Bookham Wind Farm

Scoping Report

ecological AUSTRALIA
A TETRA TECH COMPANY

DOCUMENT TRACKING

Project Name	Bookham Wind Farm - Scoping Report
Project Number	23SYD 7376X
Project Managers	Rebecca Ben-Haim and Bethany Lavers
Prepared by	Sam Oomens
Reviewed by	Bethany Lavers and Daniel Magdi
Approved by	Daniel Magdi
Status	**Final**
Version Number	**3**
Last saved on	**6 February 2025**

This report should be cited as 'Eco Logical Australia 2024. *Bookham Wind Farm – Scoping Report*. Prepared for Bookham Wind Farm Pty Ltd.

ACKNOWLEDGEMENTS

This document has been prepared by Eco Logical Australia Pty Ltd with support from Squadron Energy Pty Ltd

Template 2.8.1

Abbreviations

Abbreviation	Description
ACHA	Aboriginal Cultural Heritage Assessment
ACMA	Australian Communication and Media Authority
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
APZ	Asset Protection Zone
BAM	Biodiversity Assessment Methodology
BAM-C	Biodiversity Assessment Methodology Calculator
BBAMP	Bird and Bat Adaptive Management Plan
BC Act	*Biodiversity Conservation Act 2016*
BCD	Biodiversity Conservation Division (now within NSW DCCEEW)
BDAR	Biodiversity Development Assessment Report
Benefit Sharing Guideline	*Benefit Sharing Guideline – Guidance for State Significant Renewable Energy Development* (DPHI, 2024e)
BESS	Battery Energy Storage System
Biodiversity and Conservation SEPP	*State Environmental Planning Policy (Biodiversity and Conservation) 2021*
Biosecurity Act	*Biosecurity Act 2015*
BOS	Biodiversity Offset Scheme
BSAL	Biophysical Strategic Agricultural Land
CAA	Controlled Activity Approval
CASA	Civil Aviation Safety Authority
CIC	Critical Industry Cluster
Commonwealth DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DPE	Department of Planning and Environment (now Department of Planning, Housing, and Infrastructure)
DPHI	Department of Planning, Housing, and Infrastructure
DPIE	Department of Planning, Industry and Environment (now Department of Planning, Housing, and Infrastructure)
EII Act	*Electricity Infrastructure Investment Act 2020*
EIS	Environmental Impact Statement
ELA	Eco Logical Australia
EPA	Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*

Abbreviation	Description
EP&A Act	*Environmental Planning & Assessment Act 1979*
EPI	Environmental Planning Instrument
EPL	Environmental Protection Licence
FM Act	*Fisheries Management Act 1994*
GIS	Geographic Information System
Heritage Act	*Heritage Act 1977*
ICNIRP	International Commission on Non-ionizing Radiation Protection
IPC	Independent Planning Commission
LEP	Local Environmental Plan
LGA	Local Government Area
LLS	Local Land Services
LSPS	Local Strategic Planning Statement
LVIA Technical Supplement	*Wind Energy Guideline – Technical Supplement for landscape Character and Visual Impact Assessment (DPHI, 2024b)*
MNES	Matters of National Environmental Significance
MW	Megawatts
NEM	National Electricity Market
NM	Nautical Mile
Noise Bulletin	*Wind Energy Guideline – Technical Supplement for Noise Assessment (DPHI, 2024c)*
NPW Act	*National Parks and Wildlife Act 1974*
NSW	New South Wales
NSW DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water (formerly DPE)
PCT	Plant Community Types
PLVIA	Preliminary Landscape and Visual Impact Assessment
Planning Systems SEPP	*State Environmental Planning Policy (Planning Systems) 2021*
POEO Act	*Protection of the Environment Operations Act 1997*
Private Agreement Guideline	*Private Agreement Guideline - Guidance for State Significant Renewable Energy Development* (DPHI, 2024d)
Project	Bookham Wind Farm
RE Act	*Renewable Energy Act 2000*
REZ	Renewable Energy Zones
RFS	NSW Rural Fire Service
Roads Act	*Roads Act 1993*
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy

Abbreviation	Description
SoHI	Statement of Heritage Impact
Squadron Energy	Squadron Renewable Energy Developments Pty Ltd
SSD	State Significant Development
TEC	Threatened Ecological Community
Transport and Infrastructure SEPP	*State Environmental Planning Policy (Transport and Infrastructure) 2021*
Visual Bulletin	*Wind Energy: Visual Assessment Bulletin* (DPE, 2016b)
Wind Energy Guideline	*Wind Energy Guideline* (DPHI, 2024a)
WTG	Wind Turbine Generators
ZVI	Zone of Visual Influence

1. Introduction

1.1. Project Overview

The Bookham Wind Farm (the 'Project') involves the construction, operation and decommissioning of up to 99 Wind Turbine Generators (WTGs), Battery Energy Storage System (BESS), and associated ancillary infrastructure and temporary facilities with a total capacity of 594 megawatts (MW). The Project is located approximately 30 km west of Yass near Bookham, within the South East Local Land Services (LLS) region of New South Wales (NSW) and within the Yass Valley Council Local Government Area (LGA) and State electorate of Goulburn (Figure 1-1). The Project is on predominantly private land as well as Crown Land and land that contains Council crossings. The Schedule of Lands is provided in Appendix D.

The main components of the Project include:

- Wind Turbine Generators – up to 99 WTGs.
- Transmission Works – including new electricity lines to connect the wind farm to the internal electrical reticulation network, new electricity transmission infrastructure (HumeLink) and the construction and operation of new Electrical Plant Compound.
- Battery Energy Storage System – including the construction and operation of an Electrical Plant Compound (includes battery and/or substation) to store and deploy energy with a proposed capacity of 200-250 MW / 850-1000 MWh.
- Ancillary Infrastructure – including (but not limited to) internal access roads/tracks, utilities and communications infrastructure, operation & maintenance (O&M compounds), hardstands, meteorological masts and external road upgrades (subject to blade sizing and transport routes).
- Temporary Facilities – including construction compounds, laydown and storage areas, construction working areas, rock crushing and concrete batch plants, temporary roads, and temporary meteorological masts.
    - worker accommodation - pending further investigation temporary accommodation is likely to be required for the construction workforce. Accommodation within Yass and the surrounds is limited. Accommodation requirements will be further assessed in the EIS.

A preliminary Project layout is provided in Figure 2-1 and the Project's regulatory approval pathway will be:

- State Significant Development (SSD) process under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) based on the Project's value as defined in the *State Environmental Planning Policy (Planning Systems) 2021* (Planning Systems SEPP).
- NSW Assessment Bilateral Agreement for Project Matters of National Environmental Significance (MNES) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

This Scoping Report has been prepared by Eco Logical Australia Pty Ltd (ELA) on behalf of Bookham Wind Farm Pty Ltd (the 'Proponent'). The purpose of this Scoping Report is to request Secretary's Environmental Assessment Requirements (SEARs) for the preparation of the EIS for the Project (refer to Section 1.4 for details).

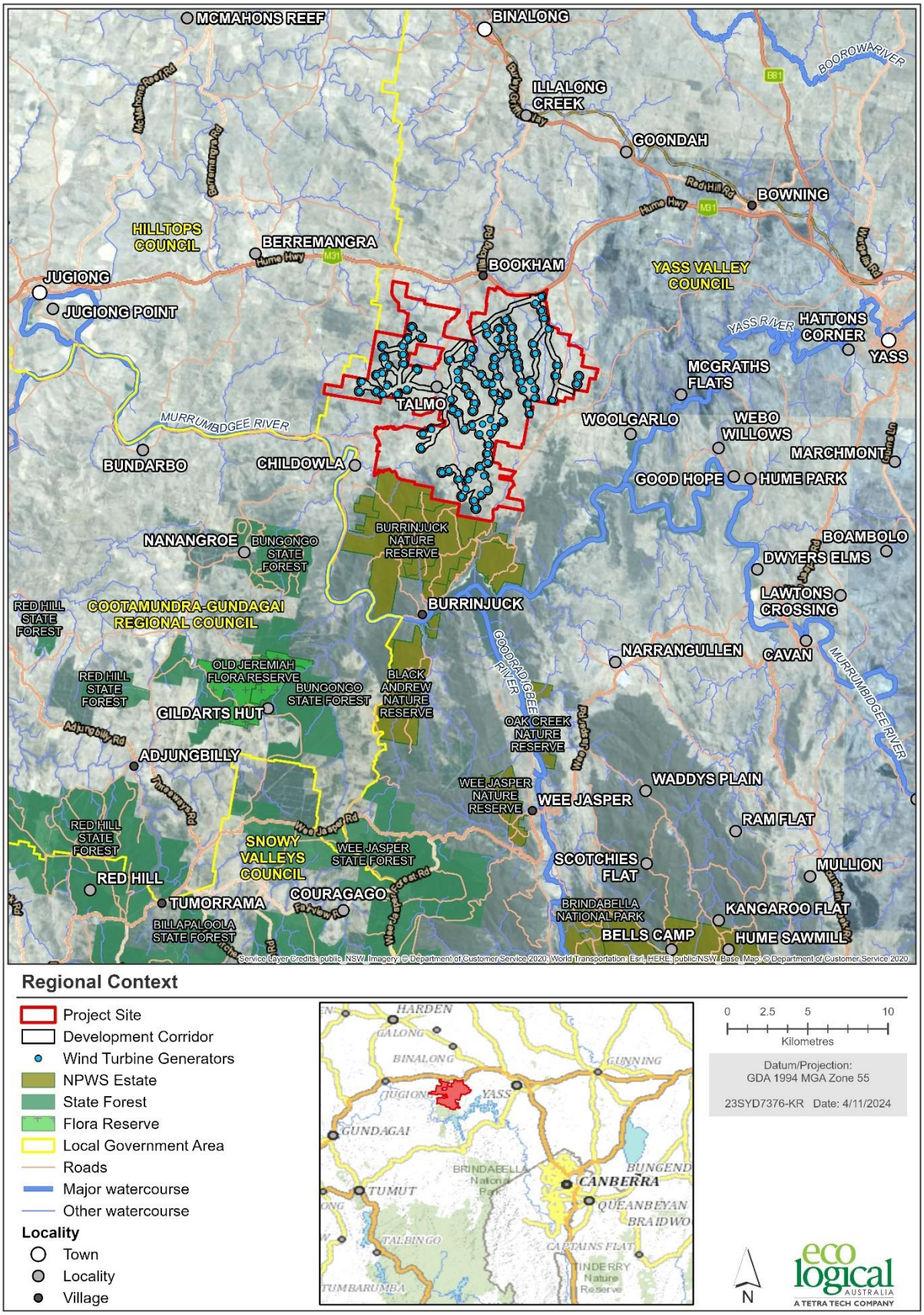


Figure 1-1: Regional context

1.2. Project Background

The Project will generate significant benefits to the Bookham community and wider South East region, producing enough electricity to power the equivalent of 321,000 NSW homes and prevent 322,000 tonnes of emissions annually. The Project will assist in the delivery of more reliable, more affordable, and cleaner electricity and assist State, Commonwealth and international renewable energy plans to accelerate delivery of clean energy and meet the Energy Security Target established by the NSW Electricity Strategy (2019) and enacted in the *Electricity Infrastructure Investment Act 2020* (EII Act). The Project is not within a declared Renewable Energy Zone (REZ) but will assist in delivering network benefits and renewable energy services in line with the NSW Electricity Infrastructure Roadmap (2020). With excellent wind energy resources available and existing proximity to energy infrastructure, the South East region is ideally placed to support the energy transition.

1.3. Proponent

The Proponent for the Project is Bookham Wind Farm Pty Ltd, a wholly owned subsidiary of Squadron Energy, one of Australia's leading renewable energy companies that develops, operates, and owns renewable energy assets across Australia. Currently, Squadron Energy has 1.1 GW of renewable energy in operation and 900 MW under construction.

The details of the Proponent are provided in Table 1-1.

Table 1-1: Proponent details

Proponent Details	Details
Proponent Name	Bookham Wind Farm Pty Ltd
Postal Address	PO Box 1708, Newcastle NSW 2300
ABN	88 674 936 371
Project Contact	Nigel Barton, Project Manager bookhamwind@squadronenergy.com

1.4. Document Purpose

This Scoping Report has been prepared in accordance with the following guidelines and frameworks:

- State Significant Development Guidelines – Preparing a Scoping Report (DPIE, 2021) (SSD Guideline).
- Undertaking Engagement Guidelines for State Significant Projects (DPE, 2022).
- Social Impact Assessment Guideline for State Significant Projects (DPIE, 2021).
- Standard Industry SEARs..
- Wind Energy Guideline (DPHI, 2024a)
- Wind Energy Guideline – Technical Supplement for Landscape Character and Visual Impact Assessment (DPHI, 2024b)
- Wind Energy Guideline – Technical Supplement for Noise Assessment (DPHI, 2024c)

The requirements of the above guidelines and frameworks are provided in Table 1-1.

An assessment against the NSW Wind Energy Guideline (DPHI, 2024a) has identified the scoping requirements to submit an application for SEARs are comparable with the approach used in the preparation of this Report, including:

- The requirements of scoping in Section 2.3.1 and Section 4.2 of the NSW Wind Energy Guideline (DPHI, 2024a) are to identify the key environmental assessment issues, describe the engagement with the local community and complete preliminary visual and noise assessments in accordance with the SSD Guideline. Refer to Table 1-2.
- The requirements of scoping in Section 1.3 and 4.1 of the Wind Energy Guideline – Technical Supplement for Landscape Character and Visual Impact Assessment (DPHI, 2024b) are consistent with the output of the preliminary visual assessment in Section 6.
- The requirements of scoping in Section 2.1 of the Wind Energy Guideline – Technical Supplement for Noise Assessment (DPHI, 2024c) are consistent with the output of the preliminary/indicative noise assessment in Section 6 and Appendix B.

Table 1-1: Summary of Guideline requirements

Item	Section
State Significant Development Guidelines – Preparing a Scoping Report (DPIE, 2021)	
Describe the Project in simple terms	Section 3
Include an analysis of feasible alternatives considered having regard to the objectives of the development, and identify the alternatives that will be investigated further in the EIS	Section 3.2
Give an early indication of community views on the Project and identify what engagement will be carried out during the preparation of the EIS	Section 5
Identify the key matters requiring further assessment in the EIS and the proposed approach to assessing each of these matters having regard to any relevant Government legislation, plans, policies, or guidelines.	Section 6
Undertaking Engagement Guidelines for State Significant Projects (DPE, 2022)	
The Proponent must: • Identify an early engagement that has been carried out that is relevant to the Project (i.e., engagement undertaken as part of a prior planning process). • Identify the key stakeholders for further engagement (i.e., individuals, special interest groups, councils, and government agencies with an interest in or likely to be affected by the Project). • Plan how they intend to engage with the community, council, and government agencies, so that the engagement is proportionate to the scale and nature of the Project and the likely level of community interest in the Project. • The community can: – Take up any early engagement opportunities to understand the Project. – Provide feedback to the proponent about aspects of the Project which they support, do not support, or wish to be adjusted. – Provide clear reasons for any concerns to enable the proponent to consider possible alternative approaches to address the issues. – Alert the proponent to any matters they feel have not been considered.	Section 5
Wind Energy Guidelines (DPHI, 2024a)	
Provide clear and consistent guidance to the community, industry and regulators about how to measure and assess key environmental impacts of SSD wind energy development in NSW	Section 5, Section 6
Facilitate better outcomes by requiring early identification of impacts to drive better siting and design	Section 3.2, Section 6
Facilitate meaningful, respectful and effective community and stakeholder engagement across the development assessment process, from pre-lodgement to post-approval	Section 5
Encourage benefit-sharing between wind energy operators and the communities in which they operate, where appropriate	Section 5, Sectio 6.1.10
Social Impact Assessment Guidelines for State Significant Projects (DPE, 2023g)	
Gain an initial understanding of the Project's social locality.	Section 6.1.10
Gain an initial understanding of the characteristics of the communities within the Project's social locality.	Section 6.1.10
Conduct an initial evaluation of the likely social impacts for different groups in the social locality and the level to which these impacts need to be assessed.	Section 6.1.10
Consider potential refinements or approaches in response to likely social impacts.	Section 6.1.10.3
Consider the remainder of the SIA tasks, including engagement.	Section 6.1.10

1.5. Terminology Used

This Scoping Report uses the following terminology:

- **Project:** This is in reference to the proposed development, including the proposed WTGs and all associated ancillary infrastructure and temporary facilities, as described in Section 3 and related areas.
- **Project Site:** This includes the area in which the Development Corridor is currently sited and defines the extent of the property boundaries and the bounds of the proposed EPBC referral.
- **Development Footprint:** A layout of all infrastructure elements, based on disturbance assumptions per infrastructure element type, required for feasible and safe construction.
- **Development Corridor:** This includes the area in which all proposed infrastructure and direct impacts of the Project will occur (Figure 2-1). The Development Corridor includes a 300 m buffer based on the Development Footprint at the time of the preparation of this Report.
- **Study Area:** as defined by the investigation of each environmental aspect and impact assessment.
- **Associated residence:** A residence on privately owned land in respect of which the owner has reached an agreement with the applicant about the development and management of impacts.
- **Non-associated residence:** A residence on privately-owned land in respect of which the owner has not reached an agreement with the applicant in relation to the development

2. Strategic Context

2.1. Project Viability

Squadron Energy has integrated social, environmental, and economic considerations in developing the Project with the principles of Ecologically Sustainable Development (ESD). This approach minimises the potential impacts while maintaining or enhancing positive outcomes for the wider community.

There are several key areas that have been considered in the selection of the Project Site, including:

- **Suitable Wind Resource:** Wind resource has been monitored at the Project Site since 2022. The monitoring data has been modelled with long term reference data and shows wind speeds that are high and consistent, demonstrating the viability of the Project in the selected location.
- **Environmental Impacts:** The Project has adopted the hierarchy of avoid, minimise, mitigate, and offset to manage potential environmental impacts which will be addressed in detail as part of the EIS. The preliminary layout has been designed to avoid known constraints and incorporates environmental design criteria such as preferential siting of the development footprint on cleared land, maintaining vegetation buffers and avoiding ridgelines.
- **Access to Local Electricity Network:** The Project is proposing to potentially connect to the proposed 500 kV HumeLink connecting Wagga Wagga, Bannaby and Maragle. Squadron Energy has engaged with Transgrid regarding access. Transgrid confirmed that connection enquiries are not currently being accepted. There are also existing 66 kV, 132 kV and 330 kV transmission lines within the Project Site (Figure 2-1) which may be considered.
- **Local Communities:** The low population density of the surrounding area will assist in reducing any residual noise or visual impacts from the Project. Impacts to sensitive receivers will be studied further in the EIS and consultation with landowners will continue throughout the Project.
- **Land Suitability:** During the operational phase it is proposed that the balance of land would continue to be used for agricultural purposes such as sheep and cattle grazing, with grasses sown for ground cover and grazing fodder in disturbed areas, resulting in only a minor net change to the existing land use.
- **Site Access:** There is good existing road access to the Project Site including highways, wide sealed minor roads, and numerous unsealed, graded minor roads which intersect the Project Site.
- **Proximity to Resources:** During the construction phase it will be necessary to source water and other materials for the construction of roads and WTG foundations. In the local area, there are several active quarries and water sources that have the potential to service the resource requirements associated with the construction of the Project, subject to procurement processes.
- **Economic Impact:** The population centres of Yass, Gundagai, and Canberra are well established to cater for an increase in workforce, having prior experience in servicing the transport, renewable energy infrastructure, manufacturing, and tourism industries.

2.2. Strategic need for the Project

Table 2-1 provides a summary of the relevant national, state, regional and local planning and policy context to the Project.

Table 2-1 Project alignment with strategic plans and policies

Strategy, Plan or Policy	Description	Project Relevance
National Policy Context		
2015 Paris Agreement	The Agreement sets out a global framework to address climate change and limit global warming to well below 2°C, and ideally 1.5°C compared to pre-industrial levels. The Australian Government ratified the Agreement in November 2016.	To achieve the reduction in the greenhouse gas emissions resulting in global warming, the development of renewable energy Projects is critical. The Project will contribute to meeting Australia's greenhouse gas emission reduction targets.
Renewable Energy Act (RE Act) 2000	The RE Act encourages investment in large-scale renewable power by incentivising renewable energy through a Renewable Energy Certificate Market.	The Project will contribute to both the increasing local and global need for such renewable projects, as well as aid in mitigating the issues of global warming and climate change.
National Electricity Market (NEM)	The NEM connects transmission grid infrastructure cross-state and responsible for the wholesale of electricity within Australia.	As the NEM increasingly looks to integrated variable renewable energy solutions to supply the energy market, wind power will be required to efficiently generate and deploy energy within the NEM and provide system strength. With a proposed generation capacity of 594 MW, the Project is well positioned to contribute to this need through its connection to the NEM.
Climate Change Act 2022	The Act sets out Australia's greenhouse gas emissions reduction targets, provide annual climate change statements, confer advisory functions on the Climate Change Authority, and other related purposes.	The Project would contribute to the reduction of emissions generated in Australia required in this legislation by contributing zero emission electricity into the grid.
Australian Energy Market Operator (AEMO) Integrated System Plan (ISP) 2024	The AEMO ISP 2024 provides a 'roadmap for the energy transition' in Australia. The key objective is to support the complex and rapid transition of Australis energy network towards net zero emissions, develop low-cost, firmed renewable energy and develop upgraded transmission infrastructure to provide consumers in the NEM with secure, clean, affordable and reliable power.	The Project would contribute to addressing the objectives of supplying firmed, reliable renewable energy to consumers within the NEM.
State Policy Context		
Climate Change (Net Zero Future) Act 2023	This Act legislates the NSW targets to reduces GHG emissions target by 50% by 2030, 70% by 2035 and achieve net zero by 2050.	The Project would generate electricity from renewable sources reducing GHG emissions when compared with fossil fuels.

Strategy, Plan or Policy	Description	Project Relevance
The Net Zero Plan	The Net Zero plan is the foundation for NSW's action on climate change and goal to reach net zero emissions by 2050. It outlines the NSW Government's plan to grow the economy, create jobs and reduce emissions over the next decade.	The Project aligns with the Net Zero Plan through the generation of electricity through renewable energy.
NSW Electricity Strategy	The Strategy is the NSW Government's plan for a reliable, affordable, and sustainable electricity future that supports a growing economy.	The Project would positively contribute to the sale of reliable, affordable, and sustainable energy.
NSW Electricity Infrastructure Roadmap (2020)	The NSW Roadmap plans on capitalising on that opportunity by *'transforming the electricity system into one that is cheap, clean and reliable'* (DoE, 2020). The implementation of the NSW Roadmap sets the foundation for considerable investment and job creation in NSW while also addressing electricity affordability.	The Project aligns with the Electricity Infrastructure Roadmap through the generation of cheap, clean and reliable electricity.
Regional and Local Policy Context		
South East and Tablelands Regional Plan 2041	The regional plan is a 20-year blueprint for the future seeking to capitalise on the growing population and proximity to Canberra and Sydney by developing strong, diverse, and competitive local and regional economies while supporting the protection of high value environmental assets across the region. A core element of the 'Vision' for the region seeks to *'position the region as a hub of renewable energy excellence" under Goal 1 'A Connected and Prosperous Economy'* (DPIE, 2017).	The location of the Project is identified as an area with potential for wind energy generation within the plan.
Yass Valley Local Strategic Planning Statement 2020	The Statement sets out a plan for the economic, social, and environmental land use needs of the community over the coming 20 years. It sets land use planning priorities to ensure that the future development within the LGA is appropriate for the local context. The statement provides a local level blueprint for how Council will adapt to the future challenges and opportunities of a growing regional population	*Planning Priority 6* seeks to 'maximise opportunities for tourism, industry, and investment within the Yass Valley. The Project will be an important asset to that priority as it will involve a rapidly growing industry that can utilise local workforces while also providing significant investment into the area, both in the short and long term. *Planning Priority 7* interacts with planning priority 6 as it seeks to 'increase Yass Valley's Resilience to Climate and Natural Hazards.
Yass Valley Community Strategic Plan 2042	The plan sets out the long-term vision for the region to 2042, identifying key priorities and strategies informed by the communities.	The Project aligns with the key themes and objectives *EC.3 – Our local and emerging businesses are supported to thrive* and *EN.1 – Our Natural environment is maintained, protected, and enhanced in line with community expectations*

2.3. Project Location Context

The Project Site is situated in Yass Valley Council LGA in the agricultural South East region of NSW, which supports a range of diverse industries including: manufacturing, tourism, renewable energy generation and forestry. The South East region provides a range of natural landscapes from the foothills of the Snowy Mountains through to the flat dry inland plains of Hay and Carrathool, covering an area of 80,545 km^2 (Regional Development Australia, 2018). The nearest large regional centre is Yass, approximately 30 km to the east. As of 2021, the population of Yass is 5,837 and the median age is 41 (ABS, 2021a).

The Project Site is located near the small village and within the rural locality of Bookham, in the South West Slopes and Riverina regions of NSW. In 2021, the town of Bookham had a population of 127 people (ABS, 2021b). The Bookham community consists primarily of rural residences and structures associated with agricultural land uses, with several historic buildings including the Uniting Church and Catholic St Columbus Church. The local context of the Project is summarised in Table 2-2.

Table 2-2: Local context of the Project

Project	Details
Size	Project Site: 11,896 ha Development Corridor: 3,853 ha Disturbance Footprint: 130 ha
Local Government Area	Yass Valley Council
Land Zoning	RU1 – Primary Production (Figure 2-2)
Land Tenure	Freehold, Crown Land, Crown waterways, Crown roads and Council roads
Land Use	The following land uses are present within the Project Site, as shown in Figure 2-3: grazing (modified pastures); grazing (native vegetation); cropping; river; managed resource protection; reservoir / dam; residential and farm infrastructure
Water Catchment	Murrumbidgee River Catchment
Local Land Services Region	South East

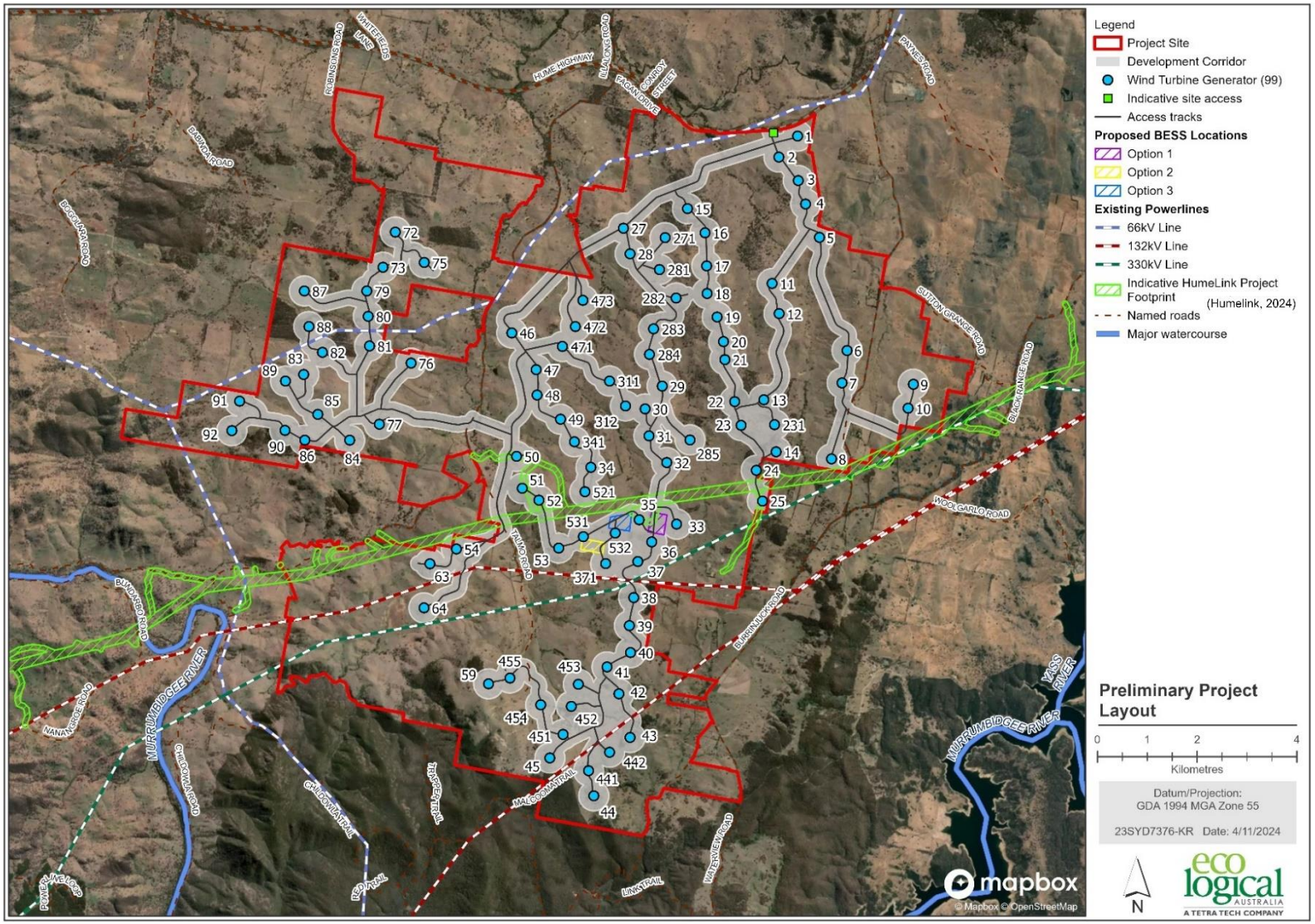


Figure 2-1: Preliminary Project Layout

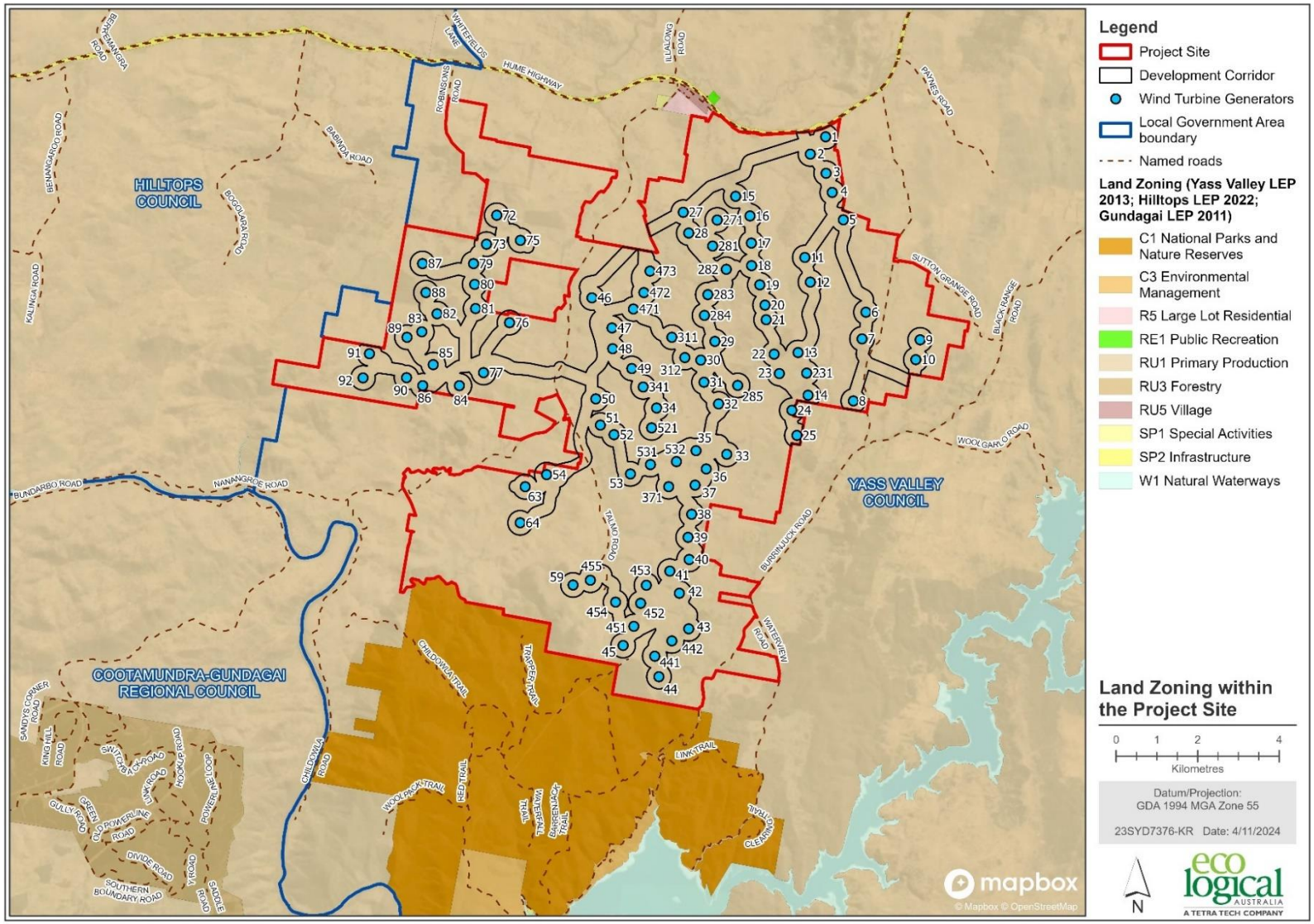


Figure 2-2: Land zoning within the Project Site

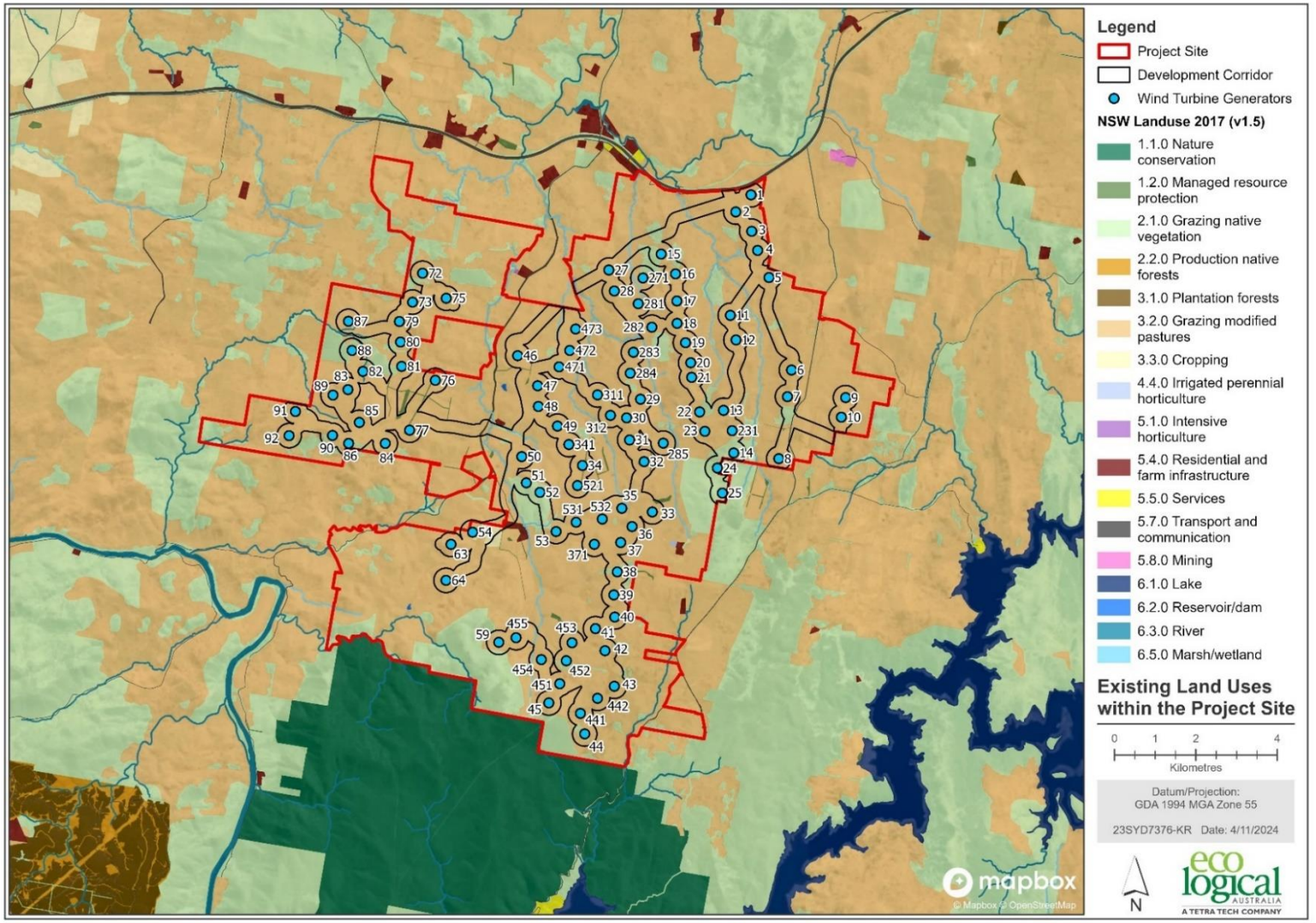


Figure 2-3: Existing land uses within the Project Site

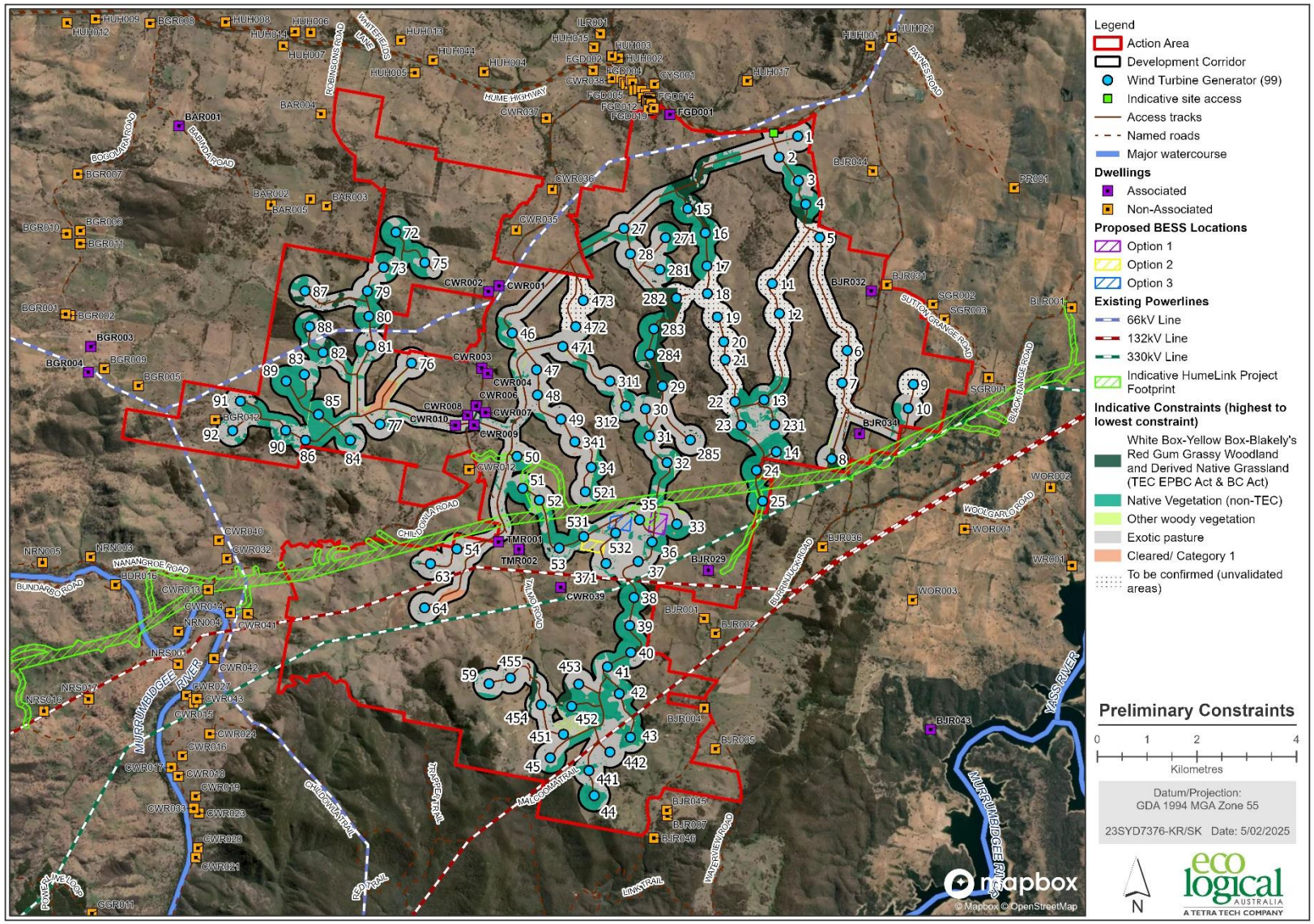


Figure 2-4: Preliminary constraints within and in proximity to the project site

2.3.1. Key Landscape Features

In addition to the agricultural land uses, the region is characterised by scenic landscapes, natural environments, and productive forests, with the following protected areas within a 20 km radius of the Project Site:

- Burrinjuck Nature Reserve.
- Black Andrew Nature Reserve.
- Oak Creek Nature Reserve.
- Wee Jasper Nature Reserve.
- Bungongo State Forest.
- Wee Jasper State Forest.
- Red Hill State Forest.
- Brindabella National Park.

