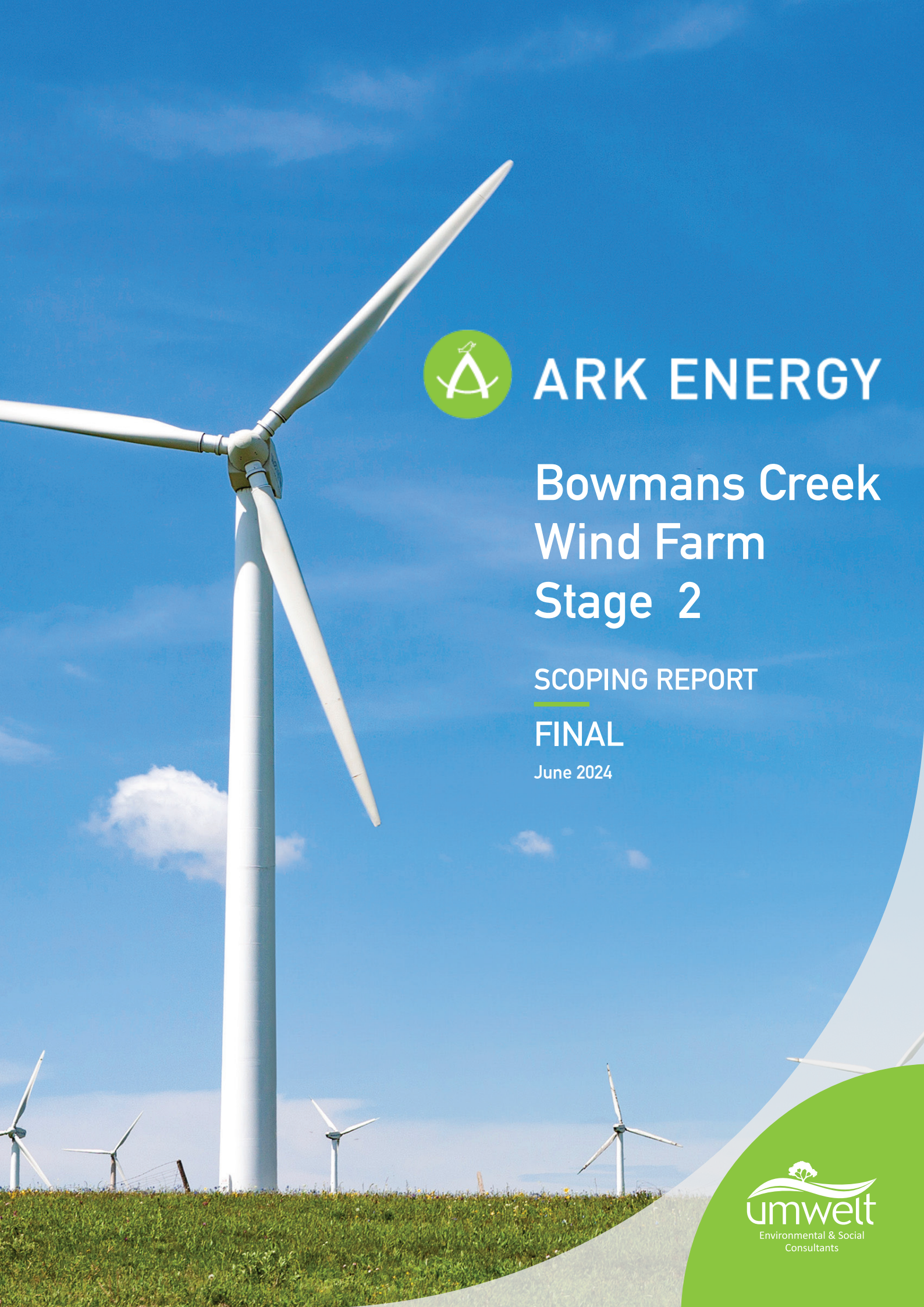


ARK ENERGY

Bowmans Creek Wind Farm Stage 2

SCOPING REPORT

FINAL

June 2024

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Environmental & Social Consultants

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BOWMANS CREEK WIND FARM STAGE 2

Scoping Report

FINAL

July 2024

ARK ENERGY

BOWMANS CREEK WIND FARM STAGE 2

Scoping Report

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Bowmans Creek Wind Farm Pty Ltd

Project Director: Nathan Baker
Project Manager: Thomas Buchan
Report No. 23307/R08
Date: July 2024

umwelt
Environmental & Social Consultants

This report was prepared using Umwelt's ISO 9001 certified Quality Management System.

Acknowledgement of Country

Umwelt would like to acknowledge the traditional custodians of the country on which we work and pay respect to their cultural heritage, beliefs, and continuing relationship with the land. We pay our respect to the Elders – past, present, and future.

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V04 Final	Nathan Baker	5 July 2024	Nathan Baker	5 July 2024

Abbreviations

Abbreviation	Description
ABS	Australian Bureau of Statistics
ACHA	Aboriginal Cultural Heritage Assessment Report
AEMO	Australian Energy Market Operator
AIA	Aviation Impact Assessment
BAM	Biodiversity Assessment Method
BC Act	Biodiversity Conservation Act 2016 (NSW)
BCA	Biodiversity Constraints Assessment
BCS	Biodiversity, Conservation and Science
BDAR	Biodiversity Development Assessment Report
BOM	Bureau of Meteorology
BSAL	Biophysical Strategic Agricultural Land
CASA	Civil Aviation Safety Authority
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environmental Management Plan
CLM Act	Contaminated Land Management Act 1997 (NSW)
Crown Land Act	Crown Land Management Act 2016 (NSW)
CSEP	Community and Stakeholder Engagement Plan
dB(A)	A-weighted noise or sound power level in decibels
DC	Direct Current
Cth DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DPE	NSW Department of Planning and Environment [former]
DPHI	NSW Department of Planning, Housing and Infrastructure [current]
EEAP	NSW Energy Efficiency Action Plan
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EL	Exploration Licence
EMF	Electromagnetic Field
EMI	Electromagnetic Interference
EnergyCo NSW	Energy Corporation of NSW
EP&A Act	Environmental Planning and Assessment Act 1979 (NSW)
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)
EPL	Environment Protection Licence
GHG	Greenhouse Gas
GIS	Geographic Information System
GW	Gigawatts
Ha	Hectares
HCC REZ	Hunter Central Coast Renewable Energy Zone

Abbreviation	Description
HHA	Historic Heritage Assessment
IAIA	International Association for Impact Assessment
kV	Kilovolt
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
LGA	Local Government Area
LVIA	Landscape and Visual Impact Assessment
MNES	Matter of National Environmental Significance
MP	Member of Parliament
MW	Megawatt
MWh	Megawatt Hour
MWTT	Multiple Wind Turbine Tool
NDC	Nationally Determined Contributions
NEM	National Electricity Market
NPfI	Noise Policy for Industry 2017
NSW	New South Wales
NSW EPA	NSW Environment Protection Authority
NSW REAP	NSW Renewable Energy Action Plan
NVIA	Noise and Vibration Impact Assessment
OSOM	Over-size, over-mass vehicle
PA	Planning agreement
PCT	Plant Community Type
PMST	Protected Matters Search Tool
POEO Act	Protection of the Environment Operations Act 1997 (NSW)
PVIA	Preliminary Visual Impact Assessment
RAAF	Royal Australian Air Force
REZ	Renewable Energy Zone
RFS	NSW Rural Fire Service
Roads Act	Roads Act 1993 (NSW)
SAT	Spot Assessment Technique
SEARs	Secretary's Environmental Assessment Requirements
SIA	Social Impact Assessment
SISR	Social Impact Scoping Report
SSD	State Significant Development
TBDC	Threatened Biodiversity Data Collection
TEC	Threatened Ecological Community
TfNSW	Transport for NSW
TTIA	Traffic and Transport Impact Assessment
Umwelt	Umwelt (Australia) Pty Ltd
WM Act	Water Management Act 2000 (NSW)

Abbreviation	Description
WRIA	Water Resources Impact Assessment
WSP	Water Sharing Plan
WTG	Wind Turbine Generator
ZVI	Zone of Visual Influence

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Appendix D	Preliminary Visual Impact Assessment
Appendix E	Preliminary Noise Assessment
Appendix F	Biodiversity Constraints Assessment
Appendix G	Cultural Heritage Scoping Report

1.0 Introduction

1.1 Project Overview

The Bowmans Creek Wind Farm Stage 2 project (i.e., the Project) is proposed by Bowmans Creek Wind Farm Pty Ltd, a wholly owned by Ark Energy Pty Ltd (the Proponent), and comprises the construction, operation and decommissioning of additional large-scale wind farm infrastructure in the Muswellbrook Shire Council and Singleton Council Local Government Area (LGAs) in the Upper Hunter region of New South Wales (NSW), Australia.

The additional wind farm infrastructure associated with the Project is proposed to increase capacity of the 'Bowmans Creek Wind Farm' (SSD-10315) project (i.e., Stage 1, or the Stage 1 project), which was approved by the NSW Independent Planning Commission (IPC) on 6 February 2024. Because of the scale of additional infrastructure, and other requirements under the NSW planning system, the Project is proposed as a separate State Significant Development (SSD) to that already approved under Stage 1.

Staging of the Bowmans Creek Wind Farm was not proposed within the SSD-10315 approvals documentation, however for simplicity and to assist differentiate between the two (2) projects, all wind turbines generators (WTGs) and ancillary infrastructure associated with SSD-10315 are referred as "Bowmans Creek Wind Farm Stage 1", or simply "the Stage 1 project" throughout.

