that issue occurring, and potential impacts of that issue if it did occur in consideration of standard industry controls; and
- ▶ The extent to which standard industry practice, statutory requirements, and standard consent conditions adequately address the issue.

Where an issue has been established as a Low Priority, this has been on the basis that:

- ▶ It is a risk which is well understood;

- ▶ Site-specific assessment is not required to understand the risk;
- ▶ It has previously been demonstrated to not affect the assessment of wind farm projects or the consent conditions relevant to them;
- ▶ It has previously been found not to be relevant to the assessment of wind farm projects; and/or
- ▶ An industry standard approach is available which adequately addresses the issue and it is proposed that this approach will be included in the EIS.

Issues which fall into the Low Priority category are discussed in Section 7.2.1.6.

Table 3 summarises the sources of impact, preliminary direct mitigation options, and proposed strategies for addressing each issue. High and moderate issues and the proposed assessment approach are discussed in detail in Section 7.1 and 7.2.

Table 3 – Risk assessment, Preliminary Direct Mitigations and Assessment Approach

Issue	Sources of impact		Priority	Assessment
Visual amenity	Impacts	Loss of visual amenity for receivers and communities Loss of visual amenity for key outlooks or tourism routes Impact on scenic/landscape character Shadow flicker disturbance Cumulative visual impacts Lighting impacts	High	Independent specialist assessment in accordance with the Visual Bulletin
	Mitigation:	Landscaping measures		
Noise amenity	Impacts	Operational aerodynamic or mechanical noise impacts on receivers Construction noise impacts on receivers Road traffic noise Vibration Cumulative impacts	High	Independent specialist assessment in accordance with the Noise Bulletin
	Mitigation	Through turbine selection, location, and other noise control measures		
Biodiversity	Impacts	Clearing of vegetation during construction and maintenance Loss or modification of habitat for terrestrial and aquatic species Potential for spread of weeds through soil disturbance and traffic movement Impact on threatened species or endangered ecological communities Bird and bat strike through direct collision or barotrauma Cumulative impacts	High	Independent specialist assessment
	Mitigation	Relocation of equipment Appropriate environmental management procedures Species-specific mitigation options Biodiversity Offsets commitment		
Aboriginal Heritage	Impacts	Potential to impact Aboriginal objects or heritage values	High	Independent specialist assessment
	Mitigation	Relocation of project components Appropriate environmental management procedures		
Traffic and transport	Impacts	Increased traffic on local and regional road network for each of construction and operation Construction traffic may contribute to road pavement deterioration Turbines may distract drivers Cumulative impacts	High	Independent specialist assessment
	Mitigation	Traffic Management Plan and road maintenance and upgrades, as required		

Issue	Sources of impact		Priority	Assessment
Historic heritage	Impacts	Potential to impact heritage values and items	Moderate	Independent specialist assessment
	Mitigation	Relocation of project components Appropriate environmental management procedures		
Telecommunications	Impacts	Loss of communication signals Reduction in strength of broadcast signals (TV or radio)	Moderate	In house assessment
	Mitigation	Relocation of equipment Site specific mitigation		
Soils, Landforms and Rehabilitation	Impacts	Erosion, landform and rehabilitation stability	Moderate	In house and/or independent specialist assessment
	Mitigation	Environmental Management Plan		
Water	Impacts	Availability of water for construction Erosion and sediment control leading to pollution	Moderate	In house and/or independent specialist assessment
	Mitigation	Standard practices apply		
Social and Economic	Impacts	Land use change Economic impacts	Moderate	In house and/or independent specialist assessment
	Mitigation	Economic impacts are positive		
Hazards and Safety	Impacts	Aviation safety (instruments and airspace intrusion) Bushfire safety (hazards and risks) Fire management Blade throw risks	Moderate	In house and/or independent specialist assessment
	Mitigation	Standard practices apply		
Dust management	Impacts	Construction dust impacts	Low	Main EIS volume
	Mitigation	Standard practices apply		
Waste	Impacts	Generation of recyclable and general waste Generation and disposal of refurbished blades	Low	Main EIS volume
	Mitigation	Standard practices apply		
Decommissioning	Impacts	Decommissioning procedures Rehabilitation	Low	Main EIS volume
	Mitigation	Standard practices apply		
Health	Impacts	Epilepsy triggers Infrasound EMF	Low	Main EIS volume
	Mitigation	Standard practices apply and demonstrated application of the principles of prudent avoidance		

7 Preliminary Environmental Assessment

This section discusses potential environmental and social impacts associated with the Project identified in Section 6 and outlines of how each will be assessed in the EIS.

7.1 Assessment of Key Issues

7.1.1 Visual Amenity

7.1.1.1 Introduction

Green Bean Design Pty Ltd (GBD) was commissioned to undertake a Preliminary Landscape and Visual Impact Assessment (PLVIA) for the Project. The PLVIA has been prepared in accordance with the Visual Bulletin and is provided in Appendix A with a summary below. The PLVIA was prepared consistent with the preliminary project description in Section 3.

7.1.1.2 Background

The Visual Bulletin requires consideration of residential dwellings and key public view points within the Study Area, an area defined by the combination of the location of proposed turbines and the tip height of the turbines in the development application (as shown on Figure 12).

The “Study Area” is defined as anywhere within 3 km from a proposed wind turbine shown as “3 km” on Figure 13. An initial desktop analysis along with follow-up consultation activities was conducted to identify these residential receptors.