The Project Site borders the Burrinjuck Nature Reserve to the south and is characterised by largely agricultural lands that are privately owned.

The Project Site is within the Murrumbidgee catchment. The Murrumbidgee River, a major tributary of the Murray-Darling River system, drains much of southern NSW and is located approximately 1.25 km to the southwest portion of the Project Site. The Murrumbidgee is regulated downstream of Burrinjuck Dam, which is located approximately 7.5 km to the south of the Project Site, with the Tumut, Gudgenby, Naas, Molonglo, Queanbeyan, Cotter, and Yass rivers as key tributaries. The Tumut River, the Murrumbidgee's largest tributary, is regulated downstream of Blowering Dam and forms part of the Snowy Hydro Scheme.

The Project Site contains several tributaries of the Murrumbidgee River, including:

- Jugiong Creek.
- Bogolong Creek.
- Ponds Creek.
- Oaks Creek.
- Limestone Creek.
- Carrolls Creek.

Figure 1-1 provides a visual overview of the Project Site and key landscape features in the region, including watercourses and reserves.

2.3.1.1. Topography and Wind Resources

The Project Site is characterised by steep to rolling hills, located between 400 m AHD and 700 m AHD. Figure 2-5 provides an overview of wind resources in the area as mapped by the Geological Survey of New South Wales (2019).

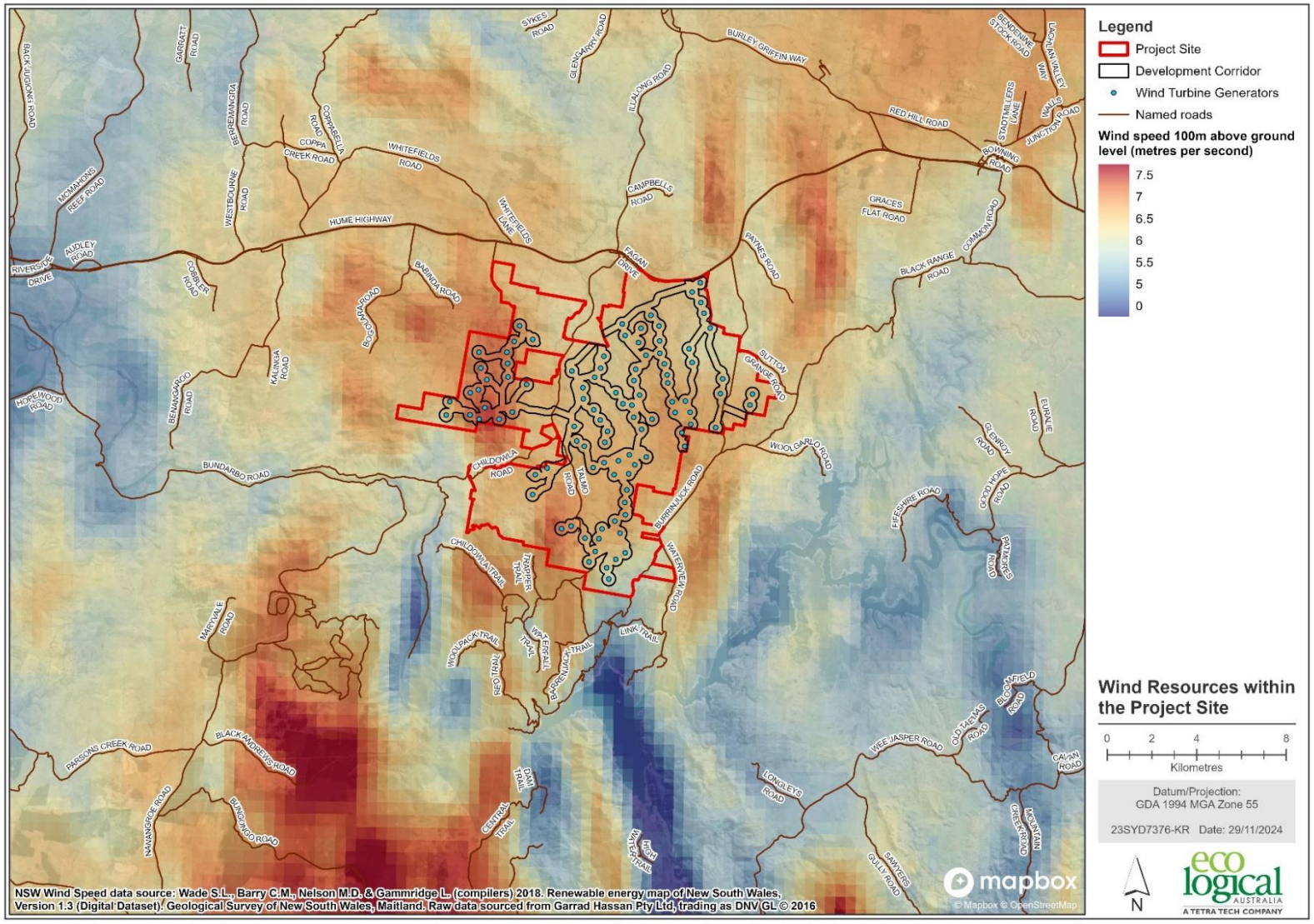


Figure 2-5: Wind resources within the Project Site (Wade, Barry, Nelson, Gammridge, 2018)

2.3.2. Key Transport and Infrastructure

The Project Site near the major centres of Yass (28 km by road to the southeast) and Canberra (93 km by road to the southeast) and is benefited by major road and rail routes that connect the LGA to the wider region, including the Hume Highway, Barton Highway, and the Sydney to Melbourne Rail Line. The Inland Rail, currently under construction, will traverse the neighbouring Cootamundra-Gundagai LGA through Stockinbingal, just north of Cootamundra, approximately 100 km west of the Project Site. These strategic transport links will increase the prominence and strategic importance of the region as a freight interchange. The region is serviced by regional aerodromes including Tumut Airport and Cootamundra Airport, as well as non-certified aerodromes such as Harden Airport, Jindalee Airport and Hall Airport, all located within 30 nautical miles (nm) to the Project Site.

2.3.3. Other Major Renewables Energy Projects in the Locality

The Project Site is in proximity to the following renewable energy Projects at various stages of development (Figure 2-6).

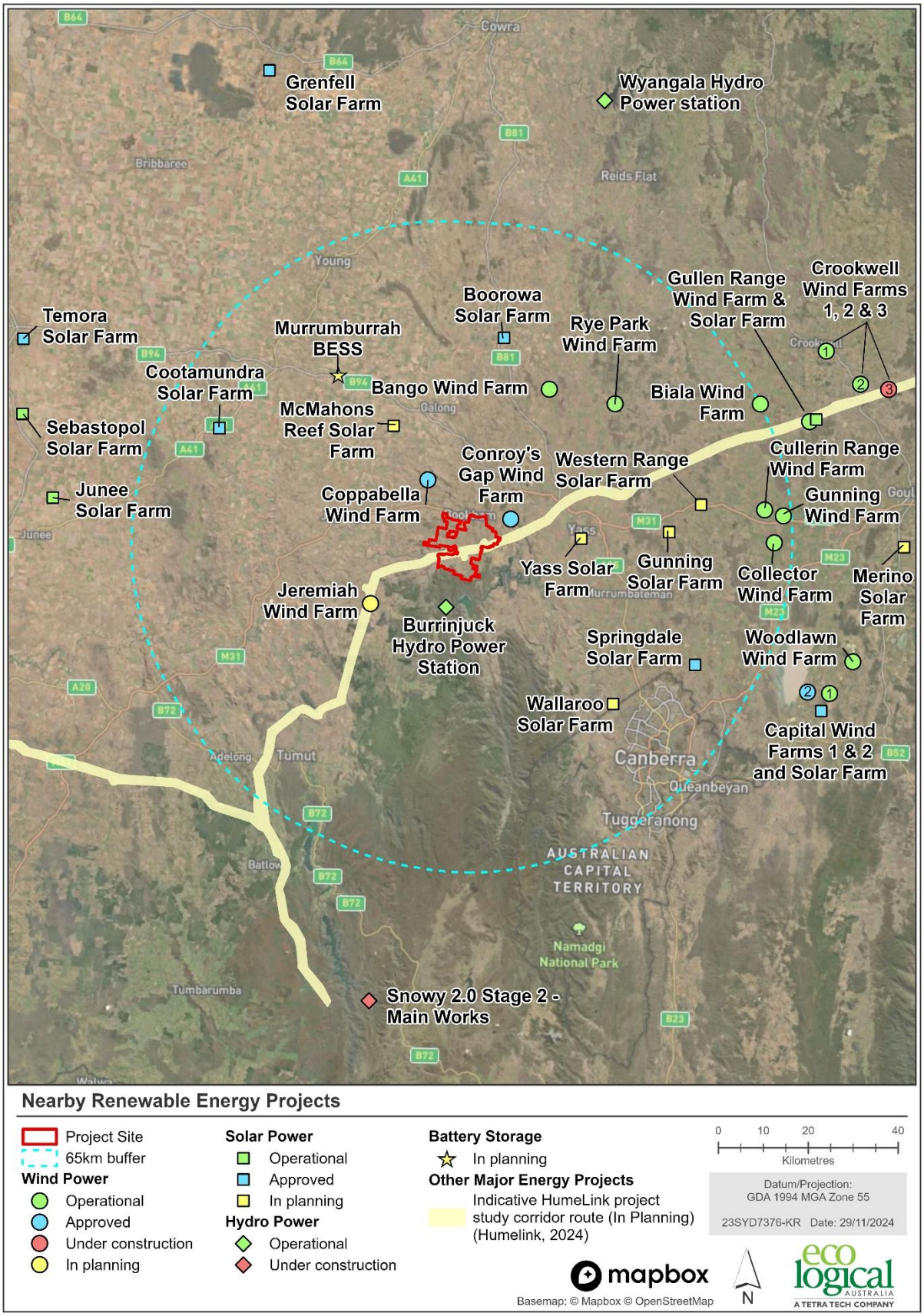


Figure 2-6: Other renewable energy Projects within 65 km of the Project Site

3. Project Description

The Project proposes to construct, operate, decommission and rehabilitate a commercial-scale wind farm producing clean energy to power the equivalent of approximately 321,000 average NSW households each year.

The proposed 594 MW Project would connect to either the existing 330kV Yass to Lower Tumut transmission line and the 132 kV transmission line (line 970) or the proposed 500kV HumeLink connecting Wagga Wagga, Bannaby and Maragle. The inclusion of the BESS is to allow for renewable energy to be stored and dispatched to and from the Project or the NEM when excess is produced during highly productive periods or as required.

Based on experience from Projects of a similar size, approximately 270 to 300 full time equivalent jobs would be established during the nominal two-year construction phase, providing local benefits and requiring local services and amenities. It is anticipated that 12 full time equivalent jobs would also be required during the 30-year operational life of the Project, typically utilising local professionals or professionals relocating to the region to fill these roles.

The Project includes a Development Footprint which represents to areas to be directly impacted and ultimately host infrastructure such as WTGs or access tracks. The Development Corridor details the envelope within which the infrastructure would be placed. The Development Corridor includes a buffer area to provide flexibility for the detailed design of the Project while allowing a detailed environmental assessment process to be completed. The Development Corridor will avoid key constraints and setbacks to achieve the best on-ground environmental outcomes. This flexibility also allows the most suitable technologies and types of infrastructure to be identified and deployed for use in the Project based on market conditions and availability.

3.1. Key Project Elements

The Project will involve the key components listed in Table 3-1. Siting and dimensions are subject to further design and refinement during preparation of the EIS, ongoing stakeholder consultation, detailed design stage, procurement process, and construction readiness. Avoid and mitigate principles will be integrated into the design of the layout as the Project progresses.

Table 3-1: Key Project elements

Project Elements and Infrastructure	Approximate Dimensions	Quantity
WTGs		
WTG Height	Up to 270 m	99
Tower (hub) Height	Up to 170 m	
WTG Foundations (excavation size)	35 m diameter	
Blade length	Up to 100 m	297
Battery Energy Storage System		
200-250 M / 850-1000 MWh capacity within Electrical Plant Compound (to be further assessed during EIS)	360 m by 360 m	1

Project Elements and Infrastructure	Approximate Dimensions	Quantity
Ancillary Infrastructure		
Blade laydown	25(W) x 105(L)m	99
WTG hardstand	50(W) x 80(L)m	99
Internal Roads	6 m (width)	TBC
Substations	100 m to 100 m	1 (TBC)
O&M Compounds	50 m by 70 m	To be Determined
Overhead and Underground Transmission Cables	Extent to be determined based on field electrical optimisation	To be Determined
Permanent Meteorological Masts (concrete footings for mast and guy wires)	At hub height (footings of 1 m^2 per mast)	To be Determined
Telecommunication Facilities, Utility Services and External Road Upgrades	Subject to detailed design	To be Determined
Temporary Facilities		
Site compounds and offices, laydown areas (including equipment, stockpile, and material storage), concrete (or asphalt) batching plants, rock crushing facilities and temporary access roads	Variable. Subject to detailed design and located within the Development Corridor.	To be Determined
Temporary Meteorological Masts (concrete footing for mast and guy wires)	At hub height (footings of 1 m^2 per mast)	To be Determined
Temporary worker accommodation	Requirements to be assessed during the EIS	To be determined

3.1.1. Wind Turbine Generators

The Project comprises approximately 99 three-bladed WTGs of up to 270 m in height with an anticipated generation capacity of 6-7 MW. This allows for a conservative assessment of a 'worst case' impact scenario, allowing for WTG technology advances between the time of this assessment and the commencement of construction. Final numbers and power output will be dependent on the final geographic footprint as well as outcomes of the various engineering, environmental and social studies and is subject to change. A WTG is made up of the foundation, tower, nacelle, rotor, blades, and a generator transformer. The key components of a WTG are described in Table 3-2.

Table 3-2: Components of a WTG

WTG Component	Description
Design Height	WTG designs continue to evolve, with a trend towards larger WTGs. At the current scoping stage, the Project has been designed to accommodate WTGs of up to 270 m in height. Final numbers and power output will be dependent on the final geographic footprint as well as outcomes of the various engineering, environmental and social studies and is subject to change.
Foundation	Two types of foundation for the WTG may be required for the Project pending geotechnical investigation of the ground conditions across the Project Site including slab (gravity) foundation or rock anchor foundation.

WTG Component	Description
Towers	The supporting tower structure of a WTG is typically comprised of a reducing cylindrical tower made from either a welded steel shell, concrete, or a concrete steel hybrid, fitted with an internal ladder and lift.
Nacelle	The nacelle is the housing constructed of steel and fibreglass that is mounted on top of the tower and is typically around 15 – 18 m long, 4.5 m high and 4.5 m wide (depending on the wind turbine generator model). It encloses the gearbox, generator, transformers (WTG model dependant), motors, brakes, electronic components, wiring and hydraulic and lubricating oil systems. Weather monitoring equipment located on top of the nacelle will provide data on wind speed and direction for the automatic operation of the WTG. Obstacle hazard lighting if required, would be installed to the top of the nacelle.
Rotor	The WTG rotor drives the generator within the nacelle producing electrical output. In general, a larger rotor enables greater generation capacity, however site-specific wind conditions influence the rotor selected for installation at any given wind farm.
Blades	WTG blades are typically made from glass fibre reinforced with epoxy or plastic attached to a steel hub and include lightning protection inside the blade.
Generator Transformer	WTGs produce electricity at low voltage which is then stepped up to medium voltage (33 kV or greater) by a transformer located in either the nacelle, within the base of the tower, or adjacent to the base of the tower on a concrete pad. The footprint of the transformer is small as it would sit on the WTG footing and/or the hardstand assembly area.

Figure 3-1 below shows a 200 m tall WTG installed at Sapphire Wind Farm, for reference in detailing the component parts.

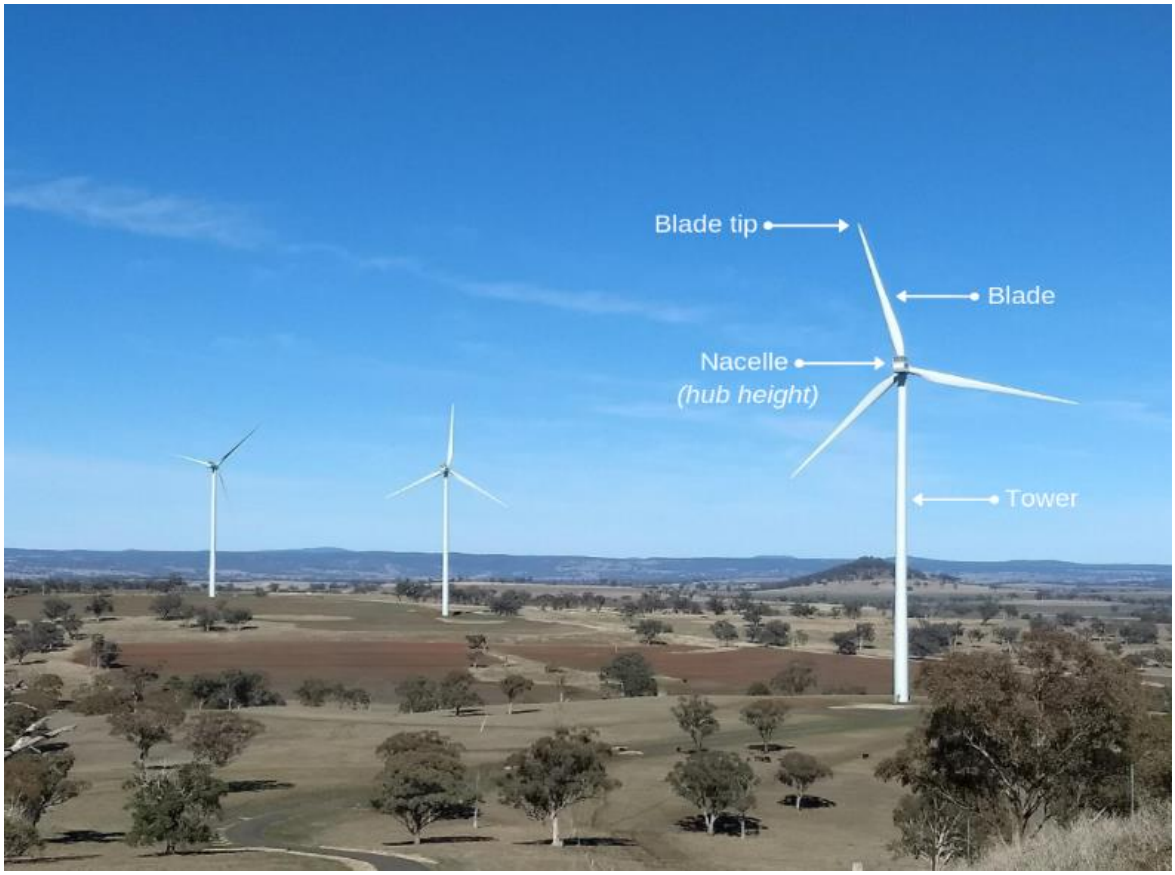


Figure 3-1: Components of a WTG as shown at Sapphire Wind Farm for reference

3.1.2. Battery Energy Storage System

Large-scale BESSs allow for the storage and discharge of energy and support stabilising the supply of electricity to the NEM. The indicative electrical capacity of the battery storage is up to 250MW / 1000 MWh, but this is not intended as an upper limit and will be subject to further design.

Due to consistent evolution in battery storage technology, the proposed battery technology and location would be refined and assessed during the EIS. The BESS would be in an Electrical Plant Compound and consist of gravel hardstand or concrete slab, buildings, shipping containers and other infrastructure to contain the chosen technology and to connect the battery storage, WTGs, and substations via underground and/or overhead cables. The BESS may be constructed as a stand-alone facility or as a combined facility co-located with other compounds.

3.1.3. Ancillary Infrastructure

Other ancillary infrastructure necessary for the operation of the Project is described in Table 3-3.

Table 3-3: Proposed ancillary infrastructure

Permanent Ancillary Infrastructure	Description
WTG Hardstands	Hardstands are required adjacent to each WTG location for the assembly, erection, maintenance, repowering and/or decommissioning activities. Hardstands will be surfaced with gravel pavement material and maintained throughout the construction and operational life of the Project.
Internal Roads and Drainage	Internal roads will be established within the Project Site for the construction, operation, repowering and/or decommissioning of the Project, from the public road access locations, WTGs, the BESS, substations, and other permanent and temporary facilities. Internal roads are planned to follow existing farm tracks where practicable.
External Roads	Subject to blade length and transport routes requiring the use of over-size over-mass vehicles, external road upgrades may be required. This would be determined and assessed during the EIS.
Substations	Substations include infrastructure required to collect electrical reticulation for transmission to connect to the grid, and to physically connect to the grid (switching station).
O&M Compound	One or more permanent O&M compounds will be established for the day-to-day operation of the Project. Each O&M compound may include lay down areas, site operations facilities and services buildings, workshop, storage, parking, and other facilities for operations staff.
Transmission Lines (Overhead / Underground)	A series of underground and overground transmission lines are proposed to conduct electricity generated by the WTGs to potentially connect to the proposed 500kV HumeLink connecting Wagga Wagga, Bannaby and Maragle.
Permanent Meteorological Masts	Meteorological masts, up to hub height of the WTGs, will be installed on-site. The purpose of these masts is to aid in performance monitoring of the WTGs.
Telecommunication Facilities	Telecommunications facilities providing for transmission of voice, data, image, graphic and video information are proposed to be installed on site at standalone locations or onto Project infrastructure such as permanent masts.
Utility Services	The Project proposes to connect to Transgrid's transmission network and when not generating will draw a small amount of electricity from the grid. Backup and emergency power at the substations may be supplied by a local 11kV distribution line, on-site batteries and/or a standalone diesel generator. Two separate and independent telephone communications facilities (optic fibre and microwave) will be required to be installed between the substations. Operational water requirements will be provided to the proposed facilities and auxiliary services building from a storage tank designed to collect water from roof drainage and augmented by

Permanent Ancillary Infrastructure	Description
	potable water delivered by tankers. An approved septic system or composting system will be installed to treat minor quantities of wastewater, subject to securing the relevant authorisation. Other waste will be classified and removed from the Project Site to an approved facility (landfill, recycling etc).

3.1.4. Temporary Facilities

Temporary facilities will consist of site offices and compounds, amenities, rock crushing facilities, concrete or asphalt batching plants, accommodation facilities, stockpiles and materials storage compounds, water (and potentially quarry) sources, temporary field laydown areas, crane pads, minor work front construction access roads and temporary meteorological masts. All temporary facilities will be rehabilitated once they are no longer required in accordance with detailed measures to be defined in the environmental management plan.

3.1.4.1. Temporary worker accommodation

Temporary worker accommodation may or may not form part of the Project but will be considered more fully and assessed as part of the EIS.

3.1.5. Project Phases

Squadron Energy proposes to construct the Project as a single stage of development however this would be subject to ongoing review depending on factors such as grid connection capacity. Figure 3-2 outlines the stages of the Project's development cycle.

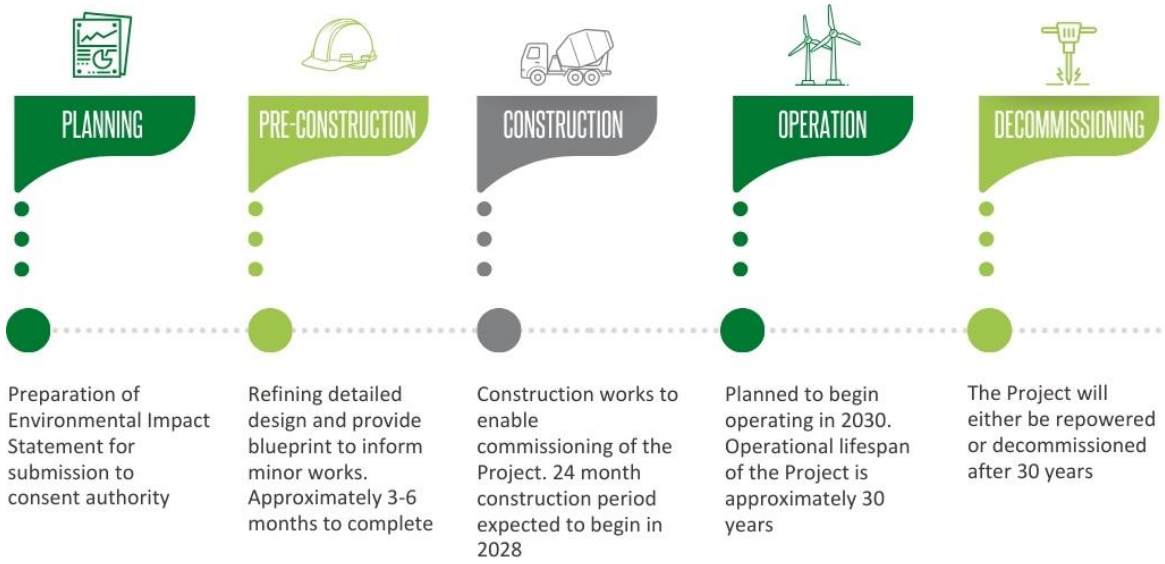


Figure 3-2: Project phases

3.1.6. Transport and Access

Subject to WTG selection and a review of the available transport routes for Oversize Overmass (OSOM) vehicles, external road upgrades may be required. Preliminary transport route studies have been assessed for potential ports of entry including Port Kembla, Port of Newcastle, Port of Geelong and Port Adelaide. The port of entry is yet to be determined. Consultation commenced with TfNSW in April 2024

regarding site access from the Hume Highway. A preferred option using an existing intersection has been identified and will be further assessed during the EIS.

Resources required for the Project may be sourced from local suppliers and may require the use of alternate public roads/routes including for general site access. The routes used to move the resources through the surrounding towns and road network (and access the site) will be along the permitted standard heavy vehicle road network where feasible, or alternatively along routes subject to an endorsed Traffic Management Plan.

3.2. Project Design Development and Alternatives

The Project is still in the early stages of design, with the development of the preliminary Project layout to consider:

- Results from the preliminary assessments and constraints analysis undertaken to date.
- Feedback from associated and neighbouring landowners.

The Project layout will progress through many iterations before construction and be contained wholly within the final proposed Development Corridor to which the approval will relate subject to the EIS assessment process.

Key principles of Project development that will be adopted to avoid, minimise or offset the impacts of the Project to the extent known at the scoping stage include:

- Minimise vegetation clearing (areas of higher conservation value and/or native vegetation will be strategically avoided, wherever possible).
- Preference the use of previously disturbed land (i.e. land that has been previously modified for agricultural operations, previously cleared land, and established access tracks and local roads).
- Minimise disturbance (footprints for Project infrastructure limited to minimum area required).
- Protect significant Aboriginal cultural and historic heritage values (through the identification and evaluation of heritage sites as part of the preparation of the Aboriginal Cultural Heritage assessment and through consultation with Aboriginal stakeholders).
- Minimise direct and indirect impacts on neighbouring landholders (locating infrastructure away from nearby residences and adjoining properties, wherever possible).
- An iterative and flexible approach to design (responding to identified environmental and social impacts and constraints).
- Effective stakeholder engagement for developing enhancement or mitigation measures and maximising benefits of the Project.

3.2.1. Site Selection and Design Development

As outlined in the *NSW Wind Energy Guideline (DPHI, 2024a)*, a well-sited wind farm can maximise the potential for energy generation while limiting impacts on the environment and provide greater social license to operate. The preliminary layout has been informed by:

- Principles outlined in available guidelines
- Landowner and community feedback in relation to the Project Site.
- Wind speed assessments based on publicly available and locally recorded wind data.

- Results from the Preliminary Landscape and Visual Impact Assessment (PLVIA) undertaken by Moir Landscape Architecture (2024) (Section 6.1.1).
- Results from the Preliminary Noise Impact Assessment undertaken by Marshall Day Acoustics (2024) (Section 6.1.2, Appendix B).
- Environmental constraints such as major watercourses, Threatened Ecological Communities (TECs) and threatened species, previously recorded Aboriginal heritage items, etc. identified using desktop and preliminary fieldwork assessments.
- Project Site access and anticipated transport routes.
- Civil design and (desktop) 3D model.
- Internal assessment and consideration of commercial viability.

4. Statutory Context

The relevant statutory requirements for the Project are summarised in Table 4-1.

Table 4-1: Statutory context of the Project

Matter	Relevance to the Project
Power to Grant Approval	In accordance with Part 2, Clause 6 of the Planning Systems SEPP, development is declared to be SSD for the purposes of the EP&A Act if: c. *the development on the land concerned is, by the operation of an environmental planning instrument, not permissible without development consent under Part 4 of the Act, and* d. *the development is specified in Schedule 1 or 2.* Clause 20 of Schedule 1 of the Planning Systems SEPP states that *"development for the purpose of electricity generating works or heat or their co-generation (using any energy source, including gas, coal, biofuel, distillate, waste, hydro, wave, solar or wind power) that have a capital investment value of more than $30 million"* shall be classified as SSD under Division 4.7 of the EP&A Act. The Project has a capital investment value estimated to be greater than $30 million, and therefore is deemed SSD. The Minister for Planning and Public Spaces is the consent authority for SSD applications. SSD applications are assessed by DPHI, and in some cases the Minister may delegate decision making to Department staff. However, the Independent Planning Commission (IPC) is the consent authority for SSD applications where specific conditions occur.
Permissibility	The Project Site is located within the Yass Valley Council LGA and is therefore subject to the Yass Valley LEP 2013. The Project Site is situated on land zoned as RU1 (Primary Production). Within this zone, electricity generation is not permitted. However, pursuant to Clause 36(1b) of the *State Environmental Planning Policy (Transport & Infrastructure) 2021* (Transport and Infrastructure SEPP), development for the purpose of electricity generating works may be carried out by any person with consent on any land in a prescribed rural, industrial, or special use zone, which in this case is the RU1 (Primary Production) zone. Given that the Project is located on prescribed rural land, and the proposed activity is to generate electricity using wind energy, the Project is permissible with consent under clause 36(1b) of the Transport and Infrastructure SEPP.
Other Approvals	**Consistent Approvals** In accordance with Section 4.42 of the EP&A Act, an authorisation of the following approvals cannot be refused if it is necessary for carrying out SSD that is authorised by a development consent under this Division and is to be substantially consistent with the consent: An Environmental Protection Licence (EPL) under Chapter 3 of the *Protection of the Environment Operations Act 1997* (POEO Act) (for any of the purposes referred to in Section 43 of the Act) A consent under Section 138 of the *Roads Act 1993* (Roads Act). **EPBC Act Approval** The Project may have the potential to have a significant impact on Commonwealth listed threatened species and ecological communities and a Referral to the Commonwealth DCCEEW will be made. If the Commonwealth determine that the Project is likely to have a significant impact on a MNES, the Project will become a 'Controlled Action' and assessed under the NSW Assessment Bilateral Agreement. **Other Approvals** A range of approvals and licences that may be required for the Project prior to construction, or commencement of specific Project elements. These will be defined in the Project's Regulatory Approvals Management Plan.

Matter	Relevance to the Project
	Approvals Required if this was not an SSD Project Although all relevant environmental impacts will be assessed in the EIS for the Project, due to the Project's nature and being SSD, there are several approvals and licences, as listed in Section 4.41 of the EP&A Act, that are not required if matters are sufficiently assessed as part of the SSD application. These include: Applications for separate permits under Sections 201, 205 or 219 of the *Fisheries Management Act 1994* (FM Act) however, the offset policy still applies. Applications for separate approvals under Sections 89, 90 and 91 (other than an aquifer interference policy) of the *Water Management Act 2000* (WM Act). An Excavation Permit under Section 139 of the *Heritage Act 1977* (Heritage Act). An Aboriginal Heritage Impact Permit (AHIP) under Section 90 of the *National Parks and Wildlife Act 1974* (NPW Act).
Pre-Condition to Exercising the Power to Grant Approval	No pre-conditions to exercising the power to grant approval have been identified.
Mandatory Matters for Consideration	The following Acts, Regulations and Environmental Planning Instruments (EPIs) have been identified as applicable to the Project based on the nature, location and scale of the Project: Commonwealth Legislation EPBC Act *Native Title Act 1993* *Renewable Energy (Electricity) Act 2000* (RE Act) *Crowns Land Management Act* 2016 State Legislation *Biodiversity Conservation Act 2016* (BC Act) *Biosecurity Act 2015* (Biosecurity Act) EP&A Act FM Act Heritage Act *Mining Act 1992* (Mining Act) NPW Act POEO Act Roads Act *Rural Fires Act 1997* (RF Act) *Waste Avoidance and Resource Recovery Act 2001* (WARR Act) WM Act State Environmental Planning Policies: *State Environmental Planning Policy (Biodiversity and Conservation) 2021* (Biodiversity and Conservation SEPP) *State Environmental Planning Policy (Primary Production) 2021* (Primary Production SEPP) *State Environmental Planning Policy (Resilience and Hazards) 2021* (Resilience and Hazards SEPP) Transport and Infrastructure SEPP Planning Systems SEPP Planning Instruments: Yass Valley LEP 2013

5. Engagement

5.1. Community and Stakeholder Engagement Objectives

Squadron Energy is committed to undertaking genuine, robust and meaningful community and stakeholder engagement and consultation to better inform the Project. To achieve this the Project has implemented the following consultation and engagement objectives:

- Engage with the local community to seek feedback on the proposed Project, to be integrated into Project planning and design as far as practicable.
- Maintain communication to inform the community about potential impacts and benefits in a continuous, accurate and timely manner.
- Identify key stakeholders early for further engagement and provide various opportunities and mechanisms for Squadron Energy to meaningfully engage with all stakeholders.
- Develop a sound understanding of the potential social impacts of the Project to assist in developing and implementing mitigation measures.
- Ensure the development team has a deep understanding of the local context of the Project, including any local impacts that it may have or opportunities that the Project could provide.
- Build and maintain Squadron Energy's social licence within the community and among all stakeholders.

Squadron Energy's approach to community and stakeholder engagement is multi-faceted, to ensure comprehensive engagement across all groups, utilising the skills of our various teams. Landowners and hosts engage directly with Project teams. Broader stakeholder groups may be engaging with a wider group of staff with expertise, including First Nations engagement, government relations, media and communications and community engagement.

The first step in developing this relationship is to undertake robust stakeholder mapping and analysis to understand the needs of the community and to begin building early relationships. By consistently building on these relationships, Squadron Energy maintains open and transparent communication with stakeholders throughout the Project lifecycle to ensure community needs are considered.

The Stakeholder Engagement Plan for Bookham Wind Farm can be found at:

https://www.squadronenergy.com/our-projects/bookham-wind-farm

5.2. Consultation and Engagement Undertaken to Date

Squadron Energy has been engaging with a broad range of stakeholders since 2021. The Project team has completed a variety of engagement activities with host landowners, surrounding neighbours, First Nations identified community members, Council and relevant State and Federal Government members and agencies. There have been more than 900 stakeholder interactions as at November 2024. The engagement undertaken to date is summarised in Figure 5-1 and Table 5-1.

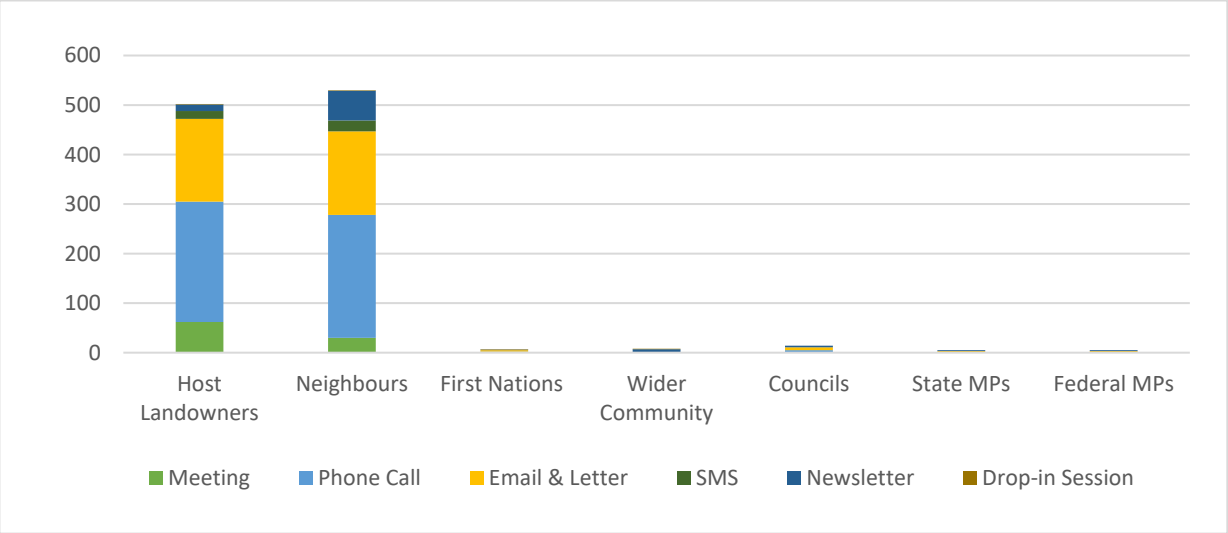


Figure 5-1: Engagement by type, stakeholder and frequency

Table 5-1: Frequency and Type of Engagement

Event Type	Frequency
Meeting	96
Phone Call	487
Email and Letter	410
SMS	36
Newsletter	88
Community drop-in session	1

5.3. Feedback received

A summary of the feedback received from the consultation and engagement undertaken to date is summarised in Table 5-2 and Table 5-3.