1.2 Project Objectives

The objectives of the Project are to:

- Establish a reliable and affordable source of energy for the people of NSW and contribute to reducing GHG emissions associated with energy generation.
- Positively contribute to State and Commonwealth renewable energy goals.
- Align with the NSW Government's emissions reduction targets and Electricity Strategy.
- Create employment opportunities during Project construction, operations and decommissioning in addition to community benefit sharing, assist to diversify the local economy; create training and employment opportunities for the local community; create business opportunities for local suppliers; and provide a significant investment in local infrastructure.
- Maintain partnerships with stakeholders and the community to minimise environmental, social and economic impacts (including potential cumulative impacts) and maximise benefits.
- Ensure that the highest safety and environmental standards are met during construction, operation and decommissioning of the Project.

1.3 Project Background

The NSW Government's Electricity Strategy and Electricity Infrastructure Roadmap (NSW Government, 2020a) set out a plan to deliver the state's first five (5) Renewable Energy Zones (REZs) in the Central-West Orana, New England, South-West, Hunter-Central Coast (HCC) and Illawarra regions. These REZs will play a vital role in delivering affordable, reliable energy generation to help replace the State's existing power stations as they come to their scheduled end of operational life. This builds on the NSW Transmission Infrastructure Strategy and supports the implementation of the Australian Energy Market Operator's (AEMO's) Integrated System Plan.

The Hunter-Central Coast Renewable Energy Zone (Hunter-Central Coast REZ) was chosen due to excellent renewable energy resources, availability of existing power stations, rehabilitated mining land, electricity network infrastructure, port and transport infrastructure and a skilled workforce. The Hunter-Central Coast REZ was formally declared in December 2022, which is the first step in formalising the REZ under the *Electricity Infrastructure Investment Act 2020*. The Energy Corporation of NSW (EnergyCo NSW) is responsible for planning and is continuing to refine the geographical extent of REZ, however based on current mapping, the proposed Project is located within the boundaries of the Hunter-Central Coast REZ.

A target of up to one (1) GW of renewable energy generation has been assigned to the Hunter-Central Coast REZ (NSW Government, 2020b). At the time this Scoping Report was prepared (June 2024), 87 registrations were received, totalling over 40 GW from potential energy generation and storage projects. The Project, if approved, will support the generation of renewable energy within a REZ.

The Project is within the Hunter-Central Coast REZ and therefore strategically located in an area identified as suitable for renewable energy projects and will assist the NSW Government in delivering on its broader objectives for the Hunter-Central Coast REZ. Although located within the Hunter-Central Coast REZ boundary, the Project currently does not rely on REZ-related infrastructure to support grid connection.

Further information relating to the Project's justification is provided within **Section 2.1**.

The Project's regional and local context is presented in **Figure 1.1** and **Figure 1.2** below.

1.4 Related Development

Related development, as outlined in the NSW Government State Significant Development Guidelines (DPIE, 2021), refers to any existing or approved development that would be incorporated into, or operated in conjunction with the Project. Related development can also include development by a Proponent that is required for a Project; but is subject to a separate development approval process.

The Stage 2 Project is a proposed extension to the Stage 1 project, which was approved by the NSW Independent Planning Commission (IPC) in February 2024. The Stage 1 project is directly related to the Stage 2 Project and will be considered throughout the assessment process (i.e., with respect to cumulative impacts, etc.). Although related to the Stage 1 project, the Stage 2 Project would be assessed as a separate SSD project on its own merits.

A summary of the Stage 1 project and how it relates to the Stage 2 Project (i.e. this Project) is provided in **Section 1.4.1** below.

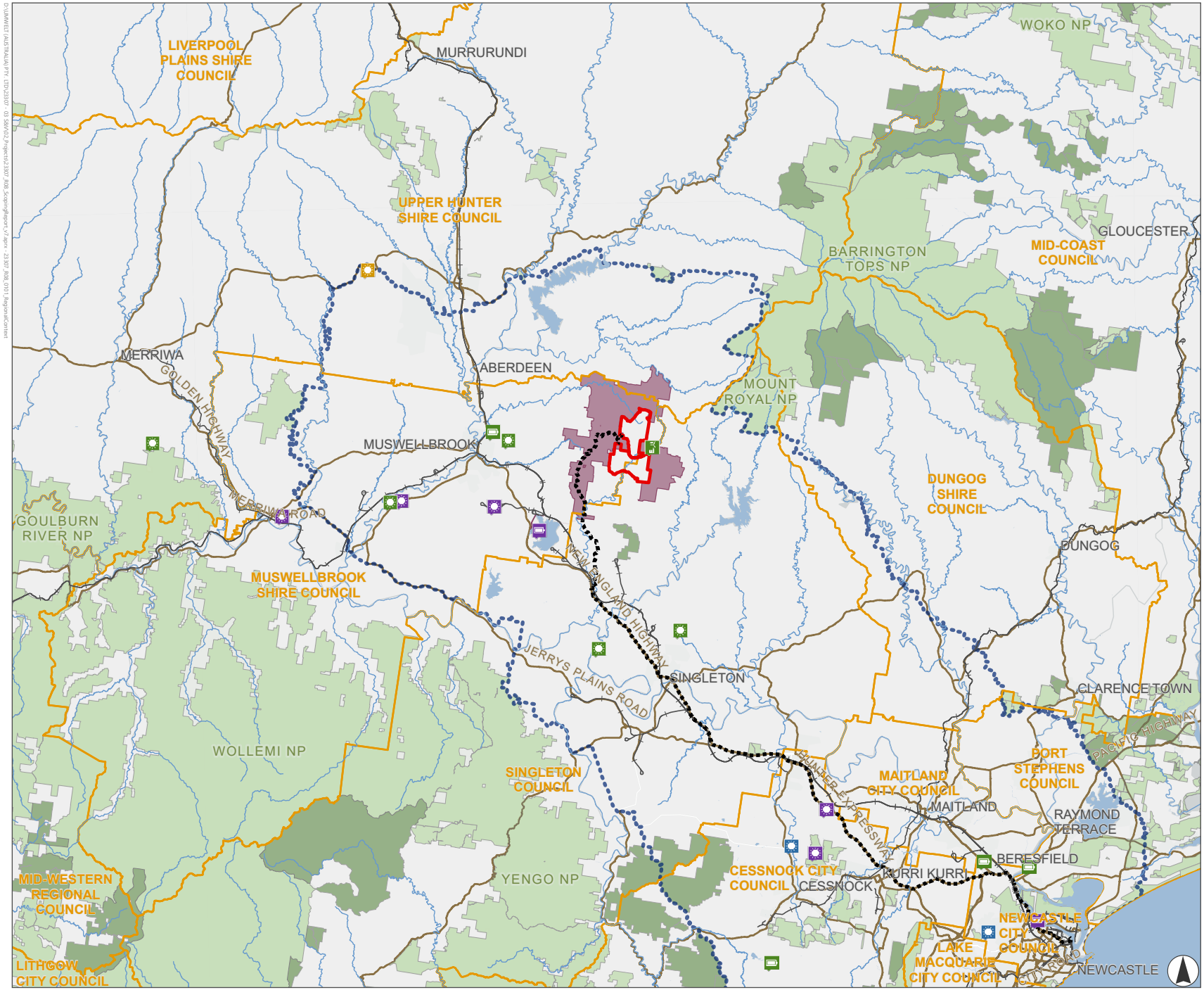
1.4.1 Bowmans Creek Wind Farm - Stage 1

Bowmans Creek Wind Farm Stage 1 (SSD-10315) involves the construction, operation, maintenance and decommissioning of the following key project components. The general layout of Stage 1 in the context of Stage 2 is presented in **Figure 1.2.**

- Up to 54 WTGs with a maximum tip height of 220 m, consisting of:
    - A three (3) blade rotor and nacelle mounted onto a tubular tower.
    - Crane hardstand area.
    - Laydown areas.
- Electrical infrastructure, including:
    - Up to two (2) collector substations and associated transmission line(s) to transmit the generated electricity into the existing high voltage network.
    - Connections between the WTGs and the collector substation/s, which will include a combination of underground cables and overhead powerlines.
- Operations and Maintenance Facility (O&M Facility).
- Storage facilities and laydown areas.
- Unsealed access tracks.
- Ongoing use of two (2) temporary wind monitoring masts and the installation of up to four (4) permanent monitoring masts.
- Temporary construction facilities (including concrete batching plant and rock crushing facilities).
- Minor upgrades to the road network to facilitate delivery of oversize or overmass (OSOM) loads to the Stage 1 project site, and to facilitate the construction of the transmission line.
- Administrative activities (including boundary adjustments and subdivisions).

As discussed in **Section 3.1** below, the Stage 2 Project will rely on components of the approved Stage 1 project to facilitate connection to the grid, including portions of the approved electrical reticulation network, temporary construction facilities (construction compounds, site offices and storage areas, concrete catching plants, laydown areas etc.) and the O&M Facility. Each of these Stage 1 infrastructure components and facilities are within areas already assessed for impact, as per the SSD-10315 project approvals documentation and development consent received 6 February 2024, and no additional impact would occur as a result of the Project.