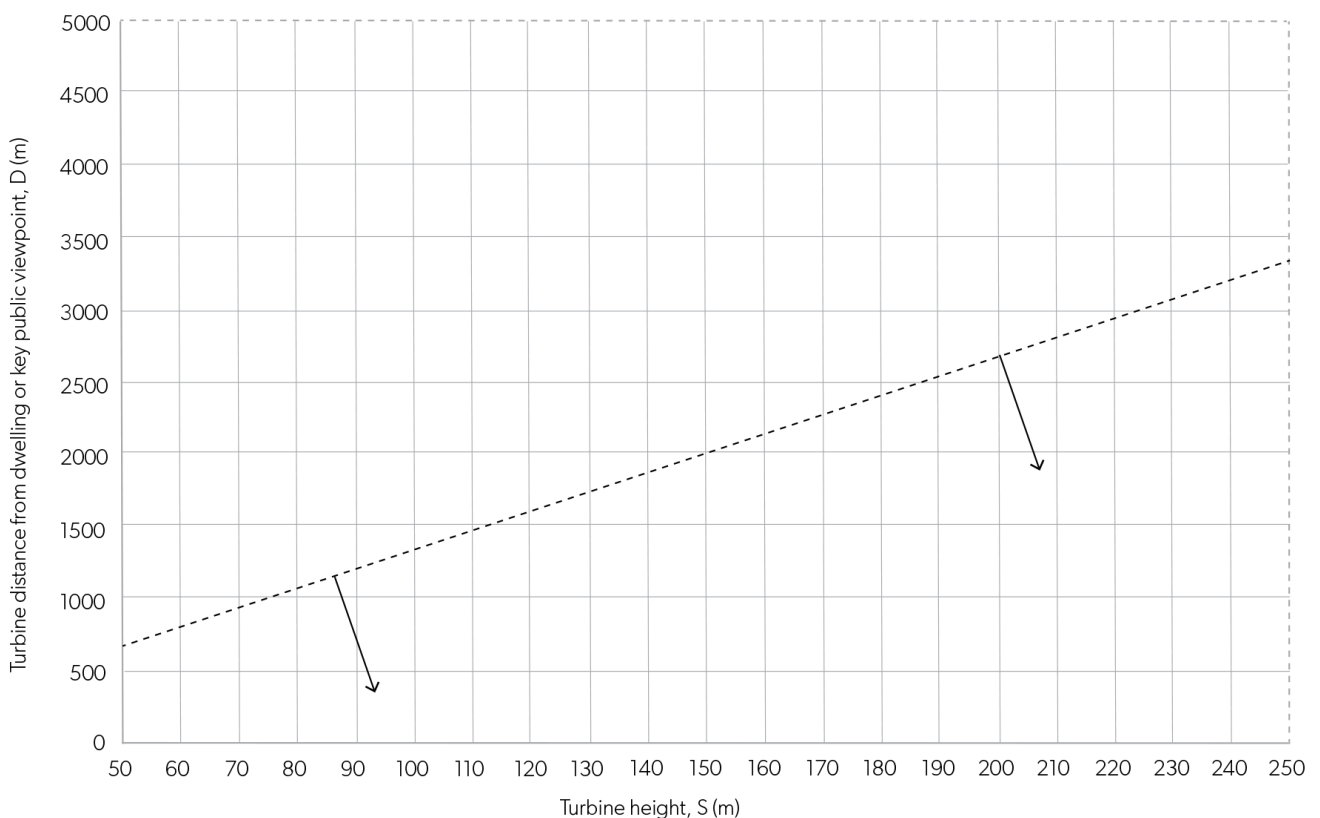


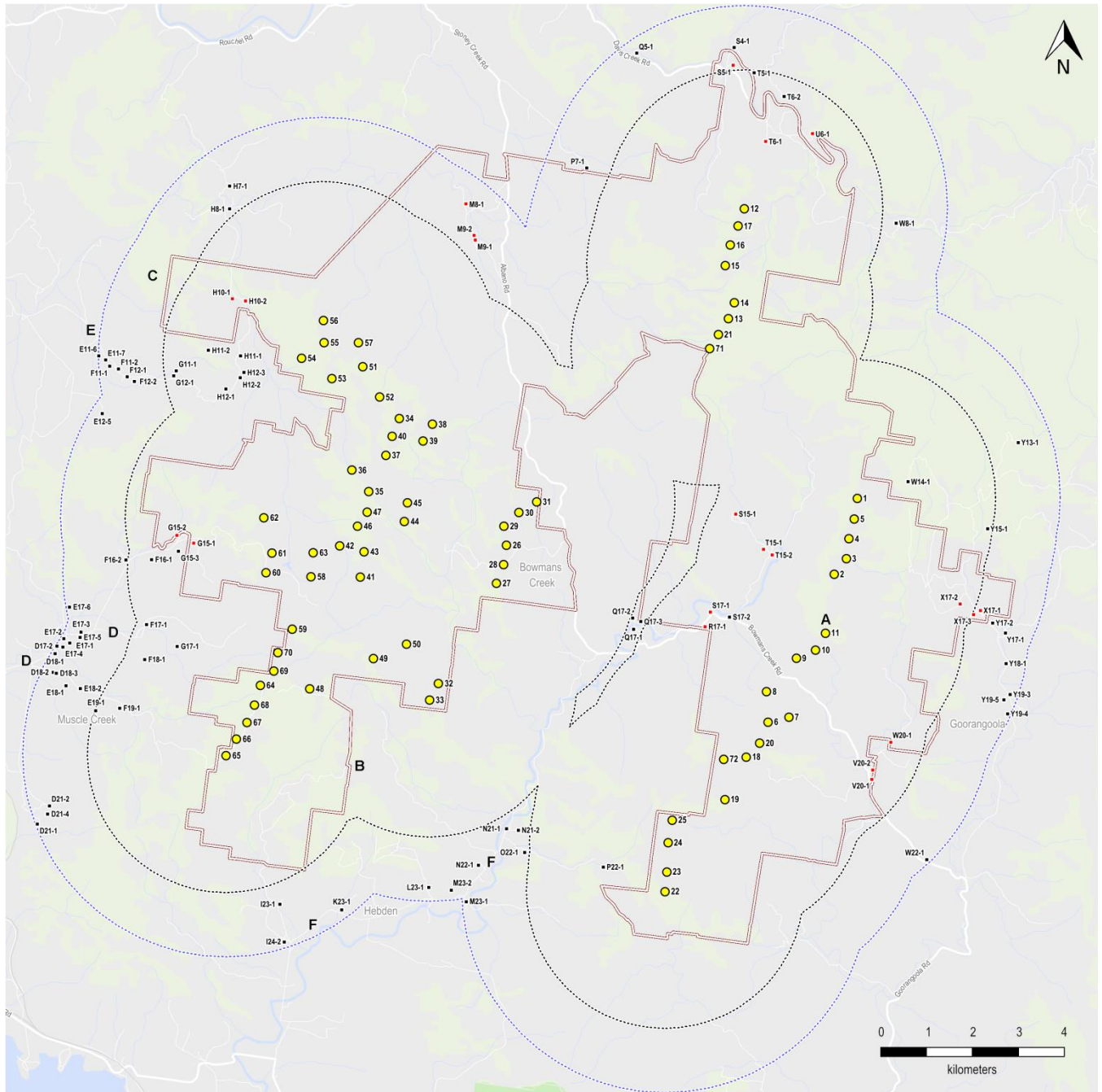
Figure 12: Preliminary Assessment Tool 1 indicating potential visual impacts for further detailed consideration

Consistent with Table 2 of the Visual Bulletin, a further desktop analysis was conducted to identify additional residential receptors within 4.4 km of a proposed wind turbine to define the “additional threshold distance”. Consultation activities with landowners in this zone are ongoing. All residential receptors identified within 4.4 km of a proposed wind turbine location are shown within the “4.4 km” blue line on Figure 13.

A Zone of Visual Influence (ZVI) map was created and is included in Appendix A which gives a graphical representation of the visibility of the proposed wind turbines to the surrounding area.

Figure 13 also indicates receptors relevant to the Project and whether each is “associated” or “non-associated”. Each has been allocated an individual receiver value.

No public view points are known to occur within the Visual Study Area. Further investigation and consultation will occur leading up to the preparation of the EIS in an endeavour to identify any such points.



Legend







	Project boundary		Non associated residential dwelling	A	Yellow Rock	D	Muscle Creek Road
	Proposed wind turbine (indicative location)		3km black line	B	Well Mountain	E	Sandy Creek Road
	Associated residential dwelling		4.4km blue line	C	Native Dog Hill	F	Scrumio Road

Figure 13: Study Area for further detailed consideration in EIS

7.1.1.3 Preliminary Assessment

Methodology

The assessment methodology for the PLVIA consisted of the following:

- ▶ Review of the objectives of the Visual Bulletin and a site-specific scope of work created for the Project;
- ▶ Development and implementation of the SEP as described in Section 5 to ensure that the objectives of the Visual Bulletin are met;
- ▶ Face-face meetings and community sessions to gather feedback on the local landscape values and the Project;
- ▶ Conduct a scenic quality assessment of the local area focusing on landscape features, topography, vegetation cover and land use to assist in gathering feedback from the local community;
- ▶ Desktop analysis and a ZVI map to identify nearby receptors;
- ▶ Assessment of the draft wind turbine layout;
- ▶ Thirty-one representative viewpoints were selected to evaluate the visual impact of the receivers within 4.4 km of proposed turbine locations;
- ▶ A preliminary landscape and visual assessment was completed using the Visual Magnitude and Multiple wind farm tools; and
- ▶ Recommendations for further assessment were identified using the PLVIA.

Visual Magnitude Assessment

Table 4 reproduces the residential dwellings within the Study Area, provides the distance to the nearest wind turbine and its ID. Within the 3 km buffer, 35 receptors were identified of which 20 are “non-associated”.

No public viewpoints were identified within the Study Area.