Table 5-2: Topics raised during stakeholder consultation

Topics	Number of times raised
General update	430
Land use	172
Legal	158
Land access	150
Benefits of renewable energy	83

Topics	Number of times raised
Project layout/design	65
Visual	60
Biodiversity	60
Agreement negotiation	48
Community sponsorship	43
Resource monitoring	36
Other	185
TOTAL	**1490**

Table 5-3: Key topics raised by stakeholders

Stakeholder type	Key theme/issue raised during consultation to date	Stakeholder View Category (grouped per SSD guidelines)
Host landowners	• Potential visual & noise impacts • Biodiversity & Biosecurity • Project layout/design • Community sponsorships • Avoidance where possible of local roads • Decommissioning/repowering • Transmission • Bushfire risk management	• Strategic context • Alternatives considered • Key matters to be assessed during preparation of the EIS
Neighbours and community	• Potential visual & noise impacts • Project layout/design • Decommissioning/repowering • Use of local roads • Transmission • Bushfire risk management • Property value	• Strategic context • Alternatives considered • Key matters to be assessed during preparation of the EIS
Yass Valley Council	• Meeting held April 2024 • Workforce accommodation • Use of local infrastructure • Skills training • Community benefits	• Cumulative impacts • Statutory issues • Key matters to be assessed during preparation of the EIS
Hilltops Council	• Invited to open day, briefing offered.	• Cumulative impacts
Cootamundra-Gundagai Council	• Invited to open day, briefing offered.	• Cumulative impacts
First Nations stakeholders	• Meeting with LALC July 2024 • Potential heritage values • Project design process • Opportunities for first nations	• Community engagement during the preparation of the EIS • Key matters to be assessed during preparation of the EIS

Stakeholder type	Key theme/issue raised during consultation to date	Stakeholder View Category (grouped per SSD guidelines)
State MP, Mrs Wendy Tuckerman MP State MP, Ms Steph Cooke MP	• Invited to open day, briefing offered. Unable to attend • No feedback received	
Federal MP, Hon Kristy McBain MP Federal MP, Hon Michael McCormack MP	• Invited to open day, briefing offered. Unable to attend • No feedback received	
Local business	• Project layout • Community sponsorships	
Community groups	• Project layout • Community sponsorships	
Wider community (residents of Bookham and surrounds)	• Potential visual & noise impacts • Project layout/design • Use of local roads • Community benefits • Biodiversity impacts • Anti renewable energy	• Strategic context • Alternatives considered • Community engagement during preparation of the EIS • Key matters to be assessed during preparation of the EIS • Issues beyond the scope of the Project or not relevant
Other Agencies: Transport for NSW Transgrid Biodiversity, Conservation and Science Division	• Transportation route and site access • Transmission line (HumeLink) access application enquiry • BDAR/BBUS design	

5.3.1. Community Drop-In Session summary

A Community Drop-in Session was held at the Bookham Memorial Hall on Tuesday 22 October between 3:00 pm-7:00 pm. The session was attended by approximately 45-60 people, with some representing various community groups. A summary of feedback received during the information session is provided in Table 5-4.

Table 5-4: Summary of feedback received to date

Stakeholder Type	Key Theme/Issue Raised
Host Landowner	• Feedback on the Project layout • Potential positive impacts of the Project
Neighbouring Landowner	• Some stakeholders held opposition to renewable energy • Process of amending Project/turbine layout • Potential visual impacts
Community Members	• Biodiversity and wildlife risks

Stakeholder Type	Key Theme/Issue Raised
	• Servicing construction workers and materials (accommodation, water, concrete, etc.) • Concerns regarding visual/noise impacts of other nearby wind farms (Bango) • Penetration of wind energy into the NEM • The Project in relation to HumeLink • Technical questions about capacity, WTG dimensions, decommissioning/repowering • Decommissioning
First Nations Stakeholders	• Opportunities for benefit sharing with First Nations stakeholders • Employment opportunities • Health, financial benefit opportunities • Protection of heritage values and artifacts
Community Groups, schools and businesses	• Sponsorship opportunities • Support for local Rural Fire Service • Benefit sharing schemes
State and Federal MPs	• Contact made but no feedback received
Yass Valley Council; Cootamundra-Gundagai Council; Hilltops Council	• Contact made but no feedback received

5.4. Engagement and Consultation Proposed During Preparation of the EIS

Squadron Energy will continue to engage and consult with all identified stakeholders throughout the EIS process. This ongoing consultation will be guided by the Project's Stakeholder Engagement Plan and in accordance with relevant legislation and guidelines (listed in Section 1.6 of the SEP). The SEP can be found on the Project's website (www.bookhamwindfarm.com.au). The feedback and participation from engagement and consultation activities will be used to further inform the environmental and social impact assessments for the Project. Key issues identified in Section 6 and the associated technical reports will help to inform targeted engagement and consultation.

Proposed engagement is included in Section 3.5 of the Project's Stakeholder Engagement Plan.

6. Proposed Assessment of Impacts

6.1. Preliminary Environmental Risk Assessment

In accordance with the SSD Scoping Report Guidelines, the scale of impact, nature of impact and sensitivity of the receiving environment for the environmental issues has been evaluated in the scoping summary table in Appendix A. The scoping summary table groups the matters requiring further assessment in the EIS by the level of assessment required.

Definitions for levels of assessment and the level of assessment proposed for each matter is summarised in Table 6-1. The assessment matters are grouped into the broad categories identified in the SSD Scoping Report Guidelines.

Table 6-1: Level of assessment required for each environmental and/or social matter assessed

Level of Assessment	Definition	Environmental / Social Matter
Detailed	The Project may result in significant impacts on the matter identified, including cumulative impacts. The assessment of the impacts of the Project on the matter will require detailed studies and investigations to be carried out by technical specialists.	• Biodiversity (Native Vegetation, Fauna, and Aquatic Ecology) • Heritage (Aboriginal and Historic) • Water (Hydrological Flows, Surface and Groundwater Quality and Water Availability) and Water and Soil interface • Landscape and Visual • Noise and Vibration • Traffic and Transport (Property Access and Road Network) • Social (Health, Safety, Housing Availability and Community Benefits) • Economic (Natural Resource Use, Livelihood, Opportunity Cost and Economic Benefits) • Temporary worker accommodation
Standard	The Project is unlikely to result in significant impacts on the matter, including cumulative impacts. While the assessment of the impacts of the Project on the matter will involve technical specialists, these impacts are likely to be well understood, relatively easy to predict using standard methods and are capable of being mitigated to comply with relevant standards or performance measures.	• Air (Particulate Matter, Gases and Atmospheric Emissions) • Land (Stability, Topography, Geology and Land Capability) • Hazards (Bushfire, Aviation, Telecommunications, Blade Throw, Climate Change and Public Health) • Waste (Resource Use and Waste Management)
Matters requiring no further assessment	The Project will have no impact on the matter, or the impacts of the Project on this matter will be sufficiently minor that they are not worth considering.	• Port, Airport and Rail Facilities • Greenhouse Gas • Odour • Opportunity Cost • Coastal Hazards, Land Movement and Dam Safety

6.1.1. Landscape and Visual Amenity

A preliminary visual impact assessment was undertaken in accordance with the Wind Energy Guideline Technical Supplement for Landscape Character and Visual Impact Assessment (DPHI, 2024b)

6.1.1.1. Existing Environment

The Project Site sits within a landscape that is varied and characterised by isolated ranges, steep and rocky ridges and undulating hills. The Project Site is located to the north of Lake Burrinjuck. The Murrumbidgee and Yass Rivers are key landscape features in proximity to the Project Site.

6.1.1.2. Potential Impacts

The development of the Project will impact the visual landscape surrounding the Project Site to varying degrees depending on the location of the receiver and several factors, including topography and natural screening. The setback for a 270m tip is 1,705m with a study area of 7,732m. Within the setback there are 14 associated and 24 non-associated landowners including 26 dwellings (25 contacted). Within the study area there are 14 associated and 127 non-associated including 89 dwellings (65 contacted). The output from the ZVI assessment is shown in Figure 6-1 and Table 6-2. Note that since the PLVIA report was prepared, BJR032 is now associated and CWR012 licence agreement is pending execution.

Table 6-2: Contact with non-associated landowners

Visual Magnitude	Associated	Non-Associated	Dwellings	Contacted Dwellings
1.7km	14	24	26	25 (96%)
7.7km	14	127	89	65 (73%)

While the WTGs will be visible within the landscape, the isolated, steep and rocky landscape of the Project Site, together with other factors, reduces the number of WTGs visible to any single receptor and reduces the overall impact of the Project. During development of the layout, the Project has considered potential cumulative impacts for projects in the public domain.

6.1.1.3. EIS Assessment Approach

A full Landscape and Visual Impact Assessment (LVIA) will be undertaken as part of the EIS in accordance with the Wind Energy Guideline - Technical Supplement for Landscape Character and Visual Impact Assessment (DPHI, 2024b) to address impacts to non-associated dwellings and the broader community. The assessment will include a baseline study, establish visual influence zones from viewpoints, assess the proposed layout against visual performance objectives and provide a justification for the final proposed layout along with mitigation measures that can be undertaken to minimise potential visual impacts.

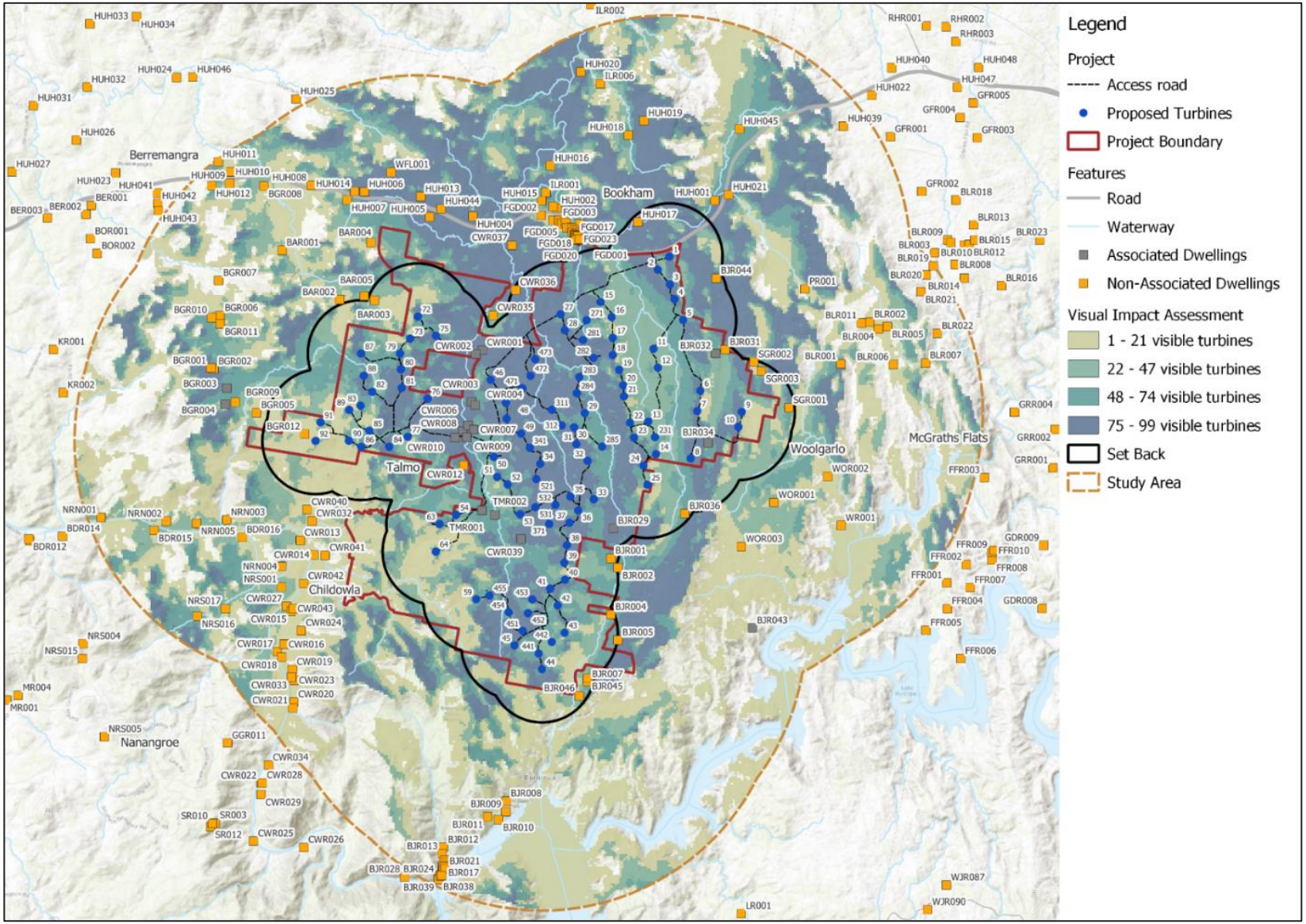


Figure 6-1: Zone of Visual Influence of the Project on associated and non-associated dwellings within the study area (Moir LA, 2025)

6.1.2. Noise

6.1.2.1. Existing Environment

A Preliminary Noise Assessment (PNA) has been undertaken in accordance with the *NSW Wind Energy: Noise Assessment Bulletin 2016* (Noise Bulletin) by Marshall Day Acoustics (2024; Appendix B), the results of which are summarised below. As described in Section 1.4 this preliminary assessment also meets the requirements of the scoping and preliminary assessment in Section 2.1 of the Wind Energy Guideline – Technical Supplement for Noise Assessment (DPHI, 2024c).

The Project is located within the rural locality of Bookham, NSW with background noise levels typical of the rural setting. No background monitoring was undertaken within or in proximity to the Project Site during the scoping stage. Background monitoring over a number of weeks at multiple locations will be undertaken as part of the noise assessment during the EIS. To prepare the PNA, an initial identification of residential receivers was carried out in accordance with the NSW *Noise Assessment Bulletin* (DPE, 2016).

6.1.2.2. Potential Impacts

The assessment found that predicted WTG noise levels for the Project are above the *Noise Assessment Bulletin* (DPE, 2016) base noise limit of 35 dB $L_{Aeq,\ 10\ min}$ for a number of non-associated receivers. The magnitude of exceedance is up to 9.1 dB. Compliance with the applicable noise limits as part of the Project design process will be further investigated during the EIS phase.

CONSTRUCTION

Construction noise and vibration will be assessed for the Project during the EIS stage. Given the distance between the Project and the nearest sensitive receivers, the Project will need to consider compliance with applicable noise limits as part of the ongoing design development.

Construction noise in NSW is assessed using the Department of Energy and Climate Change (DECC) (now NSW DCCEEW) *Interim Construction Noise Guideline 2009* (ICNG). Noise associated with construction traffic utilising local roads is assessed using the NSW EPA *Road Noise Policy 2011* (RNP).

OPERATION

Squadron Energy has selected three (3) candidate WTG models during the preliminary assessment phase to assess potential noise impacts. These models are used as a guide and do not necessarily reflect the model that Squadron Energy may ultimately choose to use for the Project. These models comprise:

- Candidate 1 - GE GE6.0-164
- Candidate 2 - Goldwind GWH175-7.8
- Candidate 3 - Vestas V172-7.2

For all three candidates, the sound power levels at various hub height wind speeds from the manufacturer's documentation were adopted for the noise modelling. The assessment identified a total of 83 receivers within 5 km of the Project Site, with 68 categorised as non-associated receivers and 15 as associated receivers as shown in Figure 1, Figure 2, and Figure 3 of the Preliminary Noise Assessment (MDA, 2024). The assessment prepared the predicted noise levels at non-associated and associated receivers within 5 km of the Project site to determine the potential for each candidate model to produce noise over the baseline 35dB. This is described in greater detail in Appendix B.

6.1.2.3. EIS Assessment Approach

A Noise and Vibration Impact Assessment (NVIA) will be completed to support the EIS in accordance with the Wind Energy Guideline – Technical Supplement for Noise Assessment (DPHI, 2024c). This is expected to include an assessment of other noise considerations including background noise levels (if monitoring is required), special noise characteristics, construction, and ancillary infrastructure as well as a review of cumulative noise considerations if required. Squadron Energy is committed to ensuring compliance with applicable noise limits as part of the ongoing design development of the Project.

6.1.3. Biodiversity

6.1.3.1. Existing Environment

The Project Site is located within two NSW bioregions, comprising the South Western Slopes Bioregion, within the Inland Slopes Sub Region and the South Eastern Highlands Bioregion, within the Bondo Sub Region and Murrumbateman Sub Region (Interim Biographic Regionalisation for Australia). The South Western Slopes Bioregion is characterised by foothills and isolated ranges comprising the lower inland slopes associated with the Great Dividing Range. The Inland Slopes sub region is characterised by steep, hilly and undulating ranges and Granite basins and confined river valleys with terrace remnants. The South Eastern Highlands Bioregion is typically characterised by rugged hills and stony slopes. The Bondo Sub region commonly characterises plateaus with rounded hills and peaks, along with meandering streams.

PLANT COMMUNITY TYPES

The desktop assessment identified a list of vegetation communities that may potentially occur within the Project Site based on the State Vegetation Type Mapping (SVTM) (NSW DCCEEW 2024a).

Preliminary Plant Community Type (PCT) identification and mapping has been completed through initial field observations with Rapid Data Points (RDP) collected, noting dominant characteristics of an area including classification of landform, vegetation formation and dominant canopy species identified. Quantitative analysis of plot data collected during field surveys (27-31 May 2024; 16-20 Sep; 14-18 Oct) was also undertaken using the Eastern NSW Plot to PCT Assignment tool ('Plot to PCT tool', NSW Government 2024a). The tool was applied to plot data collected in mapped PCTs as well as in Exotic and planted native vegetation in order to check if this data predicted any likely PCTs. No full floristic plot data was collected at this initial stage. The 'best fit' PCTs were then allocated based upon results from field surveys and analysis of data collected at RDPs, and preliminary vegetation mapping created.

Five (5) PCTs have been identified within the Development Corridor (Appendix C). Further field survey, in accordance with the BAM will identify and refine the PCT mapping within the Biodiversity Development Assessment Report (BDAR) and the EIS.

PCTs were further stratified into 19 Condition Classes, including 17 native vegetation classes and two (2) non-native vegetation classes. Areas of 'High' habitat were often found to have more intact canopy and generally a greater cover in native mid-storey and understory covers. Areas of 'Moderate' habitat were instead often found with an absent mid-storey, and if it was present, it was predominantly native but comprised low species diversity. The understory was predominantly native but also comprised of low species diversity. Areas of 'Low' consisted of more scattered paddock trees, and either an absent mid-storey layer or a mid-storey layer with more than 50% of the cover was exotic. The understorey layer

was predominantly exotic. Areas of 'Derived Native Grassland (DNG)' were generally found to contain greater than 50% native groundcovers.

Table 6-3 outlines the type of habitat features identified during the preliminary field surveys undertaken to date, that may provide potential habitat for threatened fauna species. It is noted that surveys are still ongoing. Therefore, further habitat features may be identified in the future.

Table 6-3: Fauna habitat features, and fauna guild recorded in the Project Site

Habitat Feature	Species/Guild	Recorded
Woodland and forest vegetation	Birds, Microchiroptera bats (microbats), megachiropteran bats (fruit bats), arboreal mammals, reptiles	Yes
Winter flowering species	Winter migratory birds, arboreal mammals, and fruit bats	Yes
Hollow-bearing trees	Microbats, birds, arboreal mammals, reptiles, amphibians	Yes
Mistletoe	Arboreal mammals, woodland and migratory birds, fruit bats	Yes
Stags	Birds, particularly birds of prey, microbats	Yes
Nectar producing trees (Acacia and bloodwoods)	Gliders and other arboreal mammals, birds	Yes
Leaf litter	Invertebrates, reptiles, amphibians	Yes
Trees with defoliating or fibrous bark	Microbats, reptiles, amphibians	Yes
Fallen woody debris	Terrestrial mammals, reptiles, invertebrates	Yes
Water body or dam	Amphibians, birds, reptiles	Yes
Large rocky outcrops	Microbats, reptiles, invertebrates, small mammals	Yes
As per Appendix C Koala (*Phascolarctos cinereus*) Biodiversity Assessment Method Survey Guide	Koala feed trees – Koala	Yes

THREATENED FLORA AND FAUNA

A search for threatened species using the Protected Matters Search Tool and BioNet (within a 10 km buffer around the Project Site) and the review of literature identified several threatened flora species, threatened fauna and migratory species. The literature review identified three (3) threatened flora species and thirty-one (31) threatened fauna species listed under the BC Act and/or EPBC Act, which have previously been recorded within a 10 km radius of the Project Site (Figure 6-2).

MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

Following is a preliminary table of MNES with the potential to occur within the Project Site that may require referral as shown in Table 6-4. Figure 6-3 outlines the areas where White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland, a critically endangered TEC under the EPBC Act intersects the Development Corridor.

Table 6-4: Matters of National Environmental Significance with potential to occur within the Project Site (PMST, 2024)

Scientific Name/Community Name	Common Name	Status
Threatened Species		
Lathamus discolor	Swift Parrot	Critically Endangered
Anthochaera phrygia	Regent Honeyeater	Critically Endangered
Calidris ferruginea	Curlew Sandpiper	Critically Endangered
Prasophyllum petilum	Tarengo Leek Orchid	Endangered
Crinia sloanei	Sloane's Froglet	Endangered
Pomaderris cotoneaster	Cotoneaster Pomaderris	Endangered
Maccullochella macquariensis	Trout Cod	Endangered
Dasyurus maculatus maculatus (SE mainland population)	Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population)	Endangered
Grevillea iaspicula	Wee Jasper Grevillea	Endangered
Bidyanus bidyanus	Silver Perch, Bidyan	Endangered
Callocephalon fimbriatum	Gang-gang Cockatoo	Endangered
Keyacris scurra	Key's Matchstick Grasshopper	Endangered
Melanodryas cucullata cucullata	South-eastern Hooded Robin, Hooded Robin (south-eastern)	Endangered
Rostratula australis	Australian Painted Snipe	Endangered
Botaurus poiciloptilus	Australasian Bittern	Endangered
Swainsona recta	Small Purple-pea, Mountain Swainson-pea, Small Purple Pea	Endangered
Chalinolobus dwyeri	Large-eared Pied Bat, Large Pied Bat	Endangered
Lophochroa leadbeateri leadbeateri	Major Mitchell's Cockatoo (eastern), Eastern Major Mitchell's Cockatoo, Pink Cockatoo (eastern)	Endangered
Litoria booroolongensis	Booroolong Frog	Endangered
Macquaria australasica	Macquarie Perch	Endangered
Petauroides volans	Greater Glider (southern and central)	Endangered
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)	Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)	Endangered
Synemon plana	Golden Sun Moth	Vulnerable
Lepidium aschersonii	Spiny Peppercress	Vulnerable
Litoria raniformis	Southern Bell Frog, Growling Grass Frog, Green and Golden Frog, Warty Swamp Frog, Golden Bell Frog	Vulnerable
Delma impar	Striped Legless Lizard, Striped Snake-lizard	Vulnerable
Thesium australe	Austral Toadflax, Toadflax	Vulnerable
Gallinago hardwickii	Latham's Snipe, Japanese Snipe	Vulnerable

Scientific Name/Community Name	Common Name	Status
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	Vulnerable
Polytelis swainsonii	Superb Parrot	Vulnerable
Aphelocephala leucopsis	Southern Whiteface	Vulnerable
Senecio macrocarpus	Large-fruit Fireweed, Large-fruit Groundsel	Vulnerable
Pycnoptilus floccosus	Pilotbird	Vulnerable
Amphibromus fluitans	River Swamp Wallaby-grass, Floating Swamp Wallaby-grass	Vulnerable
Caladenia concolor	Crimson Spider-orchid, Maroon Spider-orchid	Vulnerable
Stagonopleura guttata	Diamond Firetail	Vulnerable
Hirundapus caudacutus	White-throated Needletail	Vulnerable
Calidris acuminata	Sharp-tailed Sandpiper	Vulnerable
Climacteris picumnus victoriae	Brown Treecreeper (south-eastern)	Vulnerable
Neophema chrysostoma	Blue-winged Parrot	Vulnerable
Pteropus poliocephalus	Grey-headed Flying-fox	Vulnerable
Ammobium craspedioides	Yass Daisy	Vulnerable
Grantiella picta	Painted Honeyeater	Vulnerable
Nyctophilus corbeni	Corben's Long-eared Bat, South-eastern Long-eared Bat	Vulnerable
Maccullochella peelii	Murray Cod	Vulnerable
Falco hypoleucos	Grey Falcon	Vulnerable
Aprasia parapulchella	Pink-tailed Worm-lizard, Pink-tailed Legless Lizard	Vulnerable
Threatened Ecological Communities		
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia		Endangered
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland		Critically Endangered
Natural Temperate Grassland of the South Eastern Highlands		Critically Endangered
Migratory Species		
Gallinago hardwickii	Latham's Snipe, Japanese Snipe	Vulnerable
Apus pacificus	Fork-tailed Swift	-
Hirundapus caudacutus	White-throated Needletail	Vulnerable
Calidris melanotos	Pectoral Sandpiper	-
Calidris acuminata	Sharp-tailed Sandpiper	Vulnerable
Actitis hypoleucos	Common Sandpiper	-
Calidris ferruginea	Curlew Sandpiper	Critically Endangered
Motacilla flava	Yellow Wagtail	-

SPECIES CREDIT SPECIES

The vegetation zones within the Development Corridor were entered into the Biodiversity Assessment Methodology Calculator (BAM-C) to generate a list of predicted ecosystem credit species and species credit species. Table 6-5 outlines the species credit species predicted to occur within the Project Site (i.e. candidate species). These species will require targeted survey to confirm presence, during the preparation of the BDAR to accompany the EIS.

Table 6-5: Species credit species predicted to occur within the Project Site

Scientific Name	Common Name	Survey Months
	Flora	
Caladenia concolor	Crimson Spider Orchid	Sep
Prasophyllum petilum	Tarengo Leek Orchid	Sep-Dec
Ammobium craspedioides	Yass Daisy	Sep-Oct
Leucochrysum albicans subsp. tricolor	Hoary Sunray	Sep-Nov
Pultenaea humilis	Dwarf Bush-pea	Sep-Apr
Senecio macrocarpus	-	Oct-Dec
Swainsona recta	Small Purple-pea	Oct-Dec
Swainsona sericea	Silky Swainson-pea	Sep-Nov
Grevillea iaspicula	Wee Jasper Grevillea	All
Pomaderris pallida	Pale Pomaderris	All
Senecio garlandii	Woolly Ragwort	All
Eucalyptus aggregata	Black Gum	All
Eucalyptus alligatrix subsp. Alligatrix	-	All
	Fauna	
Crinia sloanei	Sloane's Froglet	
Litoria aurea	Green and Golden Bell Frog	Jul-Aug
Litoria booroolongensis	Booroolong Frog	Nov-Mar
Litoria castanea	Yellow-spotted Tree Frog	Oct-Dec
Litoria raniformis	Southern Bell Frog	Nov-Dec
Pseudophryne pengilleyi	Northern Corroboree Frog	Oct-Jan
Aprasia parapulchella	Pink-tailed Legless Lizard	Feb-Mar
Delma impar	Striped Legless Lizard	Sep-Nov
Tympanocryptis lineata	Canberra Grassland Earless Dragon	Sep-Dec
Keyacris scurra	Key's Matchstick Grasshopper	Oct-Apr
Synemon plana	Golden Sun Moth	Mar-May, Aug-Dec
Callocephalon fimbriatum	Gang-gang Cockatoo	Nov-Dec
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	Oct-Jan
Polytelis swainsonii	Superb Parrot	Jan-Sep
Burhinus grallarius	Bush Stone-curlew	Sep-Nov

Scientific Name	Common Name	Survey Months
Ninox connivens	Barking Owl	all
Ninox strenua	Powerful Owl	all
Tyto novaehollandiae	Masked Owl	all
Haliaeetus leucogaster	White-bellied Sea-Eagle	all
Hamirostra melanosternon	Black-breasted Buzzard	Jul-Dec
Hieraaetus morphnoides	Little Eagle	Sep-Nov
Lophoictinia isura	Square-tailed Kite	Aug-Oct
Petrogale penicillata	Brush-tailed Rock-Wallaby	Sep-Jan
Cercartetus nanus	Eastern Pygmy-possum	Jan-Dec
Petauroides volans	Southern Greater Glider	Oct-Mar
Petaurus norfolcensis	Squirrel Glider	all
Phascogale tapoatafa	Brush-tailed Phascogale	Jan-Dec
Phascolarctos cinereus	Koala	Dec-Jun
Pteropus poliocephalus	Grey-headed Flying-Fox	all
Chalinolobus dwyeri	Large-eared Pied Bat	Oct-Dec
Miniopterus orianae oceanensis	Large Bent-winged Bat	Nov-Jan
Myotis macropus	Southern Myotis	Dec-Feb
Anthochaera phrygia	Regent Honeyeater	BOAMS Map
Lathamus discolor	Swift Parrot	BOAMS Map

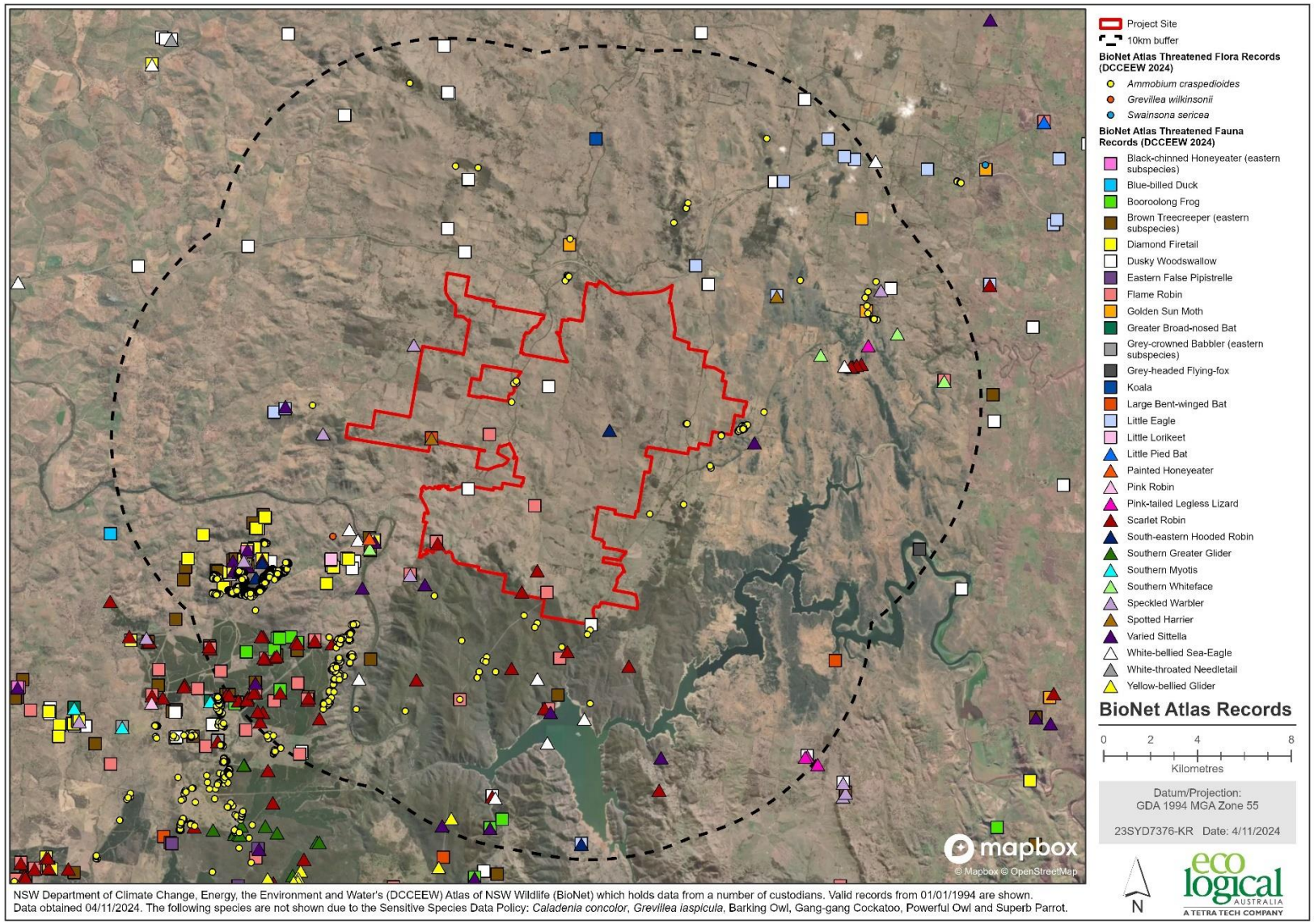


Figure 6-2: Recorded threatened fauna and flora within 10 km of the Project Site (BioNet and ELA 2024)

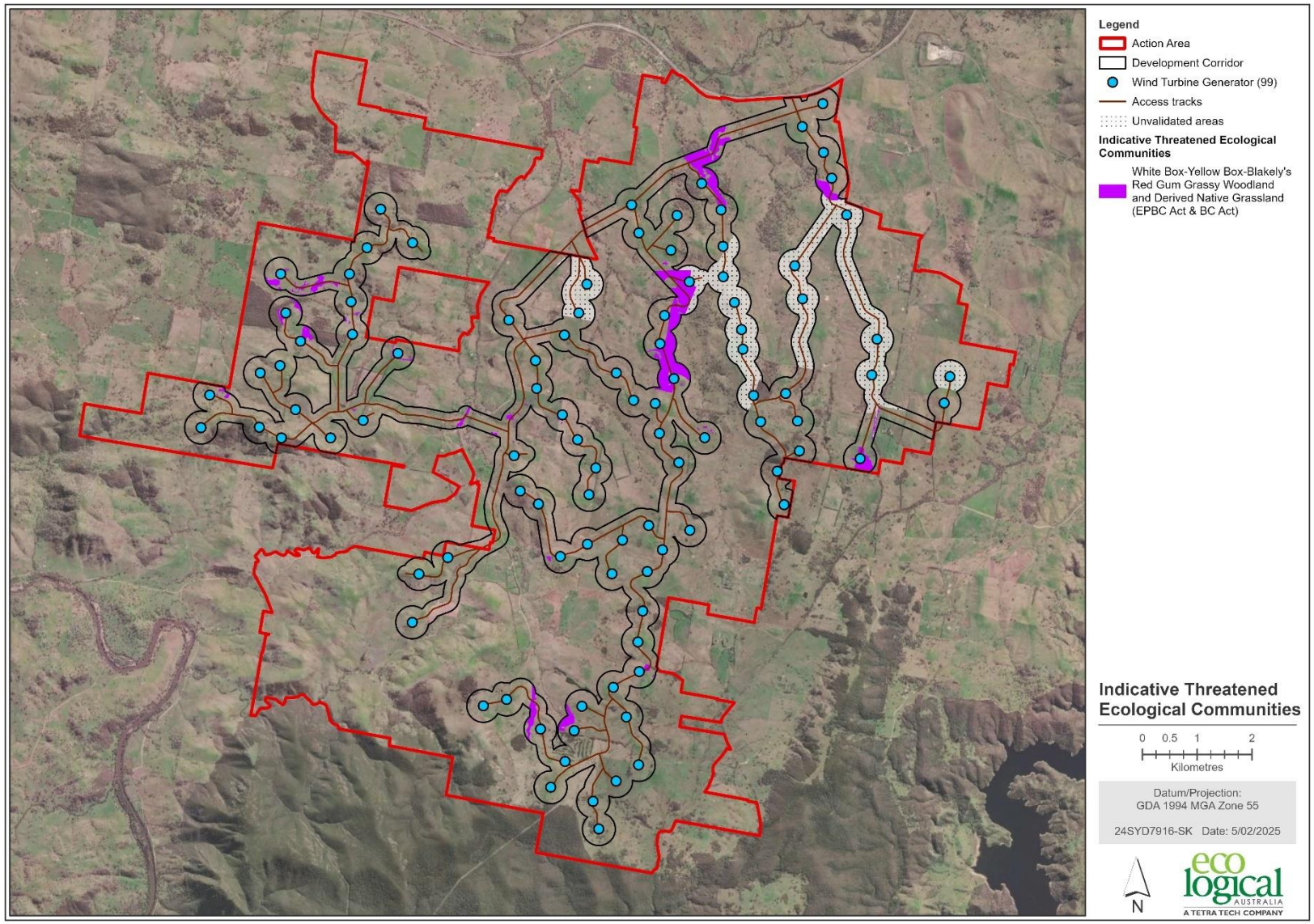


Figure 6-3: Identified biodiversity constraints relating to TECs within the Project Site (ELA, 2025)

6.1.3.2. Potential Impacts

Direct and indirect impacts during the construction phase may include clearing, sedimentation, dust deposition, erosion, weed introduction and/or spread, introduction of competitive feral fauna, vehicle/machinery strike, bird and bat WTG strike, light and noise pollution, and vibration from the movement of equipment and vehicles. Impacts during the operational phase of the Project may include a continuation of indirect impacts associated with weed spread.

The key receptors for these potential impacts are nearby National Parks, State Forest lands, ecosystems, vegetation communities, flora and fauna. Table 6-6 outlines the potential biodiversity impacts that may occur because of the Project.

Table 6-6: Potential biodiversity impacts because of the Project

Project Phase	Potential Impact	Receptor(s)	Does the Impact Need Assessment in the EIS?	Consultation Required
Construction	There is mapped NPWS Estate and NSW Forestry land adjacent to the Project Site. Whilst direct impacts are not expected to the Reserves, indirect impacts could occur including noise, erosion and sedimentation, dust deposition, and weed introduction and/or spread.	Nearby NPWS Estate and NSW Forestry Lands	Yes	NPWS, Forestry Corporation and Community
	Disturbance/loss of vegetation during construction, including potential direct (clearing) and indirect impacts (sedimentation, dust deposition, erosion, weed introduction and/or spread, soil and/or water pollution) to TECs and threatened flora species.	Native Vegetation Communities and Flora	Yes	DPE – BCD, NSW DCCEEW, Commonwealth DCCEEW and Community
	Direct impacts including disturbance / loss of habitat, injury and mortality from vehicle strike, and loss of wildlife corridors. Indirect impacts including impacts resulting from light, noise, and dust.	Native Fauna	Yes	DPE – BCD, NSW DCCEEW, Commonwealth DCCEEW and Community
	Potential direct impacts on terrestrial ecosystems including loss or modification of habitat for aquatic and terrestrial species. Potential indirect impacts through the introduction and spread of weeds and pests, sedimentation and erosion, soil and water pollution, light, noise, and dust.	Ecosystems and Native Habitat	Yes	DPE – BCD, NSW DCCEEW, Commonwealth DCCEEW and Community
Operation	Potential direct impacts due to traffic and maintenance activities (though significantly less than the construction phase), as well as potential visitation by tourists	Native Vegetation Communities and Flora	Yes	DPE – BCD, NSW DCCEEW, Commonwealth DCCEEW and Community

Project Phase	Potential Impact	Receptor(s)	Does the Impact Need Assessment in the EIS?	Consultation Required
	Potential direct impacts due to blade strike of bird and bat species	Native Fauna	Yes	DPE – BCD, NSW DCCEEW, Commonwealth DCCEEW and Community
Cumulative	The transmission line from the Project Site may result in cumulative biodiversity impacts in context to the Project area.	Native Vegetation Communities and Flora	Yes	DPE – BCD, NSW DCCEEW, Commonwealth DCCEEW and Community

6.1.3.3. EIS Assessment Approach

A BDAR under the Biodiversity Offset Scheme (BOS), using the BAM (2020) will be undertaken and included in the EIS to address impacts to threatened ecological communities and species protected by the BC Act. This will have regard to the Wind Energy Guideline (DPHI, 2024a) Section 5.4 requirements.