FIGURE 1.1
Regional Context

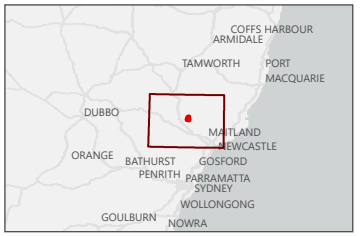


Legend

- Project Boundary - Stage 2
- Project Boundary - Stage 1
- Local Government Area Boundary
- Hunter - Central Coast REZ Boundary
- National Park
- State Forest
- Major Waterbodies
- Major Watercourse
- Major Roads
- Railway
- Transport Route and Site Access (as approved under Stage 1)

Renewable Projects

- Wind - In Planning
- Solar - Under Construction
- Solar - Operational
- Solar - In Planning
- Solar - Approved
- Battery - In Planning
- Battery - Approved



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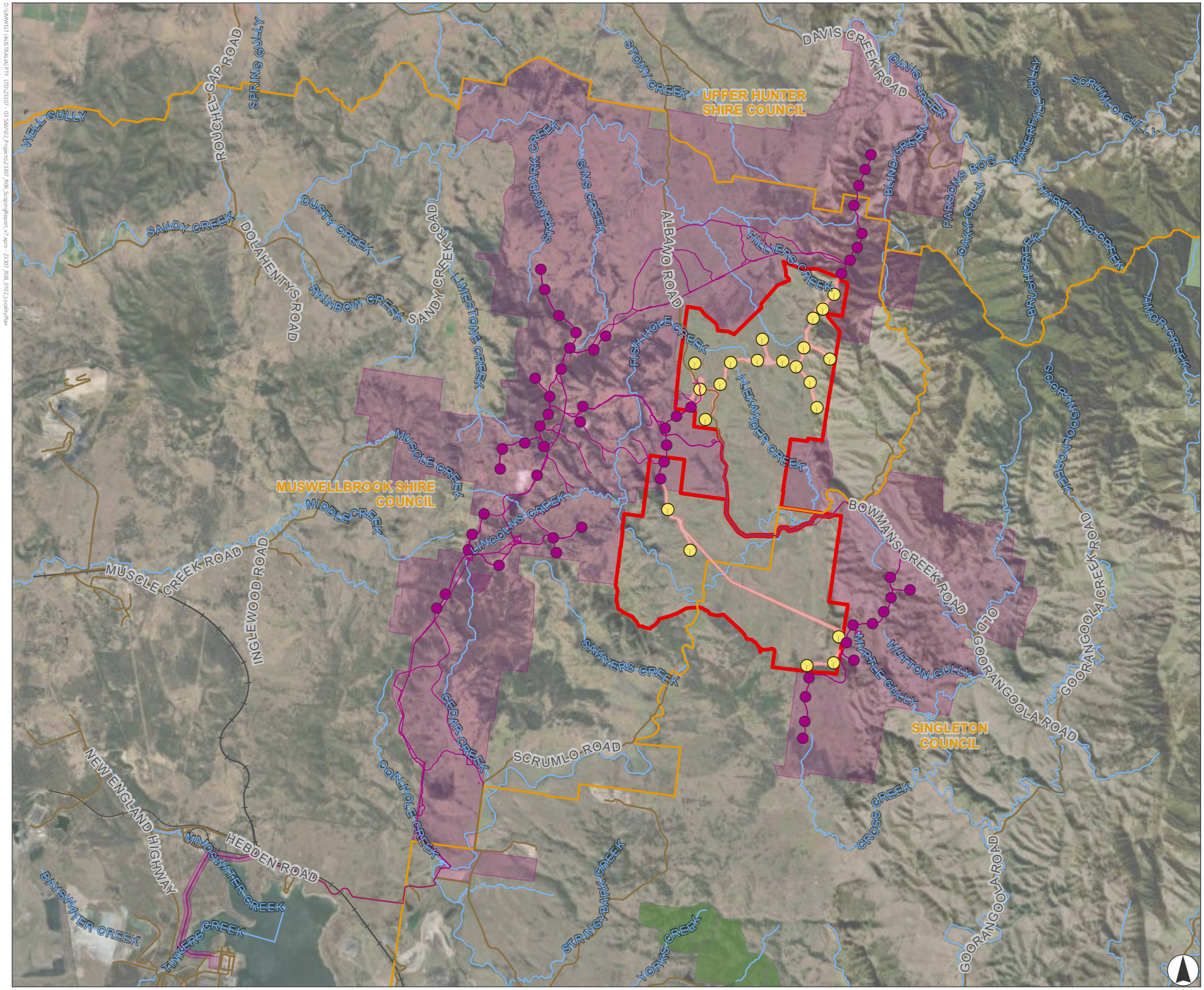
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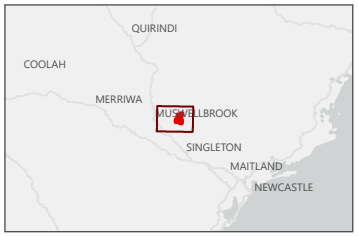
Image Source: ESRI Basemap (2023) | **Data Source:** NSW DFSI (2024), Energy Co. (2024), Ark Energy (2024)

FIGURE 1.2
Project Locality



Legend

- Turbine Locations - Stage 2
- Project Boundary - Stage 2
- Development Corridor - Stage 2
- Turbine Locations - Stage 1
- Tracks/Powerlines - Stage 1
- Facilities - Stage 1
- Project Boundary - Stage 1
- Local Government Area Boundary
- National Park
- State Forest
- Major Waterbodies
- Major Watercourse
- Major Roads
- Railway



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Kilometres

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Image Source: ESRI Basemap (2023) | **Data Source:** NSW DFSI (2024)

1.5 The Proponent

The proponent for the Project is 'Bowmans Creek Wind Farm Pty Ltd', a wholly owned by Ark Energy Pty Ltd (Ark Energy), a subsidiary of Korea Zinc Co. Ltd (Korea Zinc). Korea Zinc is the world's largest producer of zinc, lead and silver, and a company with a proud 25-year history in Australia through its Sun Metals Corporation Pty Ltd zinc refinery in Townsville.

Established in January 2021, Ark Energy is a leading Australian renewable energy company specialising in wind, solar and hydrogen. Ark Energy's mandate is to decarbonise the energy supply of the Korea Zinc group starting with Sun Metals, which involves notoriously difficult-to-abate industry sectors including nonferrous metals refining and heavy haulage transport.

In 2022, Ark Energy completed its friendly acquisition of Australian wind and solar developer Epuron, and now owns a growing portfolio of wind and solar energy projects in Queensland, New South Wales and Tasmania. It is also at the forefront of development of Australia's green hydrogen industry through its 'Sun HQ Hydrogen Hub' in Townsville and the Han-Ho H2 consortium focused on establishing a green energy export corridor from Queensland to South Korea. As part of this acquisition of the Epuron portfolio, Stage 1 was obtained by Ark Energy, who now seeks approval for a subsequent stage of the wind farm (i.e., Stage 2), that being the Project. Key details of the Proponent are provided in **Table 1.1.**

Table 1.1 Proponent Details

Requirement	Details
Full Name/s	Bowmans Creek Wind Farm Pty Ltd
Postal Address	Level 2, 275 George Street, Sydney NSW 2000
Street Address for the Project	608 Bowmans Creek Road, Bowmans Creek, NSW 2330
ABN	64 655 242 274
Nominated Contact	Rebecca Riggs

1.6 Purpose of this Scoping Report

This Scoping Report has been prepared as part of the scoping process associated with the standard SSD approvals pathway. It aims to:

- Describe the PMroject in simple terms.
- 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 Project Environmental Impact Statement (EIS).
- Give an early indication of community views on the Project and provide an overview of the community engagement that will be carried out during the preparation of the EIS.
- 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.

This Scoping Report also aims to provide a description of the Project to key regulatory agencies and to identify the key environmental, social and economic matters of relevance to the Project to inform the preparation of the Secretary's Environmental Assessment Requirements (SEARs).

Under the provisions of Clause 4.12(8) of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act), an EIS is required (and will be prepared) to accompany the SSD application for the Project, to be lodged with the NSW Department of Planning, Housing and Infrastructure (DPHI) (formerly the Department of Planning and Environment, DPE) on behalf of the Planning Secretary. The SEARs will identify specific assessment considerations relevant to the Project that must be addressed in the EIS.

1.7 Wind Energy and SSD Guidelines

This Scoping Report has been prepared in consideration of the former NSW Government DPE – Wind Energy Guideline (the Wind Energy Guideline), dated December 2016 (DPE, 2016a), including:

- NSW Government – DPE – Wind Energy: Visual Assessment Bulletin (the Visual Bulletin), dated December 2016 (DPE, 2016b).
- NSW Government – DPE – Wind Energy: Noise Assessment Bulletin (the Noise Bulletin), dated December 2016 (DPE, 2016c).

It has also been prepared with due regard to the former NSW Government Department of Planning, Industry and Environment (DPIE, now DPHI) – State Significant Development Guidelines (SSD Guideline), dated November 2021 (DPIE, 2021), including where relevant:

- NSW Government – DPIE – State Significant Development Guidelines – Preparing a Scoping Report – Appendix A (SSD Guideline: Appendix A), dated October 2022 (DPIE, 2022b), referred to hereafter as the SSD Scoping Report Guideline.
- NSW Government – DPIE – State Significant Development Guidelines – Preparing an Environmental Impact Statement – Appendix B (SSD Guideline: Appendix B), dated July 2022 (DPIE, 2022c).
- NSW Government – DPIE – State Significant Development Guidelines – Preparing a Submissions Report – Appendix C (SSD Guideline: Appendix C), dated October 2022 (DPIE, 2022d).
- NSW Government – DPIE – State Significant Development Guidelines – Preparing an Amendment Report – Appendix D (SSD Guideline: Appendix D), dated October 2022 (DPIE, 2022e).
- NSW Government – DPIE – Social Impact Assessment Guideline for State Significant Projects (the SIA Guideline), dated October 2022 (DPIE, 2021f).
- NSW Government – DPIE – Undertaking Engagement Guidelines for State Significant Projects (the Engagement guidelines), dated October 2022 (DPIE, 2021g).
- NSW Government – DPIE – Cumulative Impact Assessment Guidelines for State Significant Projects (the CIA Guidelines), dated October 2022 (DPIE, 2022h).