Table 4 – Residential Receptors within the Study Area

ID	Associated or Non-Associated	Distance to Wind Turbine (m)	Wind Turbine ID
E19-1	Non-associated	2,989	65
F16-1	Non-associated	2,496	60
F17-1	Non-associated	2,796	64
F18-1	Non-associated	2,566	64
F19-1	Non-associated	2,527	65
G11-1	Non-associated	2,728	54
G12-1	Non-associated	2,797	54
G15-3	Non-associated	1,954	60
G17-1	Non-associated	1,994	64
H11-1	Non-associated	1,320	54
H11-2	Non-associated	2,023	54
H12-1	Non-associated	1,772	54
H12-2	Non-associated	1,393	54
H12-3	Non-associated	1,288	54

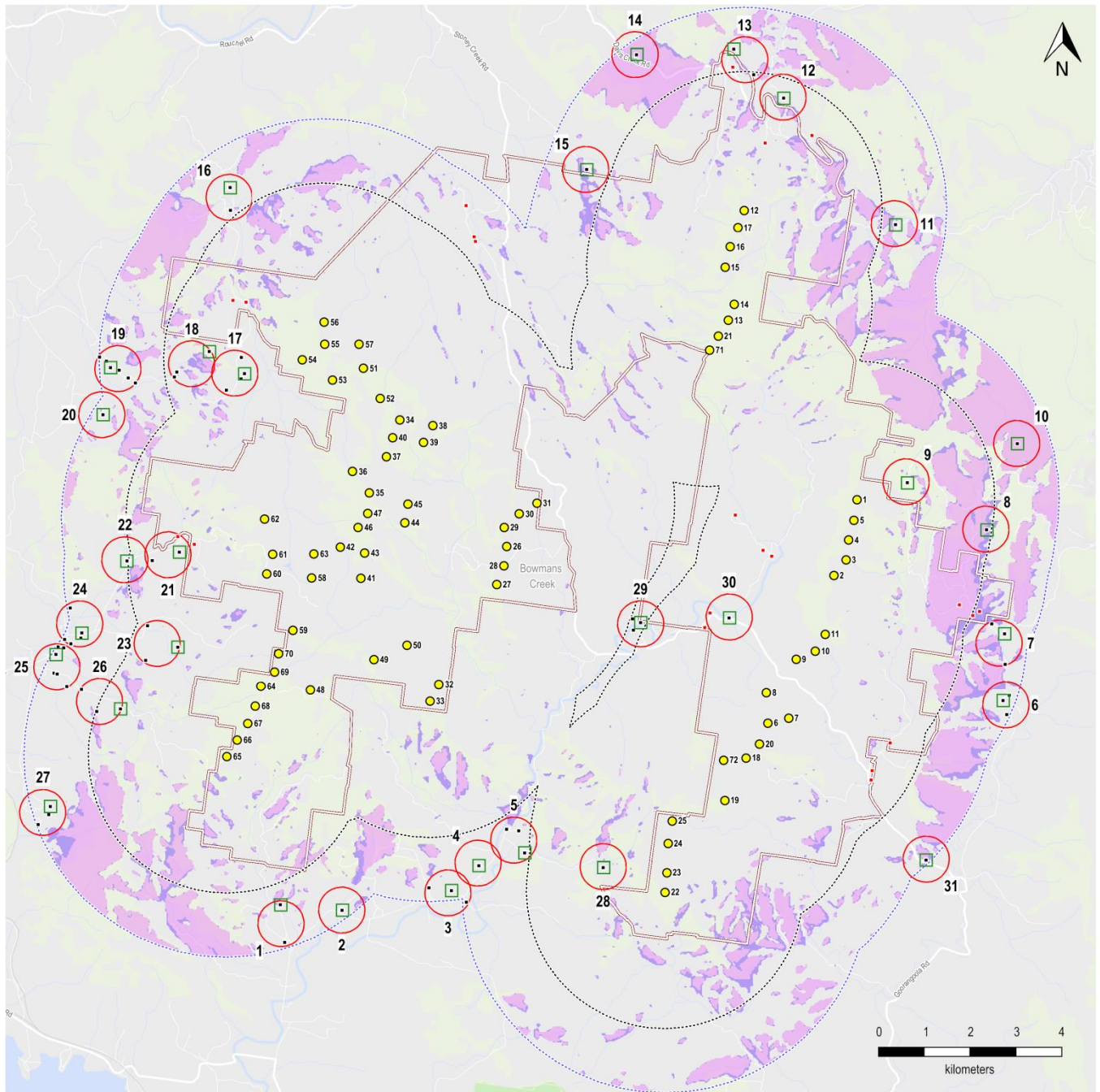
ID	Associated or Non-Associated	Distance to Wind Turbine (m)	Wind Turbine ID
P22-1	Non-associated	1,378	23
S17-2	Non-associated	1,704	9
T5-1	Non-associated	2,963	12
T6-2	Non-associated	2,587	12
W14-1	Non-associated	1,156	1
Y15-1	Non-associated	2,892	5
G15-1	Associated	1,617	62
G15-2	Associated	1,920	62
H10-1	Associated	1,979	54
H10-2	Associated	1,741	54
R17-1	Associated	1,943	8
S15-1	Associated	2,508	2
S17-1	Associated	2,116	9
T15-1	Associated	1,625	2
T15-2	Associated	1,409	2
T6-1	Associated	1,536	12
U6-1	Associated	2,197	12
V20-1	Associated	2,245	7
V20-2	Associated	2,147	7
W20-1	Associated	2,275	7
X17-2	Associated	2,658	3

Multiple Wind Turbine Assessment

The Multiple Wind Turbine Tool was designed to assess the number of visible wind turbines or cumulative impacts from being able to see multiple wind turbines. There are no other wind farms in the vicinity of the Project, however the tool was applied to the Project's multiple turbines.

The PLVIA identified 31 individual representative view locations which contain single or multiple non-associated residential dwellings out to a distance of 4.4km from the proposed wind turbines. The PLVIA incorporated multiple residential dwellings into a single view location where dwellings occur within a 500m radius of each other (see Figure 14). GBD considers that views from these locations will be either very similar or identical in most cases.

The multiple wind turbine analysis is shown in Appendix A in Figures 9 to 40. Figure 14 also illustrates a Zone of Visual Influence analysis which indicates areas of the landscape from which wind turbines will not be visible, or visible toward blades only. The extent of screening illustrated in Figure 14 relates to screening by landform only and does not account for vegetation (tree cover) within the landscape or surrounding residential dwellings.



Legend

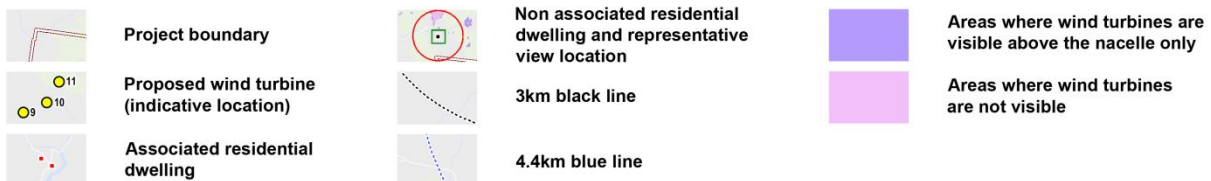


Figure 14: Residential dwellings Multiple Wind Turbine Tool

Table 5 provides a summary of the Multiple Wind Turbine Analysis for non-associated dwellings.

The PLVIA has determined that 10 of the 67 receptors within 4.4km of the wind turbines may have views extending up to 8 km toward wind turbines within three or more 60° sectors which are shown in **bold** in **Table 5**.

Table 5 – Multiple Wind Turbine Analysis Non-Associated Residential Dwellings

Rep. ID	Representative residential dwelling ID (and other proximate dwellings)	Distance (m) from representative dwelling to closest wind turbine (and turbine ID)	Number of 60°sectors with wind turbines	Number of visible wind turbines within 3 or more 60°sectors
1	I23-1 (I24-2)	3,439 (65)	1	
2	K23-1	4,186(65)	2	
3	M23-2 (L23-1,M23-1)	4,158(33)	2	
4	N22-1	3,742(33)	2	
5	O22-1 (N21-1,N21-2)	3,112 (23)	3	16
6	Y19-5 (Y19-3,Y19-4)	4,125(11)	2	
7	Y17-1(Y17-2, Y18-1)	3,806 (3)	1	
8	Y15-1	2,892(5)	1	
9	W14-1	1,156(1)	1	
10	Y13-1	3,692 (1)	0	
11	W8-1	3,289(12)	1	
12	T6-2	2,587(12)	1	
13	S4-1	3,518(12)	1	
14	Q5-1	4,115(12)	0	
15	P7-1	3,513(17)	2	
16	H7-1 (H8-1)	3,566(56)	1	
17	H12-3 (H12-1, H12-2, H11-1)	1,288(54)	2	
18	H11-2 (G11-1,G12-1)	2,023 (54)	2	
19	F11-1 (E11-6, E11-7, F11-2, F12-1, F12-2)	4,162(54)	1	
20	E12-5	4,172(62)	1	
21	G15-3 (F16-1)	1,954(60)	3	28
22	F16-2	3,046(60)	2	
23	G17-1 (F17-1,F18-1)	1,994(64)	3	19
24	E17-3(E17-1, E17-2, E17-5, E17-6)	4,056(64)	2	
25	D18-1 (E17-4,D17-2,D18-2, D18-3,E18-1)	4,321(65)	2	
26	F19-1 (E18-2, E19-1)	2,527 (65)	1	
27	D21-2 (D21-1, D21-4)	3,981(65)	1	
28	P22-1	1,378(23)	2	5
29	Q17-3	3,124 (8)	4	27
30	S17-2	1,704 (9)	4	25
31	W22-1	4,301(7)	1	

Of 31 potential receivers, two receivers (Q5-1 and Y13-1) are predicted to have no view of a wind turbine.