An assessment of impacts upon MNES will be undertaken during the preparation of the BDAR for the Project.

A Bird and Bat Adaptive Management Plan (BBAMP) will be prepared to support the application, which will include 24-months of bird and bat utilisation surveys. This is to provide an overall strategy for managing and mitigating any significant bird and bat strikes arising from operations.

6.1.4. Traffic and Transport

6.1.4.1. Existing Environment

Proposed access to the site for OSOM vehicles is via the Hume Highway. Additional access for light vehicles is via existing Burrinjuck Road, Childowla Road and Talmo Road (Figure 2-1). Internal roads will be required to provide access to WTGs and relevant Project infrastructure. The preferred transport route for turbine components will be confirmed as part of the EIS following an External Route Study. The study will consider transport from the Port of Newcastle, Port Kembla, Port Adelaide and Geelong Port.

6.1.4.2. Potential Impacts

CONSTRUCTION

The construction phase of the Project will require a significant increase in the number and type of traffic accessing local roads around the Project Site, including light vehicles, heavy vehicles and OSOM vehicles. Based on industry experience, most vehicle movements are expected to be light vehicles for construction works transiting to and from the Project Site. The use of a construction access road adjacent to Childowla Road is proposed to allow for minimal clearing and may achieve a better outcome than the use of Childowla Road itself, reducing potential impacts. The efficacy of this approach will be assessed during the Traffic and Transport Impact Assessment during the EIS stage and a determination on which road to use will be made.

Given the proximity of other projects, cumulative traffic impacts during the construction phase will be further investigated during the EIS phase.

OPERATION

Operational vehicle movements are not expected to significantly increase overall traffic movements, although vehicle access to the Project area for plant management and maintenance will be ongoing. There is the potential for implementation of road upgrades leading to long term benefits to residents and road users.

6.1.4.3. EIS Assessment Approach

A detailed External Route Study and Traffic and Transport Impact Assessment will be undertaken as part of the EIS and focus primarily on the preferred transportation route 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). The assessment will also provide important data and analysis on the existing road network, anticipated traffic volumes, accident history and school bus routes to inform the development of the Project.

The Traffic and Transport Impact Assessment and External Route Study would be undertaken following a review of the requirements set out in the industry specific SEARs and Section 5.5 requirements of the Wind Energy Guideline (DPHI, 2024a).

6.1.5. Hazards and Risks

6.1.5.1. Existing Environment

AVIATION

There are several airports located within 30 NM of the Project Site, including both certified and non-certified aerodromes. Two (2) certified aerodromes (Tumut and Cootamundra Airports) are located within 30 NM of the Project Site. A further eight (8) non-certified aerodromes exist within proximity to the Project Site.

TELECOMMUNICATIONS AND ELECTROMAGNETIC INTERFERENCE

There are several Australian Communication and Media Authority (ACMA) associated links and sites within and in proximity to the Project Site. A preliminary assessment of communication links has been prepared and the preliminary layout designed in consideration of this constraint with buffers placed around high frequency communication links. This will require further assessment in the EIS.

BUSHFIRE AND ELECTRICAL

A review of the NSW Rural Fire Service Bush Fire Prone Land map determined that the Project is located in proximity to Bushfire Prone Land (Figure 6-4). Therefore, there is low to medium bushfire risk due to the vegetation and agricultural practices in the area, having primarily been utilised for cattle and sheep grazing and cropping for stock feed. The vegetation hazard in proximity to the proposed infrastructure is predominately modified grassland with scattered trees and woodland. The topography of the Project Site is characterised by steep to rolling hills with varying degrees of elevation, with WTG locations likely to vary in slope classifications. The usage of the area surrounding the Project Site is mostly limited to landowners, who are predominately farmers, and the operators of the Project Site.

OTHER HAZARDS AND RISKS

Other potential hazards and risks such as public health regarding electromagnetic fields, low frequency and noise infrasound, risks associated with the BESS, blade throw, and shadow flicker will also be assessed as part of the EIS.

6.1.5.2. Potential Impacts

AVIATION

Potential aviation impacts may include impacts to airspace protection areas, air routes or air traffic control surveillance systems and navigation aids. However, such impacts are anticipated to be avoided through Project layout design.

TELECOMMUNICATIONS AND ELECTROMAGNETIC INTERFERENCE

The construction of WTGs can potentially impact telecommunication infrastructure on and surrounding the Project Site. This could occur if a proposed WTG were to interfere with the direct Line of Sight (LoS) required by telecommunication equipment, such as weather radar and communication links or by diffracting signals from nearby AM/FM/digital receivers.

BUSHFIRE AND ELECTRICAL

In the event of bushfires occurring in the area, WTGs and associated infrastructure may be impacted due to the elevated positions and the fire behaviour of bushfires which, given the right conditions and fuel loads, can 'run' uphill to areas likely to facilitate the WTGs. The alternative risk of bushfires occurring because of the Project would likely be a result of an electrical fire igniting vegetation surrounding a WTG and spreading across the landscape. These risks however are mitigated by appropriate management strategies and the construction of the Project could provide potential benefits to tackling bushfire occurring close to or within the Project Site by improving access from new tracks, creating fire breaks, and reducing lightning strikes to vegetation.

6.1.5.3. EIS Assessment Approach

AVIATION

An Aviation Impact Assessment will be undertaken in accordance with the *National Airports Safeguarding Framework Guideline D: Managing Wind Turbine Risk to Aircraft* (DIRDC, 2012) and Wind Energy Guideline (DPHI, 2024a) Section 5.3 and Appendix A requirements. The assessment will assist in determining potential impacts of the Project and provide critical information regarding height and co-ordinates of the Project. Consultation with both CASA and Air Services Australia will also be undertaken during preparation of this assessment.

TELECOMMUNICATIONS AND ELECTROMAGNETIC FIELD

A Telecommunications (Electromagnetic Interference) Impact Assessment will be undertaken to identify all telecommunication infrastructure in proximity to the Project Site. The assessment will seek to identify possible effects on telecommunication systems, assess impacts on telecommunications infrastructure and propose mitigation measures to minimise impacts because of the Project.

An Electromagnetic Field (EMF) Assessment will be undertaken in accordance with the International Commission on Non-Ionizing Radiation Protection (ICNIRP) Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields.

This will have regard to the requirements in Section 6 of the Wind Energy Guideline (DPHI, 2024a).

BUSHFIRE AND ELECTRICAL FIRE

A Bushfire Risk Assessment will be undertaken in accordance with *Planning for Bush Fire Protection* (NSW RFS, 2019).

Similarly, a Preliminary Hazard Assessment will be undertaken in accordance with the NSW *Hazardous Industry Planning Advisory Paper No 4 'Risk Criteria for Land Use Safety Planning'* (HIPAP 4) and *Hazardous Industry Planning Advisory Paper No 6 'Hazard Analysis' (*HIPAP 6) to determine potential risks of electrical fires and other hazards caused by the operation of the Project, mainly the proposed Battery Storage.

This will have regard to the requirements in Section 6 of the Wind Energy Guideline (DPHI, 2024a).

BLADE THROW

A Blade Throw Impact Assessment will be undertaken in accordance with the NSW Hazardous Industry Planning Advisory Paper No 4 'Risk Criteria for Land Use Safety Planning' (HIPAP 4). This will have regard to the requirements in Section 6 of the Wind Energy Guideline (DPHI, 2024a).

OTHER HAZARDS AND RISKS

Other potential hazards and risks such as low frequency and noise infrasound and shadow flicker will also be assessed as part of the EIS. This will have regard to the requirements in Section 6 of the Wind Energy Guideline (DPHI, 2024a).

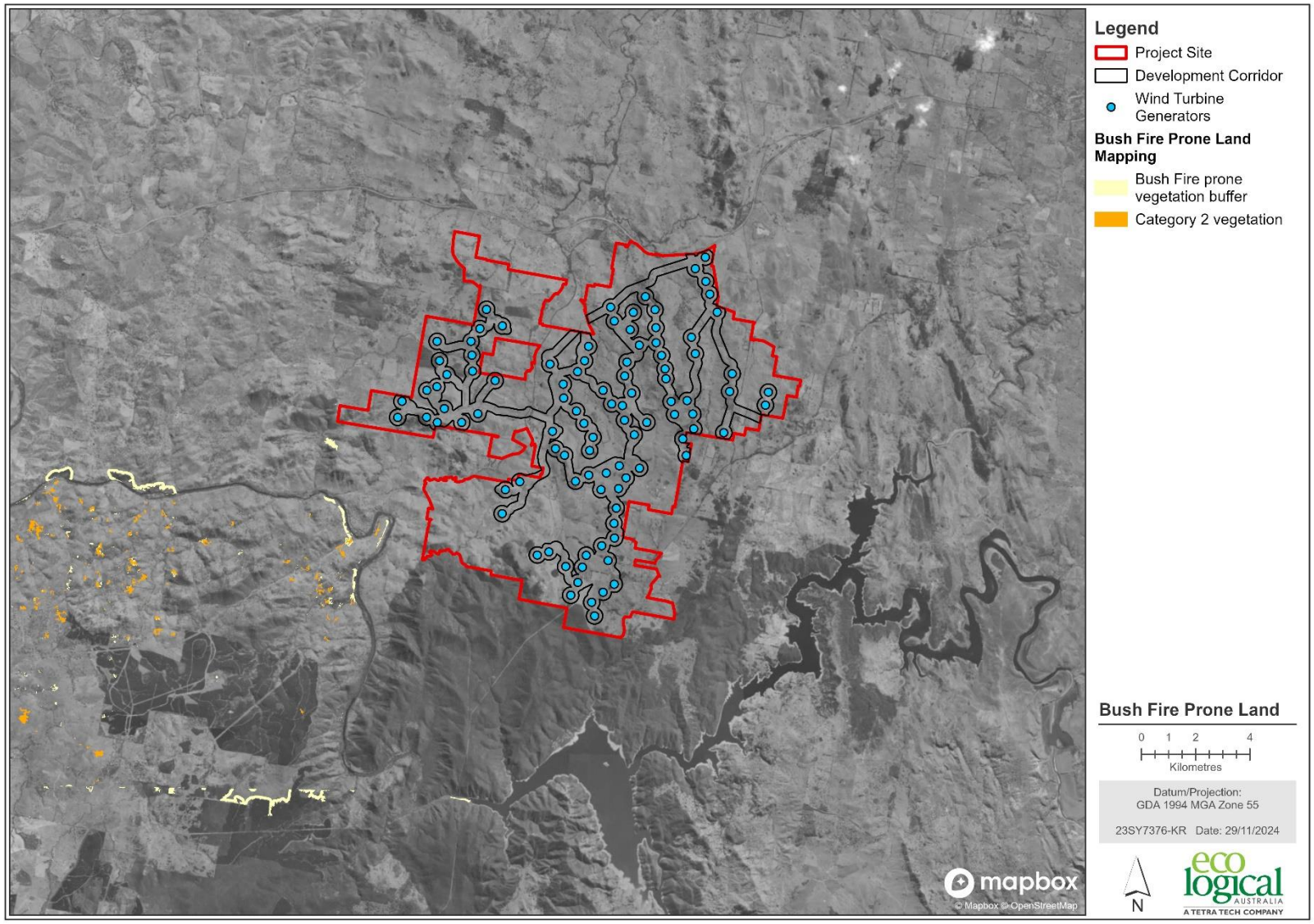


Figure 6-4: Bushfire Prone Land in proximity to the Project Site

6.1.6. Aboriginal Heritage

6.1.6.1. Existing Environment

The Project Site is located on the approximate boundary between the traditional lands of the Wiradjuri and Ngunnawal people (Tindale, 1974). Three (3) extensive Aboriginal Heritage Information Management System (AHIMS) database searches were undertaken on 5 April 2024 covering the Project Site.

The AHIMS search identified 167 Aboriginal sites and no Aboriginal places recorded within the search parameters. Of the 167 sites, 39 are located within the boundaries of the Project Site (Figure 6-5). The 39 sites included 31 Artefact sites, three (3) Potential Archaeological Deposits (PAD), one (1) modified (carved or scarred tree) and four (4) artefacts/PADs. Five (5) PAD site features are in close proximity to the Development Corridor. Three (3) of the PADs – AHIMS ID 51-4-0492, AHIMS ID 51-4-0493 and AHIMS ID 51-4-0494 – have been previously excavated by Navin Officer in 2023. The PAD site extents do not overlap with the Development Corridor.

AHIMS ID 51-4-0097 and AHIMS ID 51-4-0101 represent the same site ('WYTL-OS1 with PAD'). The site extent has not been included in the site card. It is unknown whether the site extent overlaps with the Development Corridor.

The NSW *Native Title Act 1994* (Native Title Act) was introduced to work in conjunction with the Commonwealth *Native Title Act 1993*. Native Title claims, registers and Indigenous Land Use Agreements are administered under the Act. There are no Native Title Determinations of Indigenous Land Use Agreements or Native Title Claims within the Project Site.

6.1.6.2. Potential Impacts

There are known Aboriginal sites located within the Project site and it is likely that more Aboriginal sites exist within the boundaries of the Project Site. Therefore, there is potential for both known and unknown Aboriginal sites to be impacted by the proposed works. All Aboriginal cultural heritage sites, whether recorded or not, are protected under the NPW Act. Works or activities that could potentially disturb the ground surface include earthworks, access road construction / upgrades, associated building construction, services installation, and repetitive vehicular movement. These works have the potential to disturb surface and in situ subsurface Aboriginal sites.

6.1.6.3. EIS Assessment Approach

Based on the size of the Project Site and the presence of multiple archaeologically sensitive landscape features, an ACHA for the proposed Project will be required to be prepared in accordance with the requirements of the NPW Act.

As a component of the ACHA process, consultation with the Aboriginal community will be undertaken in accordance with the *'Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010'* (DECCW, 2010a). Given the amount of previously identified PADs, archaeological test excavation may also be required in accordance with the *'Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW'* (DECCW, 2010b).

This will have regard to the requirements in Section 6 of the Wind Energy Guideline (DPHI, 2024a).

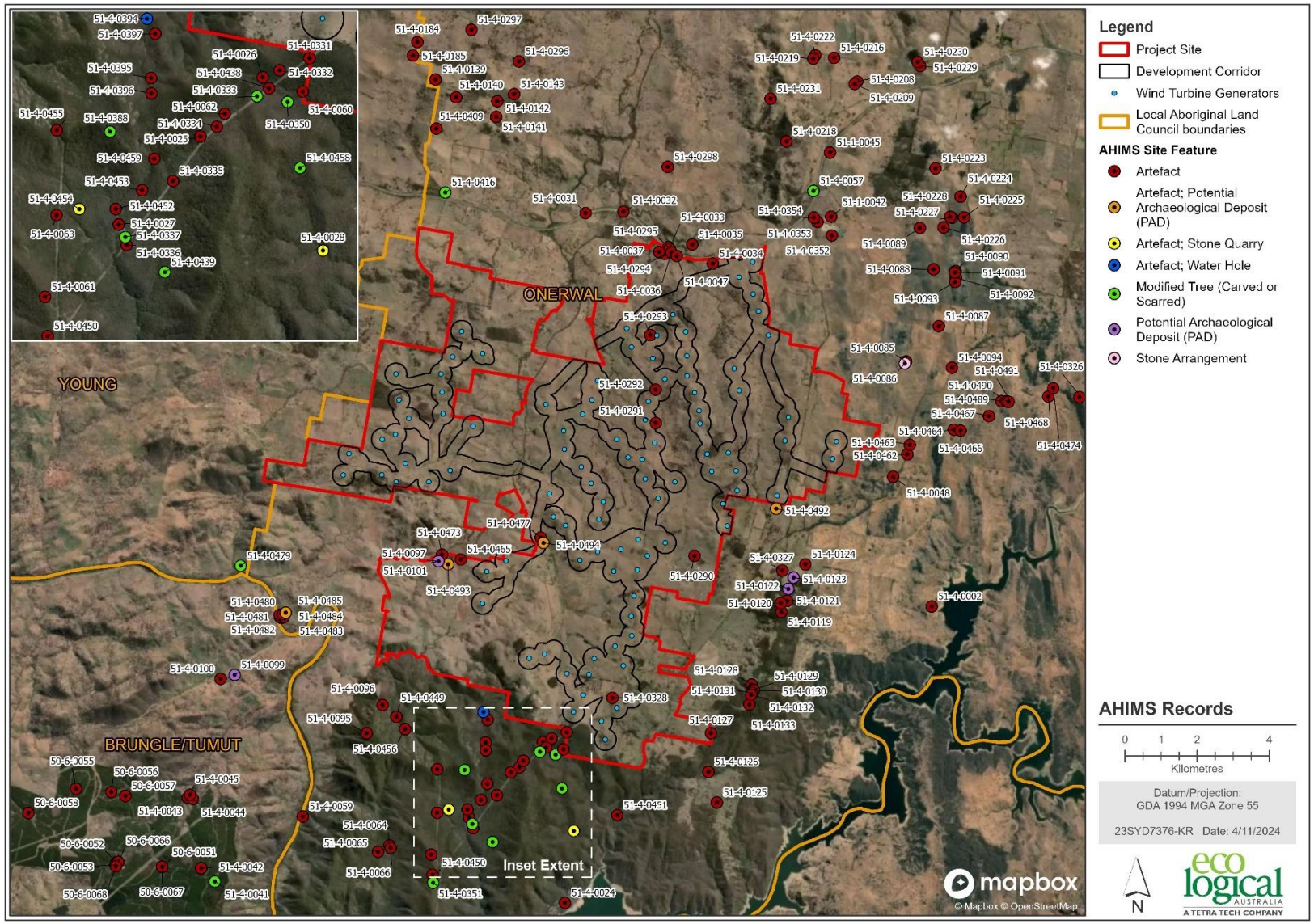


Figure 6-5: AHIMS sites within and surrounding the Project Site (green polygons represent groupings of AHIMS identification labels)

6.1.7. Historic Heritage

6.1.7.1. Existing Environment

Searches of the Australian Heritage Database, the State Heritage Register (SHR) Yass Valley LEP 2013 utilising the terms "Bookham" were conducted on 3 April 2024 to determine if any places of archaeological and/or heritage significance were located within the Project Site.

There is one (1) historic item of significance recorded on these databases as being within the Project Site (Figure 6-6), being the Bogolong Homestead and Woolshed (former Bogolong Inn). The Bogolong Homestead is outside the Development Corridor. Details of the heritage item are outlined in Table 6-7.

Table 6-7: Listed heritage items in proximity to the Project Site

Heritage Item Name/Listing	Proximity to Project Site	Significance
IO41- Bogolong - Homestead and Woolshed (former Bogolong Inn)	Within Project Site	*'Historic significance as one of the early wayside inns in the Yass district, strategically located on the Port Phillip Road. The significance is enhanced by the continuing association of the building (now a homestead) with the Julian family, who first acquired leasehold rights to the Bogolong Run in 1858'* (SHI, 2003b)

6.1.7.2. Potential Impacts

All heritage in NSW is afforded protection under the Heritage Act. The Heritage Act regulates the impact of development on places, buildings, works, relics, moveable objects, and precincts that are significant to the heritage of NSW. Under Section 140 of the Heritage Act, a person must not disturb or excavate any land knowing or having reasonable cause to suspect that the disturbance or excavation will or is likely to result in a 'relic' being discovered, exposed, moved, damage or destroyed unless the disturbance or excavation is carried out in accordance with a Section 140 permit.

Section 4(1) of the Heritage Act (as amended 2009) defines 'relic' as "any deposit, artefact, object or material that relates to the settlement of the area that comprises NSW, not being Aboriginal settlement, and is of State or Local heritage significance". The Heritage Council must be notified on the discovery of a relic under Section 146 of the Heritage Act.

6.1.7.3. EIS Assessment Approach

If required, a Statement of Heritage Impact (SoHI) will be completed for the Project in accordance with the NSW Heritage Council *Statements of Heritage Impact Guidelines 2002*.

This will have regard to the requirements in Section 6 of the Wind Energy Guideline (DPHI, 2024a).

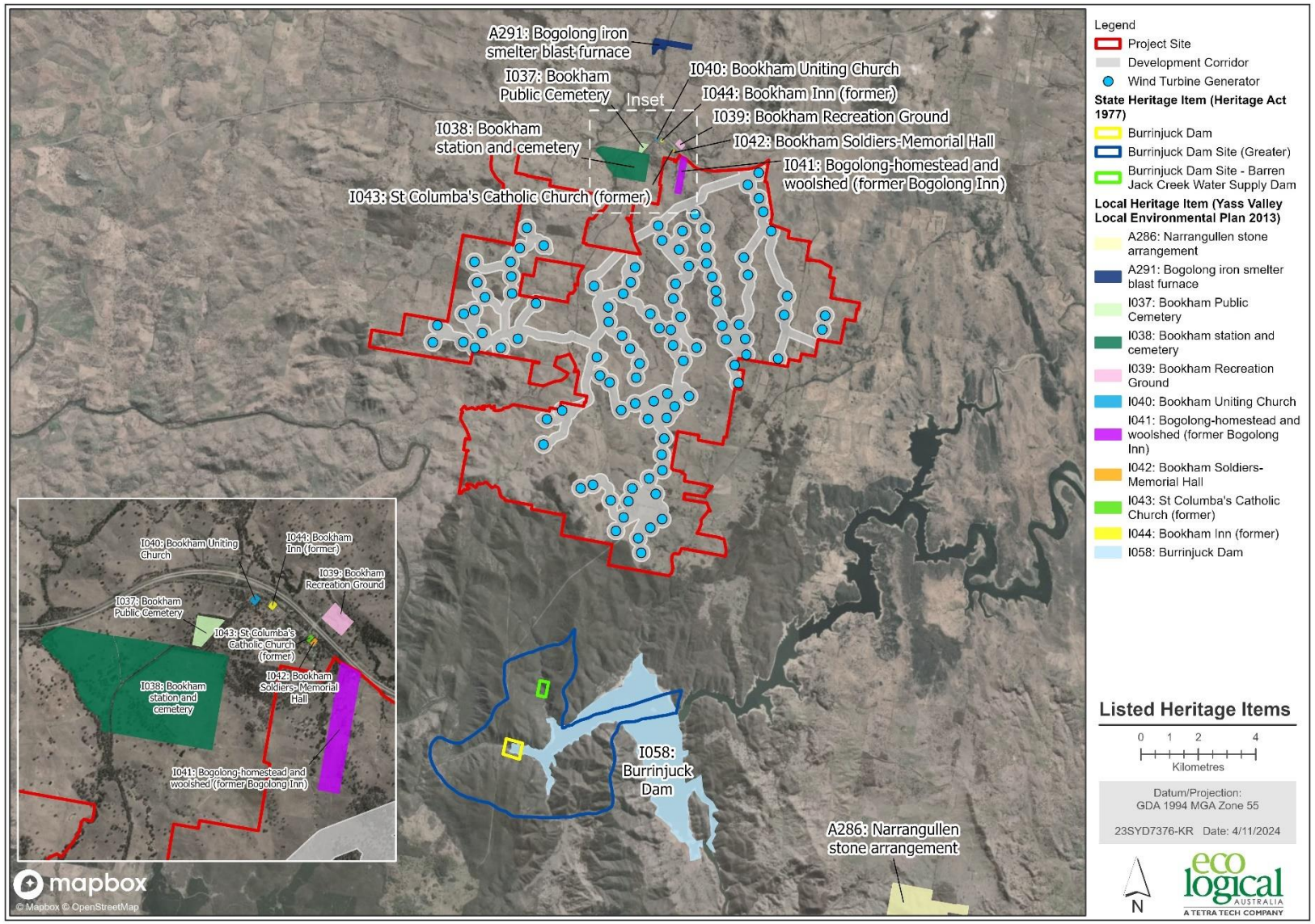


Figure 6-6: Heritage items in proximity to the Project Site

6.1.8. Soils and Land Use

6.1.8.1. Existing Environment

SOIL LANDSCAPES

The Project is located across three soil classifications which dominate the Project Site, being Kandosols, Rudosols and Sodosols. These soils have a range of fertility classes, from low to moderate (Kandosols, Rudosols and Sodosols, demonstrating restricted fertility across the Project Site. As the fertility capability ranges for these soil classes, so does the water holding capacity.

Additionally, three (3) Mitchell Landscapes occur across the Project Site, Upper Murrumbidgee Gorge, Boorowa Volcanics (90% cleared) and Marilba Range (84% cleared), with Boorowa Volcanics being the dominant Mitchell Landscape.

NATURALLY OCCURRING ASBESTOS

The Project Site is in the vicinity of geological units comprising serpentine minerals, with the potential for Naturally Occurring Asbestos (NOA) to be present. Reference to the Tumut 1:100,000 Geological Sheet (Basden, 1990) shows that the Coolac Serpentinite forms the Serpentine Ridge and Honeysuckle Range to the west of the Project Site. No areas of NOA are mapped as having potential to occur within the Project Site, with the nearest mapped potential over 25 km to the west.

CONTAMINATION

A search of the NSW EPA contaminated land register was carried out and identified no contaminated sites recorded within or in proximity (within 5 km) of the Project Site. However, past agriculture land uses have the potential to result in land contamination through chemical use and storage.

LAND AND SOIL CAPABILITY

Figure 6-7 outlines the Land and Soil Capability (LSC) across the Project Site. The mapping is based on an eight-class system with values ranging between 1 and 8 representing a decreasing capability of the land to sustain various types of agricultural land use. Class 1 represents land capable of sustaining most land uses including those that have a high impact on the soil (e.g., regular cultivation), whilst Class 8 represents land that is not suitable for agricultural production (DPIE, 2020). The Project Site contains land broadly classified as Classes 4, 5, 6 and 7 (Table 6-8). The Project Site is currently used largely for grazing and contains no land mapped as BSAL, or Critical Industry Cluster (CIC).

As shown in Figure 6-7 and Table 6-8, the majority of the Development Corridor and Project Site are located on land with a soil capability of Class 4 and Class 6.

Table 6-8: LSC Classes present within the Project Site

Land and Soil Capability Class (LSC)	Within Project Site		Within Development Corridor	
	Area (ha)	Percentage (%)	Area (ha)	Percentage (%)
Class 4	6,164	52%	2,204	57%
Class 5	1,497	13%	444	12%
Class 6	2,904	24%	890	23%
Class 7	1,326	11%	296	8%
TOTAL	**11,893**	**100%**	**3,836**	**100%**

6.1.8.2. Potential Impacts

The development of the Project will involve the removal of soil to accommodate the construction of WTG hardstands and ancillary infrastructure. While the development of WTGs requires a relatively small footprint, the earthworks required may still result in impacts to the local environment, including sedimentation, soil erosion and the temporary reduction in agricultural land use to accommodate the Project.

6.1.8.3. EIS Assessment Approach

Impacts to soils will be addressed within the EIS and will include assessment on the climate, topography, Mitchell landscapes, geology, soil landscapes, soil erodibility and dispersibility, erosion hazards and erosion potential of the Project Site and surrounding area. The assessment will describe mitigation measures aimed to minimise the potential for soil erosion and negative land use impacts, including invasive weed mitigation and contamination controls.

This will have regard to the requirements in Section 6 of the Wind Energy Guideline (DPHI, 2024a).

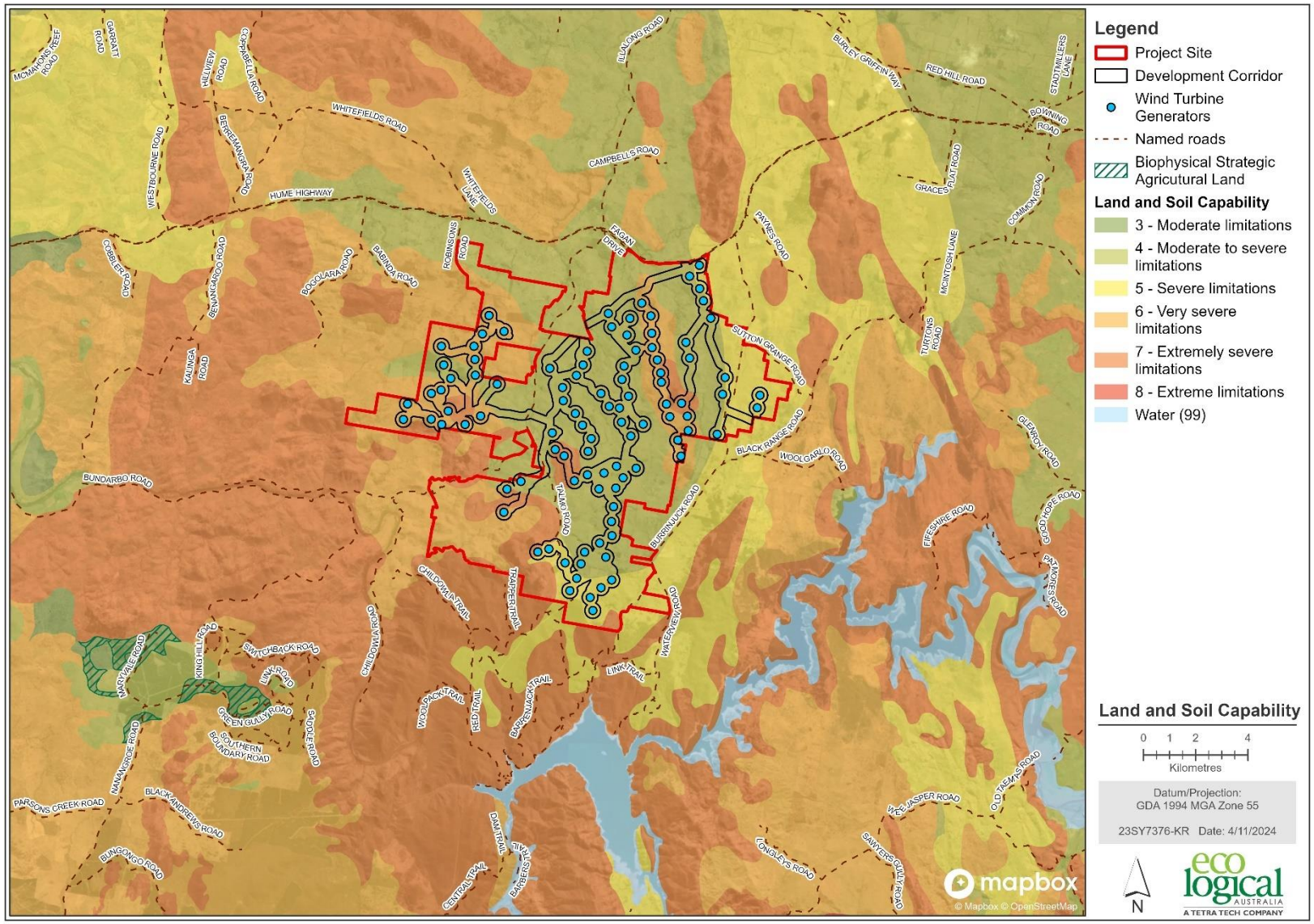


Figure 6-7: Land and Soil Capability within the Project Site

6.1.9. Surface Water, Groundwater, and Aquatic Habitat

6.1.9.1. Existing Environment

The Project Site is within the Murrumbidgee River catchment area with both the Murrumbidgee and Yass Rivers adjacent to the site on the southwest and southeast, respectively. The Yass River flows into the Murrumbidgee River where it is impounded at Lake Burrinjuck. The Burrinjuck Dam and its impounded reservoir Lake Burrinjuck are located to the southwest of the Project Site. From Burrinjuck Dam, the Murrumbidgee River flows through a rugged narrow gorge and is joined by Jugiong and Muttama Creeks from the north and the Tumut River from the south, before emerging onto the western plains near Gundagai.

The Murrumbidgee and Yass Rivers do not enter the Project Site. However, the Ponds Creek, Oak Creek, Limestone Creek, Burnt Hut Creek, Carrols Creek, and Bogolong Creek all run through the Project Site and constitute 5th and 6th order watercourses in accordance with the Strahler System, and tributaries of the Murrumbidgee and Yass Rivers (Figure 6-8). Several smaller tributaries also run through the landscape (Figure 6-8). Interfaces with watercourses will consider *The Controlled Activities – Guidelines for Riparian Corridors on Waterfront Land* (DPE, 2022).

Surface water in the Project Site is regulated by the Water Sharing Plan for the Murrumbidgee Regulated River Water Source 2003 which covers approximately 1,200 km of regulated rivers and creeks below Burrinjuck and Blowering Dams, including the Oak Creek System. Groundwater is regulated by the Lower Murrumbidgee Groundwater Sharing Plan, which is managed by the Water Sharing Plan for the Macquarie and Cudgegong Regulated Rivers Water Source 2016 and the NSW Government, who manages licensed water for the environment.

Several creeks and drainage lines, which occur in or around the Project Site have been identified as Key Fish Habitat, including Five Mile Creek, Back Creek, Bogolong Creek, Limestone Creek and Oak Creek (Figure 6-9). These are aquatic areas that have been identified as important to the sustainability of the maintenance of fish populations. Any waterway crossings within Key Fish Habitat will be designed with reference to *Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings* (DPI, 2013).

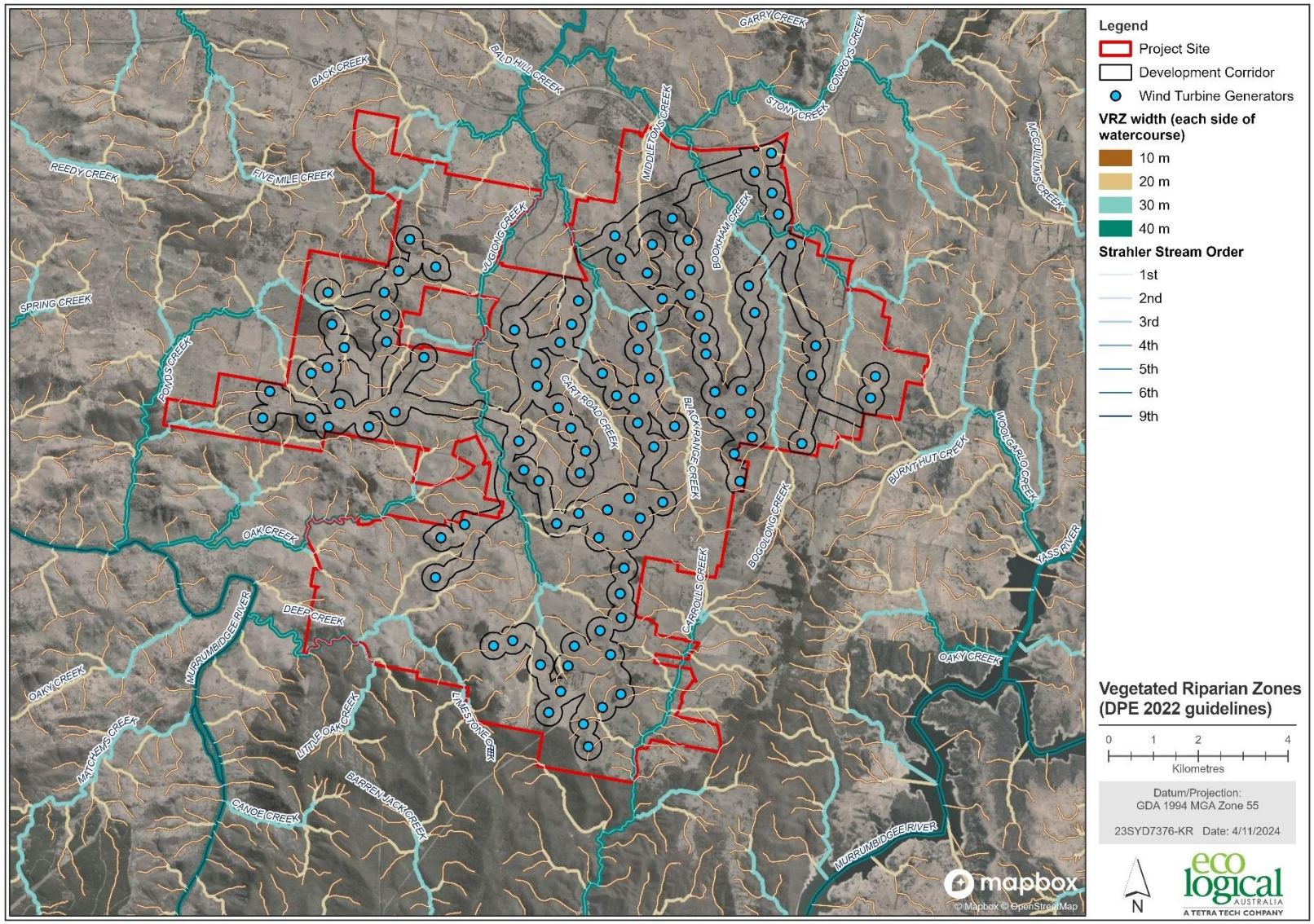


Figure 6-8: Mapped watercourses and Vegetated Riparian Zones (VRZs) within the Project Site (in accordance with Strahler stream classification system)

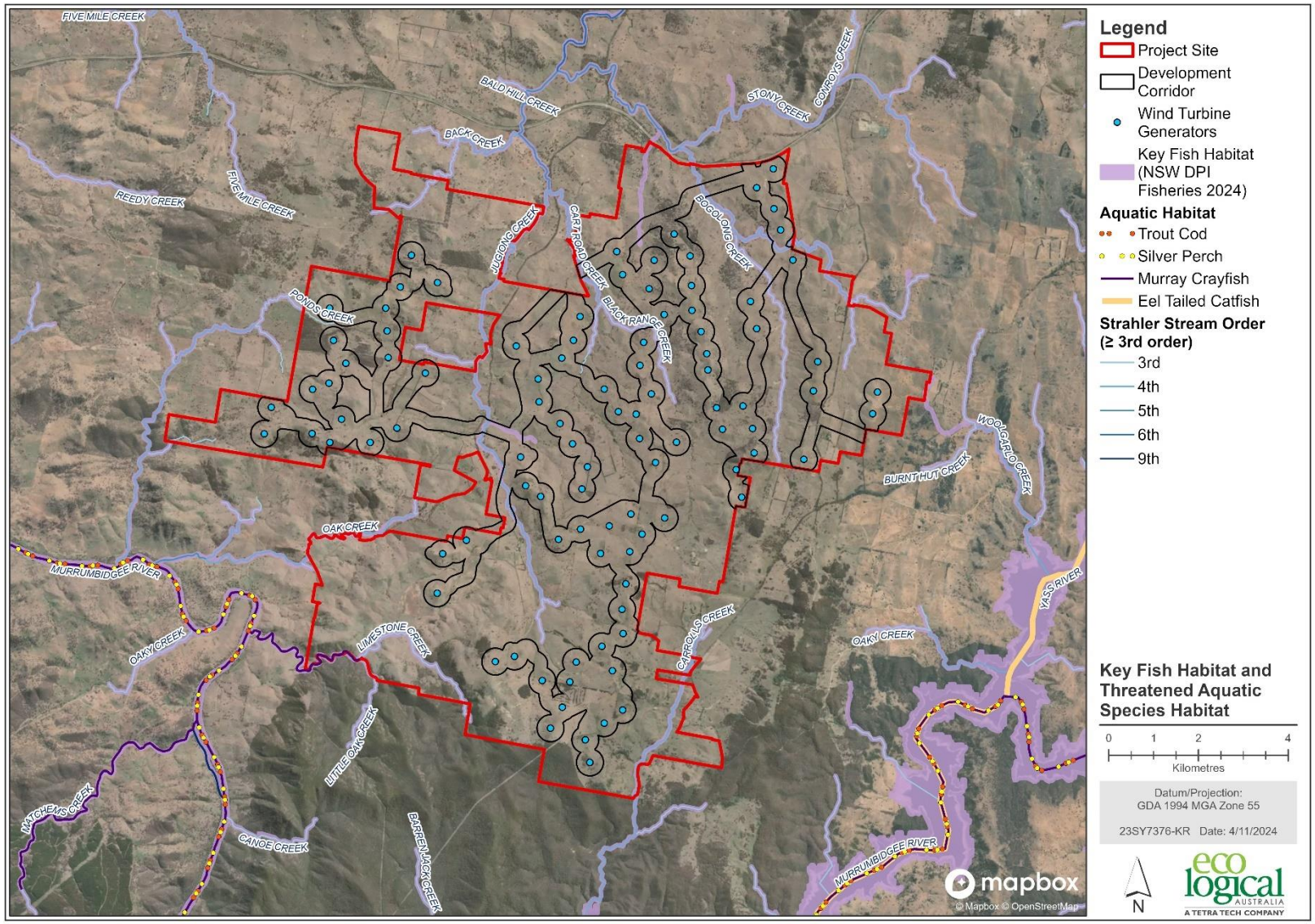


Figure 6-9: Key Fish Habitat and threatened aquatic species habitat within the Project Site

6.1.9.2. Potential Impacts

The potential impacts of the Project can be categorised as changes to surface water, groundwater, flooding impacts and aquatic ecology. The construction phase of the Project will be the period most likely for these potential impacts to occur.