1.8 Structure of this Report

As per the SSD Scoping Report Guideline, this report has the following sections:

- **Section 1.0 (Introduction)**: introduces the Project, the Proponent and provides an outline of the structure of the document.
- **Section 2.0 (Strategic Context)**: outlines the strategic context for the Project, including the justification for the Project, a summary of the locality in which the Project is undertaken and an overview of the environmental, social and economic context.
- **Section 3.0 (Project)**: contains a description of the Project, including an overview of alternatives considered and strategies to avoid and minimise environmental impacts.
- **Section 4.0 (Statutory Context)**: summarises the relevant State and Commonwealth statutory context applicable to the approval process for the Project.
- **Section 5.0 (Engagement)**: describes the stakeholder engagement program for the Project and identifies the environmental, social and economic matters identified during the scoping phase for further consideration in the EIS.
- **Section 6.0 (Proposed Assessment of Impacts)**: contains analysis of the environmental, social and economic matters relevant to the Project and the assessments proposed to be completed for the EIS.
- **Section 7.0** References.
- **Appendix A** Scoping Summary Table.
- **Appendix B** Cumulative Impact Assessment Scoping Summary.
- **Appendix C** Social Impact Scoping Report.
- **Appendix D** Preliminary Visual Assessment.
- **Appendix E** Preliminary Noise Impact Assessment.
- **Appendix F** Biodiversity Constraints Assessment.
- **Appendix G** Cultural Heritage Scoping Report.

2.0 Strategic Context

2.1 Project Justification

The development of renewable energy projects aligns with both Commonwealth and NSW commitments to increase renewable energy generation and reduce carbon emissions across the NSW and Australian economies. In particular, the NSW Government is taking action to lead investment in new renewable generation to ensure an orderly transition away from coal (EnergyCo NSW, 2022), with the State's five existing coal-fired power stations scheduled for progressive closure from 2022-2035, starting with the Liddell Power Station in 2023.

The proposed location of this Project is within the Hunter-Central Coast REZ, being an area declared by the NSW Government to be targeted for renewable energy development. The REZs form a critical component of the NSW Government's Electricity Infrastructure Roadmap (NSW Government, 2020a). The purpose of each REZ is to group new wind and solar power generation projects in areas where it can be efficiently stored and transmitted across NSW. Although located within the Hunter-Central Coast REZ, the Project does not propose utilising any REZ-related infrastructure to support connection to the grid.

The NSW Government has also indicated that the REZs are expected to unlock a significant pipeline of large-scale renewable energy and storage projects, while supporting private sector investment and jobs throughout regions of NSW. The NSW Government expects the Hunter-Central Coast REZ to have an intended network capacity of 1 gigawatt. The capacity of the Hunter-Central Coast REZ is also likely to increase over time with the retirement of coal-fired power stations, re-purposing of mining land and the growth of offshore wind throughout NSW.

As demonstrated in **Section 2.2** below, the Project will contribute to meeting these Commonwealth and NSW Government objectives and will provide significant renewable energy generation capacity within an area planned for renewable energy development by the NSW Government.

Furthermore, the Project will contribute capital investment, generate jobs during the construction and operational phases, provide indirect benefits to local services throughout the life of the Project, deliver additional income to Host landholders, and provide benefits to the local community through the implementation of a proposed community benefit fund.

Further details regarding Project benefits are provided in **Section 2.6.**

2.2 Strategic and Regional Context

2.2.1 Commonwealth Policy

2.2.1.1 The United Nations Framework Convention on Climate Change – Paris Agreement

Australia is one of the 195 countries from around the world signed to the international climate change agreement (The Paris Agreement). The Paris Agreement aims to:

- Hold the increase in the global average temperature to below 2°C above pre-industrial levels, and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels.

- Increase the ability (of nations) to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas (GHG) emissions development, in a manner that does not threaten food production.
- Make finance flows consistent with a pathway towards low GHG emissions and climate resilient development.

The Paris Agreement seeks to meet its objectives by developing programs and mechanisms that:

- Require participating Parties to prepare and communicate GHG mitigation contributions. Parties were expected to set mitigation targets for 2020, and then develop new targets every five years. Each successive target is expected to represent a larger mitigation effort than the previous target.
- Promote climate change resilience and adaptation.
- Provide mitigation and adaptation funding to developing countries.
- Foster mitigation and adaptation technology transfer between Parties.
- Require participating Parties to report progress towards their mitigation contributions on an annual basis.

Australia signed The Paris Agreement on 22 April 2016. The obligations under The Paris Agreement are driving national GHG policy between 2020 and 2030. Australia's commitment to The Paris Agreement includes reducing GHG emissions by 26% to 28% on 2005 levels by 2030 (Commonwealth of Australia, 2021). Australia's Nationally Determined Contribution (NDC) prescribes an unconditional economy-wide target to reduce GHG emissions, and states that future policies will target emissions generated from energy use, industrial processes, agriculture, land-use, land-use change and forestry and waste.

The Project, as a large-scale renewable energy project, will contribute to achieving Australia's GHG emission reduction targets through reducing emissions from energy production in NSW.

2.2.1.2 Australian Renewable Energy Target (RET) scheme

The RET is an Australian Government scheme introduced in 2001 to reduce emissions of GHG in the electricity sector and encourage the additional generation of electricity from sustainable and renewable sources (Australian Government Department of Industry, Science, Energy and Resources, 2018).
The objectives of the RET are to:

- Encourage the additional generation of electricity from renewable sources.
- Reduce emissions of greenhouse gases in the electricity sector.
- Ensure that renewable energy sources are ecologically sustainable.

The RET is achieving these objectives by stimulating investment in large-scale renewable energy projects through the Large-scale Renewable Energy Target (LRET) that creates a financial incentive for the installation of renewable energy developments.

The LRET target of 33,000 GW hours of additional renewable electricity generation was met on a rolling 12-month basis at the end of January 2021 and this target will remain until the scheme ends in 2030.

The Project is proposing to generate approximately 120 MW of renewable energy, which would contribute achieving the targets set out in the RET and LRET schemes.

2.2.1.3 Australian Energy Policy

The Australian Government's Energy Policy, 'A Fair Deal on Energy', announced in 2019, aims to put downward pressure on electricity and gas prices, encourage new reliable supply and technology, and to invest in new ways to make the energy system cleaner and more efficient (Australian Government Department of Environment and Energy (DoEE), 2019). The policy is comprised of three major pillars:

- Delivering an affordable and reliable energy system.
- Putting energy consumers first.
- Taking real and practical action to reduce emissions and meet our international commitments.

2.2.2 NSW Policy

2.2.2.1 NSW Climate Change Policy Framework

The NSW Government has developed its NSW Climate Change Policy Framework, which aims to deliver net zero emissions by 2050, and a State that is more resilient and responsive to climate change (Office of Environment and Heritage, 2016).

Under the NSW Climate Change Policy Framework, NSW has committed to both follow the Paris Agreement and to work to complement national action.

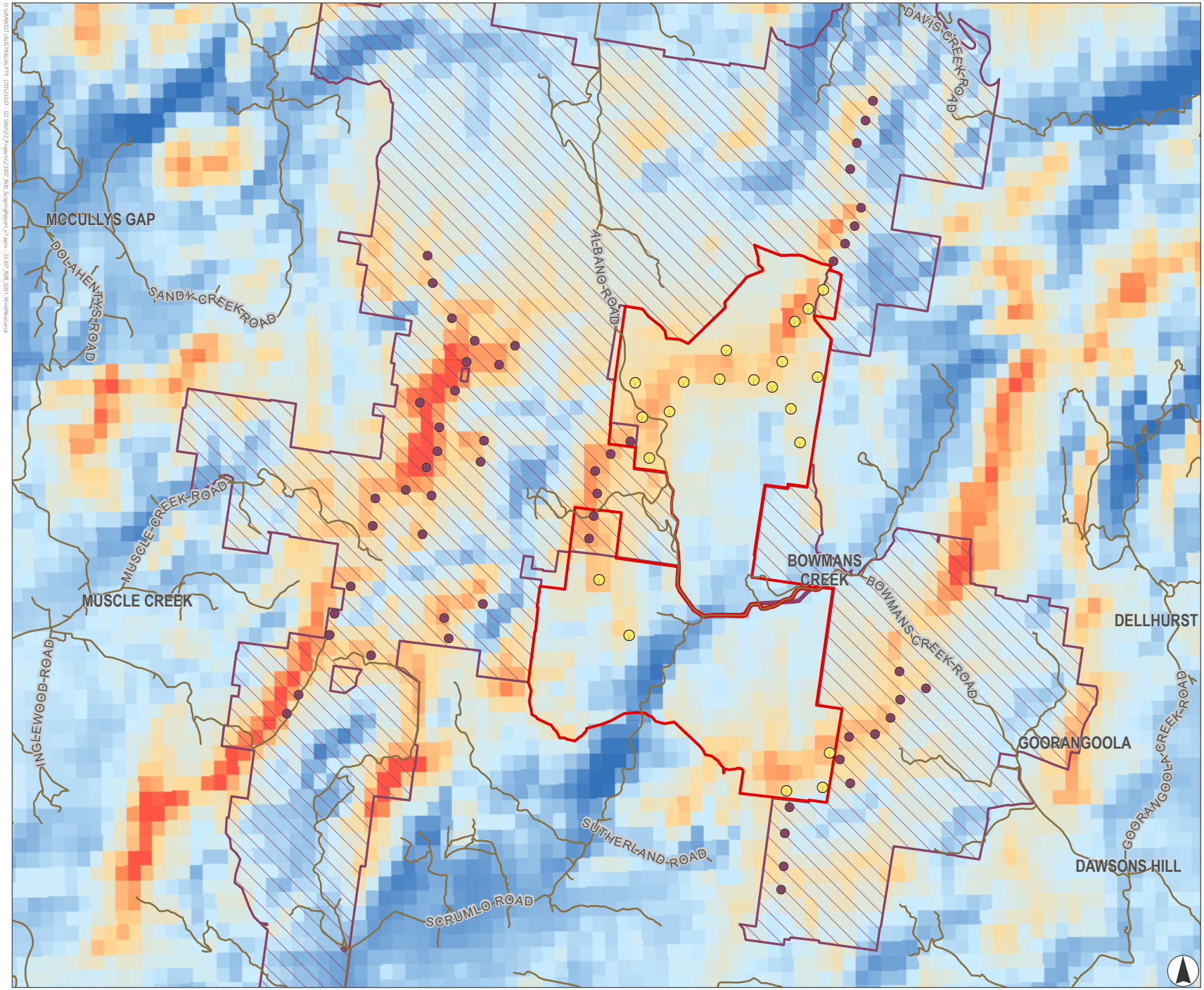
The Climate Change Policy Framework is being delivered through:

- The Climate Change Fund.
- Developing an economic appraisal methodology to value GHG emissions mitigation.
- Embedding climate change mitigation and adaptation across government operations.
- Building on NSW's expansion of renewable energy.
- Developing action plans and strategies.