Five representative locations including 10 receivers are predicted to have views towards 16-28 wind turbines within three or more 60° sectors including: O22-1(N21-1, N21-2); G15-3 (F16-1); G17-1 (F17-1, F18-1); Q17-3 and S17-2. Q17-3 and S17-2 are predicted to have views of wind turbines within four 60° sectors of 27 and 25 turbines, respectively.

The remaining 21 receivers are predicted to have views towards multiple wind turbines on to two 60° sectors.

7.1.1.4 Methodology

The EIS will include a detailed Visual impact assessment and Lighting Assessment which shall consider all components of the Project in accordance with the Visual Bulletin which will include (but not be limited to):

- ▶ An assessment and justification for the placement of wind turbines in sensitive areas, including those located within and between the 3km and 4.4km distance offsets from the wind turbine locations;
- ▶ A description of the mitigation and management measures to be employed to reduce impacts. Including a consideration of whether site-specific factors such as topography, relative distance and existing vegetation may minimise or eliminate the impacts of the project will be made;
- ▶ An assessment of the circumstances where dwellings or key public viewpoints located above the line may require further consideration due to topography or other landscape features. The further detailed assessment and ground-truthing at the visual assessment stage will also consider impacts on these dwellings or key viewpoints;
- ▶ A consideration of any issues identified in stakeholder engagement to date including an assessment of specific landscape features, public viewing points and representative photomontages;
- ▶ A consideration of shadow flicker as an amenity impact;
- ▶ Further assessment and justification for the placement of wind turbines within 3 or more 60° sectors where necessary; and
- ▶ A description of the proposed mitigation measures to reduce visual impacts.

7.1.2 Noise Amenity

7.1.2.1 Introduction

Epuron has undertaken a Preliminary Noise Impact Assessment (PNIA) for the Project. The PNIA has been prepared generally in accordance with the Noise Bulletin.

7.1.2.2 Background

Noise generated by wind farms is often raised by members of the local community as an issue of concern during the development phase. To ensure that noise levels for people living near the proposed wind farm are at an acceptable level, developers of wind energy projects are required to demonstrate the ability to comply with strict operational and construction noise limits.

A detailed standard for conducting noise impact assessments has been developed to improve the accuracy of predicted noise levels at dwellings in the area surrounding a proposed wind farm. The NSW Department of Planning has adopted this standard from the '2009 South Australian Environmental Noise Guidelines' (SA, 2009) in developing its own guidelines, the 'Noise Bulletin'.

The Noise Bulletin requires a preliminary NIA to be completed at the pre-lodgement stage to inform the design of the proposal.

7.1.2.3 Preliminary Assessment

Methodology

Epuron has conducted a preliminary assessment on operational noise using specialised modelling software (WindFarmer) to provide indicative noise predictions. The assessment was conducted consistently with the recommendations of the NIA, using the maximum sound power level of the likely turbine model and conservative assumptions to produce worst case noise propagation conditions.

Assumptions included:

- ▶ Turbine locations consistent with Figure 5;
- ▶ Receiver locations consistent with Figure 13;
- ▶ Hard ground conditions; and
- ▶ Sound Power Level (SPL) from Siemens Gamesa 145m 4.5MW turbine (representative turbine); and

Indicative noise predictions generated in the modelling were compared to the base criteria adopted by the Noise Bulletin of 35dBA for non-involved residences (noise criteria).

Figure 15 below is featured in the Noise Bulletin and shows the average distances at which compliance can be achieved against a number of different noise standards. It also demonstrates the how strict the noise levels adopted by the NSW Planning system are in comparison to other jurisdictions.

These set back distances are indicative only and take no consideration for site specific terrain, vegetation cover or climatic conditions which could increase or decrease the noise levels at a receiver. However, the Noise Bulletin states that the NSW criteria will typically be achievable at distances between 0.8 – 1.5 km.

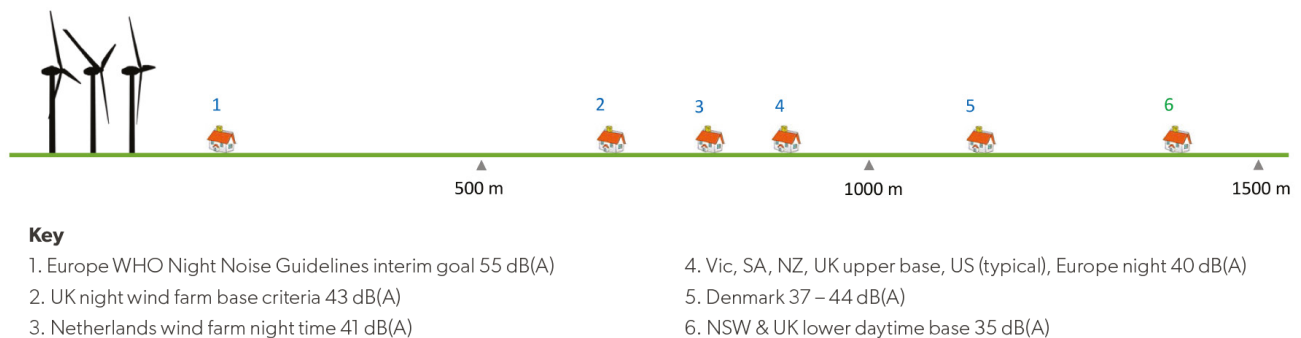


Figure 15: Noise Bulletin Average Distances for Different Noise Standards

Results

The results of the preliminary assessment modelling are shown in Table 6. Where predictions indicate a potential to exceed the noise criteria, these are **bolded**. Figure 16 presents the results from the modelling in graphical form.

Of the 35 non-associated residential dwellings modelled as part of this preliminary NIA, ten are predicted to marginally exceed the noise criteria (ranging from 35.3 dB(A) to 36.5 dB(A)).

The predicted exceedances are within 1.5 dBA of the noise criteria and as such are anticipated to be able to be managed through detailed design. As such, no modification to the location of the wind turbines was required for the scoping report.

Table 6 – Predicted noise levels at non-associated receiver locations

Dwelling ID	Distance to nearest turbine (m)	Noise Prediction (dB(A))
G15-3	1957.6	34.6
G15-1	1619.5	35.8
G15-2	1923.8	34.3
F19-1	2530.1	31.7
S17-1	2115.8	34.5
R17-1	1942.3	34.7
S15-1	2509.9	33.4
T15-2	1411	36.5
G12-1	2803.1	31.3
H12-1	1775	34.4
H12-2	1395.1	35.7
H11-1	1323.3	35.7
H12-3	1290.3	36.1
G11-1	2733.7	31.3
F17-1	2798.5	32.9
E19-1	2993.5	30.2
H10-2	1740.8	34.3
H10-1	1978.3	33.2
T6-2	2581.5	28.4
T5-1	2954.5	27.4
U6-1	2196.2	29.8
T6-1	1532.2	32.7
W14-1	1158.1	36.0
X17-2	2661.2	31.1
W20-1	2279.2	32.6

Dwelling ID	Distance to nearest turbine (m)	Noise Prediction (dB(A))
V20-2	2148.4	32.9
V20-1	2246	32.6
P22-1	1380.7	35.8
Y15-1	2897.4	29.8
S17-2	1705.2	35.7
T15-1	1627.6	35.6
F16-1	2500.9	32.8
F18-1	2570.7	33.2
G17-1	1996.4	35.3
H11-2	2027.3	32.9