The development of the Project has the potential for degradation of safe water quality related to sediment and erosion, dust deposition, pollution from spills and contamination from waste. Depending on the local groundwater conditions this could also lead to degradation of groundwater quality through infiltration processes or construction intersecting with aquifers. The potential impacts to water quantity and availability are a result of construction water requirements, alterations to overland flow paths and a reduction in environment health from groundwater drawdown or reduced streamflow.

Access tracks will likely require traversing creek lines and riparian corridors and their connectivity may therefore be impacted, along with the ability of aquatic species to move both upstream and downstream. The key receptors for these impacts are groundwater aquifers, surface water streams, licenced water users, aquatic fauna, riparian vegetation, downstream users, and the community.

6.1.9.3. EIS Assessment Approach

A Surface Water Impact Assessment, Groundwater Assessment and Aquatic Ecology Assessment will be undertaken as part of the EIS and will include, but not be limited to:

- A site water balance assessment to quantify water demand, identify water sources (surface and groundwater), detail water requirements and supply arrangements for construction and operation.
- Flood modelling (if required depending on the routes chosen for the access tracks and the likely flood extents expected).
- Assessing the likely impacts to Waterfront Land and aquatic habitat, and how activities will be designed and implemented in accordance with the relevant guidelines.
- Identification of any necessary impact mitigation and management measures.

This will have regard to the requirements in Section 6 of the Wind Energy Guideline (DPHI, 2024a).

6.1.10. Social and Economic Factors

6.1.10.1. Existing Environment

A Preliminary Social Impact Assessment (PSIA) has been undertaken in accordance with the *Social Impact Assessment Guideline* (DPE, 2023f). The social environment assessed in the PSIA is defined as the locality of Bookham, NSW and surrounding area. Bookham is a small rural town with the social characteristics of the locality analysed in Table 6-9 based on data from the ABS 2021 Census. The social locality of the Project in relation to the township of Bookham and the wider area is shown in Figure 6-10.

A key component in developing the social baseline is the collation and interpretation of relevant demographic data. The statistics indicate that the local and surrounding areas have distinct economic and demographic characteristics compared to the wider LGAs and the rest of NSW averages, including higher labour force participation and relatively good health.

Table 6-9: Social Baseline (ABS, 2021)

Aspect	Number Identified
Population	In the 2021 national census, the social locality was home to 127, living in 45 dwellings with an average household size of 2.6 persons per dwelling (compared to 2.4 across regional NSW).
Median age	The median age of the social locality was 47, older than the regional NSW median age of 43
Age profile	Approximately 22.3% of the population was over the age of 65 in 2021, compared to 22% across regional NSW. The population was also made up of nearly a quarter of young adults, with 20.8% of the population aged between 20 and 34 years old, compared to 17% across regional NSW.
Language spoken at home	At the 2021 Census, 5 residents (11.1%) in the social locality reported speaking a language other than English at home, compared to 6.6% across regional NSW.
Household type	At the 2021 Census, 25.6% (11 households) of the social locality's households were lone person households, compared to around 28% across regional NSW. The remaining 32 households consisted of families, with no group households in the social locality.
Household size	At the 2021 Census, 75% of the social locality's private dwellings were occupied, compared to 88.8% across regional NSW. Renting (8.9%) and mortgage ownership (20%) were both less common in the social locality than in regional NSW (26.8% and 31.2% respectively), with the majority of dwellings owned outright (37.8%).
Income	In 2021, the median household income in the social locality was $1,458 compared with $1,460 across regional NSW.
Work	In 2021, 100% of the social locality's residents aged 15 or older were in the labour force, of whom none reported being unemployed, 63.4% of which were employed full-time. This is compared to 56% of residents aged 15 and above in the labour force throughout regional NSW, with 4.6% reporting being unemployed. Most employed residents in the social locality were employed as Managers (36.8%), followed by Professionals (16.2%), Community and Personal Service Workers (11.8%), Clerical and Administrative Workers (11.8%), Labourers (11.8%), Technicians and Trades Workers (5.9%) and Sales Workers (5.9%). Most employed residents in the social locality were employed in specialised sheep farming, followed by sheep/cattle farming and education.

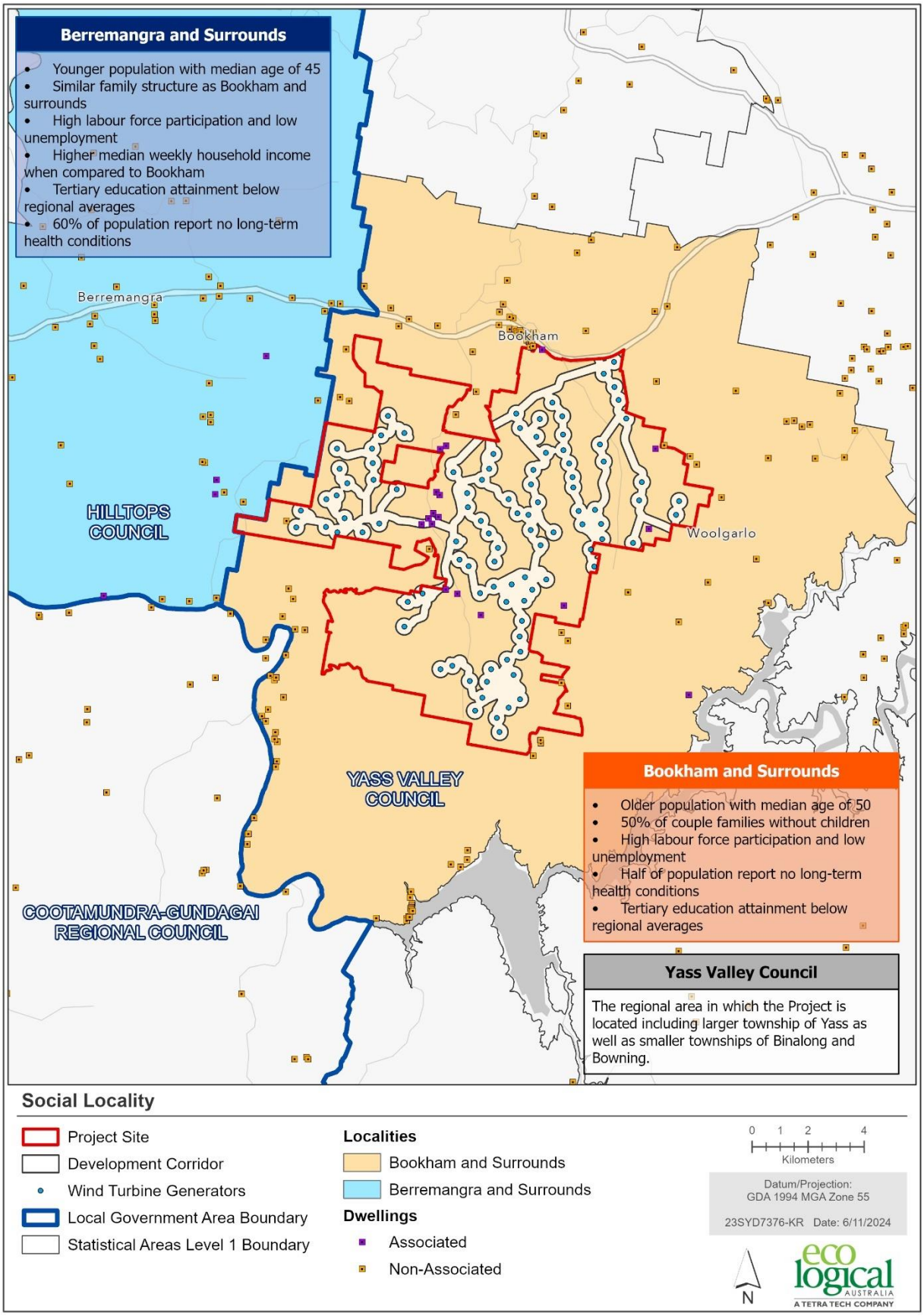


Figure 6-10: Social locality of the study area (AAP, 2024)

6.1.10.2. Potential Impacts

The PSIA involved preparing the DPHI Social Impact Assessment Scoping Worksheet. The scoping worksheet identified potential social impacts, considering social impacts separately for the Project's construction, operation and cumulative effects. The factors identified in Table 6-9 provide an indication of potential impacts and will assist in preparation of the EIS and SIA to better identify and mitigate any Project impacts.

Table 6-10: Scoped social impacts (AAP, 2024)

Theme	Id	Impact to people	Timing*	Significance type	Stakeholder group	Social impact ranking (without mitigation1)			Social impact categories	Potential vulnerabilities or opportunities	Level of assessment in SIA
						L	M	S			
Visual impacts	S01	Changes to the visual landscape and how people experience their rural surroundings, something people value	O	Neg	Host landholders, neighbouring landholders and surrounding communities	C	2	Medium	Surroundings Way of life	**Vulnerability**: Aging populations and those living in an area for a long period of time may be more affected by visual changes as they impact their familiar environment and sense of place.	Standard, requiring targeted consultation and research
	S02	The cumulative impact of multiple renewable energy Projects and changes to the	O	Neg	Surrounding communities Local Councils	B	3	High	Surroundings	**Opportunity:** Look at opportunities to actively support Projects within the social locality that enhance aesthetic values	Detailed, requiring broader consultation

[1] *L = Likelihood (A: Almost Certain, B: Likely, C: Possible, D: Unlikely, E: Very Unlikely); M = Magnitude (1: Minimal, 2: Minor, 3: Moderate, 4: Major, 5: Transformational); S = Significance rating (L: Low, M: Medium, H: High, VH: Very High).*

		regional visual landscape.									and targeted research
Amenity impacts	S03	Increased dust and noise during construction, causing a decline in social amenity, health or way of life for host landholders and nearby neighbours	C	Neg	Host and neighbouring landholders	C	3	Medium	Health and wellbeing	**Vulnerability**: Older residents and those with chronic health conditions may be more susceptible to increased noise and dust during construction.	Standard, requiring targeted engagement with those directly impacted.
Amenity impacts	S04	Increase noise during operations, decreasing overall quality of life	O	Neg	Host landholders, neighbouring landholders and surrounding communities	C	2	Medium	Health and Wellbeing	**Vulnerability**: Ongoing noise disturbances can exacerbate health issues among sensitive populations, including older residents.	Standard, requiring targeted engagement with those directly impacted.
Economic benefits	S05	Economic uplift and employment opportunities, due to job creation during construction and opportunities for local service providers and community	C	Pos	Surrounding communities, industry and local business	B	2	Medium	Livelihoods	**Vulnerability**: Leverage economic development potential in Berremangra to create jobs and training programs, addressing skills gaps for residents	Standard, requiring targeted engagement with those directly impacted.
	S06	Distributive equity of economic benefits between	C/O	Neg	Host and neighbouring landholders surrounding	C	3	Medium	Community	**Vulnerability**: Concerns about inequitable distribution of benefits may lead to community	Standard, requiring targeted consultation

		the region and surrounding communities			community, Local Councils					dissatisfaction, especially among lower-income households.	and secondary data analysis.
	S07	Strain on existing short and long-term accommodation due to the presence of the construction workforce, including during cultural and tourism events	C	Neg	Local businesses, Local Councils, surrounding communities	B	4	High	Accessibility Way of life	**Vulnerability**: Limited affordable housing options may exacerbate housing stability issues for lower-income households, leading to increased demand for local resources.	Detailed, requiring targeted consultation and secondary data analysis.
Community cohesion and support	S08	Funding support may enhance community Projects, fostering pride and engagement across the LGA's.	C/O	Pos	Community interest and service groups, surrounding communities	C	3	Medium	Community	**Opportunity**: High rates of volunteering can be harnessed to support community initiatives, promoting social cohesion and engagement among vulnerable groups.	Standard, requiring targeted consultation and secondary data analysis.
	S09	Fear of community division due to the planning for and operation of renewable energy and desire for alternative energy sources, leading to decreased social interactions	C/O	Neg	Host and neighbouring landholders	B	3	High	Community decision-making systems	**Vulnerability**: Individuals reliant on close-knit community support may experience increased stress and social isolation due to differing opinions on energy sources.	Detailed, requiring targeted consultation and secondary data analysis.

		and weakening of community bonds									
Cultural heritage	S10	Disconnection from cultural heritage due to changes to land use potentially impacting the identity and the erosion of cultural practices	C	Neg	First Nation people and groups	C	3	Medium	Culture	**Vulnerability**: Changes to land use may threaten the cultural practices and identity of First Nations communities, requiring targeted support and engagement.	Standard, requiring targeted consultation and secondary data analysis.
	S11	Opportunities for economic participation and enhanced benefit sharing by creating job opportunities, support and training for First Nation communities	C/O	Pos	First Nation people and groups	C	3	Medium		**Opportunity**: Develop culturally sensitive programs to enhance Indigenous engagement and create pathways for economic participation	Standard, requiring targeted consultation and secondary data analysis.
Emergency response and accessibility	S12	Improved road infrastructure, enhancing road access for farmers and emergency responders, improve connectivity for isolated residents	C/O	Pos	Host and neighbouring landholders, emergency services.	C	3	Medium	Accessibility	**Opportunity**: Enhanced road infrastructure can improve access to services for isolated residents and vulnerable populations, including those with limited mobility.	Standard, requiring targeted consultation and secondary data analysis.
	S13	Changes to how people access roads and other	C	Neg	Host and neighbouring landholders,	c	3	Medium	Accessibility	**Vulnerability**: Increased traffic may pose challenges for older	Standard, requiring targeted

		services due to increased vehicle movements during construction and traffic management			emergency services.					residents or those with disabilities who rely on safe access to services.	consultation and secondary data analysis.
	S14	Impact on aerial firefighting due to the presence of wind towers hindering operations affected emergency response capability	O	Neg	Host and neighbouring landholders, emergency services.	C	3	Medium	Accessibility	**Vulnerability**: Residents in fire-prone areas, particularly those with limited mobility or in isolated locations, may face increased risk during emergencies.	Standard, requiring targeted consultation and secondary data analysis.
Environmental	S15	Disruption to local wildlife and flora, affecting ecosystems and how people experience their surroundings	C/O	Neg	Community interest groups, surrounding communities, local councils, state governments	C	3	Medium	Surroundings	**Vulnerability**: Changes to local ecosystems may disproportionately affect communities that rely on natural resources for cultural and recreational purposes.	Standard, requiring targeted consultation and secondary data analysis.
Changes to land use	S16	Changes to land use impacting agricultural resources and production	C/O	Neg	Industry, surrounding communities, Local councils	C	2	Medium	Livelihoods	**Vulnerability**: The potential impact on agricultural resources could threaten local livelihoods, particularly for farmers and those dependent on agricultural production.	Standard, requiring targeted consultation and secondary data analysis.

*C = Construction, O = Operation

**Neg = Negative, Pos = Positive

6.1.10.3. EIS Assessment Approach

Both a Social Impact Assessment (SIA) and Economic Impact Assessment (EIA) will be undertaken to accompany the EIS in accordance with the *Social Impact Assessment Guideline* (DPE, 2023f) and *Social Impact Assessment Guideline – Technical Supplement* (DPE, 2023g). The assessments will consider a number of aspects, including:

- Benefits of the Project for the region and the State as a whole.
- Consideration of any increase in demand for community infrastructure services.
- Assessment of impact on agricultural resources and agricultural production on the Project Site and region.
- Details of how the construction workforce will be managed to minimise local impacts.

The SIA will evaluate social impacts based on anticipated likelihood and magnitude, taking into account cumulative impacts and any other mitigation or enhancement measures. The positive and negative impacts will be judged according to a significance of social impacts matrix for assessing social significance. The EIA will be undertaken to review the impacts and benefits of the Project for the local community, region and state. The EIA will consider increases in demand, impacts on local and regional economies during construction and operation, employment opportunities and other relevant economic factors.

This will have regard to the requirements in Section 6 of the Wind Energy Guideline (DPHI, 2024a).

6.1.11. Other Matters

The EIS will address a number of issues identified in Table 6-11, however detailed assessments are not proposed as the issues identified can be readily defined, assessed and mitigated using well recognised approaches. These matters will be addressed in the EIS to an appropriate degree of detail and investigation.

Table 6-11: Other matters to be assessed

Matter	Comment
Air Quality	A qualitative air quality assessment will be undertaken for construction activities and will include relevant construction phase air quality controls and mitigation measures. The assessment will be in accordance with relevant NSW Guidelines. Air quality issues relating to the operation of the Project would be minimal and likely only relate to the operation of maintenance vehicles, site staff light vehicles and the occasional heavy vehicles required for deliveries or other works. This will be considered within the qualitative assessment.
Climate Change	Climate change projections for the operational phase of the Project show the potential for an increase in operational risks, associated extreme weather events. These issues will be considered as part of the design development for the Project. Direct climate risks may include increased frequency and severity of extreme rainfall events, increased average temperatures and frequency of heatwaves and increased severity and frequency of bushfires.
Waste	The EIS will describe 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 relevant guidelines.

6.1.12. Matters Requiring No Further Assessment

In accordance with the SSD Guidelines, matters that require no further assessment and justification are identified in Table 6-12. This is a result of the Project either not being in proximity to the matter requiring an assessment or the assessment not being applicable to the proposed development.

Table 6-12: Matters that require no further assessment in the EIS

Matter	Justification
Air – Gases (greenhouse)	The Project will produce emissions free energy and avoid emissions generated from traditional energy generation technology. This will offset emissions resulting from the Project, with the emissions payback period for windfarms generally occurring within 6-9 months of operation. Greenhouse gas emissions will be addressed in the justification for the Project as part of the EIS. Scope 1 – 3 greenhouse gas emissions generated from construction and operation of the Project will be assessed as part of the EIS.
Access – port, airport and rail facilities	The Project does not involve the development of, or affect access to port, airport or rail facilities.
Amenity – odour	The Project would not produce odorous emissions as a result of the nature of the Project
Hazards and Risks – coastal hazards, land movement, dam safety	The Project is not proposed on or in proximity to a coastal setting The Project does not generate a risk of land movement The Project does not propose to construct, maintain or decommission a dam
Social – decision-making systems	The Project would have no impact on decision making systems but would be undertaken in accordance with the relevant systems

7. References

Abbass, K., Qasim, M. Z., Song, H., Murshed, M., Mahmood, H., & Younis, I., 2022. *A review of the global climate change impacts, adaptation, and sustainable mitigation measures.* Environmental Science and Pollution Research.

Australian Business License and Information Service (ABLIS), 2022. *Aerodrome Certificate – Australian Government.* Retrieved from Aerodrome Certificate – AG – Australian Business Licence and Information Service

Australian Bureau of Statistics, 2024. *Bookham 2021 Population Census data.* Retrieved from https://www.abs.gov.au/census/find-census-data/quickstats/2021/SAL10476

Austroads Guide to Traffic management. Available online: https://austroads.com.au/network-operations/network-management/guide-to-traffic-management

Clean Energy Council, 2021. Best Practice Charter for Renewable Energy Projects. Retrieved from https://www.cleanenergycouncil.org.au/advocacy-initiatives/community-engagement/best-practice-charter

Climate Action Tracker, 2024. *Country Summary: Australia.* Accessed 20 March 2024 from https://climateactiontracker.org/countries/australia/#:~:text=All%20countries%20need%20to%20rapidly,levels%20by%202030%2C%20excluding%20LULUCF.

CSIRO, 2023. *Australia's contribution to global greenhouse gas emissions.* Accessed 21 March 2024 from https://www.csiro.au/en/research/environmental-impacts/climate-change/climate-change-qa/sources-of-co2

Department of Environment, Climate Change and Water, 2010. NSW Wind Farms and Greenhouse Gas Savings. Retrieved from https://www.environment.nsw.gov.au/resources/communities/101002-wind-ghg-saving.pdf

Department of Climate Change, Energy, the Environment, Water (DCCEEW), 2022. EPBC Act policy statements. Retrieved from https://www.dcceew.gov.au/environment/epbc

Department of the Environment 2013. Matters of National Environmental Significance: Significant Impact Guidelines 1.1. Retrieved from: http://www.environment.gov.au/epbc/publications/significant-impact-guidelines-11-matters-national-environmental-significance

Department of Environment, Climate Change and Water (DECCW) 2010a. Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010.

Department of Environment, Climate Change and Water (DECCW) 2010b. Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW.

Department of Planning and Environment (DPE) 2016a. *NSW Wind Energy Guideline*.

Department of Planning and Environment (DPE) 2016b. *NSW Wind Energy: Visual Assessment Bulletin*.

Department of Planning and Environment (DPE) 2016c. *NSW Wind Energy: Noise Assessment Bulletin*.

Department of Planning and Environment (DPE) 2022a. *Net Zero Plan Implementation Update 2022.* Accessed 21 March 2024 from https://www.energy.nsw.gov.au/sites/default/files/2022-12/NSW-Net-Zero-Plan-Implementation-Update-2022.pdf

Department of Planning and Environment, 2022c. NSW Department of Planning and Environment. 2022 NSW Population Projections. https://www.planningportal.nsw.gov.au/populations (Accessed October 2022)

Department of Planning and Environment (DPE) 2022d. *Biodiversity Assessment Method (BAM)*.

Department of Planning and Environment (DPE) 2022e. *Undertaking Engagement Guidelines for State Significant Projects*.

Department of Planning and Environment (DPIE) 2021*. Social Impact Assessment Guideline*

Department of Planning, Housing and Infrastructure (DPHI) *2024a. Wind Energy Guideline – Guidance for State Significant Wind Energy Development*

Department of Planning, Housing and Infrastructure (DPHI) *2024b. Private Agreement Guideline - Guidance for State Significant Renewable Energy Development*

Department of Planning, Housing and Infrastructure (DPHI) 2024c. *Wind Energy Guideline – Technical Supplement for Noise Assessment*

Department of Planning, Housing and Infrastructure (DPHI) 2024d. *Wind Energy Guideline – Technical Supplement for Landscape Character and Visual Impact Assessment* (DPHI, 2024d)

Department of Planning, Housing and Infrastructure (DPHI) 2024d. *Private Agreement Guideline - Guidance for State Significant Renewable Energy Development* (DPHI, 2024e)

Department of Planning, Housing and Infrastructure (DPHI) 2024f. *Benefit Sharing Guideline – Guidance for State Significant Renewable Energy Development*

Department of Planning, Industry and Environment, 2021. *State Significant Development Guidelines – Preparing a Scoping Report.*

Department of Planning, Industry and Environment 2021a. *Net Zero Plan Stage 1: 2020-2030*. Retrieved from https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Climate-change/net-zero-plan-2020-2030-200057.pdf

Department of Planning, Industry and Environment 2021b. *Undertaking Engagement Guidelines for State Significant Projects*. Retrieved from https://www.planning.nsw.gov.au/-/media/Files/DPE/Guidelines/Policy-and-legislation/SSPT-Guidelines/GD1265-RAF-Engagement-Guidelines-final.pdf

Department of Planning, Industry and Environment 2021c. *Social Impact Assessment Guideline*. Retrieved from https://www.planning.nsw.gov.au/-/media/Files/DPE/Guidelines/Policy-and-legislation/Social-Impact-Assessment/SIA-Guideline.pdf

Department of Infrastructure, Regional Development and Communications (DIRDC) 2012. National Airports Safeguarding Framework Guideline D: Managing Wind Turbine Risk to Aircraft.

Fossil Fuel Treaty Organisation, 2024. *Why we need a Fossil Fuel Non-Proliferation treaty?* Accessed 20 March 2024 from www.fossilfueltreaty.org

Global Wind Energy Council, 2023. *Global Wind Report 2023.* Accessed from https://gwec.net/globalwindreport2023/

International Energy Agency (IEA) 2021. Wind Power. IEA, Paris. Retrieved from https://www.iea.org/reports/wind-power

Intergovernmental Panel on Climate Change, 2021. *Climate Change 2021: The Physical Science Basis.* Retrieved from extension://elhekieabhbkpmcefcoobjddigjcaadp/https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_FullReport.pdf

Intergovernmental Panel on Climate Change, 2022: Summary for Policymakers [H.-O. Pörtner et al. (eds.)]. Cambridge University Press.

Intergovernmental Panel on Climate Change, 2022b: Summary for Policymakers. Skea, J. et al. Climate Change 2022 – Mitigation of Climate Change. Retrieved from: https://report.ipcc.ch/ar6wg3/pdf/IPCC_AR6_WGIII_SummaryForPolicymakers.pdf

Ipsos, 2023. *8 in 10 Australians are concerned about climate change with a clear public expectation of Government action.* Accessed 20 March 2024 from https://www.ipsos.com/en-au/8-10-australians-are-concerned-about-climate-change.

HumeLink, 2024. HumeLink Amendment Report. Retrieved from https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSI-36656827%2120240716T213735.724%20GMT

Lee, O'Donnell, Babeck, 2021. *COP26 outcomes and Australia's pathway to net zero.* Retrieved from COP26 outcomes and Australia's pathway to net zero – Hall & Wilcox (hallandwilcox.com.au)

Liu, Z., Deng, Z., Davis, S., Ciais, P., 2023. *Monitoring global carbon emissions in 2022.* Cited in Nature Reviews: Earth and Environment https://www.nature.com/articles/s43017-023-00406-z

Möller, A. Okem (eds.)]. In: Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press.

Net Zero Plan Stage 1 2020 - 2030 summary. https://www.soe.epa.nsw.gov.au/all-themes/climate-and-air/net-zero-plan-stage-1-2020-

2030#:~:text=NSW%20Government%20policies%20under%20the,%E2%80%9352%25%20below%202005%20levels

NSW Office of Energy and Climate Change, 2022. *Net Zero Plan Implementation Update.* Accessed from https://www.energy.nsw.gov.au/sites/default/files/2022-12/NSW-Net-Zero-Plan-Implementation-Update-2022.pdf

NSW Rural Fire Service (RFS) 2019. Planning for Bushfire Protection: A guide for Councils. Planners, Fire Authorities and Developers. NSW Rural Fire Service.

Office of Energy and Climate Change, 2022. Net Zero Plan Implementation Update 2022. https://www.energy.nsw.gov.au/sites/default/files/2022-12/NSW-Net-Zero-Plan-Implementation-Update-2022.pdf

Ortis-Bobeda, A., 2021. *The empirical analysis of climate change impacts and adaptation in agriculture.* Handbook of Agricultural Economics.

Nassar, Y., El-Khozondar, H., El-Osta, W., Mohammed, S., Elnaggar, M., Khaleel, M., Ahmed, A., Alsharif, A., 2024. *Carbon footprint and energy life cycle assessment of wind energy in Libya.* Journal of Energy Conversion and Management.

Roads and Traffic Authority (RTA) 2002. Guide to Traffic Generating Developments.

NSW State Heritage Inventory, 2003a. Bookham Station and Cemetery. Retrieved from https://www.hms.heritage.nsw.gov.au/App/Item/ViewItem?itemId=2750142

NSW State Heritage Inventory, 2003b. Bogolong - Homestead and Woolshed. Retrieved from https://www.hms.heritage.nsw.gov.au/App/Item/ViewItem?itemId=2750137

NSW State Heritage Inventory, 2003c. 'Burrinjuck Dam'. Retrieved from https://www.hms.heritage.nsw.gov.au/App/Item/ViewItem?itemId=5012041

NSW State Heritage Inventory, 2010a. Bogolong Iron Smelter. Retrieved from https://www.hms.heritage.nsw.gov.au/App/Item/ViewItem?itemId=2750658

NSW State Heritage Inventory, 2010b. Bookham Public Cemetery. Retrieved from https://www.hms.heritage.nsw.gov.au/App/Item/ViewItem?itemId=2750140

NSW State Heritage Inventory, 2010c. Bookham Recreation Ground. Retrieved from https://www.hms.heritage.nsw.gov.au/App/Item/ViewItem?itemId=2750141

NSW State Heritage Inventory, 2010d. Bookham Uniting Church. Retrieved from https://www.hms.heritage.nsw.gov.au/App/Item/ViewItem?itemId=2750139

NSW State Heritage Inventory, 2010e. Bookham Soldier's Memorial Hall. Retrieved from https://www.hms.heritage.nsw.gov.au/App/Item/ViewItem?itemId=2750138

NSW State Heritage Inventory, 2010f. St Columba's Catholic Church. Retrieved from https://www.hms.heritage.nsw.gov.au/App/Item/ViewItem?itemId=2750146

NSW State Heritage Inventory, 2010g. Bookham Inn. Retrieved from https://www.hms.heritage.nsw.gov.au/App/Item/ViewItem?itemId=2750143

Transport for New South Wales, 2020. Oversize Overmass Load Carrying Vehicles Network Map. Retrieved from https://roads-waterways.transport.nsw.gov.au/business-industry/heavy-vehicles/maps/nsw-load-carrying-network/map/index.html

Thomson, C., Harrison, G. 2015. Life cycle costs and carbon emissions of wind power: Executive Summary. ClimateXClimate. Retrieved from http://www.climatexchange.org.uk/index.php/download_file/557/338/

United Nations Framework Convention on Climate Change, 2021. The Paris Agreement. Retrieved from https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement

United Nations Framework Convention on Climate Change, 2023. *COP28: what was achieved and what happens next?* Accessed from https://unfccc.int/cop28/5-key-takeaways#end-of-fossil-fuels

Vanclay, F., A.M. Esteves, I. Aucamp, D. Franks (2015). *Social Impact Assessment: Guidance for assessing and managing the social impacts of Projects*. International Association for Impact Assessment. Retrieved from https://research.rug.nl/files/17534793/IAIA_2015_Social_Impact_Assessment_guidance_document.pdf

Wade S.L., Barry C.M., Nelson M.D. & Gammridge L. (compilers) 2018. Renewable energy map of New South Wales, Version 1.3 (Digital Dataset). Geological Survey of New South Wales, Maitland.

Wood, T., 2023. *The Government Will Underwrite Risky Investments in Renewables – here's why that's a good idea.* Published in the Conversation.

World Wind Energy Agency, 2023. WWEA Half-year report 2023: additional momentum for wind power in 2023.

Appendix A Scoping Summary Table

Level of Assessment[1]	Matter	Cumulative Impact Assessment	Engagement	Relevant Government Plans, Policies and Guidelines	Scoping Report Reference
Detailed	Landscape and Visual	Yes	DPHI	• Wind Energy Visual Supplement (DPHI, 2024) • Cumulative Impact Assessment Guidelines for State Significant Projects (DPE, 2021) • Dark Sky Planning Guidelines (DPE, 2016) • Guidelines for Landscape and Visual Impact Assessment (GLVIA) Third Edition (2013)	Section 6.1.1
Detailed	Noise and Vibration	Yes	DPHI, EPA	• Construction Noise and Vibration Strategy (TfNSW, 2019) • Draft Construction Noise Guideline (Environment Protection Authority, 2020) • Noise Policy for Industry (NPfI) (EPA, 2017) • NSW Industrial Noise Policy (Environment Protection Authority, 2000) • NSW Road Noise Policy (Environment Protection Authority, 2011) • Assessing Vibration: A Technical Guideline (DECC, 2006) • Cumulative Impact Assessment Guidelines for State Significant Projects (DPE, 2021) • Wind Energy Guideline (DPHI, 2024) • Wind Energy Guideline – Noise Supplement (DPHI, 2024)	Section 6.1.2
Detailed	Biodiversity	Yes	DPHI, NSW DCCEEW and Commonwealth DCCEEW	• Biodiversity Assessment Method (DPE, 2022) • Cumulative Impact Assessment Guidelines for State Significant Projects (DPE, 2021) • Wind Energy Guideline (DPHI, 2024)	Section 6.1.3
Detailed	Traffic and Transport	Yes	TfNSW and Councils	• Guide to Traffic Generating Developments (RTA, 2022) • Austroads Guide to Traffic Management (Austroads)	Section 6.1.4

Level of Assessment[1]	Matter	Cumulative Impact Assessment	Engagement	Relevant Government Plans, Policies and Guidelines	Scoping Report Reference
				• Cumulative Impact Assessment Guidelines for State Significant Projects (DPE, 2021) • Wind Energy Guideline (DPHI, 2024)	
Standard	Bushfire	Yes	RFS and Fire and Rescue	• Planning for Bushfire Protection Guidelines (NSW RFS, 2019) • Cumulative Impact Assessment Guidelines for State Significant Projects (DPE, 2021)	Section 6.1.5
Detailed	Aviation	Yes	CASA and Air Services Australia	• National Airports Safeguarding Framework Guideline D: Managing Wind Turbine Risk to Aircraft (DIRDC, 2012) • Cumulative Impact Assessment Guidelines for State Significant Projects (DPE, 2021) • Wind Energy Guideline (DPHI, 2024)	Section 6.1.5
Detailed	Telecommunication	Yes	Telco Authority	• Cumulative Impact Assessment Guidelines for State Significant Projects (DPE, 2021)	Section 6.1.5
Standard	Blade Throw	Yes	DPHI	• Hazardous Industry Advisory Paper No. 4, 'Risk 6 Criteria for Land Use Safety Planning (DoP, 2011) • Cumulative Impact Assessment Guidelines for State Significant Projects (DPE, 2021)	Section 6.1.5
Standard	Public Health	Yes	DPHI	• International Commission on Non-Ionizing Radiation Protection (ICNIRP) Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields • Cumulative Impact Assessment Guidelines for State Significant Projects (DPE, 2021)	Section 6.1.5
Detailed	Battery Storage	Yes	DPHI	• Hazardous Industry Planning Advisory Paper No. 6, 'Hazard Analysis' and Multi-level Risk Assessment (DoP, 2011). • Hazardous Industry Advisory Paper No. 4, 'Risk 6 Criteria for Land Use Safety Planning (DoP, 2011) • Cumulative Impact Assessment Guidelines for State Significant Projects (DPE, 2021)	Section 6.1.5

Level of Assessment[1]	Matter	Cumulative Impact Assessment	Engagement	Relevant Government Plans, Policies and Guidelines	Scoping Report Reference
Detailed	Aboriginal Heritage	Yes	LALCs, RAPs and Heritage NSW	• Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (DEECCW, 2010a) • Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH, 2011) • Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW (DECCW, 2010b) • Cumulative Impact Assessment Guidelines for State Significant Projects (DPE, 2021)	Section 6.1.6
Standard	Historic Heritage	Yes	Heritage NSW	• Statements of Heritage Impact Guidelines (DPE, 2022) • Cumulative Impact Assessment Guidelines for State Significant Projects (DPE, 2021)	Section 6.1.7
Standard	Land Use and Soils	Yes	MEG and DPI – Agriculture	• Land Use Conflict Risk Assessment Guide (DPI, 2011) • Cumulative Impact Assessment Guidelines for State Significant Projects (DPE, 2021)	Section 6.1.8
Standard	Surface Water and Groundwater	Yes	NSW DCCEEW and Water NSW	• NSW aquifer interference policy (DPI 2012) - Water • Best practice erosion and sediment control (BPESC) books 1-6 (IECA, 2008) • Controlled Activities – guidelines for Riparian Corridors on Waterfront Land (DPE, 2022) • Floodplain Development Manual (DIPNR, 2005) • Liquid Chemical Storage, Handling and Spill Management: Part B Review of Best Practice Regulation (DEC 2005) • Storing and handling liquids - environmental Protection: Participant's Manual (DEC, 2007) • Cumulative Impact Assessment Guidelines for State Significant Projects (DPE, 2021)	Section 6.1.9
Standard	Aquatic Habitat and Riparian Land	Yes	NSW DCCEEW and DPI – Fisheries	• Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings (Dept. of Planning and Industry, 2003)	Section 6.1.9

Level of Assessment[1]	Matter	Cumulative Impact Assessment	Engagement	Relevant Government Plans, Policies and Guidelines	Scoping Report Reference
				• Policy & Guidelines for Fish Habitat Conservation and Management (Dept. of Planning and Industry, 2013) • Cumulative Impact Assessment Guidelines for State Significant Projects (DPE, 2021)	
Standard	Resource and Waste	Yes	DPHI and EPA	• Waste Classification Guidelines Part 1 Classifying Waste (DECCW, 2009) • Cumulative Impact Assessment Guidelines for State Significant Projects (DPE, 2021)	Section 6.1.5
Detailed	Social	Yes	DPHI and Councils	• Social Impact Assessment Guideline (DPIE, 2021) • Cumulative Impact Assessment Guidelines for State Significant Projects (DPE, 2021)	Section 6.1.10
Detailed	Economic	Yes	DPHI and Councils	• Social Impact Assessment Guideline (DPIE, 2021) • Cumulative Impact Assessment Guidelines for State Significant Projects (DPE, 2021)	Section 6.1.10

LEVEL OF ASSESSMENT[1]:

DETAILED ASSESSMENT: THE PROJECT MAY RESULT IN SIGNIFICANT IMPACTS ON THE MATTER, INCLUDING CUMULATIVE IMPACTS REQUIRING DETAILED STUDIES AND INVESTIGATIONS CARRIED OUT BY TECHNICAL SPECIALISTS.

STANDARD ASSESSMENT: THE PROJECT IS UNLIKELY TO RESULT IN SIGNIFICANT IMPACTS ON THE MATTER, INCLUDING CUMULATIVE IMPACTS.

NO FURTHER ASSESSMENT: THE PROJECT WILL HAVE NO IMPACT ON THE MATTER, OR THE IMPACTS OF THE PROJECT ON THE MATTER WILL BE SO SMALL THAT THEY ARE NOT WORTH CONSIDERING.