In 2013 the NSW Government released the Renewable Energy Action Plan (REAP) and the NSW Energy Efficiency Action Plan (EEAP). The REAP aimed to increase the generation, storage and use of renewable energy in NSW, at least cost to customers and with maximum benefits to NSW. The three core goals of the REAP were to attract renewable energy investment, build community support for renewable energy and attract and grow expertise in renewable energy. Based on the implementation of the REAP, renewable energy is now well-placed to play a leading role in meeting NSW's energy needs into the future.

The location of the Project is mapped as an area with high wind renewable energy source potential under the NSW REAP. The Renewable Energy Resource Mapping is reproduced in **Figure 2.1** which indicates the existing wind resources applicable to the Project Area. This high wind resource makes the location suitable for a productive wind farm.

FIGURE 2.1
Wind Resource Mapping



Legend

- Turbine Locations - Stage 2
- Turbine Locations - Stage 1
- Project Boundary - Stage 2
- Project Boundary - Stage 1
- Roads and Tracks

Average Wind Speed at 100m (km/h)

9.03

4.91

0 2 4

Kilometres

Scale1:100,000 at A4
GDA2020 MGA Zone 56

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Image Source: ESRI Basemap (2023) | **Data Source:** NSW DFSI (2023), Global Wind Atlas (2024)

2.2.2.2 NSW Net Zero Plan Stage 1: 2020-2030

The Net Zero Plan Stage 1: 2020-2030 (the Plan) is for a key NSW Government plant that sets out action on climate change and a 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 Plan aims to fast-track emissions reduction over 10 years and prepare the State to take further action in the following decades (DPIE, 2020). The Plan sets out four key priorities to achieve its target. The most relevant to the Project is the State's priority to drive the uptake of proven emissions reduction technologies that grow the economy, create new jobs, and/or reduce the cost of living. The strategy will reduce barriers to necessary barriers to entry for those technologies and make co-investments to address the high upfront capital costs that may reduce potential growth in the industry.

The Plan outlines that, to meet its commitment to provide reliable and affordable electricity, the NSW and Commonwealth Governments are working to fast-track the delivery of NSW's Renewable Energy Zones (REZs). This will involve expanding transmission infrastructure into those regions to open new parts of the grid for renewable energy projects, like wind and solar farms. The five REZs announced formally to date in the Central-West, New England, Hunter-Central Coast, Illawarra and South-West of NSW, will play a critical role in replacing retiring thermal generators in NSW over the next two decades and bringing up to 17,700 megawatts of cheaper, renewable power into the grid.

The Hunter-Central Coast REZ is intended to have an initial capacity of 1 GW of generation capacity. Further details regarding the Hunter-Central Coast REZ are provided in **Section 2.2.2.4**.

2.2.2.3 NSW Electricity Infrastructure Roadmap

The NSW Electricity Infrastructure Roadmap 2020 (the Roadmap) outlines a number of policy measures with the aim to drive the transition of the state's electricity sector to a system underpinned by wind and solar power. Its enabling legislation, the *Electricity Infrastructure Investment Act 2020*, passed both houses of NSW Parliament with strong bi-partisan support and was enacted into law on 2 December 2020 (NSW Government, 2020a).

Together, the Roadmap and the accompanied Act outline several commitments for the NSW Government to keep. The most relevant to the Project is the commitment to declaring five REZs to deliver an intended capacity of 12 GW and the commitment to establish a Transmission Development Scheme that will de-risk REZ investments.

In May 2023, the recommendations from the Electricity Supply and Reliability Check Up which was undertaken to review the Roadmap were released (Marsden Jacob, 2023). Three key areas that the NSW government have proposed to take action in light of the review include:

1. A focus on the security of the energy grid as coal fired power stations in NSW are retired.
2. As coal fired power stations are retired, a new Energy Security Target Monitor will be used to inspect their capacity and generation efficiency to ensure that electricity is produced at an affordable rate.
3. The NSW government will streamline renewables approvals in the planning system and focus on ensuring that community benefit sharing is integrated into proposals. This will unlock opportunities for the communities to be involved in how investment decisions are made both inside and outside the REZs.

The Project will take place within the Hunter-Central Coast REZ and will provide additional electricity to the grid during the closure of NSWs coal fired power stations. Although located entirely within the REZ, the Project does not propose utilising any REZ-related infrastructure to support connection to the grid.
The Project will also deliver benefits to local communities through the implementation of a Community Benefit Fund (CBF) that will be developed in consultation with Muswellbrook Shire Council, the community, local service providers and businesses.

2.2.2.4 Hunter-Central Coast REZ

Beginning in 2021, EnergyCo undertook a geospatial mapping analysis investigation of the Hunter and Central Coast regions to identify a nominal boundary for the Hunter-Central Coast REZ. The Hunter-Central Coast REZ was formally declared by the Minister for Energy on 9 December 2022. The REZ declaration is the first step in formalising the REZ under the *Electricity Infrastructure Investment Act 2020* and establishes EnergyCo as the Infrastructure Planner responsible for coordinating the development of the REZ. It also sets out the intended network capacity (size), geographical area (location) and infrastructure that will make up the REZ.

The declaration sets out the intended network capacity for network infrastructure in the Hunter-Central Coast REZ of one (1) GW, which would be sufficient to cater for the expected generation in this area given the variable nature of wind and solar energy generation. Importantly, the capacity of the Hunter-Central Coast-REZ is likely to increase over time with the retirement of coal-fired power stations, re-purposing of mining land and the growth of offshore wind in NSW. Additional transfer capacity from inland REZs to support the decarbonisation of existing industries will be facilitated via the Hunter Transmission Project.

Based on the current mapping, the Project is wholly located within the Hunter-Central Coast REZ boundary (refer to **Figure 2.2** below), however the Project does not anticipate using any HCC-REZ infrastructure to support the connection to the grid. The Project is consistent with the objectives of the Electricity Strategy and Infrastructure Road Map, in aiming to provide large-scale renewable electricity generation that is affordable and reliable.

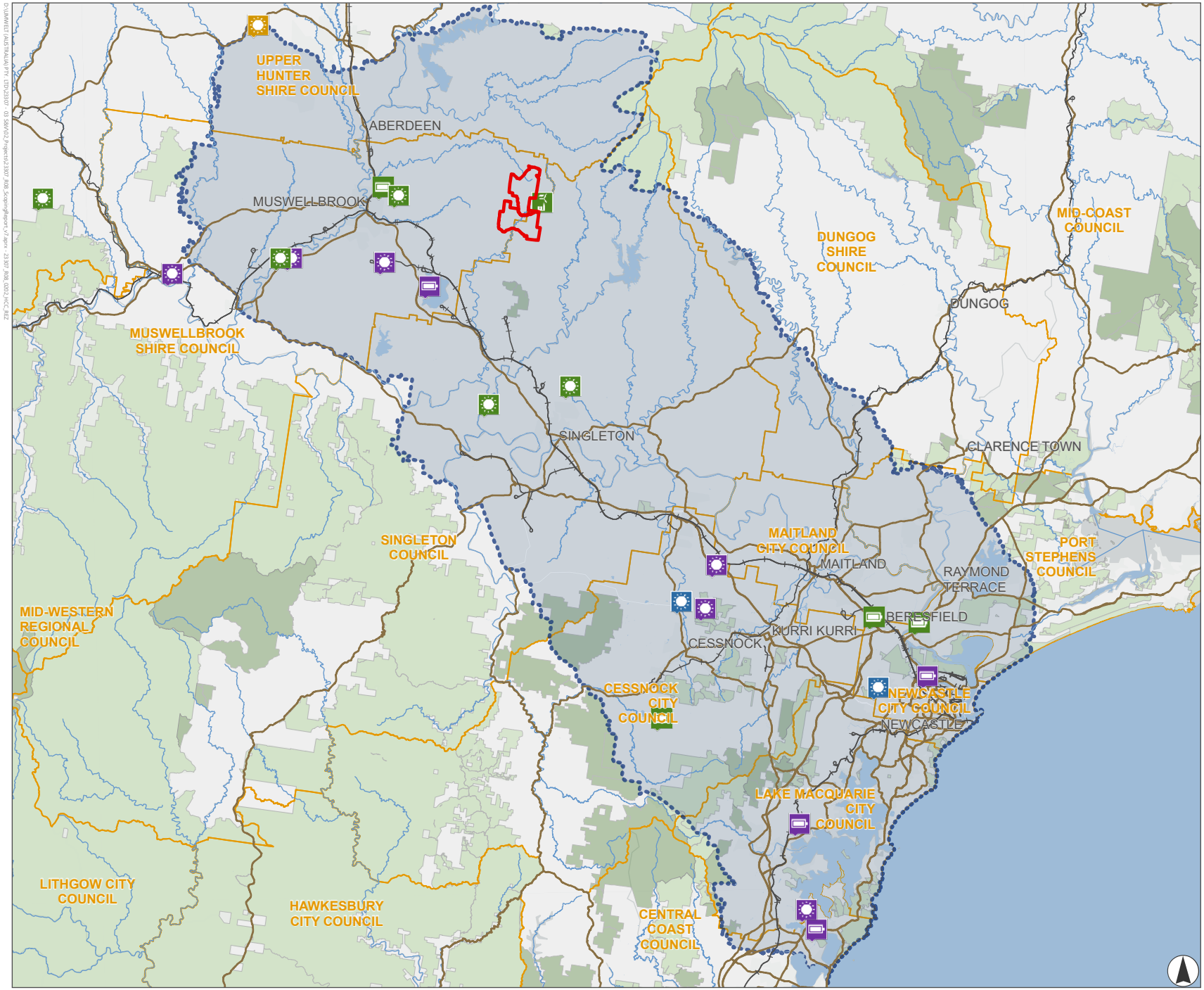


FIGURE 2.2

Project Context in Hunter-Central Coast REZ

Legend

- Project Boundary - Stage 2
- Hunter - Central Coast REZ Boundary
- Local Government Area Boundary
- National Park
- State Forest
- Major Waterbodies
- Major Watercourse
- Major Roads
- Railway