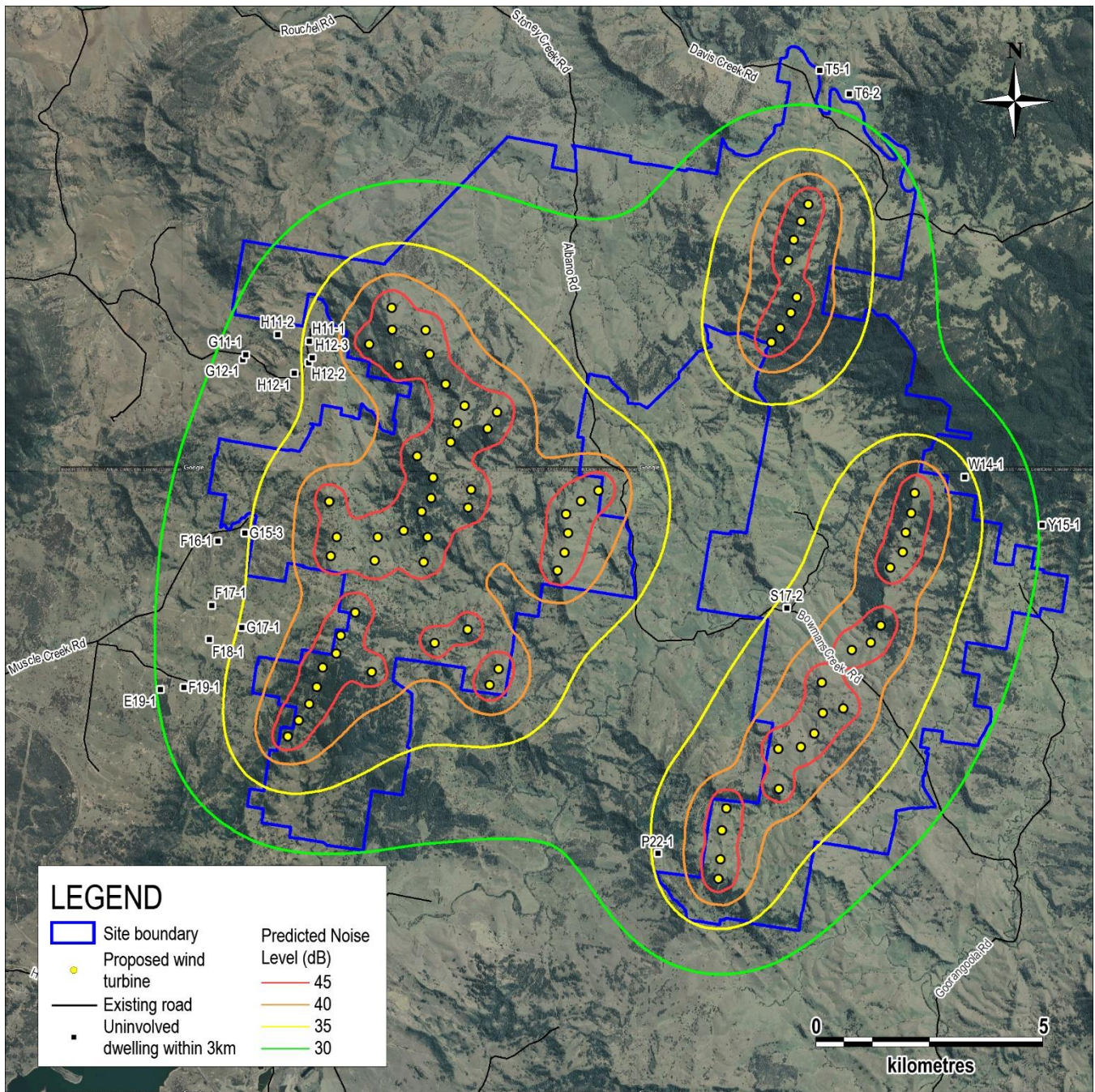


Figure 16: Predicted noise levels based on preliminary layout

7.1.2.4 Methodology

The NIA will assess all components of the Project including:

- ▶ Wind turbine noise in accordance with the Noise Bulletin (DPE, 2016c);
- ▶ Ancillary infrastructure in accordance with the 'NSW Noise Policy for Industry' (EPA, 2017);
- ▶ Construction noise under the 'Interim Construction Noise Guideline;' (DECC, 2009);
- ▶ Traffic noise under the 'NSW Road Noise Policy' (DECCW, 2011); and
- ▶ Vibration 'Assessment Vibration: A technical Guideline' (DECC, 2006).

The scope of the NIA will include:

- ▶ A relevant level of background noise survey;
- ▶ Review of site meteorology data to determine relevant meteorological data to be used in modelling;
- ▶ Predictive noise modelling of the Project's construction and operational activities;
- ▶ Road traffic noise during construction and operational activities;
- ▶ Vibration impacts at sensitive receptors;
- ▶ Cumulative noise impacts with surrounding industry (if any); and
- ▶ Identification of any reasonable and feasible mitigation and management measures.

7.1.3 Biodiversity

7.1.3.1 Introduction

Epuron has carried out a preliminary biodiversity assessment of the Project.

7.1.3.2 Background

The ridges most likely to contain turbines are generally clear on the tops and carry dry forest vegetation communities on the steeper sheltered slopes. Remnant stands of the original vegetation remain as paddock tress or larger scattered patches of forest/woodland. The surrounding slopes and gullies are unlikely to contain turbines but could be affected if access routes or powerlines were routed through them. In general, the slopes and gullies carry more native vegetation than the ridges.

The proposed site is located within the NSW North Coast IBRA and IBRA Sub-Regions of Ellerston, Tomalla and Upper Hunter.

There are no significant wetlands in the proposed site or surrounding area, however, Bowmans Creek bisects the overall site and Glennies Creek Dam, Lake Liddell and Lake Glenbawn occur within approximately 10km from the site. Mount Royal National Park is located at least 5 km to the North East of the proposed site boundary.

7.1.3.3 Preliminary Assessment

Threatened Species

A search of the NSW OEH BioNet Atlas was conducted (December 2018) using a 1.5 km buffer around the Project Boundary and returned eight threatened species which included three species of birds, four mammals, and one flora species. Of these records only one threatened species (spotted-tailed quoll) has been recorded within the Project Boundary.

The EPBC Act Protected Matters Search Tool was used (December 2018) with a buffer of 5 km around the Project Boundary and returned one (1) Wetlands of International Importance (Hunter estuary wetlands, 50-100km downstream), four threatened ecological communities, 32 listed threatened species and 15 listed migratory species which may occur or relate to the area.

The purpose of these search tools is to identify entities that may be or are likely to occur and to guide the site investigations. Detailed site field work will be undertaken to identify all species and communities relevant to the site.

Vegetation communities

A desktop assessment was conducted to map the vegetation communities or Plant Community Types (PCT) known to occur within the Project Boundary. Based on this existing mapping the PCTs that are likely to occur on the ridgelines where infrastructure is proposed include:

- ▶ River oak/sandpaper fig riparian forest of the Upper Hunter and Liverpool Ranges (PCT 1713);
- ▶ Spotted gum/ narrow-leaved ironbark shrub/ grass open forest of the central and lower Hunter (PCT 1602);
- ▶ White mahogany/ spotted gum/ grey myrtle semi-mesic shrubby open forest of the central and lower Hunter Valley (PCT 1584);

- ▶ White box/ narrow-leaved ironbark/ Blakely's red gum shrubby open forest of the central and upper Hunter (PCT 1606);
- ▶ Narrow-leaved ironbark/ grey box grassy woodland of the central and upper Hunter (PCT 1691);
- ▶ Narrow-leaved ironbark/ native olive shrubby open forest of the central and upper Hunter (PCT 1605);
- ▶ Sydney blue gum/ silvertop stringybark grassy open forest on ranges of the lower North Coast (PCT 1546);
- ▶ Sandpaper fig/ whalebone tree warm temperate rainforest (PCT 1525); and
- ▶ Whalebone tree/ red kamala dry subtropical rainforest of the lower Hunter River (PCT 1541).