Appendix B Preliminary Noise and Vibration Impact Assessment (Marshall Day Acoustics, 2024)

MARSHALL DAY Acoustics

BOOKHAM WIND FARM
PRELIMINARY NOISE ASSESSMENT

Rp 001 20240078 | 30 October 2024

Project:	**BOOKHAM WIND FARM**
Prepared for:	**Eco Logical Australia Pty Ltd** **Level 13, 420 George Street** **Sydney NSW 2000**
Attention:	**Bethany Lavers**
Report No.:	**Rp 001 20240078**

Document Control

Status:	Rev:	Comments	Date:	Author:	Reviewer:
Complete	-	For client information	30 Oct 2024	Y. Chen	A. Stoker

EXECUTIVE SUMMARY

ASSESSMENT OVERVIEW

Squadron Renewable Energy Developments Pty Ltd (the Proponent) is seeking development consent for the construction, operation, maintenance and decommissioning of the Bookham Wind Farm, which would include up to 99 wind turbine generators (WTGs), a battery energy storage system (BESS), ancillary infrastructure, and temporary facilities (the Project). The Project would have a generation capacity of approximately 594 megawatts (MW).

Marshall Day Acoustics Pty Ltd (MDA) have been commissioned by Eco Logical Australia Pty Ltd (ELA) on behalf of the Proponent, to undertake a preliminary assessment of noise associated with the Project for submission with the scoping report and request for Planning Secretary's Environmental Assessment Requirements (SEARs).

The purpose of the assessment is to identify noise related matters requiring further assessment in the subsequent environmental impact statement (EIS) and the level of assessment that should be carried out for each matter.

The primary noise related matter associated with the Project is noise from operation of WTGs. On this basis a preliminary assessment of noise is conducted to provide a robust evaluation of potential noise impacts related to this matter.

Other, secondary noise related matters associated with the Project include operational noise from the proposed BESS, and other Project related ancillary infrastructure, as well as construction noise and vibration, including construction traffic. These secondary matters have not been numerically evaluated but are identified as being matters requiring detailed assessment as part of the EIS.

WTG NOISE

The Project is proposed to have an installed capacity of approximately 594 MW of renewable energy generated from up to 99 WTGs, each with a maximum tip height of up to 270 m above ground level.

A preliminary assessment of operational noise for the proposed Project has been conducted in accordance with the NSW Department of Planning and Environment *NSW Wind Energy: Noise Assessment Bulletin* (NSW Noise Assessment Bulletin) dated December 2016.[1]

The NSW Noise Assessment Bulletin specifies that the assessment of WTG noise is to be conducted in accordance with the South Australia EPA *Wind farms environmental noise guidelines* (SA Guidelines 2009), dated July 2009, subject to a set of supplementary procedures that are specific to NSW.

Noise assessment has been carried out based on 3 candidate WTG models, as nominated by the Proponent, being representative of the size and type of WTG being considered for the Project. Noise emission data for the candidate WTG models has been reviewed and is consistent with the range of values expected for comparable types of multi megawatt WTG models.

The noise emission data has been used with international standard ISO 9613-2 to develop a 3D noise model allowing the prediction of the level of noise expected to occur at neighbouring receivers, under worst case noise propagation conditions.[2] The ISO 9613-2 standard has been applied based on well-established input choices and adjustments, based on research and international guidance, that are specific to wind farm noise assessment. ISO 9613-2 (without reference to a specific version of the standard) is nominated as being an acceptable noise prediction method in the SA Guidelines 2009.

---

1 Now under the purview of the NSW Department of Planning, Housing and Infrastructure (DPHI)

2 ISO 9613-2:1996 *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation*

Predicted WTG noise levels for the Project are above the NSW Noise Assessment Bulletin base noise limit of 35 dB $L_{Aeq,\ 10\ min}$ for a number of non-associated receivers, for each candidate WTG model. The magnitude of exceedance is up to 9.1 dB.

Based on the results of the preliminary WTG noise assessment, the Proponent will need to consider compliance with applicable noise limits as part of ongoing design development for the Project. This would include detailed noise assessment and investigation of potential mitigation strategies, following the completion of background noise monitoring and wind-speed based noise limits being established.

RECOMMENDATIONS

Once the SEARs are issued for this Project, further detailed assessment will be undertaken to support the EIS as part of the State significant development application (SSDA), to be lodged with the NSW Department of Planning, Housing, and Infrastructure (DPHI). The detailed assessment would demonstrate how compliance would be achieved for the specific noise matters that would be defined by the SEARs.

This would include background noise monitoring at key receivers around the Project, revised operational WTG noise modelling assessment, noise mitigation strategies (where required) and other noise considerations including special noise characteristics, construction, ancillary infrastructure (including the BESS) and cumulative noise.

TABLE OF CONTENTS

1.0 INTRODUCTION

Squadron Renewable Energy Developments Pty Ltd (the Proponent) is seeking development consent for the construction, operation, maintenance and decommissioning of the Bookham Wind Farm, which would include up to 99 wind turbine generators (WTGs), a battery energy storage system (BESS), ancillary infrastructure and temporary facilities (the Project). The Project would have a generation capacity of approximately 594 megawatts (MW).

Marshall Day Acoustics Pty Ltd (MDA) have been commissioned by Eco Logical Australia Pty Ltd (ELA) on behalf of the Proponent, to undertake a preliminary assessment of noise associated with the Project for submission with the scoping report and request for Planning Secretary's Environmental Assessment Requirements (SEARs).

The purpose of the assessment is to identify noise related matters requiring further assessment in the subsequent environmental impact statement (EIS) and the level of assessment that should be carried out for each matter.

The primary noise related matter associated with the Project is noise from operation of WTGs. On this basis a preliminary assessment of noise is conducted to provide a robust evaluation of potential noise impacts related to this matter.

Other, secondary noise related matters associated with the Project include operational noise from the proposed BESS, and other Project related ancillary infrastructure, as well as construction noise and vibration, including construction traffic. These secondary matters have not been numerically evaluated but are identified as being matters requiring detailed assessment as part of the EIS.

The preliminary WTG noise assessment has been prepared in accordance with the NSW Department of Planning and Environment's *Wind Energy: Noise Assessment Bulletin - For State significant wind energy development (NSW Noise Assessment Bulletin),* dated December 2016 and is based on:

- The minimum (base) operational noise limit determined in accordance the NSW Noise Assessment Bulletin.
- Preliminary noise modelling for the Project based on the current Project design comprising 99 multi-megawatt WTGs and 3 candidate WTG models representative of the size and type of WTG being considered for the Project.
- A comparison of the predicted noise levels with the base noise limit.

MDA has not been provided with information regarding other renewable energy projects, in particular wind energy facilities, in the vicinity of the Project. A risk assessment related to cumulative noise is therefore not feasible at this stage.

Other noise considerations relating to the Project would be assessed during the subsequent EIS stage. This would include assessment of operational noise associated with Project ancillary infrastructure (including the proposed BESS), assessment of cumulative noise impacts, and assessment of construction noise (including construction traffic) associated with the Project. Specific noise matters that may be defined by the SEARs for the Project, when issued, would also be addressed.

Acoustic terminology used in this report is presented in Appendix A.

2.0 PROJECT DESCRIPTION

2.1 Overview

The Project is located within the rural locality of Bookham, NSW, approximately 300 km southwest of Sydney and 90 km northwest of Canberra by road. Bookham is in the Yass Valley Council and Hilltops local government areas (LGA). Along the northern boundary of the Project site is the Hume Highway (M31), 880 km of inter-city national highway connecting Sydney and Melbourne and serving as the primary transport route between Sydney and the Southern Tablelands of NSW.

The Project site covers an area of approximately 14,900 ha. The development corridor for the preliminary design layout covers an area of approximately 4,760 ha.

2.2 Project components

The power generated by the Project (from WTGs and released from battery storage) would feed into the electricity grid (NEM) via direct connection to either the existing 330kV Yass to Lower Tumut transmission line and the 132 kV transmission line (line 970) or the proposed 500kV HumeLink connecting Wagga Wagga, Bannaby and Maragle.

At this stage, plans for the proposed Project comprise:

- Up to 99 WTGs, with a with a blade-tip height of up to 270m and generation capacity of approximately 594 MW
- A 250 MW/1,000 MWh battery energy storage system (BESS);
- Permanent ancillary infrastructure including:
  - Operation and maintenance compounds
  - Substation and switch station
  - Internal roads and hardstands
  - Electrical reticulation (underground and overhead cabling; connection to transmission lines)
  - Wind monitoring masts
  - Telecommunication facilities
  - Utility services
  - External road upgrades (subject to blade sizing and transport routes based on EIS traffic assessment)
- Temporary facilities and activities for use during the construction phase or for discrete maintenance activities including:
  - Site compounds, laydown and storage areas
  - Stockpiling and rock crushing facilities
  - Concrete batch plants
  - Temporary roads
  - Temporary monitoring masts.

The coordinates of the WTGs are presented in tabular format in Appendix B.

A site layout plan illustrating the WTG layout and receivers is provided in Appendix C.

2.3 Receivers

Throughout this report, the term receiver is used to identify any dwelling identified by the Proponent in the vicinity of the proposed Project.

A total of 83 receivers have been identified by the Proponent within 5 km of a proposed WTG location and are considered in this noise assessment.

For the purposes of noise assessment, receivers are separated into two distinct categories, based on the requirements of the NSW Noise Assessment Bulletin, SA Guideines 2009 and preliminary guidance in the Draft Wind Energy Guideline:[3]

Associated

- A residence on privately-owned land in respect of which the owner has reached an agreement with the applicant in relation to the development and management of noise impacts

Non-associated

- A residence on privately-owned land in respect of which the owner has not reached an agreement with the applicant in relation to the development; or
- A residence on privately-owned land in respect of which the owner has reached an agreement with the applicant in relation to the development, but the agreement does not include management of noise impacts

Agreements established between an applicant and landholders/owners can comprise two general types:

Host agreements

- Where applicants enter into agreements with 'host' landholders who are willing to have project infrastructure located on their land; or

Impact agreements

- Where agreements are negotiated between the applicant and neighbours of the development when the development may significantly impact the neighbour or their land. The agreement aims to manage and mitigate these impacts.

Where an agreement of either type, specifically addressing noise, is in place between an applicant and a landholder, the affected residence is taken to be associated with the development for the purpose of the assessment.

All other receivers are categorised as non-associated.

Based on the above definitions, 15 of the 83 receivers are categorised as associated receivers. The remaining 68 receivers are categorised as non-associated.

The coordinates of the receivers are tabulated in Appendix D.

[3] NSW DPE (Department of Planning and Environment) *Draft Wind Energy Guideline - Guidance for state significant wind energy development* November 2023

3.0 NEW SOUTH WALES POLICY & GUIDELINES

Based on the requirements specified in SEARs that are typically applied to wind farm projects, the following publications are expected to be relevant to the assessment of operational and construction noise from the Project.

- DPE (Department of Planning and Environment) *NSW Wind Energy: Noise Assessment Bulletin* (NSW Noise Assessment Bulletin) 2016
- EPA (Environment Protection Authority) *Noise Policy for Industry* (NPfI) 2017
- DECC (Department of Environment and Climate Change) *Interim Construction Noise Guideline* (ICNG) 2009
- DECCW (Department of Environment, Climate Change and Water) *Road Noise Policy* (RNP) 2011
- DEC (Department of Environment and Conservation) *Assessing Vibration: A Technical Guideline* (AVTG) 2006.

For the purposes of the preliminary noise assessment, only WTG noise has been considered. Other noise considerations relating to the Project would be assessed during the subsequent environmental impact statement (EIS) stage.

The following sections provide information with respect to the NSW Noise Assessment Bulletin, being the policy document relevant for the assessment of WTG noise.

3.1 NSW Noise Assessment Bulletin

The NSW Noise Assessment Bulletin provides proponents of wind energy projects and the community with advice about how noise impacts are assessed for large-scale wind energy development projects that are a State significant development. The stated objective of the NSW Noise Assessment Bulletin is to ensure that the noise impacts of wind energy projects are appropriately identified, mitigated, and managed.

The NSW Noise Assessment Bulletin specifies that the assessment of WTG noise is to be conducted in accordance with the SA Guidelines 2009, subject to a set of supplementary procedures that are specific to NSW. The variations relate to:

- *Noise limits:* selection of a lower base noise limit in all areas of NSW, in recognition that the regional areas of NSW with high quality wind resources are more populated than the equivalent regions in South Australia.
- *Special noise characteristics:* definition of additional procedures and establishing low frequency as an assessable characteristic.
- *Noise monitoring:* definition of additional technical procedures, including the use of alternative/intermediate noise monitoring locations for compliance monitoring.

The elements of the NSW Noise Assessment Bulletin that are applicable to the current scoping stage assessment are described in further detail below.

3.1.1 Noise limits

In relation to noise limits, the variation defined in the NSW Noise Assessment Bulletin sets the base noise limit at a value of 35 dB $L_{Aeq,\ 10\ min}$ for all projects, in lieu of the 35 dB to 40 dB $L_{Aeq,\ 10\ min}$ base criterion range defined in the SA Guidelines 2009.

The criteria in the NSW Noise Assessment Bulletin are subsequently defined as follows:

> *The predicted equivalent noise level ($L_{Aeq,10\ minute}$)*, adjusted for tonality and low frequency noise in accordance with these guidelines, should not exceed 35 dB(A) or the background noise ($L_{A90(10\ minute)}$) by more than 5 dB(A), whichever is the greater, at all relevant receivers for wind speed from cut-in to rated power of the wind turbine generator and each integer wind speed in between.*
>
> ** Determined in accordance with SA 2009, Section 4.*

The NSW Noise Assessment Bulletin notes the following in relation to the types of receivers where the noise limits apply:

> *The criteria in this Bulletin have been developed to address potential noise impacts on the amenity of residents and other relevant receivers in the vicinity of a proposed wind energy project. Wind energy proponents commonly negotiate agreements with private land owners where applicable noise limits may not be achievable at relevant receiver locations. A negotiated agreement will be considered as part of the assessment of a wind energy project, as will the requirements of SA 2009 and this Bulletin. The proponent's EIS should clearly identify the expected noise levels at all receiver locations including host properties to ensure that affected persons are appropriately informed regarding the development proposal.*

Accordingly, the NSW Noise Assessment Bulletin noise limits only apply to non-associated receivers. Associated receivers are discussed in Section 3.1.4.

For the purposes of the preliminary WTG noise assessment detailed herein, only the base noise limit of 35 dB $L_{Aeq,\ 10\ min}$ is considered. That is, background noise measurements have not been conducted for the site and background noise level adjusted noise limits have not been derived.

3.1.2 Tonality

Sounds which have unusually high levels of energy in a relatively narrow band of frequencies may be referred to as being tonal. Audible tonal sounds from WTGs are generally related to rotational equipment in the WTG nacelle and can have a specific pitch dependent on the speed of rotation. This can cause the noise to be more annoying or noticeable. These tonal characteristics (as defined below) typically do not occur in well designed and well-maintained WTGs.

The SA Guidelines 2009 requires that development applications for wind energy projects report the following:

> *To help determine whether there is tonality, the method and results of testing (such as in accordance with IEC 61400–11) carried out on the proposed wind turbine model to determine the presence of tonality should also be specified in the development application.*

Section 4 of the SA Guidelines 2009 further requires checks to be made during post completion compliance assessments.

Under the NSW Noise Assessment Bulletin, in addition to the above requirements, tonality is also assessed using the method described in Annex D of ISO 1996-2:2007 *Acoustics - Description, measurement and assessment of environmental noise – Determination of environmental noise levels* (ISO 1996-2:2007) for the assessment of tonality.

Tonality is defined as when the level of a one-third octave band (with the descriptor in accordance with the SA Guidelines 2009), exceeds the level of the adjacent bands on both sides by:

- 5 dB or more if the centre frequency of the band containing the tone is in the range 500 Hz to 10,000 Hz
- 8 dB or more if the centre frequency of the band containing the tone is in the range 160 Hz to 400 Hz, and/or
- 15 dB or more if the centre frequency of the band containing the tone is in the range 25 Hz to 125 Hz.

If tonality is found to be a repeated characteristic of the candidate WTG, 5 dB is to be added to the predicted or measured WTG noise levels. Note that 5 dB is the maximum penalty that may be applied for special noise characteristics, irrespective of whether one or more characteristics are present.

3.1.3 Low frequency noise

Low frequency noise is present in all types of environmental noise and is particularly difficult to measure in the presence of wind due to the increased level of background noise. The NSW Noise Assessment Bulletin indicates that low frequency noise is typically not a significant feature of modern WTG noise when it complies with the A-weighted noise limits.

In NSW, contemporary approvals include the following requirement for low frequency noise:

> *The presence of excessive low frequency noise that is a repeated characteristic* [i.e. noise from the wind farm that is repeatedly greater than 60 dB(C)] will incur a 5 dB(A) penalty, to be added to the measured noise level for the wind farm, unless a detailed low frequency noise assessment to the satisfaction of the Secretary demonstrates compliance with the proposed criteria for the assessment of low frequency noise disturbance (UK Department for Environment, Food and Rural Affairs (DEFRA, 2005)) for a steady state noise source.*
>
> ** The descriptor shall be in accordance with SA 2009, Section 4*

In the unlikely event that excessive low frequency noise is found to be a repeated characteristic of the WTG noise, 5 dB is to be added to the predicted or measured WTG noise levels. An assessment of C-weighted WTG noise levels must be undertaken against the 60 dB L_{Ceq} criterion at non-associated receivers in the vicinity of the Project. Note that 5 dB is the maximum penalty that may be applied for special noise characteristics, irrespective of whether one or more characteristics are present.

3.1.4 Associated receivers

The NSW Noise Assessment Bulletin also requires noise levels to be predicted for associated receivers, i.e. host properties and receivers where a noise agreement is in place with the Proponent.

The SA Guidelines 2009 provides guidance with respect to acceptable levels for *financial stakeholders,* presenting a base reference level of 45 dB $L_{Aeq,\ 10\ min}$ for associated receivers, in order to provide context to the predicted noise levels for these locations.

Comparisons between the predicted noise levels and the 45 dB $L_{Aeq,\ 10\ min}$ reference level are provided for informative purposes only. Noise levels at associated receivers will ultimately need to be managed in accordance with the commercial agreements established between the Proponent and the landowners.

4.0 NOISE PREDICTION METHOD

Operational WTG noise levels are predicted using:

- Noise emission data for the candidate WTGs.
- A 3D digital model of the Project and the surrounding environment.
- International standards used for the calculation of environmental sound propagation.

The method selected to predict noise levels is International Standard ISO 9613-2: 1996 *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation* (ISO 9613-2:1996). The prediction method is consistent with the guidance provided by the SA Guidelines 2009, as referenced in the NSW Noise Assessment Bulletin, and has been shown to provide a reliable method of predicting the typical upper levels of the noise expected to occur in practice.

The ISO 9613-2 method is used in conjunction with a set of input choices and procedural modifications that are specific to wind farm noise assessment, based on international research and guidance.

Key elements of the noise prediction method are summarised in Table 1. Further discussion of the method and the calculation choices is provided in Appendix E.

Table 1: Downwind prediction method

Detail	Description
Software	Proprietary noise modelling software SoundPLANnoise version 9.0
Method	International Standard ISO 9613-2:1996 *Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation* (ISO 9613-2:1996). Adjustments to the ISO 9613-2 method are applied on the basis of the guidance contained in the UK Institute of Acoustics publication *A good practice guide to the application of ETSU-R-97 for the assessment and rating of WTG noise* (UK Institute of Acoustics guidance). The adjustments are applied within the SoundPLANnoise modelling software and relate to the influence of terrain screening and ground effects on sound propagation. Specific details of adjustments are noted below and are discussed in Appendix E.
Source characterisation	To model the operational WTG noise associated with the Project, the following specific procedures are noted: • Each WTG is modelled as a point source of sound. • Calculations of WTG to receiver distances and average sound propagation heights are made on the basis of the point source being located at the position of the hub of the WTG. • The total WTG noise associated with the operation of the Project is then calculated on the basis of simultaneous operation of all WTGs and summing the contribution from each. • Calculations of terrain related screening are made on the basis of the point source being located at the maximum tip height of each WTG. Further discussion of terrain screening effects is provided below.
Terrain data	Digital terrain map with a cell size of 5 m throughout the Project and surrounds, sourced from ELVIS.[4]

[4] https://elevation.fsdf.org.au/

Detail	Description
Terrain effects (WTG-specific procedures)	Adjustments for the effect of terrain are determined and applied on the basis of the UK Institute of Acoustics guidance and research outlined in Appendix E. *Valley effects*: +3 dB is applied to the calculated noise level of a WTG when a significant valley exists between the WTG and calculation point. A significant valley is determined to exist when the actual mean sound propagation height between the WTG and calculation point is 50 % greater than would occur if the ground were flat. *Terrain screening effects*: only calculated if the terrain blocks line of sight between the maximum tip height of the WTG and the calculation point. The value of the screening effect is limited to a maximum value of -2 dB. For reference purposes, the ground elevations at the WTG and receivers are tabled in Appendix B and Appendix D respectively. The topography of the Project Site is depicted in the elevation map provided in Appendix F.
Ground conditions	Ground factor of G = 0.5 on the basis of the UK Institute of Acoustics guidance and research outlined in Appendix E. The ground around the Project corresponds to acoustically soft conditions (G = 1) according to ISO 9613-2. The adopted value of G = 0.5 assumes that 50 % of the ground cover is acoustically hard (G = 0) to account for variations in ground porosity and provide a cautious representation of ground effects.
Atmospheric conditions	Temperature 10 °C and relative humidity 80 % These represent conditions which result in relatively low levels of atmospheric sound absorption and are chosen on the basis of the UK Institute of Acoustics guidance and SA Guidelines 2009. The calculations are based on sound speed profiles which increase the propagation of sound from each WTG to each receiver, whether as a result of thermal inversions or wind directed toward each calculation point. [5] The primary consideration for WTG noise assessment is wind speed and direction. The noise level at each calculation point is assessed on the basis of being simultaneously downwind of every WTG at the Project. Other wind directions in which part or the entire wind farm is upwind of the receiver will result in lower noise levels. In some cases, it is not physically possible for a receiver to be simultaneously downwind of each WTG and the approach is therefore conservative in these instances.
Receiver heights	1.5 m above ground level. It is noted that the UK Institute of Acoustics guidance refers to predictions made at receiver heights of 4 m. Predictions in Australia are generally based on a lower prediction height of 1.5 m which results in lower noise levels. However, importantly, predictions in Australia do not generally subtract a margin recommended by the UK Institute of Acoustics guidance to account for differences between L_{Aeq} and L_{A90} noise levels. The magnitude of these differences is comparable and therefore balance each other out to provide similar predicted noise levels. This approach has been shown to be valid for predicting noise level of wind farms expected to be measured using the L_{A90} parameter (as per the NSW Noise Assessment Bulletin).

[5] The sound speed profile defines the rate of change in the speed of sound with increasing height above ground

5.0 WTG NOISE ASSESSMENT

The WTG model to be assessed in detail as part of the EIS will be determined from ongoing Project design development. Further, if the Project is approved, the final WTG model would only be selected after a tender process to procure the supply of WTGs. The final selection would be made on account of a range of design requirements, including achieving compliance with relevant noise limits at surrounding noise sensitive receivers.

Accordingly, to assess the proposed development at this stage in the Project, it is necessary to use representative candidate WTG models for the size and type of WTGs being considered. The purpose of using candidate WTGs in this assessment is to inform a preliminary assessment of operational noise, accounting for the base noise limit and noise emission levels that are typical of the size of WTGs being considered for the Project. For this assessment, the Proponent has nominated 3 candidate WTG models.

The candidate WTG models are variable speed WTGs, with the speed of rotation and the amount of power generated by the WTGs being regulated by control systems which vary the pitch of the WTG blades (the angular orientation of the blade relative to its axis).

Details of the assessed candidate WTGs are provided in Table 2.

Table 2: Candidate WTG models

Item	Detail		
Make	GE	Goldwind	Vestas
Model	GE6.0-164	GWH175-7.8	V172-7.2
Rated power, MW	6.0	7.8	7.2
Rotor diameter, m	164	175	172
Modelled hub height, m	170	170	170
Operating mode	Standard[1]	Standard[1]	PO7200[1]
Serrated trailing edge	No	No	Yes
Highest sound power, dB L_{WA}[2]	108.0	110.2	107.9
Wind speed for highest sound power, m/s	10	-[3]	12

1 Standard operating mode (or PO7200, being standard equivalent) means the operating mode without sound optimisation

2 Includes uncertainty as detailed in Section 5.1.1

3 This information is not provided in the manufacturer datasheet

A candidate WTG model (or models) with specifications consistent with the Project design will be used for detailed assessment in the EIS, to reflect the candidate WTG models under consideration at the time. Accordingly, the noise assessment undertaken for the EIS would reflect those candidate WTG models that may be applicable at that time.

5.1 WTG noise emissions

5.1.1 Sound power levels

The noise emissions of the WTGs are described in terms of the sound power level for different wind speeds. The sound *power* level is a measure of the total sound energy produced by each WTG and is distinct from the sound *pressure* level which depends on a range of factors such as the distance from the WTG.

Sound power level data for the candidate WTG models, including sound frequency characteristics, has been sourced from the following documents provided to MDA by the Proponent:

- GE Renewable Energy document *Technical Documentation Wind Turbine Generator Systems Cypress 6.0-164-50Hz Product Acoustic Specifications According to IEC 61400-11 (Rev. 02 – EN)*, dated 16 March 2021, received 7 June 2024.
- Goldwind International Holdings (HK) Limited document *Description of GWH175-7.8MW Acoustic Performance (Edition: A No.: GWI-15SA.0001)*, dated 01 August 2023, received 7 June 2024.
- Vestas Power Solutions document *Third octave noise emission EnVentus ™ V172-7.2MW 50/60 Hz (Document no 0128-4336_00)*, dated 30 June 2022, received 7 June 2024.

Based on the data sourced from the above specifications, the noise modelling conducted for this assessment involved conversion of third octave band levels to octave band levels and adjustment by addition of an additional margin at each wind speed for test uncertainty. The uncertainty factor for GWH175-7.8 is explicitly specified to be +1.7 dB in the abovementioned document, while a +1.0 dB factor is used for the GE6.0-164 and V172-7.2 as a typical value of test uncertainty.

The overall A-weighted sound power levels (including uncertainty factor) as a function of hub height wind speed are presented in Table 3.

Table 3: Sound power levels versus hub height wind speed, dB L_{WA}

WTG model	Hub height wind speed, m/s						
	6	7	8	9	10	11	≥12
GE6.0-164	100.2	103.5	105.7	107.7	108.0	108.0	108.0
GWH175-7.8[1]	110.2	110.2	110.2	110.2	110.2	110.2	110.2
V172-7.2	99.6	103.2	106.6	107.9	107.9	107.9	107.9

1 Only maximum sound power level data is provided in the manufacturer document. For completeness, the maximum sound power level is applied to all wind speeds.

The reference octave band values used as the basis for this assessment are presented in Table 4 and were adjusted to the overall A-weighted noise levels detailed in Table 3.

Table 4: Octave band sound power levels, dB L_{WA}

Model	Octave band centre frequency, Hz										
	16	31.5	63	125	250	500	1,000	2,000	4,000	8,000	L_{WA}
GE6.0-164[1]	66.2	79.8	89.1	94.6	99.1	101.7	103.3	101.1	93.6	77.8	108.0
GWH175-7.8[2]	-	76.1	88.4	100.5	105.3	104.5	103.2	99.3	91.0	71.7	110.2
V172-7.2[3]	64.4	79.4	91.5	99.2	102.3	102.5	100.8	96.2	88.5	77.7	107.9

1 Based on one-third octave band levels at 10 m/s

2 Based on maximum one-third octave band levels

3 Based on one-third octave band levels at 12 m/s

The values presented above are considered typical of the range of noise emissions associated with comparable multi-megawatt WTGs.

A review of available sound power data for a range of WTG models has shown that there is no clear relationship between WTG size or power output and the noise emission characteristics of a given WTG model. In practice, the overall noise emissions of a WTG are dependent on a range of factors, including the WTG size and power output, and other important factors such as the blade design and rotational speed of the WTG.

Therefore, while WTG sizes and power ratings of contemporary WTGs have increased, the noise emissions of the WTGs are comparable to, or lower than, previous generations of WTGs. This is as a result of design improvements. Notably, measures to reduce the speed of rotation of the WTGs, and enhanced blade design features such as serrations for noise control.

5.1.2 Tonality

Information concerning potential tonality is often limited at the planning stage of a project, and narrow band test data for tonality (in the form of IEC 61400-11 tonality data, as referenced in the SA Guidelines 2009) is presently unavailable for the candidate WTG model. However, the occurrence of tonality in the noise of contemporary multi-megawatt WTG designs is unusual. This is supported by evidence of operational wind farms in Australia which indicates that the occurrence of tonality at receivers is atypical.

Further, the third octave band source data detailed in the manufacturer's specification has been assessed against the additional tonality test prescribed in the NSW Noise Assessment Bulletin (detailed in Section 3.1.2). This test did not indicate the presence of tonality at any of the available hub height wind speeds.

On this basis, adjustments for tonality have not been applied to the predicted noise levels presented in this assessment. Notwithstanding this, the subject of tonality would be addressed during the EIS. As part of this, further information may need to be obtained from the manufacturer concerning tonality.

5.1.3 Low frequency noise

The NSW Noise Assessment Bulletin prescribes a criterion for the application of low frequency noise penalty adjustments, based on C-weighted noise levels. However, there is no established or verified engineering method for the prediction of C-weighted noise levels associated with the operation of WTGs.

For the purposes of this report, a risk assessment approach has been adopted using a simplified prediction method to estimate the C-weighted noise levels. Details of the study have been provided in Appendix G.

5.2 Preliminary predicted noise levels

This section of the report presents the preliminary predicted A-weighted noise levels of the Project at surrounding receivers, and an assessment of compliance with the base noise limit.

Sound levels in environmental assessment work are typically reported to the nearest integer to reflect the practical use of measurement and prediction data. However, in the case of wind farm layout design, significant layout modifications may only give rise to fractional changes in the predicted noise level. This is a result of the relatively large number of sources influencing the total predicted noise level, as well as the typical separating distances between the WTG locations and surrounding assessment positions. It is therefore necessary to consider the predicted noise levels at a finer resolution than can be perceived or measured in practice. It is for this reason that the levels presented in this section are reported to one decimal place.

The predicted noise levels are for conditions when the WTG's noise emissions have reached their highest level (corresponding to hub height wind speeds of 10 m/s and above for GE6.0-164, 12 m/s and above for V172-7.2, and the maximum sound power level for GWH175-7.8) and the wind is directed from the Project to each receiver.

The predicted noise levels include the uncertainty factors described in Section 5.1.1.

5.2.1 Non-associated receivers

Predicted noise levels for non-associated receivers are presented in Table 5 sorted by the predicted noise levels for GWH175-7.8 in descending order.

Predicted noise levels greater than the NSW Noise Assessment Bulletin base noise limit of 35 dB $L_{Aeq,\ 10\ min}$ are highlighted in grey.

Table 5: Predicted noise levels at non-associated receivers within 5 km of a proposed WTG, dB $L_{Aeq,\ 10\ min}$

Receiver	Distance to the nearest WTG, m	Candidate WTG model		
		GE6.0-164	GWH175-7.8	V172-7.2
CWR012	1,014	40.9	44.1	42.2
BJR032	1,300	37.7	41.0	39.2
BJR002	1,737	37.0	40.5	38.8
BJR031	1,550	36.4	39.9	38.2
BJR004	1,603	36.4	39.8	38.1
CWR035	1,954	36.1	39.7	38.1
BJR044	1,511	36.4	39.8	38.1
BJR036	1,522	35.8	39.3	37.7
CWR036	1,644	35.6	39.3	37.7
BAR003	1,496	35.6	38.9	37.2
BJR005	1,731	34.6	38.2	36.6
SGR002	1,660	34.2	37.8	36.2
SGR003	1,461	34.2	37.6	36.0
BAR005	1,848	34.1	37.6	36.0
FGD021	2,122	33.5	37.2	35.6

Receiver	Distance to the nearest WTG, m	Candidate WTG model		
		GE6.0-164	GWH175-7.8	V172-7.2
SGR001	1,529	33.4	36.8	35.2
FGD019	2,213	33.1	36.9	35.4
FGD017	2,287	32.9	36.6	35.1
BAR002	1,862	32.9	36.5	34.9
FGD014	2,336	32.7	36.5	35.0
FGD013	2,381	32.5	36.3	34.8
FGD012	2,412	32.3	36.1	34.6
FGD011	2,459	32.2	36.0	34.6
FGD010	2,552	31.8	35.7	34.2
CWR037	2,705	31.7	35.6	34.3
FGD008	2,616	31.7	35.5	34.1
BGR005	2,079	31.6	35.2	33.7
FGD006	2,826	30.7	34.7	33.2
FGD005	2,789	30.5	34.4	33.0
FGD003	2,948	30.4	34.3	33.0
CWR032	2,573	30.3	34.1	32.6
HUH001	2,324	30.0	33.7	32.4
HUH003	3,424	29.7	33.6	32.4
WOR001	2,679	29.8	33.7	32.3
CWR038	3,023	29.6	33.6	32.3
HUH002	3,330	29.5	33.5	32.2
CWR013	3,229	29.5	33.4	32.1
FGD002	3,231	29.4	33.3	32.1
HUH004	3,674	29.4	33.3	32.2
HUH005	3,224	29.1	33.0	32.0
ILR001	3,929	29.1	33.0	31.9
HUH015	3,686	29.1	33.1	31.9
HUH044	3,535	28.8	32.7	31.7
HUH021	2,750	28.9	32.6	31.5
BLR001	3,537	28.5	32.3	31.3
WOR003	3,262	28.4	32.4	31.2
HUH013	3,854	28.5	32.3	31.4

Receiver	Distance to the nearest WTG, m	Candidate WTG model		
		GE6.0-164	GWH175-7.8	V172-7.2
BAR004	2,813	28.2	32.0	30.9
CWR014	3,654	27.5	31.4	30.2
BGR002	3,828	27.6	31.4	30.4
HUH016	4,658	27.5	31.4	30.5
WFL001	4,711	27.2	30.8	30.2
NRS001	4,810	26.8	30.7	29.7
HUH006	4,354	26.7	30.4	29.7
HUH018	4,117	26.7	30.5	29.6
BGR006	4,677	26.5	30.3	29.3
HUH007	4,369	26.4	30.1	29.4
PR001	4,036	26.4	30.2	29.2
WOR002	3,277	26.4	30.1	29.1
BDR016	3,886	26.0	29.9	28.9
HUH019	4,437	26.1	29.8	29.1
BAR001	4,171	25.8	29.6	28.7
NRN003	3,813	25.1	28.8	28.0
HUH045	4,677	24.9	28.5	27.9
NRN005	4,649	24.1	27.7	27.1
WR001	4,563	23.9	27.6	26.9
BLR011	4,780	23.9	27.5	26.8
BJR008	4,379	23.5	27.1	26.4

Predicted noise levels for each integer wind speed are tabulated in Appendix H.

It can be seen from Table 5 that the predicted noise levels for the Project are above the NSW Noise Assessment Bulletin base noise limit of 35 dB $L_{Aeq,\ 10\ min}$ at:

- 10 non-associated receivers for GE6.0-164, by up to 5.9 dB.
- 27 non-associated receivers for GWH175-7.8, by up to 9.1 dB.
- 18 non-associated receivers for V172-7.2, by up to 7.2 dB.

Potential mitigation strategies would be considered during the EIS following the completion of background noise monitoring and wind-speed based noise limits being established.

The risk assessment indicates that the Proponent will need to consider compliance with applicable noise limits as part of ongoing design development for the Project.

5.2.2 Associated receivers

Predicted noise levels for associated receivers are presented in Table 6 for information only, sorted by the predicted noise levels for GWH175-7.8 in descending order. The levels above the reference level of 45 dB $L_{Aeq,\ 10\ min}$ are highlighted in grey.

Table 6: Predicted noise levels at associated receivers within 5 km of a proposed WTG, dB $L_{Aeq,\ 10\ min}$

Receiver	Distance to the nearest WTG, m	Candidate WTG model		
		GE6.0-164	GWH175-7.8	V172-7.2
CWR039	809	42.4	45.4	43.5
TMR002	824	41.8	44.7	42.9
TMR001	860	41.8	44.8	42.9
CWR004	966	41.3	44.4	42.5
BJR034	774	41.4	44.2	42.4
CWR003	951	41.0	44.1	42.2
CWR007	1,097	40.6	43.8	41.9
CWR006	1,264	40.0	43.3	41.5
CWR009	1,082	40.0	43.3	41.5
BJR029	1,136	40.0	43.2	41.4
CWR010	1,394	39.4	42.8	41.0
CWR002	973	39.5	42.7	40.9
CWR001	998	39.4	42.6	40.8
FGD001	1,931	34.2	37.9	36.3
BGR004	3,111	29.2	32.9	31.7

It can be seen from Table 6 that the predicted WTG noise levels from the proposed Project are below the reference level of 45 dB $L_{Aeq,\ 10\ min}$ at all associated receivers except one (CWR039) for GWH175-7.8.

5.3 Predicted noise contours

The location of the total predicted 30 dB, 35 dB, 40 dB, and 45 dB $L_{Aeq,\ 10\ min}$ noise contours associated with each candidate WTG model are shown in Figure 1 to Figure 3.