Renewable Projects

- Wind - In Planning
- Solar - Under Construction
- Solar - Operational
- Solar - In Planning
- Solar - Approved
- Battery - In Planning
- Battery - Approved

0 10 20

Kilometres

Scale1:750,000 at A4
GDA2020 MGA Zone 56

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Image Source: ESRI Basemap (2023) | **Data Source:** NSW DFSI (2023), Energy Co. (2023)

2.2.2.5 Network Infrastructure Strategy for NSW

EnergyCo released the 20-year Network Infrastructure Strategy (i.e. the Strategy) for NSW in May 2023. The Strategy will guide the practical coordination of NSW network infrastructure to connect new generation and storage in NSW's five REZs (EnergyCo, 2023). The Strategy outlines Network Infrastructure Options proposed for each of the REZ's with the ultimate aim of delivering an additional 14 GW in the next decade, along with and further options to be considered beyond that to bolster the State's energy resilience and plan for a net zero future.

The Strategy An additional 1 GW network capacity by 2027 is planned for the Hunter-Central Coast REZ, delivered by network upgrades between Muswellbrook and Liddell and new substation hubs to the west and/or east.

The Strategy also considers priority transmission infrastructure projects of relevance to the HCC REZ, including the Hunter Transmission Project (HTP) and Waratah Super Battery Project. The HTP is the existing network's first major augmentation to ease congestion for electricity flowing between the REZs and the demand centres at Sydney, Wollongong and Newcastle. HTP Stage 1 will add 5 GW of network capacity with a 500 kV double circuit line between Bayswater and Eraring power stations by 2027 followed by another line in the 2030s.

The Project will support the State's energy resilience and plan towards achieving a net-zero future, contributing to the development of renewable energy within the Hunter-Central Coast REZ.

2.2.3 Regional and Local Plans

2.2.3.1 Hunter Regional Plan 2041

The Hunter Regional Plan 2041 (HRP) is the NSW Government's strategy for guiding land use planning decisions for the Hunter Region over the next 20 years. The vision of the HRP aims to unlock sustainable growth opportunities and investments, as well as housing choice and lifestyle opportunities to retain the Hunter's position as a leading regional economy in Australia (DPE, 2022). The supporting goals of the HRP are to promote:

- Growth: Support a net zero emissions economy and foster employment growth, competitiveness and innovation.
- Community: Promote places to be together by weaving nature into our towns and cities with having welcoming, safe streets and public spaces.
- Resilience: Reduce risks associated with place-based shocks and stresses to improve the community's ability to withstand, recover from and adapt to changes and become more resilient.
- Equity: Communities should be safe and healthy with residents having opportunities for economic advancement, housing choices and a secure retirement.

The HRP promotes further development of renewable energy across the Hunter through Objective 7, being to 'Reach net zero and increase resilience and sustainable infrastructure'. The plan acknowledges the closure of Liddell power station in 2023 and Bayswater in 2030–2033, and the growing potential for the region's first renewable energy hub. The HRP indicates that renewable energy generation will also create a more sustainable energy future for the region and considers the effects of climate change as a guiding principle for all planning decisions including investment in renewable energy and supporting infrastructure.

The Project is consistent with the vision of the HRP, being development for the purposes of renewable energy generation.

2.2.3.2 Muswellbrook Shire Council – Local Strategic Planning Statement 2020–2040

The Muswellbrook Local Strategic Planning Statement (LSPS) sets out the 20-year vision for land use planning in the Muswellbrook Shire Council LGA (Muswellbrook Shire Council, 2020).

The vision outlined in the statement is for: "A Community in Transition - Muswellbrook will have a more sustainable community, environment and economy through diversification". The vision will be achieved through eight key planning priorities including: "the Shire becoming the State's major innovative energy centre".

The Project will contribute to planning priorities of the Muswellbrook LSPS by contributing to the development of the energy industry in the region.

2.2.3.3 Muswellbrook Shire Council – Community Strategic Plan

The Muswellbrook Shire Council Community Strategic Plan (CSP) sets a clear direction, reflective of community expectation. The plan notes that evidence is clear that human development has had a substantial and permanent impact on the world's climate. The consequences for the Muswellbrook Shire, being a relatively dry part of the planet, are substantial – particularly on agriculture and water security.

Moreover, Council acknowledges that the Muswellbrook LGA makes one of the largest contributions to global warming of councils in NSW as a result of its economic reliance on thermal coal and thermal coal power generation. While the Federal and NSW Governments have primary responsibility for transitioning the region's economy to a low carbon future, Council is committed to being a partner in that exercise.

The Project will support the Muswellbrook Shire CSP, working with Council to support the transition to low carbon future.

2.2.3.4 Singleton Shire Council – Local Strategic Planning Statement 2041

The Singleton Shire LSPS was endorsed by the Singleton Council in July 2020 and is an overarching strategy which outlines the twenty-year vision for land use and development for the Singleton Shire Council LGA (Singleton Council, 2020).

The Singleton Shire LSPS states that "in order to minimise impacts on employment rates from downturns in the mining industry, as well as to plan for the eventual winding down of coal mining activities in the LGA, steps need to be taken during the life of this plan to grow other industries in the LGA, so as to better balance the local industry base." Furthermore, it has identified opportunities in the higher altitude areas of the LGA to generate electricity from wind power.

The Project is consistent with the vision of the Singleton Shire LSPS, supporting diversity of local industries within the LGA, and contributing to the generation of renewable energy through wind power.

2.2.3.5 Singleton Shire Council – Community Strategic Plan 2022–2032

The Singleton Shire SCP recognises that responding to the changing environment is key in delivering upon the United Nations Sustainable Development Goals (SDGs), and notes that preserving and sustaining the environment and the longevity of natural resources, while driving an increase in the use of renewable energy, are key opportunities where the region can respond (Singleton Council, 2022).

The development of the Project will support the opportunities presented in the Singleton Shire CSP.

2.3 Project Location Context

The Project Area falls mainly within the Muswellbrook LGA, whilst the south-eastern extent of the Project Area falls within the Singleton Council LGA. The closest larger population centres are Muswellbrook (21 km west of the Project Area), Singleton (25 km south of the Project Area), and Scone (30 km north-west of the Project Area).

AGL Macquarie's Liddell and Bayswater Power Stations are located 13 km and 17 km south-west of the Project Boundary, respectively. Liddell Power Station closed in April 2023 and Bayswater is scheduled to commence closure between 2030 and 2033. Currently, Bayswater Power Station produces approximately 15,000 gigawatt hours (GWh) of electricity per annum.

The Project Area is zoned as RU1 Primary Production within the Muswellbrook LEP 2009 and Singleton LEP 2013. Most of the land that surrounds the Project is also zoned RU1 Primary Production (refer to **Section 4.1.2**). Additional contextual features of the Project Area are summarised below and addressed further in subsequent sections of this Scoping Report (where necessary):

- **Crown Lands**: Crown Land roads traverse portions of the Project Area. Works which may intercept these roads will likely require approval under the *Crown Land Management Act 2016*, which will be investigated further during preparation of the EIS. A crown lot is also identified within the Project Area. Reserve R44773 with a purpose of camping and travelling stock (Category 2 Travelling Stock Reserve (TSR)) is vested in Local Land Services (LLS). There are no current tenures over the reserve issued by DPHI – Crown Lands Division. The reserve is not intended to be impacted by infrastructure associated with the Project. An overview of land tenure within the Project Area is presented on **Figure 2.3.**
- **Community**: Several SSD projects at various stages of development are present within the region and the Hunter-Central Coast REZ more broadly (as outlined in **Section 2.4**), which are of relevance to local communities. Further discussion regarding local community and other stakeholders is provided in **Section 5.0** and the Social Impacts Scoping Report (SISR) included as **Appendix C.**
- **Land Use**: Agricultural land uses are prevalent within and surrounding the Project Area. There are no areas of mapped Biophysical Strategic Agricultural Land (BSAL) (under the DPHI Strategic Regional Land Use Policy) and there are no current mining and/or exploration titles or title applications within the Project Area.

- **Biodiversity**: The Project Area and wider locality is comprised of multiple agricultural properties with a series of ridges, valleys, and gullies. The historic land use of the locality has impacted on the presence of fauna corridors within the landscape as extensive land clearing has occurred for agricultural uses as well as development of open cut mines. Vegetation corridors are somewhat fragmented within and surrounding the Project Area, ranging from dense native vegetation on the steeper slopes of the ranges and lightly wooded areas on spurs and gentle slopes. The extent of wooded areas in the locality varies from property to property depending on the individual land management practices of existing and previous land managers/owners. Further discussion around biodiversity values within the Project Area is provided in **Appendix F**, and summarised in **Section 6.2.3**

- **Traffic and Access**: The New England Highway is located approximately 8 km south and is the main road that connects Muswellbrook and Singleton in a generally north-south direction. Further discussion around traffic, transport and access is provided in **Section 6.2.5.**

- **Topography**: The Project Area is situated on the foothills and slopes associated with the Mount Royal Range, comprising shales, sandstones, conglomerates, volcanics, and coal measures. Its surroundings are primarily characterized by undulating to rolling hills with narrow valleys transitioning to wide valleys adjoining creeks and rivers to the south of the Project Area. General elevations range from approximately 200 m in the valley flats to 800 m along the ridgelines associated with Mount Royal. Undulating to steep foothills and ridgelines associated with the Mount Royal Range National Park occur to the northeast of the Project Area.