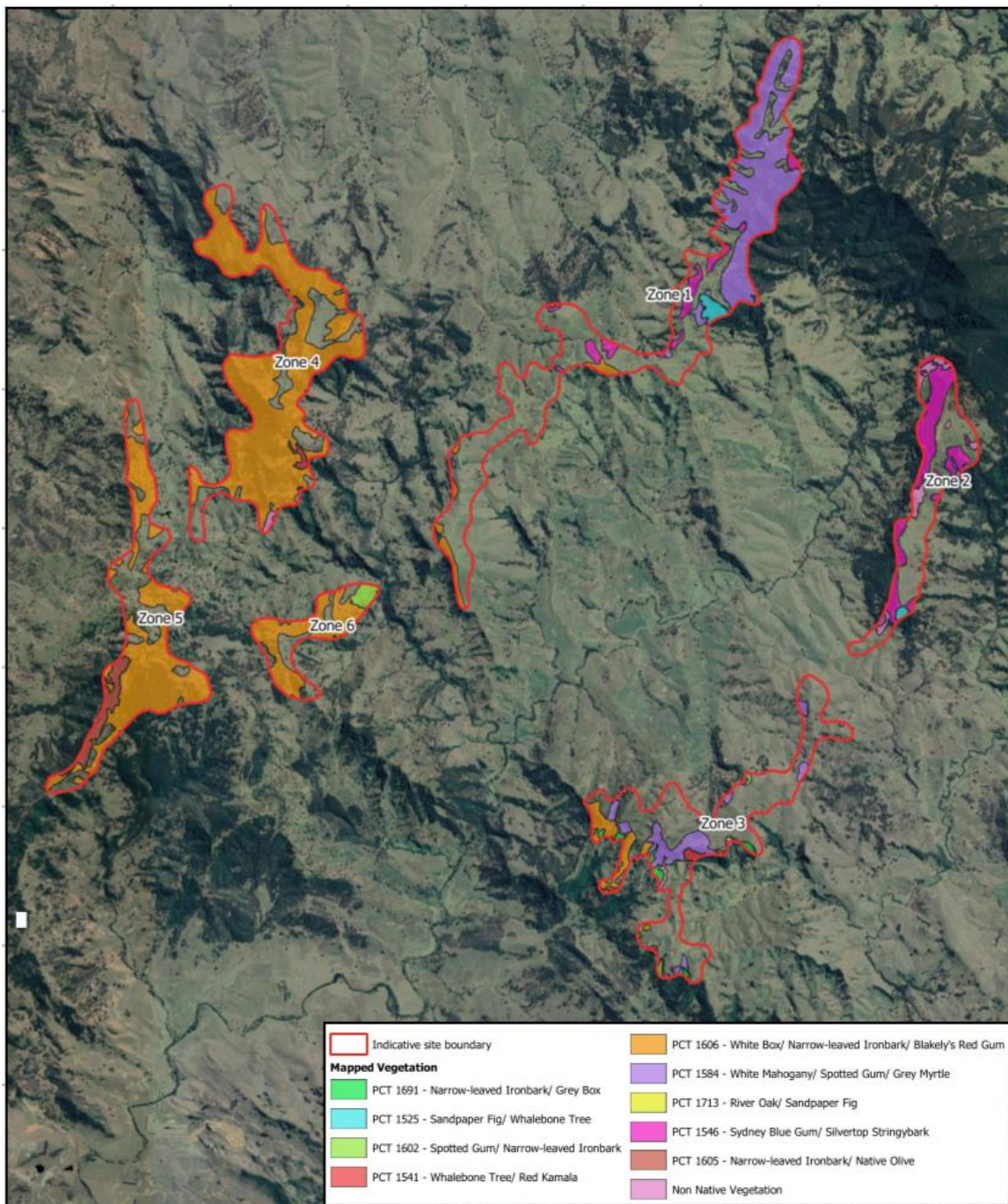


Figure 17: Mapped Vegetation (OEH)

Threatened Ecological Communities (TECs)

Of the PCTs that were mapped across the Project area, six are associated with Threatened Ecological Communities (TECs) as identified below:

- ▶ PCT 1602 – Lower Hunter spotted gum-ironbark forest in the Sydney Basin Bioregion;
- ▶ PCT 1606 – White box yellow box Blakely's red gum woodland;
- ▶ PCT 1691 - White box yellow box Blakely's red gum Woodland; Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions; Central Hunter grey box-ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions;
- ▶ PCT 1605 – Central Hunter grey box-ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions (Equivalent); Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions; and
- ▶ PCT 1525 – Lower Hunter Valley Dry Rainforest in the Sydney Basin and NSW North Coast Bioregions; Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions (Equivalent); Lowland Rainforest on Floodplain in the New South Wales North Coast Bioregion (Equivalent).

The mapped PCTs and their associated TECs will need to be confirmed in a detailed Biodiversity Impact Assessment.

7.1.3.4 Methodology

A detailed Biodiversity Impact Assessment will be undertaken in consideration of the BC Act and EPBC Act with site specific assessment of flora, ground-based fauna, and aerial fauna (including bats and birds) to determine Project impacts.

The scope of the Biodiversity Impact Assessment will generally include:

- ▶ Detailed background from existing literature sources;
- ▶ A desktop review of relevant databases and extensive available literature to identify flora, fauna species, Groundwater Dependent Ecosystem (GDEs) and vegetation communities with a potential to occur within the Project Boundary;
- ▶ Seasonal field surveys of vegetation communities, flora and fauna (terrestrial and aquatic) and habitat condition across the Project Boundary to comply, where possible, with OEH's and DoEE's recommendations for survey;
- ▶ Mapping the distribution of vegetation communities within the Project Boundary and transport route upgrades;
- ▶ Targeted searches for threatened species, populations and communities (as listed under the schedules of the BC Act and EPBC Act) that may potentially occur in the Project Boundary;
- ▶ Habitat assessments within the Project Boundary;
- ▶ Assessment of impacts on listed vegetation communities and threatened flora and fauna species;
- ▶ Assessment of impact of the Project on birds and bats from blade strikes, low air pressure zones at the blade tips (Barotrauma), and alteration to moment patterns resulting from the turbines;
- ▶ Identification of any impact avoidance, mitigation and offset measures necessary for the Project Boundary and transport route upgrades; and
- ▶ Development of any required offset strategy in accordance with the BC Act and EPBC Act.

As described in Section 2.3, an EPBC Referral will be submitted to DoEE for determination. If the Project is deemed a "controlled action", it is assumed the Project will be determined by DoEE under an "Accredited" process.

The biodiversity assessment will be conducted in accordance with relevant guidelines including:

- ▶ Biodiversity Assessment Method 2017 (OEH1 2017);
- ▶ Wind Farms and Birds: Interim Standards for Risk Assessment, AusWEA (AusWEA, 2005);
- ▶ Threatened Species Assessment Guidelines – Assessment of Significance (OEH, 2007);

- ▶ Wind Farm collision risk for birds – Cumulative risks for threatened and migratory species (DEH, 2006);
- ▶ EPBC Act Policy Statements, Supplementary Significant Impact Guidelines 2.1.1 Wind Farm Industry Sector (DEH, 2005);
- ▶ Wind Energy Framework (DPE, 2016);
- ▶ Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings (DPI);
- ▶ NSW State Groundwater Dependent Ecosystem Policy (DPI Water, 2002);
- ▶ Risk Assessment Guidelines for GDEs (DPI Water, 2012);
- ▶ Commonwealth assessment requirements including DoEE's guidelines for identifying the White box – Yellow box – Blakeley's Red Gum Grassy woodlands and Derived Native Grasslands (DEH, 2006); and
- ▶ Commonwealth (2006). Significant Impact Guidelines. EPBC Act Policy Statement 1.1. Matters of National Environmental Significance.

Avoiding and minimising impact to the vegetation has been considered during initial design and will be further developed with the benefit of mapped constraint areas identified during the detailed assessments.

7.1.4 Aboriginal Heritage

7.1.4.1 Background and Preliminary Assessment

An Aboriginal Heritage Information Management System (AHIMS) database search was undertaken on 22 March 2019 for the lot and deposited plans within the Project Boundary (Aboriginal Heritage Search Area).

The AHIMS search found no Aboriginal sites/places recorded or declared in the Aboriginal Heritage Search Area.

7.1.4.2 Methodology

An Aboriginal Archaeology and Cultural Heritage Impact Assessment (AACHIA) for the Project will be prepared in accordance with the *National Parks and Wildlife Act 1974* and the *'Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales'* (DECCW, 2010).