Figure 1: Highest predicted noise levels for GE6.0-164 (corresponding to hub height wind speeds of 10 m/s or greater)

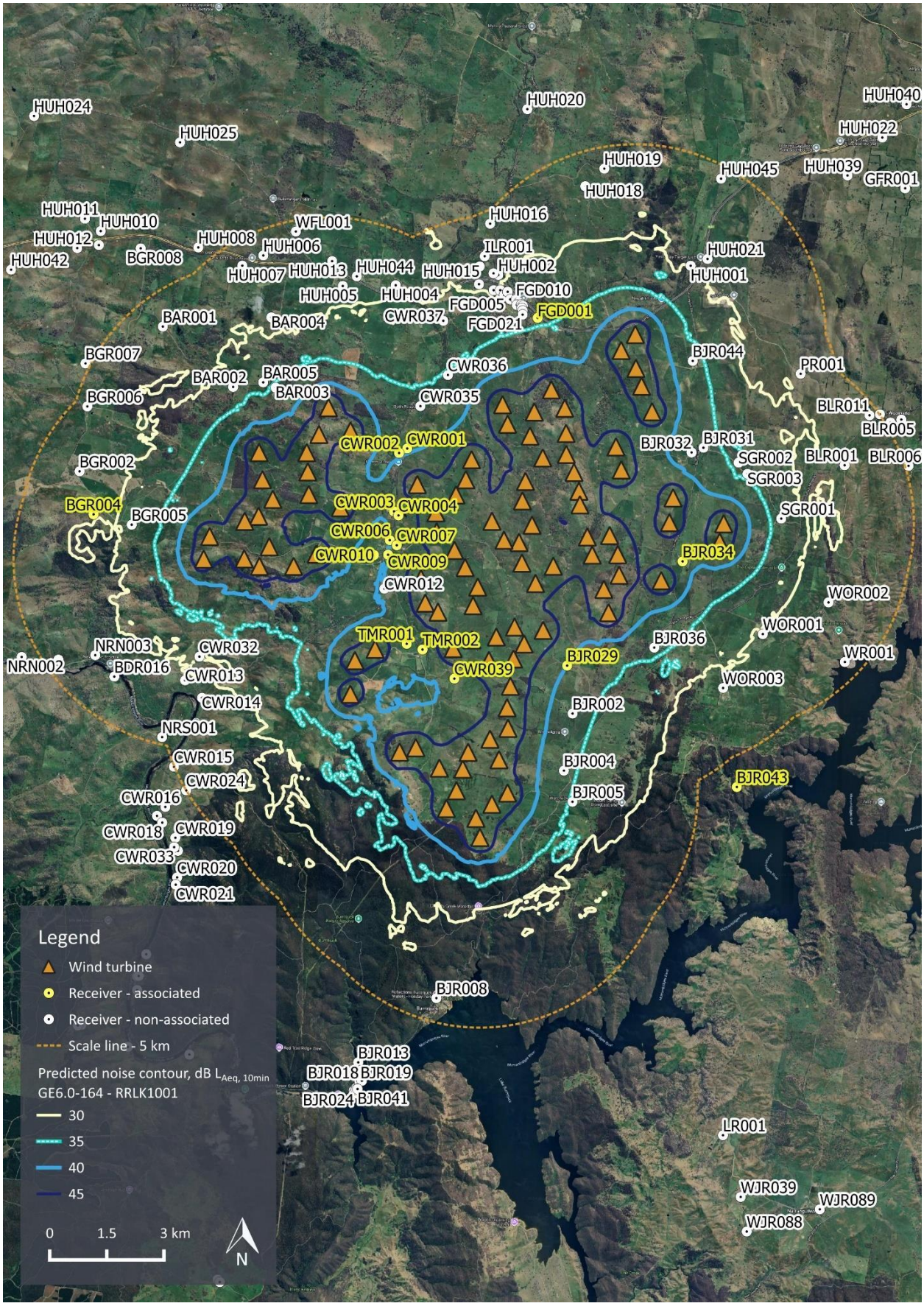


Figure 2: Highest predicted noise levels for GWH175-7.8 (corresponding to maximum sound power level)

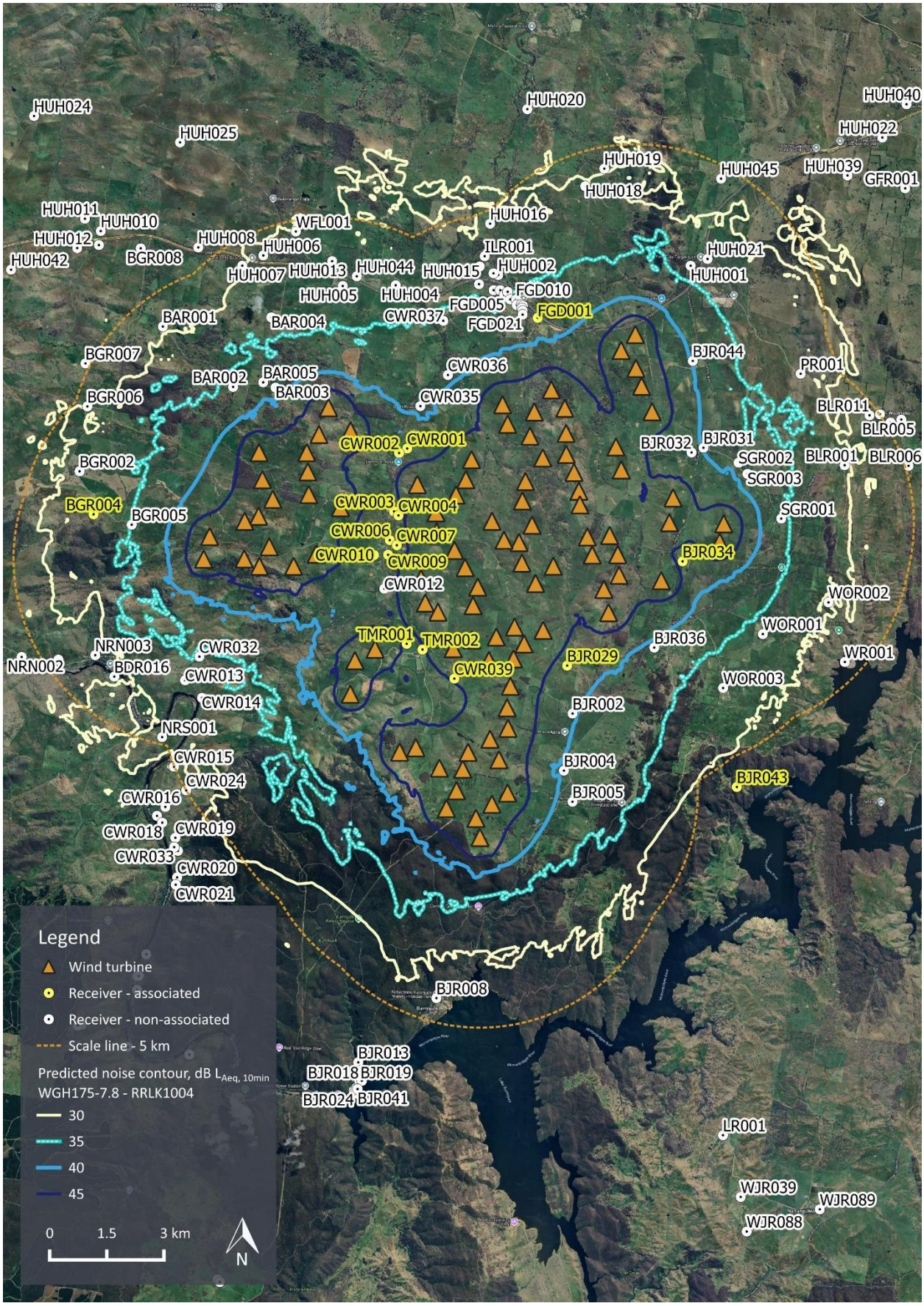
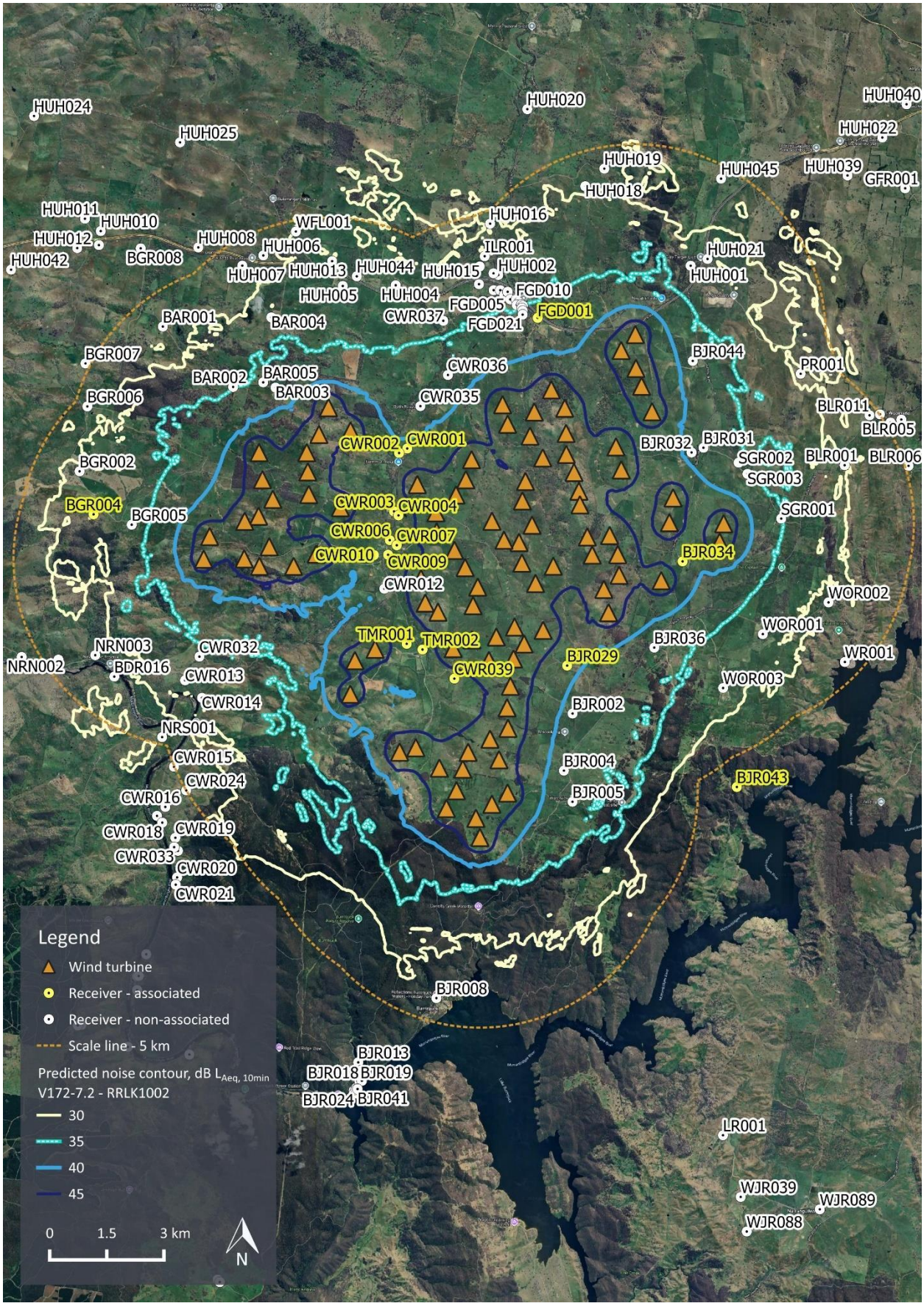


Figure 3: Highest predicted noise levels for V172-7.2 (corresponding to hub height wind speeds of 12 m/s or greater)



5.4 Low-frequency noise

The risk assessment provided in Appendix G indicates that all receivers with predicted C-weighted noise levels above the screening level of 60 dB $L_{Ceq,\ 10\ min}$ also have predicted A-weighted noise levels above the base noise limit of 35 dB $L_{Aeq,\ 10\ min}$.

Review of the C-weighted predicted noise levels and A-weighted predicted noise levels indicate that the lowest A-weighted noise level according with a C-weighted predicted noise level above the screening level of 60 dB $L_{Ceq,\ 10\ min}$ is 37.7 dB $L_{Aeq,\ 10\ min}$, occurring at CWR036 for the V172-7.2 candidate WTG model.

On the basis that the Project will be designed and operated to achieve either the base noise limit or background adjusted noise limits applicable under the NSW Noise Assessment Bulletin, it is not indicated that adjustments for low frequency noise are likely to be required. Adjustments are therefore not applied in this assessment.

Notwithstanding the above, detailed assessment of low frequency and tonality special noise characteristics would need to be carried out as part of the EIS and post-construction compliance assessment.

6.0 DETAILED ASSESSMENT PHASE

A detailed assessment of noise related to the Project will be carried out during the EIS stage.

The assessment would be designed to address specific environmental noise considerations that will be detailed in the SEARs issued for the Project.

Typical requirements include assessment of:

- operational WTG noise
- ancillary infrastructure noise (including BESS)
- construction noise
- construction traffic noise
- construction vibration
- consideration of cumulative impacts with other nearby wind farm projects.

The relevant policy and guidelines for the detailed noise assessment are set out in Section 3.0.

Based on the results of the preliminary WTG noise assessment, set out in Section 5.2, the Proponent will need to consider compliance with applicable noise limits as part of ongoing design development for the Project.

Further detailed noise assessment and investigation of potential mitigation strategies would be considered during the EIS, following the completion of background noise monitoring and wind-speed based noise limits being established. Detailed noise assessment would also address the special noise characteristics described in the NSW Noise Assessment Bulletin.

The background noise monitoring strategy would need to be established prior to commencement of the EIS, based on a revised Project layout. The results of any background noise monitoring would be documented in the Noise Assessment Report prepared to accompany the EIS for the Project.

7.0 CONCLUSION

The assessment provided herein has identified noise related matters requiring further assessment in the EIS and the level of assessment that should be carried out for each matter.

The primary noise related matter associated with the Project is noise from operation of WTGs. On this basis a preliminary assessment of WTG noise has been conducted to evaluate potential noise impacts related to this matter. The assessment is set out in Section 5.2.

Noise modelling was carried out based on 3 candidate WTG models, as nominated by the Proponent, representative of the size and type of WTG being considered for the Project.

Based on the results of the preliminary WTG noise assessment the Proponent will need to consider compliance with applicable noise limits as part of ongoing design development for the Project. This would include detailed noise assessment and investigation of potential mitigation strategies, following the completion of background noise monitoring and wind-speed based noise limits being established.

Other, secondary noise related matters associated with the Project include operational noise from the proposed BESS, and other Project related ancillary infrastructure, as well as construction noise and vibration, including construction traffic. These secondary matters have not been numerically evaluated but are identified as being matters requiring detailed assessment as part of the EIS.

Once the SEARs are released for the Project, further detailed assessment would be undertaken to support a subsequent development application to demonstrate how compliance would be achieved for the specific noise matters defined by the SEARs.

This would include background noise monitoring at key receivers around the Project, revised operational WTG noise modelling assessment, noise mitigation strategies (where required) and other noise considerations including special noise characteristics, construction, and ancillary infrastructure.

APPENDIX A GLOSSARY OF TERMINOLOGY

The basic quantities used within this document to describe noise adopt the conventions outlined in ISO 1996-1:2016 *Acoustics - Description measurement and assessment of environmental noise – Basic quantities and assessment procedures*.

Accordingly, all frequency weighted sound pressure levels are expressed as decibels (dB) in this report.

For example, sound pressure levels measured using an "A" frequency weighting are expressed as L_A dB. Alternative ways of expressing A-weighted decibels such as dBA or dB(A) are therefore not used within this report, except as part of a direct quote of third-party information.

Term	Definition	Abbreviation
A-weighting	A method of adjusting sound levels to reflect the human ear's varied sensitivity to different frequencies of sound.	See discussion above this table.
C- weighting	A method of adjusting sound levels to account for non-linear frequency response of the human ear at high noise levels (typically greater than 100 decibels).	-
A-weighted 90th centile	The A-weighted pressure level that is exceeded for 90 % of a defined measurement period. It is used to describe the underlying background sound level in the absence of a source of sound that is being investigated, as well as the sound level of steady, or semi steady, sound sources.	L_{A90}
A-weighted equivalent level	The A-weighted equivalent continuous pressure level.	L_{Aeq}
C-weighted equivalent level	The C-weighted equivalent continuous pressure level.	L_{Ceq}
Decibel	The unit of sound level.	dB
Hertz	The unit for describing the frequency of a sound in terms of the number of cycles per second.	Hz
Low frequency	A sound with perceptible content in the audible frequency range typically below 200 Hz	-
Octave Band	A range of frequencies. Octave bands are referred to by their logarithmic centre frequencies, these being 31.5 Hz, 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz, 8 kHz, and 16 kHz for the audible range of sound.	-
Sound power level	A measure of the total sound energy emitted by a source, expressed in decibels.	L_W
Sound pressure level	A measure of the level of sound expressed in decibels.	L_p
Special characteristics	A term used by the NSW Noise Assessment Bulletin to define sound characteristics that increase the likelihood of adverse reaction to the sound. The characteristics are tonality and low frequency.	-
Tonality	A characteristic to describe sounds which are composed of distinct and narrow groups of audible sound frequencies (e.g. whistling or humming sounds).	-

APPENDIX B WTG COORDINATES

Table 7 sets out the coordinates of the proposed WTGs supplied by the Proponent on 21 August 2024.

Table 7: WTG coordinates – GDA2020 MGA zone 55

WTG ID	Easting, m	Northing, m	Terrain elevation, m
1	653,118	6,145,534	520
2	652,745	6,145,113	531
3	653,133	6,144,643	545
4	653,281	6,144,172	534
5	653,556	6,143,504	522
6	654,110	6,141,238	620
7	654,012	6,140,586	623
8	653,799	6,139,063	596
9	655,440	6,140,559	637
10	655,334	6,140,078	671
11	652,608	6,142,579	515
12	652,747	6,141,975	539
13	652,442	6,140,250	566
14	652,691	6,139,205	639
15	650,909	6,144,079	520
16	651,262	6,143,594	514
17	651,297	6,142,932	594
18	651,302	6,142,380	606
19	651,506	6,141,908	672
20	651,634	6,141,414	662
21	651,660	6,141,056	661
22	651,855	6,140,212	597
23	651,984	6,139,735	621
24	652,289	6,138,834	658
25	652,413	6,138,221	666
27	649,627	6,143,688	520
28	649,761	6,143,175	544
29	650,402	6,140,521	556
30	650,059	6,140,066	596
31	650,136	6,139,524	592

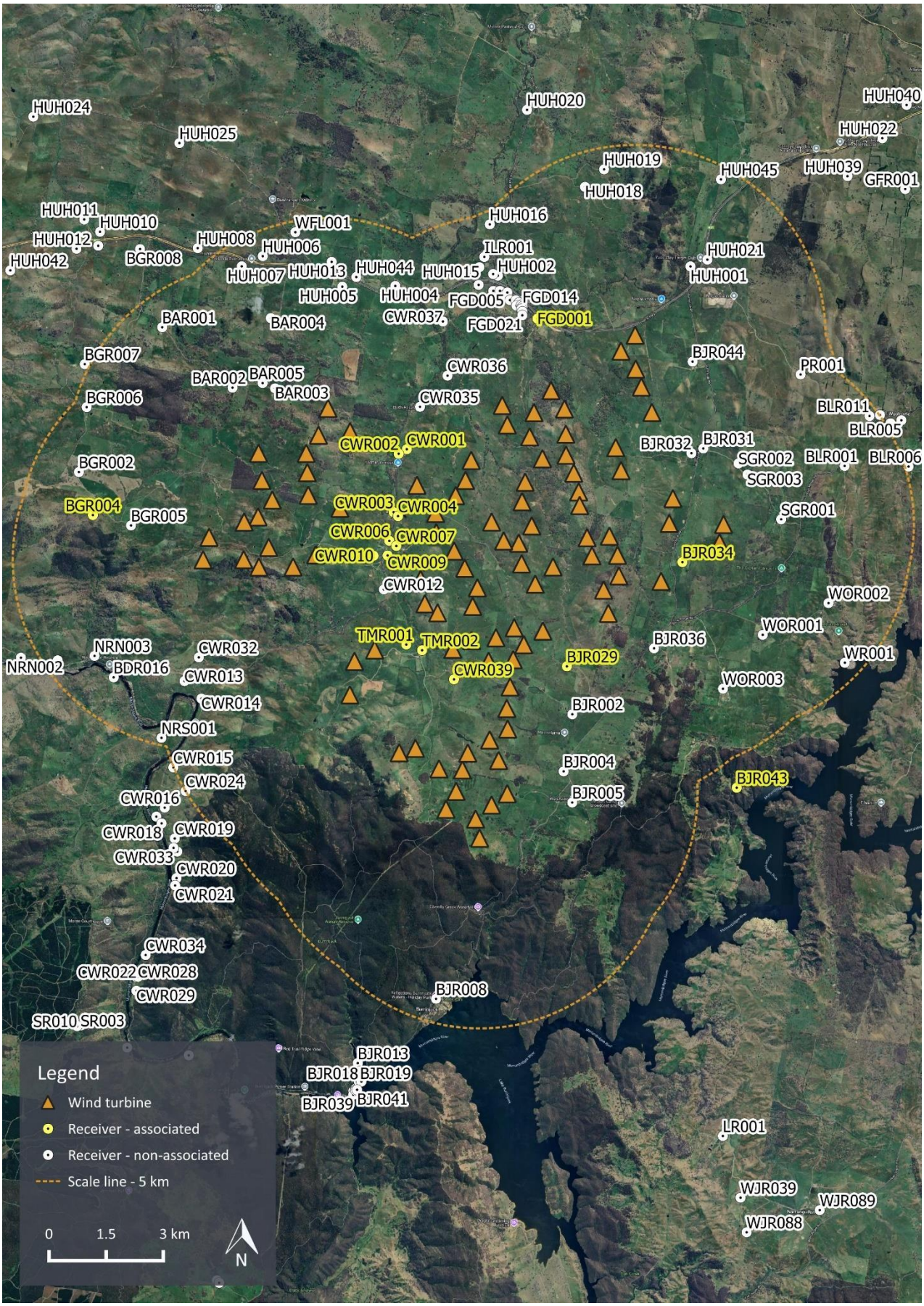
WTG ID	Easting, m	Northing, m	Terrain elevation, m
32	650,494	6,138,990	622
33	650,693	6,137,757	618
34	648,974	6,138,894	595
35	649,941	6,137,844	634
36	650,193	6,137,398	654
37	649,915	6,137,005	652
38	649,832	6,136,286	654
39	649,746	6,135,721	679
40	649,769	6,135,181	668
41	649,296	6,134,894	658
42	649,533	6,134,355	682
43	649,758	6,133,480	663
44	649,031	6,132,311	651
45	648,150	6,133,072	705
46	647,386	6,141,589	547
47	647,876	6,140,850	571
48	647,895	6,140,344	554
49	648,363	6,139,860	557
50	647,482	6,139,115	561
51	647,594	6,138,473	658
52	647,930	6,138,236	679
53	648,328	6,137,278	602
54	646,276	6,137,259	575
59	646,921	6,134,557	620
63	645,746	6,136,961	608
64	645,624	6,136,079	544
72	645,050	6,143,611	585
73	644,800	6,142,905	661
75	645,630	6,142,999	583
76	645,363	6,140,983	584
77	644,727	6,139,760	601
79	644,479	6,142,429	644
80	644,507	6,141,922	587

WTG ID	Easting, m	Northing, m	Terrain elevation, m
81	644,532	6,141,327	583
82	643,586	6,141,201	582
83	643,213	6,140,758	651
84	644,134	6,139,439	621
85	643,493	6,139,954	633
86	643,235	6,139,439	697
87	643,226	6,142,430	572
88	643,314	6,141,717	570
89	642,848	6,140,624	632
90	642,835	6,139,636	670
91	641,926	6,140,223	598
92	641,769	6,139,629	653
231	652,656	6,139,748	565
271	650,461	6,143,497	515
281	650,348	6,142,862	535
282	650,684	6,142,288	557
283	650,229	6,141,670	548
284	650,148	6,141,157	557
285	650,960	6,139,445	581
311	649,348	6,140,625	536
312	649,665	6,140,126	576
341	648,643	6,139,407	573
371	649,269	6,136,964	617
441	648,927	6,132,814	626
442	649,347	6,133,185	618
451	648,416	6,133,541	655
452	648,581	6,134,106	620
453	648,722	6,134,548	641
454	647,965	6,134,134	613
455	647,347	6,134,673	632
471	648,403	6,141,316	526
472	648,662	6,141,716	514
473	648,812	6,142,243	514

WTG ID	Easting, m	Northing, m	Terrain elevation, m
521	648,851	6,138,404	608
531	648,821	6,137,505	601
532	649,462	6,137,580	615

APPENDIX C SITE LAYOUT PLAN

Figure 4: Proposed WTG locations and receivers



APPENDIX D RECEIVER LOCATIONS

The following table sets out the 83 receivers located within 5 km of a proposed WTG and considered in the preliminary noise assessment, together with their respective distance to the nearest WTG. Data has been provided to MDA by the Proponent on 27 May 2024.

Table 8: Receiver coordinates – GDA2020 MGA zone 55

Receiver ID	Easting, m	Northing, m	Terrain elevation, m	Distance to nearest WTG, m
Non-associated receiver				
BAR001	640,696	6,145,742	517	4,171
BAR002	642,543	6,144,155	573	1,862
BAR003	643,659	6,144,137	560	1,496
BAR004	643,547	6,145,983	549	2,813
BAR005	643,334	6,144,275	566	1,848
BDR016	639,419	6,136,539	277	3,886
BGR002	638,506	6,141,936	536	3,828
BGR005	639,877	6,140,532	522	2,079
BGR006	638,711	6,143,642	586	4,677
BJR002	651,468	6,135,568	616	1,737
BJR004	651,240	6,134,068	589	1,603
BJR005	651,465	6,133,249	604	1,731
BJR008	647,887	6,128,088	410	4,379
BJR031	654,908	6,142,556	531	1,550
BJR032	654,596	6,142,432	543	1,300
BJR036	653,615	6,137,303	629	1,522
BJR044	654,626	6,144,839	552	1,511
BLR001	658,620	6,142,097	649	3,537
BLR011	659,274	6,143,409	618	4,780
CWR012	646,519	6,138,850	551	1,014
CWR013	641,280	6,136,442	336	3,229
CWR014	641,726	6,135,980	284	3,654
CWR032	641,657	6,137,064	326	2,573
CWR035	647,466	6,143,651	478	1,954
CWR036	648,190	6,144,469	485	1,644
CWR037	648,069	6,145,893	473	2,705
CWR038	649,392	6,146,698	472	3,023
FGD002	649,007	6,146,855	469	3,231

Receiver ID	Easting, m	Northing, m	Terrain elevation, m	Distance to nearest WTG, m
FGD003	649,567	6,146,698	479	2,948
FGD005	649,670	6,146,572	477	2,789
FGD006	649,761	6,146,655	463	2,826
FGD008	649,829	6,146,455	473	2,616
FGD010	649,984	6,146,452	465	2,552
FGD011	650,062	6,146,381	466	2,459
FGD012	650,001	6,146,308	472	2,412
FGD013	650,127	6,146,321	466	2,381
FGD014	650,161	6,146,285	465	2,336
FGD017	650,136	6,146,225	468	2,287
FGD019	650,157	6,146,153	469	2,213
FGD021	650,154	6,146,055	470	2,122
HUH001	654,572	6,147,340	514	2,324
HUH002	649,513	6,147,097	455	3,330
HUH003	649,388	6,147,141	461	3,424
HUH004	646,818	6,146,827	488	3,674
HUH005	645,426	6,146,808	498	3,224
HUH006	643,337	6,147,611	526	4,354
HUH007	642,785	6,147,343	542	4,369
HUH013	645,146	6,147,460	521	3,854
HUH015	649,027	6,147,321	457	3,686
HUH016	649,300	6,148,447	448	4,658
HUH018	651,801	6,149,431	481	4,117
HUH019	652,302	6,149,893	487	4,437
HUH021	655,015	6,147,519	521	2,750
HUH044	645,794	6,147,062	493	3,535
HUH045	655,372	6,149,630	553	4,677
ILR001	649,156	6,147,591	466	3,929
NRN003	638,918	6,137,103	295	3,813
NRN005	637,950	6,136,984	295	4,649
NRS001	640,677	6,134,948	296	4,810
PR001	657,464	6,144,500	602	4,036
SGR001	656,953	6,140,693	577	1,529

Receiver ID	Easting, m	Northing, m	Terrain elevation, m	Distance to nearest WTG, m
SGR002	655,832	6,142,164	561	1,660
SGR003	656,066	6,141,869	586	1,461
WFL001	644,192	6,148,241	539	4,711
WOR001	656,469	6,137,657	541	2,679
WOR002	658,196	6,138,490	467	3,277
WOR003	655,424	6,136,240	565	3,262
WR001	658,626	6,136,924	365	4,563
Associated receiver				
BGR004	638,875	6,140,805	547	3,111
BJR029	651,325	6,136,828	627	1,136
BJR034	654,360	6,139,568	604	774
CWR001	647,120	6,142,536	503	998
CWR002	646,906	6,142,418	499	973
CWR003	646,773	6,140,882	516	951
CWR004	646,890	6,140,777	519	966
CWR006	646,661	6,140,126	512	1,264
CWR007	646,846	6,139,992	513	1,097
CWR009	646,617	6,139,743	516	1,082
CWR010	646,245	6,139,735	529	1,394
CWR039	648,360	6,136,487	606	809
FGD001	650,551	6,145,969	471	1,931
TMR001	647,107	6,137,401	564	860
TMR002	647,522	6,137,251	548	824

APPENDIX E NOISE PREDICTION MODEL

In Australia, WTG noise predictions are typically calculated using ISO 9613-2:1996 *Acoustics – Attenuation of sound during propagation outdoors - Part 2: General method of calculation* (ISO 9613-2:1996) with a set of conservative assumptions tailored to wind farm assessment, as detailed in UK Institute of Acoustics publication *A good practice guide to the application of ETSU-R-97 for the assessment and rating of wind turbine noise* (the UK Institute of Acoustics guidance).

A revised version of the standard, ISO 9613-2:2024, was published earlier in 2024 based on broadly equivalent procedures to ISO 9613-2:1996, subject to refinements, clarifications, and supplementary advice for different types of sources.[6] Notably, ISO 9613-2:2024 introduces an informative annex on WTG noise modelling to reflect the recommendations of the UK Institute of Acoustics guidance.

At the date of preparing this report, the revised standard has not yet been implemented in commonly used proprietary noise modelling software options. However, the core elements of the two versions (particularly with respect to wind farm noise modelling), are similar, and proprietary software options already implement the UK Institute of Acoustics guidance with respect to ISO 9613-2:1996.

On this basis ISO 9613-2:1996 continues to be used and referenced in Australia and has been chosen as the most appropriate method to calculate the level of broadband A-weighted wind farm noise expected to occur at surrounding receptor locations. This method is considered the most robust and widely used international method for the prediction of wind farm noise.

The use of this standard is supported by international research publications, measurement studies conducted by MDA and direct reference to the standard in the South Australia EPA W*ind farms environmental noise guidelines* and NZS 6808:2010 *Acoustics – Wind farm noise.*

The standard specifies an engineering method for calculating noise at a known distance from a variety of sources under meteorological conditions favourable to sound propagation. The standard defines favourable conditions as downwind propagation where the source blows from the source to the receiver within an angle of ±45 degrees from a line connecting the source to the receiver, at wind speeds between approximately 1 m/s and 5 m/s, measured at a height of 3 m to 11 m above the ground. Equivalently, the method accounts for average propagation under a well-developed moderate ground based thermal inversion. In this respect, it is noted that at the wind speeds relevant to noise emissions from WTGs, atmospheric conditions do not favour the development of thermal inversions throughout the propagation path from the source to the receiver.

To calculate far-field noise levels according to ISO 9613-2:1996, the noise emissions of each WTG are firstly characterised in the form of octave band frequency levels. A series of octave band attenuation factors are then calculated for a range of effects including:

- Geometric divergence;
- Air absorption;
- Reflecting obstacles;
- Screening;
- Vegetation; and
- Ground reflections.

The octave band attenuation factors are then applied to the noise emission data to determine the corresponding octave band and total calculated noise level at receivers.

---

[6] ISO 9613-2:2024 *Acoustics — Attenuation of sound during propagation outdoors Part 2: Engineering method for the prediction of sound pressure levels outdoors*

Calculating the attenuation factors for each effect requires a relevant description of the environment into which the sound propagation such as the physical dimensions of the environment, atmospheric conditions, and the characteristics of the ground between the source and the receiver.

Wind farm noise propagation has been the subject of considerable research in recent years. These studies have provided support for the reliability of engineering methods such as ISO 9613-2:1996 when a certain set of input parameters are chosen in combination. Specifically, the studies to date tend to support that the assignment of a ground absorption factor of G = 0.5 for the source, middle and receiver ground regions between a wind farm and a calculation point tends to provide a reliable representation of the upper noise levels expected in practice, when modelled in combination with other key assumptions; specifically all WTGs operating at identical wind speeds, emitting sound levels equal to the test measured levels plus a margin for uncertainty (or guaranteed values), at a temperature of 10 ^{o}C and relative humidity of 70 % to 80 %, with specific adjustments for screening and ground effects as a result of the ground terrain profile.

In support of the use of ISO 9613-2:1996 and the choice of G = 0.5 as an appropriate ground characterisation, the following references are noted:

- A factor of G = 0.5 is frequently applied in Australia for general environmental noise modelling purposes as a way of accounting for the potential mix of ground porosity which may occur in regions of dry/compacted soils or in regions where persistent damp conditions may be relevant
- NZS 6808:2010 refers to ISO 9613-2:1996 as an appropriate prediction method for wind farm noise, and notes that soft ground conditions should be characterised by a ground factor of G = 0.5
- In 1998, a comprehensive study (commonly cited as the Joule Report), part funded by the European Commission found that the ISO 9613-2:1996 model provided a robust representation of upper noise levels which may occur in practice and provided a closer agreement between predicted and measured noise levels than alternative standards such as CONCAWE and ENM. Specifically, the report indicated the ISO 9613-2:1996 method generally tends to marginally over predict noise levels expected in practice

The UK Institute of Acoustics journal dated March/April 2009 published a joint agreement between practitioners in the field of wind farm noise assessment (the UK IOA 2009 joint agreement), including consultants routinely employed on behalf of both developers and community opposition groups, and indicated the ISO 9613-2:1996 method as the appropriate standard and specifically designated G = 0.5 as the appropriate ground characterisation. This agreement was subsequently reflected in the recommendations detailed in the UK Institute of Acoustics guidance. It is noted that these publications refer to predictions made at receiver heights of 4 m. Predictions in Australia are generally based on a lower prediction height of 1.5 m which tends to result in higher ground attenuation for a given ground factor, however conversely, predictions in Australia do not generally incorporate a -2 dB factor (as applied in the UK) to represent the relationship between L_{Aeq} and L_{A90} noise levels. The result is that these differences tend to balance out to a comparable approach and thus supports the use of G = 0.5 in the context of Australian prediction methods.

A range of measurement and prediction studies for wind farms in which MDA staff have been associated in have provided further support for the use of ISO 9613-2:1996 and G = 0.5 as an appropriate representation of typical upper noise levels expected to occur in practice.[7,8,9]

---

[7] Bullmore, Adcock, Jiggins & Cand – *Wind Farm Noise Predictions: The Risks of Conservatism*; Presented at the Second International Meeting on Wind Turbine Noise in Lyon, France September 2007.

[8] Bullmore, Adcock, Jiggins & Cand – *Wind Farm Noise Predictions and Comparisons with Measurements*; Presented at the Third International Meeting on Wind Turbine Noise in Aalborg, Denmark June 2009.

[9] Delaire, Griffin, & Walsh – *Comparison of predicted wind farm noise emission and measured post-construction noise levels at the Portland Wind Energy Project in Victoria, Australia*; Presented at the Fourth International Meeting on Wind Turbine Noise in Rome, April 2011.

The findings of these studies demonstrate the suitability of ISO 9613-2:1996 method to predict the propagation of WTG noise for:

- The types of noise source heights associated with a modern wind farm, extending the scope of application of the method beyond the 30 m maximum source heights considered in the original ISO 9613;
- The types of environments in which wind farms are typically developed, and the range of atmospheric conditions and wind speeds typically observed around wind farm sites. Importantly, this supports the extended scope of application to wind speeds in excess of 5 m/s.

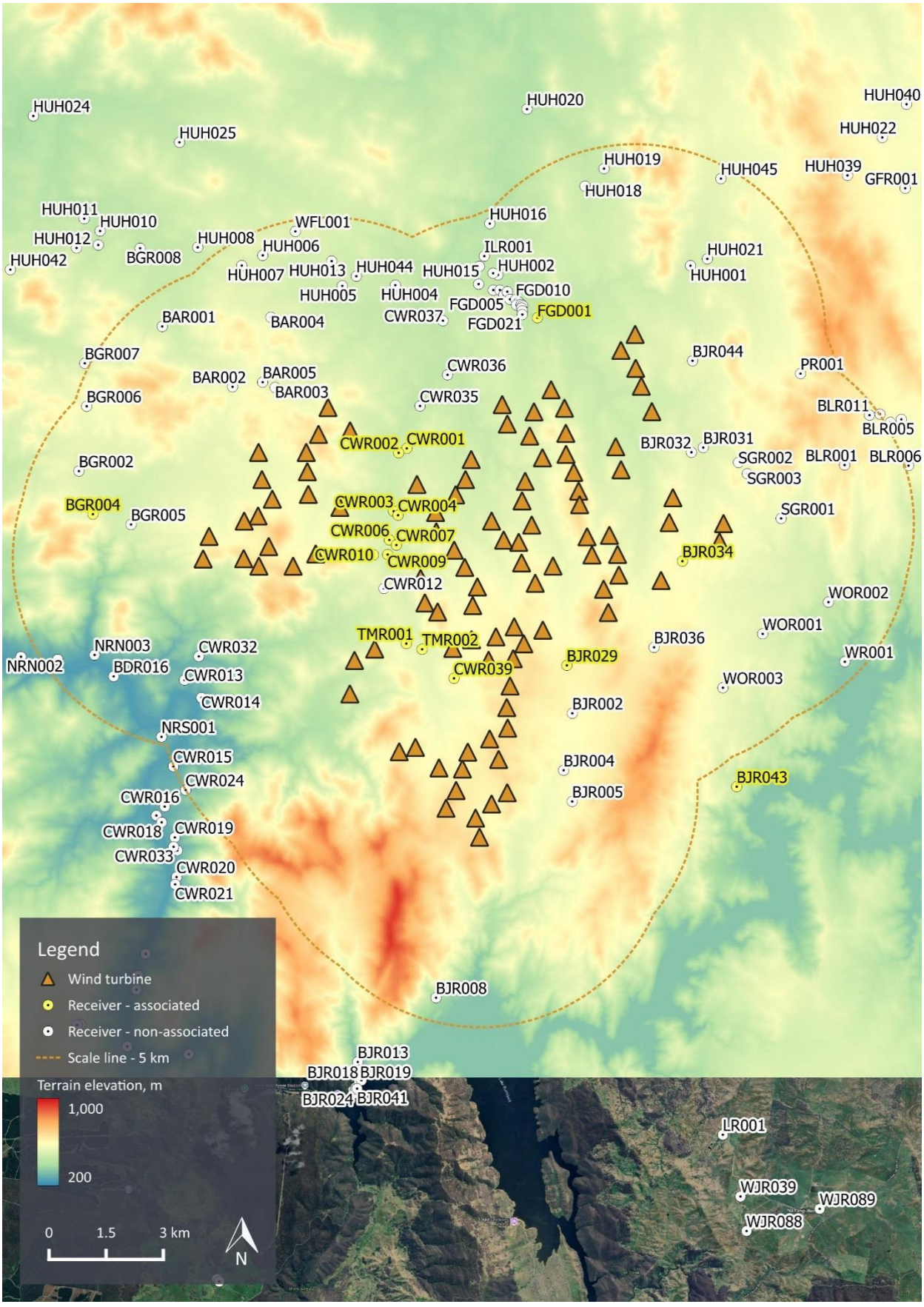
In addition to the choice of ground factor referred to above, adjustments to ISO 9613-2:1996 for screening and valleys effects are applied based on recommendations of the Joule Report, UK IOA 2009 joint agreement and the UK Institute of Acoustics guidance. The following adjustments are applied to the calculations:

- Screening effects as a result of terrain are limited to 2 dB;
- Screening effects are assessed based on each WTG being represented by a single noise source located at the maximum tip height of the WTG rotor; and
- An adjustment of 3 dB is added to the predicted noise contribution of a WTG if the terrain between the WTG and receiver in question is characterised by a significant valley. A significant valley is defined as a situation where the mean sound propagation height is at least 50 % greater than it would be otherwise over flat ground.

The adjustments detailed above are implemented in the WTG calculation procedure of the SoundPLANnoise 9.0 software used to conduct the noise modelling. The software uses these definitions in conjunction with the digital terrain model of the Project and surrounds to evaluate the path between each WTG and receiver pairing, and then subsequently applies the adjustments to each WTG's predicted noise contribution where appropriate.