- **Hydrology**: The Project Area is dissected by numerous waterways namely Millers Creek, Sandy Creek, Alexander Creek and Fish Hole Creek. No flood prone land or flood management areas are identified within the Project Area. Further discussion around water and soil resources relevant to the Project is provided in **Section 6.2.8.**

- **Hazards**: With areas of remnant or plantation vegetation, bushfire presents a potential hazard for the Project Area. The EIS will include an assessment of potential hazards associated with the Project. Further discussion around hazards and safety is provided in **Section 6.2.7**.

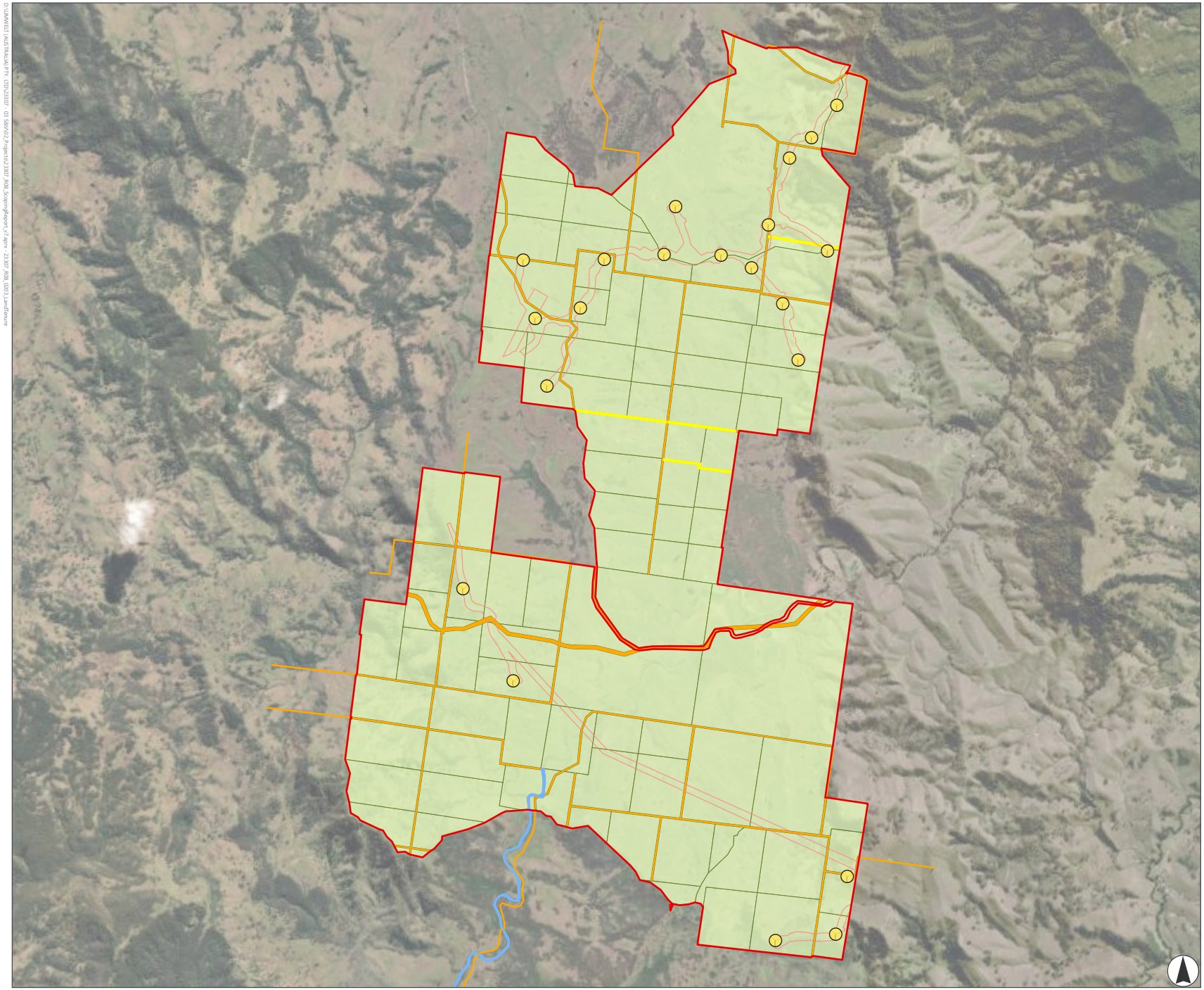


FIGURE 2.3
Land Tenure

Legend

- Project Boundary - Stage 2
- Development Corridor - Stage 2
- Turbine Locations - Stage 2
- Major Watercourse
- Roads and Tracks
- Freehold Lot
- Crown Road Corridor
- Crown Water Feature Corridor
- Crown Easement - Unidentified

0 1 2

Kilometres

Scale1:60,000 at A4
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Image Source: ESRI Basemap (2023) | **Data Source:** NSW DFSI (2023)

2.4 Cumulative Impact Considerations

A key component of environmental impact assessment is the consideration of cumulative impacts. The Project will be assessed in accordance with the requirements of the Cumulative Impact Assessment Guidelines for State Significant Project (CIA Guidelines) (DPIE, 2021g), which sets clear expectations and requirements for assessing project-level cumulative impacts related to SSD projects. The EIS will consider other relevant construction, industrial and employment-generating projects within the locality.
A cumulative impact assessment scoping summary table has been prepared to support this Scoping Report as **Appendix B.**

There are numerous renewable energy projects in the vicinity of the Project and within the broader Hunter-Central Coast REZ, at different stages of the approval process (refer to **Figure 2.1** and **Table 2.1**). It is anticipated that there will be additional renewable energy projects proposed in the vicinity of the Project that are not publicly known at the time of preparing this report. At the time this Scoping Report was prepared (June 2024) the closest renewable energy developments to the Project are:

- Bowmans Creek Wind Farm Stage 1 – located immediately west, north and east of the Stage 2 Project Boundary (discussed in detail in **Section 1.4.1**).
- Muswellbrook Solar Farm, a 135 MW solar farm currently responding to an additional information request from DPHI. Located approximately 15 km west of the Project Boundary
- Muswellbrook Pumped Hydro Energy Storage project, a proposed 500 MW pumped hydroelectric energy storage facility, located approximately 18 km west of the Project Boundary
- Muswellbrook Battery Energy Storage System (BESS) project, a 150 MW / 300 MWh battery approved in July 2023, located approximately 20 km west of the Project Boundary.

Table 2.1 Renewable Energy Projects in the Vicinity of the Project

Project	Status	Generation Capacity	Potential Construction Start Date
Bowmans Creek Wind Farm	Approved	336 MW	Q3 2024
Muswellbrook Battery Energy Storage	Approved	150 MW/300 MWh	Q4 2023
Muswellbrook Solar Farm	In Planning	135 MW	Q3 2024
Muswellbrook Pumped Hydro Energy Storage Project	In Planning	500 MW	2026
Maxwell Solar Farm	Approved	25 MW	Q1 2021
Hills of Gold Wind Farm	In Planning	280-420 MW	Q4 2024

Given the strategic importance of the Hunter-Central Coast REZ for the NSW Electricity Infrastructure Roadmap and the number of approved and proposed renewable energy projects in the region, the potential for cumulative environmental, social and economic impacts will require detailed consideration during the EIS phase of the Project, in line with the CIA Guidelines.

2.5 Planning and Other Agreements

Should the Project be approved, Ark Energy will enter into a planning agreement (PA) in accordance with the requirements of the EP&A Act. The PA will be negotiated with the relevant Council(s) for the provision of infrastructure or other items to support local communities. These agreements will be formalised as the Project progresses, in consultation with each relevant Council.

Ark Energy is currently negotiating agreements with Host residences in respect of the Project. These negotiations are well progressed and Ark Energy will seek to finalise all agreements with Host residences during the preparation of the EIS. Where appropriate, Ark Energy will also seek to enter into negotiated agreements with neighbouring residences (for example, having regard to impact thresholds under the Visual and Noise Bulletins) during the preparation of the EIS.

2.6 Project Benefits

The Project will provide long-term, strategic benefits to the state of NSW, including:

- Renewable energy supply to assist with fulfilling the current obligations under State and Commonwealth renewable energy targets.
- Contributing to the Hunter-Central Coast REZ. The NSW Government expects that REZs will deliver multiple benefits to NSW, including:
    - More reliable energy from significant amounts of new energy supply.
    - Energy bill savings from reduced wholesale electricity costs.
    - Emissions reduction from a cleaner energy sector.
    - Community partnership from strategic planning and best practice engagement and benefit sharing.
- Providing for cleaner reliable electricity generation, assisting with meeting current load demand while reducing greenhouse gas emissions and the impacts of climate change.
- Providing regional investment in the NSW renewable energy sector.
- The Project will also provide direct financial benefits to the regional and local community, including:
    - Substantial investment in local infrastructure.
    - Employment generation creating approximately 160 jobs during the construction phase and approximately 40 jobs during the operational phase, including some overlap with the Stage 1 project, which will be further understood during preparation of the EIS.
    - Flow on economic benefits to local services through the construction and operation phases.
    - Additional income to Host landholders with flow on economic benefits to the local community.
    - The development of a Community Benefit Fund.

3.0 The Project

3.1 Project Summary

The proposed development is seeking approval for up to 21 WTGs, with a maximum blade-tip height of 250 m above ground level (AGL) and a generating capacity of up to ~120 MW. The power generated by the Project will feed into the electricity grid (i.e., the National Energy Market, NEM) via connection to the approved Stage 1 electrical reticulation network.