Consultation with the Aboriginal Community will be undertaken in accordance with the *'Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW'* (OEH, 2011), the *'Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW'* (OEH, 2010b) and the *'Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010'* (DECCW, 2010).

The scope of the AACHIA will include:

- ▶ Desktop review, including AHIMS database search, Native Title Search, and a review of previously completed studies conducted in the area to assist in the development of a predictive model;
- ▶ Aboriginal stakeholder consultation;
- ▶ A field-based AACHIA with members of the local Aboriginal community to identify and record any sites of Aboriginal Cultural Heritage (social, historical, scientific and aesthetic values) within the Project boundary and transport route upgrades, and revisiting existing sites registered on the AHIMS database;
- ▶ Preparation of an AACHIA to meet the OEH guidelines and provide to the local Aboriginal community for comment. This will include an assessment of any additional Aboriginal Cultural Heritage issues or places identified during the field work; and
- ▶ Development of appropriate management and mitigation strategies for any Aboriginal Archaeology and Cultural Heritage sites that are identified to be directly or indirectly impacted by the Project.

7.1.5 Historic Heritage

7.1.5.1 Background and Preliminary Assessment

A search of available historic heritage inventories was undertaken within 5 km of the Project Boundary (heritage search area) including: Register of the National Estate, Commonwealth Heritage List, National Heritage List, NSW State Heritage Register, NSW State Heritage Inventory, Muswellbrook LEP, Singleton LEP and Upper Hunter LEP.

There were no World, Commonwealth, National, or State Heritage Listed Items identified. The closest State Heritage Item is the former “Greylands and Outbuildings” located greater than 10 km south of the Project Boundary in the Singleton LGA.

Table 7 summarises the heritage items as currently listed on heritage registers within or immediately adjacent to the heritage search area.

Additionally, there are six Muswellbrook and Singleton LEP-listed Local heritage items within or immediately adjacent to the heritage search area.

Table 7 – Historic Heritage within the Heritage Search Area

Register	Site Name	Type	LEP Schedule No	Lot	DP
Muswellbrook LEP	Stone Bridge	Bridge	I111 (MUSW/RO1*)	41	748269
Muswellbrook LEP	Fairview	Homestead	I47 (LIDD/R002*)	311	549456
Muswellbrook LEP	Hillcrest	Homestead	I48 (LIDD/R001*)	311	549456
Singleton LEP	Richards Family Cemetery	Cemetery	I38	57	752471
Singleton LEP	Former Roman Catholic Church (formerly school, community hall, accommodation)	Church	I156	1	1167323
Singleton LEP	“Greylands” and outbuildings	Homestead	I123	111	1085409

* Muswellbrook Heritage Study Inventory reference

7.1.5.2 Methodology

An Historic Heritage Impact Assessment (HHIA) will be completed for the Project in accordance with the Heritage Manual (Heritage Branch, 1996). The scope of the HHIA will include:

- ▶ A review of any relevant existing heritage assessment reports and other sources of information regarding heritage items in the region;
- ▶ A field survey of the Project Boundary, with an emphasis on sites identified during preliminary research and areas with archaeological potential and the recording of any items located;
- ▶ Assessment of the heritage significance of identified items within the Project Boundary;
- ▶ Preparation of a Non-Indigenous Heritage Impact Assessment which considers the potential for impacts on any significant adjacent heritage items; and
- ▶ Identification of any necessary impact mitigation and management measures.

7.1.6 Traffic and Transport

7.1.6.1 Background and Preliminary Assessment

The construction phase of a wind farm project generates the greatest volume of traffic and accordingly presents the most potential issues. Traffic associated with the ongoing operations of a wind farm are minimal both in terms of number and type of vehicles.

Access to the site will be via the New England Highway and then on designated local roads.

Upgrades to local roads necessary to permit over-sized vehicles will be carried out prior to delivery of turbine components and maintenance of these roads will be ongoing through the construction phase.

The local area contains a number of active coal mines and quarries and as a result the local and regional roads are generally more suitable for heavy vehicle access and have higher existing traffic volumes than other regional areas. Additional traffic volumes generated from the Project are not expected to constitute a material increase in existing volumes on the New England Highway.

Recent wind farms constructed in NSW include the White Rock Wind Farm, Sapphire Wind Farm and the Bodangora Wind Farm. These projects all transported wind turbine components from the Port of Newcastle, along the New England Highway and through the towns of Singleton and Muswellbrook. The transportation route for this Project will have considerable overlap with the route for both of those wind farms.

7.1.6.2 Methodology

A detailed Traffic and Transport Impact Assessment (TTIA) will be included in the EIS and focus primarily on the transportation routes for construction traffic generally in accordance with the 'Guide to Traffic Generating Developments' (RTA, 2002), Road Design Guide and relevant Austroads Standards and 'Austroads Guide to Traffic management' (Austroads, No Date).

The scope of the TTIA will include:

- ▶ Review of any previous traffic impact assessments undertaken for the surrounding area;
- ▶ Traffic counts in selected areas (if not available);
- ▶ An assessment of likely Project-alone and cumulative traffic impacts during the construction and operational phases of the Project (including intersection performance, capacity, safety and site access); and
- ▶ The identification of any mitigation and management measures necessary.

A commitment to the preparation of a transportation management plan in consultation with councils and RMS adopting relevant learnings from previous experiences to ensure the disruption to local communities is minimised will also be included.

7.2 Minor Issues

7.2.1.1 Telecommunications

A number of telecommunications towers in the area have been identified and the operators of equipment on each of these towers which cross the site will be consulted in carrying out the assessment of potential impacts to telecommunication signals via an EMI study.

The EMI study will also address broadcast services including television and radio services in accordance with the 'ICNIRP Guidelines for Limiting exposure to Time-varying Electric, magnetic and Electromagnetic Fields' (ICNIRP, 1998)

7.2.1.2 Soils, Landforms and Rehabilitation

A soil and landform issues assessment will focus on soil disturbance from vegetation clearing, erosion from excavation work given the potentially-erosion prone nature of the slopes of the site and rehabilitation where required.

The soil and landform impact assessment will generally consider the following guidelines:

- ▶ 'Soil and Landscape Issues in Environmental Impact Assessment' (OEH, 2000); and
- ▶ 'Landslide Risk Management Guidelines' (AGS, No Date); and
- ▶ 'Site Investigations for Urban Salinity' (OEH, 2002).

7.2.1.3 Water

The Project is located in the Hunter Rivers Catchment. There are no significant wetlands associated with the site however, Bowmans Creek bisects the project boundary and Glennies Creek Dam, Lake Liddell and Lake Glenbawn are approximately 10km from the site as shown in Figure 18.