APPENDIX F SITE TOPOGRAPHY

Figure 5: Terrain elevation map for the Project and surrounding area



APPENDIX G C-WEIGHTING ASSESSMENT

G1 Introduction

Presented below are details of the risk assessment carried out for the purpose of gauging whether penalties for low frequency, as detailed in the NSW Noise Assessment Bulletin, may be applicable.

G2 Assessment requirement

The following excerpt concerning C-weighted WTG noise has been reproduced from NSW Noise Assessment Bulletin.

> ***Low Frequency Noise***
>
> *The presence of excessive low frequency noise (a special noise characteristic) [ie noise from the wind farm that is repeatedly greater than 65 dBC during day time or 60 dBC during the night-time at any relevant receiver] will incur a 5 dB(A) penalty, to be added to the measured noise level for the wind farm, unless a detailed internal low frequency noise assessment demonstrates compliance with the proposed criteria for the assessment of low frequency noise disturbance (UK Department for Environment, Food and Rural Affairs (DEFRA, 2005) for a steady noise source.*

G3 Prediction method

As stated in Section 5.1.3, there are no commonly used, practical methods to accurately predict the WTG low frequency noise levels at receptor locations.

In this case, the C-weighted noise levels at receptor locations have been estimated using a simplified approach which constitutes the same noise modelling methods as described above for A-weighted levels, but with the following modifications:

- The range of band frequencies has been expanded to include lowest available band for each WTG model:
  - 16 Hz band for GE6.0-164
  - 31.5 Hz band for GWH175-7.8
  - 8 Hz band for V172-7.2
- The ground absorption parameter has been set to G = 0 (hard ground) to account for the increased influence of ground reflections at low frequencies.
- C-weighted noise levels have been predicted for the wind speed at which the worst-case sound power levels occur, as specified in Section 5.1.1:
  - 10 m/s for GE6.0-164
  - Maximum sound power level for GWH175-7.8
  - 13 m/s for V172-7.2

G4 Results

Table 9 presents the results of the preliminary C-weighted noise predictions for non-associated receivers within 5 km of a WTG. For conciseness, only receivers with a predicted C-weighted noise level above 58 dB $L_{Ceq, 10\ min}$ for any WTG model is presented. Predicted noise levels above the screening level of 60 dB $L_{Ceq, 10\ min}$ are highlighted in grey.

Table 9: Predicted C-weighted WTG noise levels, dB $L_{Ceq, 10\ min}$

Receiver ID	Candidate WTG model		
	GE6.0-164	GWH175-7.8	V172-7.2
CWR012	61.9	61.1	63.2
BJR002	59.7	58.7	60.9
BJR032	59.5	58.6	60.7
CWR035	59.1	58.1	60.3
BJR031	58.9	57.9	60.1
BJR004	58.9	57.9	60.1
CWR036	59.0	57.9	60.1
BJR044	58.7	57.6	59.9
BJR036	58.7	57.7	59.9
BJR005	57.9	56.8	59.1
BAR003	57.8	56.8	59.0
FGD021	57.4	56.2	58.5
SGR002	57.2	56.1	58.4
FGD019	57.2	56.0	58.4
BAR005	57.1	56.0	58.3
FGD017	57.1	55.8	58.2
SGR003	56.9	55.8	58.1
FGD014	57.0	55.7	58.1

APPENDIX H TABULATED PREDICTED NOISE LEVEL DATA

Table 10: Predicted noise levels for receivers within 5 km of a WTG – GE6.0-164, dB $L_{Aeq,\ 10\ min}$

Receiver	Hub-height wind speed, m/s								
	4	5	6	7	8	9	10	11	≥12
Non-associated receiver									
BAR001	12.6	14.5	18.0	21.3	23.5	25.5	25.8	25.8	25.8
BAR002	19.7	21.6	25.1	28.4	30.6	32.6	32.9	32.9	32.9
BAR003	22.4	24.3	27.8	31.1	33.3	35.3	35.6	35.6	35.6
BAR004	15.0	16.9	20.4	23.7	25.9	27.9	28.2	28.2	28.2
BAR005	20.9	22.8	26.3	29.6	31.8	33.8	34.1	34.1	34.1
BDR016	12.8	14.7	18.2	21.5	23.7	25.7	26.0	26.0	26.0
BGR002	14.4	16.3	19.8	23.1	25.3	27.3	27.6	27.6	27.6
BGR005	18.4	20.3	23.8	27.1	29.3	31.3	31.6	31.6	31.6
BGR006	13.3	15.2	18.7	22.0	24.2	26.2	26.5	26.5	26.5
BJR002	23.8	25.7	29.2	32.5	34.7	36.7	37.0	37.0	37.0
BJR004	23.2	25.1	28.6	31.9	34.1	36.1	36.4	36.4	36.4
BJR005	21.4	23.3	26.8	30.1	32.3	34.3	34.6	34.6	34.6
BJR008	10.3	12.2	15.7	19.0	21.2	23.2	23.5	23.5	23.5
BJR031	23.2	25.1	28.6	31.9	34.1	36.1	36.4	36.4	36.4
BJR032	24.5	26.4	29.9	33.2	35.4	37.4	37.7	37.7	37.7
BJR036	22.6	24.5	28.0	31.3	33.5	35.5	35.8	35.8	35.8
BJR044	23.2	25.1	28.6	31.9	34.1	36.1	36.4	36.4	36.4
BLR001	15.3	17.2	20.7	24.0	26.2	28.2	28.5	28.5	28.5
BLR011	10.7	12.6	16.1	19.4	21.6	23.6	23.9	23.9	23.9
CWR012	27.7	29.6	33.1	36.4	38.6	40.6	40.9	40.9	40.9
CWR013	16.3	18.2	21.7	25.0	27.2	29.2	29.5	29.5	29.5
CWR014	14.3	16.2	19.7	23.0	25.2	27.2	27.5	27.5	27.5
CWR032	17.1	19.0	22.5	25.8	28.0	30.0	30.3	30.3	30.3
CWR035	22.9	24.8	28.3	31.6	33.8	35.8	36.1	36.1	36.1
CWR036	22.4	24.3	27.8	31.1	33.3	35.3	35.6	35.6	35.6
CWR037	18.5	20.4	23.9	27.2	29.4	31.4	31.7	31.7	31.7
CWR038	16.4	18.3	21.8	25.1	27.3	29.3	29.6	29.6	29.6
FGD002	16.2	18.1	21.6	24.9	27.1	29.1	29.4	29.4	29.4
FGD003	17.2	19.1	22.6	25.9	28.1	30.1	30.4	30.4	30.4

Receiver	Hub-height wind speed, m/s								
	4	5	6	7	8	9	10	11	≥12
FGD005	17.3	19.2	22.7	26.0	28.2	30.2	30.5	30.5	30.5
FGD006	17.5	19.4	22.9	26.2	28.4	30.4	30.7	30.7	30.7
FGD008	18.5	20.4	23.9	27.2	29.4	31.4	31.7	31.7	31.7
FGD010	18.6	20.5	24.0	27.3	29.5	31.5	31.8	31.8	31.8
FGD011	19.0	20.9	24.4	27.7	29.9	31.9	32.2	32.2	32.2
FGD012	19.1	21.0	24.5	27.8	30.0	32.0	32.3	32.3	32.3
FGD013	19.3	21.2	24.7	28.0	30.2	32.2	32.5	32.5	32.5
FGD014	19.5	21.4	24.9	28.2	30.4	32.4	32.7	32.7	32.7
FGD017	19.7	21.6	25.1	28.4	30.6	32.6	32.9	32.9	32.9
FGD019	19.9	21.8	25.3	28.6	30.8	32.8	33.1	33.1	33.1
FGD021	20.3	22.2	25.7	29.0	31.2	33.2	33.5	33.5	33.5
HUH001	16.8	18.7	22.2	25.5	27.7	29.7	30.0	30.0	30.0
HUH002	16.3	18.2	21.7	25.0	27.2	29.2	29.5	29.5	29.5
HUH003	16.5	18.4	21.9	25.2	27.4	29.4	29.7	29.7	29.7
HUH004	16.2	18.1	21.6	24.9	27.1	29.1	29.4	29.4	29.4
HUH005	15.9	17.8	21.3	24.6	26.8	28.8	29.1	29.1	29.1
HUH006	13.5	15.4	18.9	22.2	24.4	26.4	26.7	26.7	26.7
HUH007	13.2	15.1	18.6	21.9	24.1	26.1	26.4	26.4	26.4
HUH013	15.3	17.2	20.7	24.0	26.2	28.2	28.5	28.5	28.5
HUH015	15.9	17.8	21.3	24.6	26.8	28.8	29.1	29.1	29.1
HUH016	14.3	16.2	19.7	23.0	25.2	27.2	27.5	27.5	27.5
HUH018	13.5	15.4	18.9	22.2	24.4	26.4	26.7	26.7	26.7
HUH019	12.9	14.8	18.3	21.6	23.8	25.8	26.1	26.1	26.1
HUH021	15.7	17.6	21.1	24.4	26.6	28.6	28.9	28.9	28.9
HUH044	15.6	17.5	21.0	24.3	26.5	28.5	28.8	28.8	28.8
HUH045	11.7	13.6	17.1	20.4	22.6	24.6	24.9	24.9	24.9
ILR001	15.9	17.8	21.3	24.6	26.8	28.8	29.1	29.1	29.1
NRN003	11.9	13.8	17.3	20.6	22.8	24.8	25.1	25.1	25.1
NRN005	10.9	12.8	16.3	19.6	21.8	23.8	24.1	24.1	24.1
NRS001	13.6	15.5	19.0	22.3	24.5	26.5	26.8	26.8	26.8
PR001	13.2	15.1	18.6	21.9	24.1	26.1	26.4	26.4	26.4
SGR001	20.2	22.1	25.6	28.9	31.1	33.1	33.4	33.4	33.4

Receiver	Hub-height wind speed, m/s								
	4	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**≥12**
SGR002	21.0	22.9	26.4	29.7	31.9	33.9	34.2	34.2	34.2
SGR003	21.0	22.9	26.4	29.7	31.9	33.9	34.2	34.2	34.2
WFL001	14.0	15.9	19.4	22.7	24.9	26.9	27.2	27.2	27.2
WOR001	16.6	18.5	22.0	25.3	27.5	29.5	29.8	29.8	29.8
WOR002	13.2	15.1	18.6	21.9	24.1	26.1	26.4	26.4	26.4
WOR003	15.2	17.1	20.6	23.9	26.1	28.1	28.4	28.4	28.4
WR001	10.7	12.6	16.1	19.4	21.6	23.6	23.9	23.9	23.9
Associated receiver									
BGR004	16.0	17.9	21.4	24.7	26.9	28.9	29.2	29.2	29.2
BJR029	26.8	28.7	32.2	35.5	37.7	39.7	40.0	40.0	40.0
BJR034	28.2	30.1	33.6	36.9	39.1	41.1	41.4	41.4	41.4
CWR001	26.2	28.1	31.6	34.9	37.1	39.1	39.4	39.4	39.4
CWR002	26.3	28.2	31.7	35.0	37.2	39.2	39.5	39.5	39.5
CWR003	27.8	29.7	33.2	36.5	38.7	40.7	41.0	41.0	41.0
CWR004	28.1	30.0	33.5	36.8	39.0	41.0	41.3	41.3	41.3
CWR006	26.8	28.7	32.2	35.5	37.7	39.7	40.0	40.0	40.0
CWR007	27.4	29.3	32.8	36.1	38.3	40.3	40.6	40.6	40.6
CWR009	26.8	28.7	32.2	35.5	37.7	39.7	40.0	40.0	40.0
CWR010	26.2	28.1	31.6	34.9	37.1	39.1	39.4	39.4	39.4
CWR039	29.2	31.1	34.6	37.9	40.1	42.1	42.4	42.4	42.4
FGD001	21.0	22.9	26.4	29.7	31.9	33.9	34.2	34.2	34.2
TMR001	28.6	30.5	34.0	37.3	39.5	41.5	41.8	41.8	41.8
TMR002	28.6	30.5	34.0	37.3	39.5	41.5	41.8	41.8	41.8

Table 11: Predicted noise levels for receivers within 5 km of a WTG – GWH175-7.8, dB $L_{Aeq, 10\ min}$

Receiver	Hub-height wind speed, m/s[1]								
	4	5	6	7	8	9	10	11	≥12
Non-associated receiver									
BAR001	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6
BAR002	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
BAR003	38.9	38.9	38.9	38.9	38.9	38.9	38.9	38.9	38.9
BAR004	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
BAR005	37.6	37.6	37.6	37.6	37.6	37.6	37.6	37.6	37.6
BDR016	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9
BGR002	31.4	31.4	31.4	31.4	31.4	31.4	31.4	31.4	31.4
BGR005	35.2	35.2	35.2	35.2	35.2	35.2	35.2	35.2	35.2
BGR006	30.3	30.3	30.3	30.3	30.3	30.3	30.3	30.3	30.3
BJR002	40.5	40.5	40.5	40.5	40.5	40.5	40.5	40.5	40.5
BJR004	39.8	39.8	39.8	39.8	39.8	39.8	39.8	39.8	39.8
BJR005	38.2	38.2	38.2	38.2	38.2	38.2	38.2	38.2	38.2
BJR008	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1
BJR031	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9
BJR032	41.0	41.0	41.0	41.0	41.0	41.0	41.0	41.0	41.0
BJR036	39.3	39.3	39.3	39.3	39.3	39.3	39.3	39.3	39.3
BJR044	39.8	39.8	39.8	39.8	39.8	39.8	39.8	39.8	39.8
BLR001	32.3	32.3	32.3	32.3	32.3	32.3	32.3	32.3	32.3
BLR011	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5
CWR012	44.1	44.1	44.1	44.1	44.1	44.1	44.1	44.1	44.1
CWR013	33.4	33.4	33.4	33.4	33.4	33.4	33.4	33.4	33.4
CWR014	31.4	31.4	31.4	31.4	31.4	31.4	31.4	31.4	31.4
CWR032	34.1	34.1	34.1	34.1	34.1	34.1	34.1	34.1	34.1
CWR035	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7
CWR036	39.3	39.3	39.3	39.3	39.3	39.3	39.3	39.3	39.3
CWR037	35.6	35.6	35.6	35.6	35.6	35.6	35.6	35.6	35.6
CWR038	33.6	33.6	33.6	33.6	33.6	33.6	33.6	33.6	33.6
FGD002	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3
FGD003	34.3	34.3	34.3	34.3	34.3	34.3	34.3	34.3	34.3
FGD005	34.4	34.4	34.4	34.4	34.4	34.4	34.4	34.4	34.4

Receiver	Hub-height wind speed, m/s[1]								
	4	5	6	7	8	9	10	11	≥12
FGD006	34.7	34.7	34.7	34.7	34.7	34.7	34.7	34.7	34.7
FGD008	35.5	35.5	35.5	35.5	35.5	35.5	35.5	35.5	35.5
FGD010	35.7	35.7	35.7	35.7	35.7	35.7	35.7	35.7	35.7
FGD011	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0
FGD012	36.1	36.1	36.1	36.1	36.1	36.1	36.1	36.1	36.1
FGD013	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3
FGD014	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
FGD017	36.6	36.6	36.6	36.6	36.6	36.6	36.6	36.6	36.6
FGD019	36.9	36.9	36.9	36.9	36.9	36.9	36.9	36.9	36.9
FGD021	37.2	37.2	37.2	37.2	37.2	37.2	37.2	37.2	37.2
HUH001	33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7
HUH002	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.5
HUH003	33.6	33.6	33.6	33.6	33.6	33.6	33.6	33.6	33.6
HUH004	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3
HUH005	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0
HUH006	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4
HUH007	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1
HUH013	32.3	32.3	32.3	32.3	32.3	32.3	32.3	32.3	32.3
HUH015	33.1	33.1	33.1	33.1	33.1	33.1	33.1	33.1	33.1
HUH016	31.4	31.4	31.4	31.4	31.4	31.4	31.4	31.4	31.4
HUH018	30.5	30.5	30.5	30.5	30.5	30.5	30.5	30.5	30.5
HUH019	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8
HUH021	32.6	32.6	32.6	32.6	32.6	32.6	32.6	32.6	32.6
HUH044	32.7	32.7	32.7	32.7	32.7	32.7	32.7	32.7	32.7
HUH045	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5
ILR001	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0
NRN003	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8
NRN005	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7
NRS001	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7
PR001	30.2	30.2	30.2	30.2	30.2	30.2	30.2	30.2	30.2
SGR001	36.8	36.8	36.8	36.8	36.8	36.8	36.8	36.8	36.8
SGR002	37.8	37.8	37.8	37.8	37.8	37.8	37.8	37.8	37.8

Receiver	Hub-height wind speed, m/s[1]								
	4	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**≥12**
SGR003	37.6	37.6	37.6	37.6	37.6	37.6	37.6	37.6	37.6
WFL001	30.8	30.8	30.8	30.8	30.8	30.8	30.8	30.8	30.8
WOR001	33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7
WOR002	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1
WOR003	32.4	32.4	32.4	32.4	32.4	32.4	32.4	32.4	32.4
WR001	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6
Associated receiver									
BGR004	32.9	32.9	32.9	32.9	32.9	32.9	32.9	32.9	32.9
BJR029	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2
BJR034	44.2	44.2	44.2	44.2	44.2	44.2	44.2	44.2	44.2
CWR001	42.6	42.6	42.6	42.6	42.6	42.6	42.6	42.6	42.6
CWR002	42.7	42.7	42.7	42.7	42.7	42.7	42.7	42.7	42.7
CWR003	44.1	44.1	44.1	44.1	44.1	44.1	44.1	44.1	44.1
CWR004	44.4	44.4	44.4	44.4	44.4	44.4	44.4	44.4	44.4
CWR006	43.3	43.3	43.3	43.3	43.3	43.3	43.3	43.3	43.3
CWR007	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8
CWR009	43.3	43.3	43.3	43.3	43.3	43.3	43.3	43.3	43.3
CWR010	42.8	42.8	42.8	42.8	42.8	42.8	42.8	42.8	42.8
CWR039	45.4	45.4	45.4	45.4	45.4	45.4	45.4	45.4	45.4
FGD001	37.9	37.9	37.9	37.9	37.9	37.9	37.9	37.9	37.9
TMR001	44.8	44.8	44.8	44.8	44.8	44.8	44.8	44.8	44.8
TMR002	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7

1 Only maximum sound power level data is provided in the manufacturer document. For completeness, the maximum sound power level is applied to all wind speeds.

Table 12: Predicted noise levels for receivers within 5 km of a WTG – V172-7.2, dB $L_{Aeq,\ 10\ min}$

Receiver	Hub-height wind speed, m/s								
	4	5	6	7	8	9	10	11	≥12
Non-associated receiver									
BAR001	16.4	17.0	20.4	24.0	27.4	28.7	28.7	28.7	28.7
BAR002	22.6	23.2	26.6	30.2	33.6	34.9	34.9	34.9	34.9
BAR003	24.9	25.5	28.9	32.5	35.9	37.2	37.2	37.2	37.2
BAR004	18.6	19.2	22.6	26.2	29.6	30.9	30.9	30.9	30.9
BAR005	23.7	24.3	27.7	31.3	34.7	36.0	36.0	36.0	36.0
BDR016	16.6	17.2	20.6	24.2	27.6	28.9	28.9	28.9	28.9
BGR002	18.1	18.7	22.1	25.7	29.1	30.4	30.4	30.4	30.4
BGR005	21.4	22.0	25.4	29.0	32.4	33.7	33.7	33.7	33.7
BGR006	17.0	17.6	21.0	24.6	28.0	29.3	29.3	29.3	29.3
BJR002	26.5	27.1	30.5	34.1	37.5	38.8	38.8	38.8	38.8
BJR004	25.8	26.4	29.8	33.4	36.8	38.1	38.1	38.1	38.1
BJR005	24.3	24.9	28.3	31.9	35.3	36.6	36.6	36.6	36.6
BJR008	14.1	14.7	18.1	21.7	25.1	26.4	26.4	26.4	26.4
BJR031	25.9	26.5	29.9	33.5	36.9	38.2	38.2	38.2	38.2
BJR032	26.9	27.5	30.9	34.5	37.9	39.2	39.2	39.2	39.2
BJR036	25.4	26.0	29.4	33.0	36.4	37.7	37.7	37.7	37.7
BJR044	25.8	26.4	29.8	33.4	36.8	38.1	38.1	38.1	38.1
BLR001	19.0	19.6	23.0	26.6	30.0	31.3	31.3	31.3	31.3
BLR011	14.5	15.1	18.5	22.1	25.5	26.8	26.8	26.8	26.8
CWR012	29.9	30.5	33.9	37.5	40.9	42.2	42.2	42.2	42.2
CWR013	19.8	20.4	23.8	27.4	30.8	32.1	32.1	32.1	32.1
CWR014	17.9	18.5	21.9	25.5	28.9	30.2	30.2	30.2	30.2
CWR032	20.3	20.9	24.3	27.9	31.3	32.6	32.6	32.6	32.6
CWR035	25.8	26.4	29.8	33.4	36.8	38.1	38.1	38.1	38.1
CWR036	25.4	26.0	29.4	33.0	36.4	37.7	37.7	37.7	37.7
CWR037	22.0	22.6	26.0	29.6	33.0	34.3	34.3	34.3	34.3
CWR038	20.0	20.6	24.0	27.6	31.0	32.3	32.3	32.3	32.3
FGD002	19.8	20.4	23.8	27.4	30.8	32.1	32.1	32.1	32.1
FGD003	20.7	21.3	24.7	28.3	31.7	33.0	33.0	33.0	33.0
FGD005	20.7	21.3	24.7	28.3	31.7	33.0	33.0	33.0	33.0

Receiver	Hub-height wind speed, m/s								
	4	5	6	7	8	9	10	11	≥12
FGD006	20.9	21.5	24.9	28.5	31.9	33.2	33.2	33.2	33.2
FGD008	21.8	22.4	25.8	29.4	32.8	34.1	34.1	34.1	34.1
FGD010	21.9	22.5	25.9	29.5	32.9	34.2	34.2	34.2	34.2
FGD011	22.3	22.9	26.3	29.9	33.3	34.6	34.6	34.6	34.6
FGD012	22.3	22.9	26.3	29.9	33.3	34.6	34.6	34.6	34.6
FGD013	22.5	23.1	26.5	30.1	33.5	34.8	34.8	34.8	34.8
FGD014	22.7	23.3	26.7	30.3	33.7	35.0	35.0	35.0	35.0
FGD017	22.8	23.4	26.8	30.4	33.8	35.1	35.1	35.1	35.1
FGD019	23.1	23.7	27.1	30.7	34.1	35.4	35.4	35.4	35.4
FGD021	23.3	23.9	27.3	30.9	34.3	35.6	35.6	35.6	35.6
HUH001	20.1	20.7	24.1	27.7	31.1	32.4	32.4	32.4	32.4
HUH002	19.9	20.5	23.9	27.5	30.9	32.2	32.2	32.2	32.2
HUH003	20.1	20.7	24.1	27.7	31.1	32.4	32.4	32.4	32.4
HUH004	19.9	20.5	23.9	27.5	30.9	32.2	32.2	32.2	32.2
HUH005	19.7	20.3	23.7	27.3	30.7	32.0	32.0	32.0	32.0
HUH006	17.4	18.0	21.4	25.0	28.4	29.7	29.7	29.7	29.7
HUH007	17.1	17.7	21.1	24.7	28.1	29.4	29.4	29.4	29.4
HUH013	19.1	19.7	23.1	26.7	30.1	31.4	31.4	31.4	31.4
HUH015	19.6	20.2	23.6	27.2	30.6	31.9	31.9	31.9	31.9
HUH016	18.2	18.8	22.2	25.8	29.2	30.5	30.5	30.5	30.5
HUH018	17.3	17.9	21.3	24.9	28.3	29.6	29.6	29.6	29.6
HUH019	16.8	17.4	20.8	24.4	27.8	29.1	29.1	29.1	29.1
HUH021	19.2	19.8	23.2	26.8	30.2	31.5	31.5	31.5	31.5
HUH044	19.4	20.0	23.4	27.0	30.4	31.7	31.7	31.7	31.7
HUH045	15.6	16.2	19.6	23.2	26.6	27.9	27.9	27.9	27.9
ILR001	19.6	20.2	23.6	27.2	30.6	31.9	31.9	31.9	31.9
NRN003	15.7	16.3	19.7	23.3	26.7	28.0	28.0	28.0	28.0
NRN005	14.8	15.4	18.8	22.4	25.8	27.1	27.1	27.1	27.1
NRS001	17.4	18.0	21.4	25.0	28.4	29.7	29.7	29.7	29.7
PR001	16.9	17.5	20.9	24.5	27.9	29.2	29.2	29.2	29.2
SGR001	22.9	23.5	26.9	30.5	33.9	35.2	35.2	35.2	35.2
SGR002	23.9	24.5	27.9	31.5	34.9	36.2	36.2	36.2	36.2

Receiver	Hub-height wind speed, m/s								
	4	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**≥12**
SGR003	23.7	24.3	27.7	31.3	34.7	36.0	36.0	36.0	36.0
WFL001	17.9	18.5	21.9	25.5	28.9	30.2	30.2	30.2	30.2
WOR001	20.0	20.6	24.0	27.6	31.0	32.3	32.3	32.3	32.3
WOR002	16.8	17.4	20.8	24.4	27.8	29.1	29.1	29.1	29.1
WOR003	18.9	19.5	22.9	26.5	29.9	31.2	31.2	31.2	31.2
WR001	14.6	15.2	18.6	22.2	25.6	26.9	26.9	26.9	26.9
Associated receiver									
BGR004	19.4	20.0	23.4	27.0	30.4	31.7	31.7	31.7	31.7
BJR029	29.1	29.7	33.1	36.7	40.1	41.4	41.4	41.4	41.4
BJR034	30.1	30.7	34.1	37.7	41.1	42.4	42.4	42.4	42.4
CWR001	28.5	29.1	32.5	36.1	39.5	40.8	40.8	40.8	40.8
CWR002	28.6	29.2	32.6	36.2	39.6	40.9	40.9	40.9	40.9
CWR003	29.9	30.5	33.9	37.5	40.9	42.2	42.2	42.2	42.2
CWR004	30.2	30.8	34.2	37.8	41.2	42.5	42.5	42.5	42.5
CWR006	29.2	29.8	33.2	36.8	40.2	41.5	41.5	41.5	41.5
CWR007	29.6	30.2	33.6	37.2	40.6	41.9	41.9	41.9	41.9
CWR009	29.2	29.8	33.2	36.8	40.2	41.5	41.5	41.5	41.5
CWR010	28.7	29.3	32.7	36.3	39.7	41.0	41.0	41.0	41.0
CWR039	31.2	31.8	35.2	38.8	42.2	43.5	43.5	43.5	43.5
FGD001	24.0	24.6	28.0	31.6	35.0	36.3	36.3	36.3	36.3
TMR001	30.6	31.2	34.6	38.2	41.6	42.9	42.9	42.9	42.9
TMR002	30.6	31.2	34.6	38.2	41.6	42.9	42.9	42.9	42.9

Appendix C Plant Community Types within the Development Corridor

Table 7-1: PCTs identified within the Development Corridor

PCT	PCT Name	Condition Classes	Area within Development Corridor (ha)	Corresponding TEC	BC Act Status	EPBC Act Status	Vegetation Description	Photos
3376	Southern Tableland Grassy Box Woodland	• Moderate • Low • DNG	173.48	BC Act: *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions.* EPBC Act: *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.*	Critically Endangered (Part)	*Potential - Critically Endangered (part)	A tall sclerophyll woodland found on the lower slopes, and broad valleys within the development corridor. PCT 3376 was generally recorded in more gentle and less rocky terrain, where soils are deeper. This PCT was recorded comprising as three condition zones within the development corridor. The few remaining areas of this PCT are usually quite disturbed from previous land clearing and ongoing grazing pressure, and, in some places pasture improvements. Areas of 3376 Moderate and Low are dominated by *Eucalyptus melliodora* and / or *E. blakelyi* and occasionally *E. bridgesiana* and *E. albens*. 3376 in moderate conditions contains a moderately dense ground cover layer (40-80%) dominated by native grasses *Microlaena stipoides*, *Bothriochloa macra*, *Rytidosperma* spp. and common forbs *Geranium solanderi*. Common native sedges, *Carex appressa* and *Juncus usitatus*, were common in wetter parts of the landscape. Exotic ground layer species are present in all patches, at varying covers depending on level of grazing pressure and usually included *Arctotheca calendula, Cirsium vulgare, Xanthium spinosum (Bathurst Burr), Hypochaeris radicata, Trifolium spp., Urtica urens.* High threat weeds, such as *Rubus fruticosa agg.* are present within these areas.	
3540	Southwest Foothills Stringybark-Box Grassy Forest	• High • Moderate • Low • DNG	368.6	NA	-	-	A tall grassy sclerophyll open forest found on the lower and mid-slopes and ridges in the steep, hilly parts of the landscape. 3540 is one of the most widespread communities within the development corridor. This PCT was recorded in four condition zones within the development corridor, with DNG being the most common. Areas of 3540 High, Moderate and Low are dominated by *Eucalyptus macrorhyncha*, E. polyanthemos and frequently contains *E. blakelyi* and *E. melliodora*. In some patches PCT 3540 was strongly dominated by *E. albens.* The mid-storey cover ranged from 30 – 50% in regenerating patches, where it was dominated by juvenile Eucalyptus spp., to 1 – 5% where it is composed of *Acacia implexa* and *Hibbertia obtusifolia*. A moderate cover (30 – 60%) of grasses dominated the ground layer, including *Microlaena stipoides*, *Rytidosperma racemosa, Aristida ramosa,* and *Bothriochloa macra*. Native rushes and forbs are also common in the ground layer including:	

PCT	PCT Name	Condition Classes	Area within Development Corridor (ha)	Corresponding TEC	BC Act Status	EPBC Act Status	Vegetation Description	Photos
							Lomandra filiformis subsp. *filiformis, Gonocarpus tetragynus*, *Hydrocotyle laxiflora*, *Asperula conferta*, *Geranium solanderi* and *Hypericum gramineum*. Exotic species such as Trifolium spp., *Arctotheca calendula, Hypochaeris radicata, Rumex acetosella* and *Verbascum Thapsus* were common in the ground layer in areas with an open canopy and high grazing pressure.	
3541	Southwest Ranges Stringybark Exposed Forest	• High • Moderate • Low • DNG	429.72	NA	-	-	A tall shrub/grass sclerophyll open forest found in the more steep, rocky locations, higher up on ridgelines and hills within the development corridor. 3544 is one of the most widespread communities within the development corridor along with 3540. This PCT was recorded in four condition zones within the development corridor. Areas of 3540 High, Moderate and Low are dominated by *Eucalyptus macrorhyncha* and *E. polyanthemos* as well as *E. goniocalyx.* The mid-storey was variable across the development corridor. Rocky sites were sparse and contained *Acacia implexa, Cassinia* spp., *Hibbertia obtusifolia* and *Melichrus urceolatus*. 3540 High contained a high diversity of shrubs, with a cover between 5 – 40%, and included: A. gunnii, A. obliquinervia, Dillwynia sericea, Pultenaea foliolosa, Platylobium montanum and Brachyloma daphnoides. The ground layer cover was variable depending on degree of rockiness. It was usually dominated by tussocky grasses such as *Poa sieberiana* and *Rytidosperma pallidum,* along with other hardy rushes and forbs, in particular *Gonocarpus tetragynus, Lomandra multiflora, Lomandra filiformis subsp. coriacea* and *Lepidosperma laterale*. PCT 3541 had similar patterns and composition of exotic species as found in PCT 3540.	

PCT	PCT Name	Condition Classes	Area within Development Corridor (ha)	Corresponding TEC	BC Act Status	EPBC Act Status	Vegetation Description	Photos
3730	Bondo Slopes Dry Stringybark Forest	• High • Moderate • Low • DNG	238.09	NA	-	-	A tall dry sclerophyll open forest found within the southern portion of the development corridor, with some patches being continuous with the large tracts of native vegetation in the Burrinjuck Nature Reserve. This PCT occurs in four condition zones within the development corridor. Areas of 3540 High, Moderate and Low are dominated by various combinations of *Eucalyptus macrorhyncha*, E. dives and *E. mannifera*. Some patches also contained occasional *E. polyanthemos* and *E. goniocalyx.* The mid-storey ranged from low to tall and composed of *Acacia dealbata, A. melanoxylon,* Allocasuarina *verticillate*, *Acacia implexa, A. mearnsii, Cassinia* spp., *Hibbertia obtusifolia*, and *Indigofera australis*. Regrowth patches were either dominated by juvenile *Eucalyptus* spp., or *Kunzea ericoides*, *Melichrus urceolatus* and *Calytrix tetragona*. The ground layer ranged from very sparse (5% cover) in rocky and dense regrowth areas, to moderately dense (60 %). It composed of a mix of native graminoids and ferns such as *Poa sieberiana, Lomandra filiformis subsp. coriacea, Microlaena stipoides*, and *Rytidosperma racemosa.* The forb, *Gonocarpus tetragynus* was always present, along with occasional *Dichondra repens* and *Hydrocotyle laxiflora.* Exotic species were present, but at very low covers in 3730 High and Moderate and included *Cynosurus echinatus, Hypericum perforatum, Holcus lanatus* and *Briza maxima.* Small, but dense patches of *Rubus fruticosa agg*. were often present in 3730 Low, along with a much higher cover of exotic ground layer species.	
4088	Southwest Riverflat Red Gum Forest	• Moderate	9.84	NA	-	-	A mid-high to tall open riverine forest found along the larger creek lines within the development corridor. The patches of this PCT were usually very narrow, averaging 50 m wide across the central line of the creeks. This PCT occurs in one condition zone being PCT 4088 Moderate. The canopy was almost entirely composed of large, mature Eucalyptus camaldulensis, with E. bridgesiana occurring more rarely. In some patches the exotic tree *Salix* sp.was also present in the canopy. The mid-layer and ground layer were often significantly disturbed and contained many exotic species. The mid-layer was dominated by the invasive exotic weed *Rubus fruticosa agg.* and occasional *Rosa rubiginosa*, with scattered native shrubs and small trees also present including *Acacia mearnsii.* The ground layer cover ranged between 20 – 80%. It was often dominated by native species, but also contained a high cover and diversity of exotic species, such as *Cirsium vulgare, Paspalum dilatatum*, Conyza sp and *Rumex conglomeratus.* The occurrence and cover of	

PCT	PCT Name	Condition Classes	Area within Development Corridor (ha)	Corresponding TEC	BC Act Status	EPBC Act Status	Vegetation Description	Photos
							native species varied with distance from the water's edge, with native grasses and forbs such as *Microlaena stipoides, Aristata ramosa* and *Geranium solanderi* more common at the top of the bank, and sedges and rushes such as *Carex appressa, Juncus australis, Phragmites australis* and *Typha* spp. more common at the bottom.	
NA	Exotic Pasture	NA	453.72	NA	-	-	Exotic areas lack canopy and midstorey species and have groundcover layer composed of >50% exotic species. Very few native species were recorded in these areas.	

*It is noted that of the three (3) identified Threatened Ecological Communities (TECs) within the study area, only one (1), being White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland, is listed as a threatened entity that may be at risk of a Serious and Irreversible Impact (SAII) under the BC Act. The TEC is noted as at risk of SAII based on the criteria of Principle 1 and Principle 2 under clause 6.7 of the Biodiversity Conservation Regulation 2017. An assessment of the potential of the TEC being considered an SAII will be undertaken within the BDAR during the EIS phase.

Further investigation warranted into whether this PCT conforms to the final determination for the EPBC Act listed White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland

Appendix D Schedule of Lands

Item	Details
Lot Details	Located on 238 Freehold lots and 1 local government authority lot including: 142/753595, F/29254, E/29254, A/29254, 17/245507, 10/1158148, 79/753595, 2/131958, 78/753595, 1/131958, 305/753595, 80/753595, 101/753595, 274/753595, 304/753595, 74/753595, 188/753595, 3/131958, 303/753595, 22/753633, 26/753633, 49/753633, 10/753633, 25/753633, 21/753633, 32/753633, 24/753633, 77/753595, 27/753633, 125/753633, 113/753633, 96/753633, 18/753633, 39/753633, 40/753633, 23/753633, 95/753633, 19/753633, 28/753633, 90/753595, 122/753633, 33/753633, 201/1246201, 200/1246201, 2/753598, 98/753629, 72/753629, 87/753629, 95/753629, 107/753629, 105/753629, 38/753629, 99/753629, 9/753629, 50/753629, 111/753629, 1/1057465, 97/753629, 96/753629, 80/753629, 117/753629, 22/618109, 2/1287095, 13/753629, 38/753598, 39/753598, 23/753598, 20/753598, 22/753598, 10/753598, 41/753598, 26/753598, 8/753598, 9/753598, 21/753598, 47/753598, 70/753629, 119/753598, 1/1097064, 3/748456, 2/748456, 50/753598, 53/753598, 342/753595, 162/753595, 73/753629, 317/753595, 83/753595, 218/753595, 236/753595, 64/753629, 40/753598, 35/753595, 174/753595, 60/753598, 19/753595, 25/753598, 194/753595, 24/753629, 160/753595, 221/753595, 48/753595, 19/753629, 316/753595, 100/753629, 217/753595, 84/753595, 36/753598, 11/753595, 82/753595, 187/753595, 166/753595, 22/753629, 348/753595, 301/753595, 315/753595, 85/753595, 343/753595, 56/753629, 195/753595, 89/753595, 193/753595, 49/753629, 2/136657, 1/132002, 120/753629, 310/753595, 21/753629, 78/753629, 2/132002, 2/871925, 81/753629, 32/753629, 85/753629, 163/753595, 196/753595, 161/753595, 36/753629, 210/753629, 23/753629, 1/587516, 62/753629, 26/753629, 55/753629, 208/753629, 76/753629, 65/753629, 102/753629, 58/753629, 34/753629, 1/177900, 213/753629, 48/753629, 30/753629, 39/753629, 33/753629, 31/753629, 2/587516, 79/753629, B/417412, 224/720163, 1/517999, 25/753629, 47/753629, 83/753629, 63/753629, 8/753629, 54/753629, 86/753629, 46/753629, 209/753629, 82/753629, 40/753629, 51/753629, 103/753629, 35/753629, 5/753629, 214/753629, 2/228185, 123/753629, 1/753629, 1/228185, 309/753595, 53/753629, 3/228185, A/417412, C/29254, 68/753629, G/29254, 1/136657, 66/753629, 52/753633, 15/245507, 37/753598, 2/176301, 3/753629, 32/753598, 101/753629, 37/753629, 57/753629, 4/753629, 20/753629, 31/753633, 212/753629, 4/228185, 207/753595, 18/753629, 30/753633, 20/1099531, 2/1097064, 14/1115727, 17/1115727, 15/1115727, 16/1115727, 4/1158148, 3/1158148, 5/1158148, 6/1158148, 8/1158148, 7/1158148, 9/1158148, 2/1158148, 1/1158148, 118/753629, 311/753595, 61/1041962, 101/876302, 16/245507, 14/245507, 3/1128483, 298/753595, 38/753595, 2/438268, 138/753595, 1/438268, 46/753595, 3/438268, 131/753595, 1/1095470

ecological AUSTRALIA
A TETRA TECH COMPANY

1300 646 131
www.ecoaus.com.au