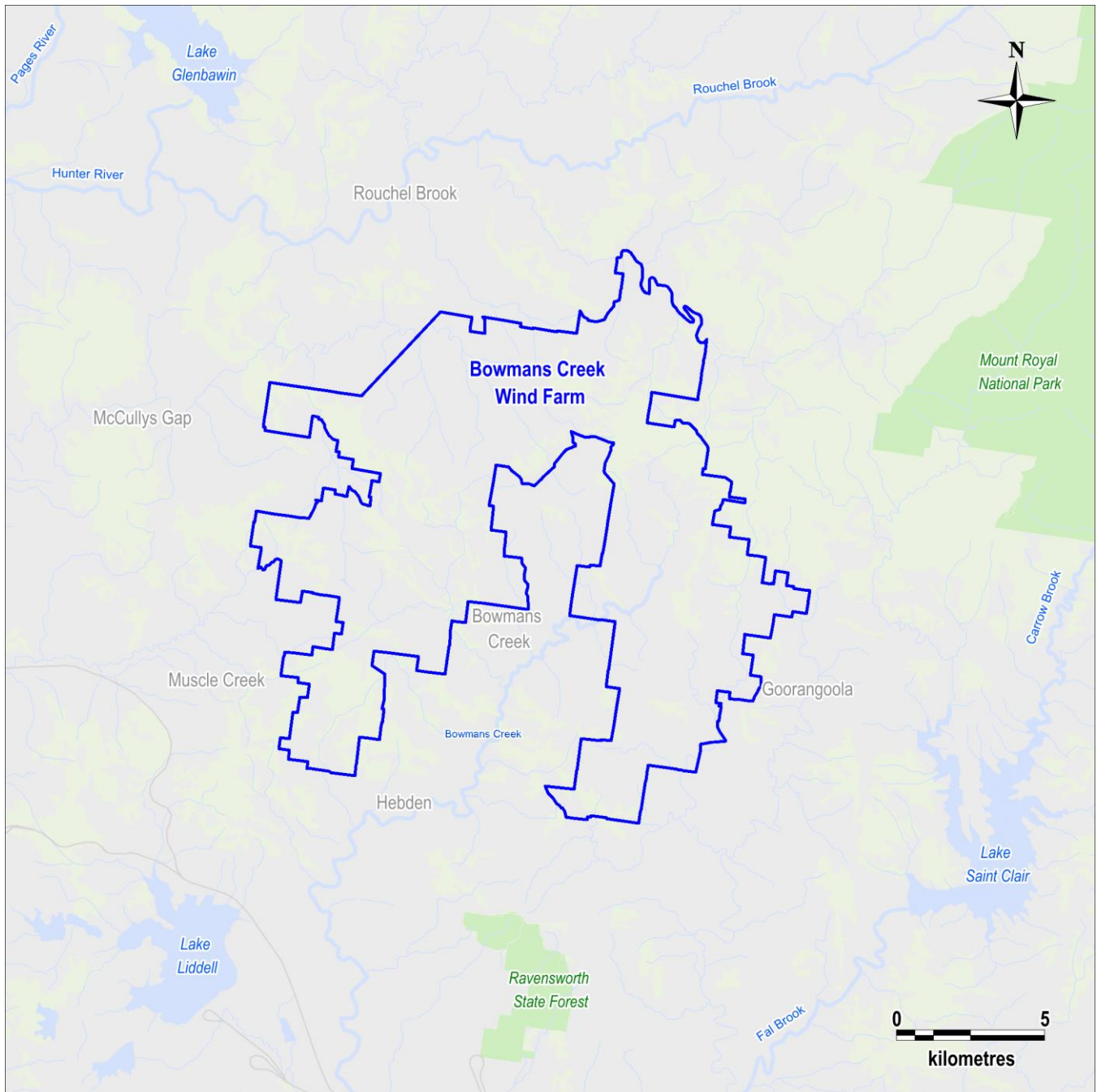


Figure 18: Key waterbodies and waterways

A water impact assessment will include a review of standard construction environment management plans to ensure that impacts from mobilisation of sediment and pollutants generated during excavation, road works, transport of machinery, etc will be adequately mitigated through avoidance, minimisation and management. This will include identification of any Projects impacts within 40 metres of the high bank of “waterfront land” and conduct a relevant assessment.

It will also quantify and identify sources of water required for construction and operation of the Project and whether any licences under the WM Act are required.

A relevant assessment on the impacts to groundwater will also be included in the water impact assessment.

The water assessment will be generally undertaken in accordance with:

- ▶ Managing Urban Stormwater; Soils & Construction (Landcom, 2004);
- ▶ Guidelines for Controlled Activities on Waterfront Land (DPI Water, 2018);
- ▶ Relevant Water Sharing Plans (DPI Water); and
- ▶ Guidelines for Watercourse Crossings on Waterfront Land (DPI Water, 2012b)

7.2.1.4 Social and Economic

A Social and Economic Assessment will review the impacts and benefits of the Project for the region and State as a whole, including consideration of any increase in demand for accommodation and community infrastructure services.

7.2.1.5 Hazards and Safety

A preliminary review of aerodromes and aircraft landing areas within 30km of the Project Boundary showed several private airstrips and two larger aircraft facilities (i.e. Warkworth Aerodrome and Scone Airport). Scone Airport is located on Walter Pye Drive, Scone, approximately 25 km north-west of the Project Boundary. Scone Airport operates 24 hours per day. Warkworth Aerodrome is located approximately 25km south of the Project Boundary. The aerodrome is the home of the Hunter Valley Gliding Club and utilises approximately 20 sailplanes, rigid winged aircraft that are pulled into the air by another plane. The club operates every weekend and on public holidays.

A Hazards and Safety Assessment will be undertaken in relation to aviation, bushfire and blade throw risk.

Aviation impacts will be assessed considering the local aviation operations and the Australian aviation regulations in accordance with the 'National Airports Safeguarding Framework Guideline D: Managing Wind Turbine Risk to Aircraft. (DIRDC, 2012). The assessment shall consider potential impacts on aviation safety including wake / turbulence issues, need for aviation hazard lighting, consideration of defined air traffic routes, heights procedures, radar and communications systems and navigation aids.

A Bushfire assessment will be undertaken in accordance with the Rural Fire Service (RFS) 'Guide for Bush Fire Prone Land Mapping', vegetation based on vegetation type and potential risk.

Relevant management and mitigation will be identified where required.

7.2.1.6 Minor Issues

Additional consideration will be given to the following issues in the EIS:

- ▶ Dust management – in accordance with relevant NSW guidelines in relation to construction;
- ▶ The potential for any health impacts (including infrasound and Electromagnetic fields (EMF);
- ▶ Waste - This assessment will quantify and classify the likely waste streams to be generated during construction and operation and describe measures to manage, reuse, recycle and dispose of this waste in accordance with 'Waste Classification Guidelines' (EPA, 2014); and
- ▶ Decommissioning.

8 Glossary and Acronyms

°C	Degrees Celsius
AACHIA	Aboriginal Archaeology and Cultural Heritage Impact Assessment
AEMO	Australian Energy Market Operator
AGS	Australian Geomechanics Society
AHIMS	Aboriginal Heritage Information Management System
AusWEA	Australian Wind Energy Association
BC Act	<i>Biodiversity Conservation Act 2016</i>
CASA	Civil Aviation Safety Authority
CCC	Community Consultative Committee
CSIRO	Commonwealth Scientific and Industrial Research Organisation
dBA	A-weighted decibels
DCP	Development Control Plan
DoEE	Department of the Environment and Energy
DPE	Department of Planning and the Environment
DPI	Department of Primary Industry
DRG	Division of Resources and Geoscience
EEAP	Energy Efficiency Action Plan
EIS	Environmental Impact Statement
EMF	Electromagnetic Fields/Frequencies
EMI	Electromagnetic Interference
EPA	Environment Protection Authority
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	<i>Environmental Protection and Biodiversity Conservation Act 1999</i>
ESD	Ecologically Sustainable Development
ESOO	Electricity Statement of Opportunities
FTE	Full Time Equivalent
GBD	Green Bean Design Pty Ltd
GDE	Groundwater Dependent Ecosystems
GWh	Gigawatt-hour
HHIA	Historic Heritage Impact Assessment
IBRA	Interim Biogeographic Regionalisation for Australia
ICNIRP	International Commission on Non-Ionizing Radiation Protection
ISP	Integrated System Plan
km	kilometres
kV	kilovolt
LCOE	Levelised Cost of Electricity
LEP	Local Environmental Plan
LLS	Local Land Services
MNES	Matters of National Environmental Significance
MSC	Muswellbrook Shire Council
MW	Megawatt
MWh	Megawatt-hour
NEM	National Electricity Market
NHMRC	National Health and Medical Research Council
NIA	Noise Impact Assessment
NSW	New South Wales
NT Act	<i>Native Title Act 1993</i>

OEH	Office of Environment and Heritage
PCT	Plant Community Types
PEA	Preliminary Environmental Assessment
PLVIA	Preliminary Landscape and Visual Impact Assessment
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
PV	Photo Voltaic
REA	NSW Renewable Energy Action Plan
RET	Renewable Energy Target
RFS	Rural Fire Service
RMS	Roads and Maritime Service
RTA	Roads and Traffic Authority
SEARS	Secretary's Environmental Assessment Requirements
SEP	Stakeholder Engagement Plan
SEPP	State Environmental Planning Policy
SPL	Sound Power Level
SSC	Singleton Shire Council
SSD	State Significant Development
TTIA	Traffic and Transport Impact Assessment
UHSC	Upper Hunter Shire Council
VIA	Visual Impact Assessment
VPA	Voluntary Planning Agreement
WM Act	<i>Water Management Act 2000</i>
ZVI	Zone of Visual Influence

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10 Appendix A – Preliminary Landscape and Visual Impact Assessment