The key components of the Project include:

- Up to 21 (3 blade) WTGs, with a maximum blade-tip height of 250 m AGL.
- Power infrastructure providing connection to the NEM, including:
    - One (1) on-site collector substation and associated medium voltage transmission line connecting the on-site substation to the Stage 1 project electrical reticulation network.
    - One (1) overhead transmission line connecting the proposed WTGs in the south of the Project Area to the Stage 1 project electrical reticulation network.
    - An internal electrical reticulation network (i.e., underground 33 kV transmission lines) connecting all WTGs to the Stage 1 project electrical reticulation network.
- Other associated permanent infrastructure including hardstands, new access tracks, upgrades to existing access tracks, and access point/s from public roads.
- Permanent and temporary meteorological monitoring masts.

The indicative Project layout is shown on **Figure 3.1**. The indicative Project components are provided in **Table 3.1** noting that these will be subject to further refinement as part of ongoing design development and the planning and approvals process.

Table 3.1 Indicative Project Components and Approximate Dimensions

Project Component(s) / Infrastructure	Approximate Dimensions	Quantity
WTGs		
WTG height	Up to 250 m	Up to 21
Rotor diameter	Up to 180 m	
Uppermost blade tip	250 m	
Lowermost blade tip	~70 m	
Tower (hub) height	Up to 160 m	
WTG foundations	35 m diameter	
Ancillary Infrastructure		
On-site collector substation and associated transmission line	150 m x 200 m, and approximately 630 m of medium voltage transmission cable connecting the on-site substation to the Stage 1 reticulation network	1

Project Component(s) / Infrastructure	Approximate Dimensions	Quantity
Overhead transmission lines (high to low voltage)	Up to five (5) km of overhead cables in the southern portion of the Project Area, connecting the southern WTGs to the Stage 1 reticulation network	1
Underground transmission cables (medium to low voltage)	Up to around 17.5 km of internal underground transmission cables connecting the proposed Project WTG to the Stage 1 reticulation network	n/a
Crane hardstands	75 m x 75 m	Multiple
Internal access tracks	~15 km	n/a
Primary site access point	The Project will utilise the site access route as assessed under Stage 1. Site access would be provided off Hebden Road, with points crossing Albano Road, a public road	1
Permanent meteorological masts	Up to 160 m high	1
Temporary Construction Facilities		
Temporary meteorological masts	Up to 110 m high	1

The proposed Project infrastructure (as summarised in **Table 3.1** above) would be contained within the Project Area, including WTG blades. The proposed layout allows for micro-siting and will be subject to further detailed design as the environmental, social and economic impact assessments progress.

The conceptual design for the EIS will include a Development Corridor within which infrastructure and WTGs will be placed, providing the necessary flexibility for the detailed design of the Project whilst also allowing a detailed environmental assessment process to be completed.

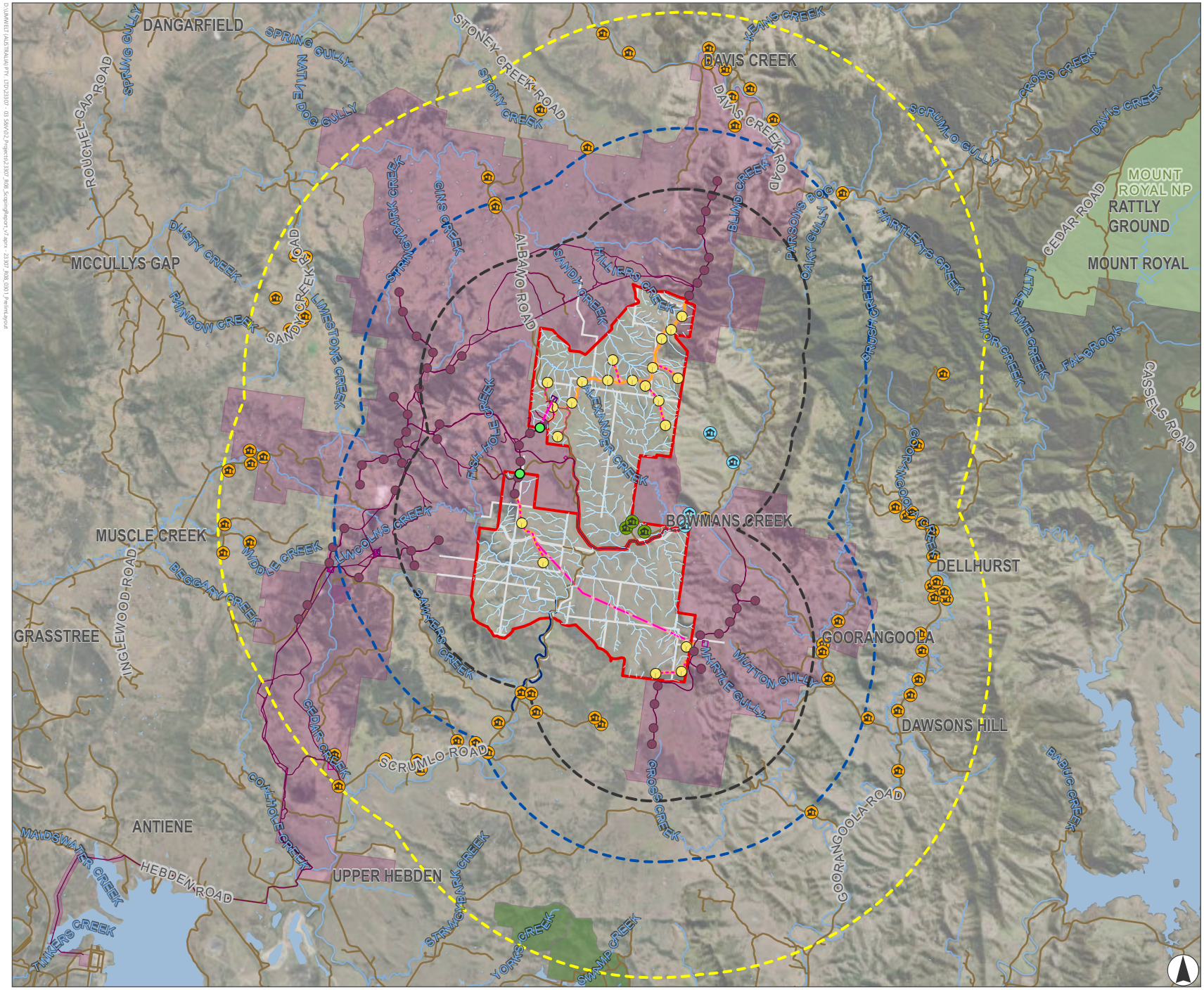


FIGURE 3.1

Bowmans Creek Wind Farm Stage 2 – Preliminary Project Layout

Legend

- Project Boundary - Stage 2
- Development Corridor - Stage 2
- Access Tracks - Stage 2
- Over-head Reticulation - Stage 2
- Underground Reticulation - Stage 2
- Powerline - Stage 2
- Turbine Locations - Stage 2
- Main Site Entry
- Proposed Sub-station
- Crown Road Corridor (Intersection Site Boundary)
- Crown Water Feature Corridor (intersection Site Boundary)
- National Park
- State Forest
- Waterbodies
- Major Watercourse
- Minor Watercourse (within Project Boundary)
- Roads and Tracks

Residences within 8km

- Host
- Associated
- Non-associated

Lines of Visual Magnitude

- 3,350m to nearest WTG
- 4,950m to nearest WTG
- 8,000m to nearest WTG
- Turbine Locations - Stage 1
- Tracks/Powerlines - Stage 1
- Facilities - Stage 1
- Project Boundary - Stage 1

0 2.5 5

Kilometres

Scale1:140,000 at A4

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3.1.1 Use of Select Stage 1 Infrastructure on the Stage 2 Project

Select Stage 1 project components are proposed to be used to facilitate the construction of the Stage 2 Project, as well as the connection to the grid following construction. These components are summarised below:

- Up to two (2) substations and select overhead and underground reticulation network infrastructure to facilitate connection to the Stage 1 project, and ultimately the grid (via the Liddell 330 kV Substation).
- Construction compound/s and site office buildings and storage areas, including fencing and screen as required.
- On-site concrete batching plants for use during the construction phase.
- Laydown areas used for WTG installation and storage of WTG components.
- Potential construction material areas such as borrow pits, quarry and rock crushing facilities.
- O&M Facility.

The Stage 1 components proposed for use to support the Stage 2 Project are summarised in **Table 3.2** and illustrated on **Figure 3.2**.

Each of these Stage 1 infrastructure components and facilities are within areas already assessed for impact, as per the SSD-10315 project approvals information and development consent received 6 February 2024, and no additional impact would occur as a result of the Project.

Table 3.2 Summary of Stage 1 Components and Approximate Dimensions

Project Component(s) / Infrastructure	Approximate Dimensions	Quantity
Ancillary Infrastructure		
Main (on-site) substations/switchyards to support grid connection	150 m x 150 m (no additional disturbance due to Stage 2)	2
Electrical reticulation network to support grid connection	• ~2 km of underground reticulation connecting the Stage 1 WTGs to the overhead reticulation line. • ~7 km of overhead reticulation connecting to the Stage 1 substation. • ~21 km of powerline connecting the Stage 1 substation to the Liddell 330 kV Substation.	N/A
O&M Facility	50 m x 50 m (no additional disturbance due to Stage 2)	1
Permanent meteorological masts	110 m to 150 m high	4
Temporary Construction Facilities		
Main Construction Compound	140 m x 200 m (no additional disturbance due to Stage 2)	1

Project Component(s) / Infrastructure	Approximate Dimensions	Quantity
Construction site compounds, including: • Construction laydown areas for equipment and supplies. • Concrete batching plants. • Construction compounds, site office, etc.	100 m x 110 m (no additional disturbance due to Stage 2)	Up to 2
On-site concrete batching plants (including rock crushing facilities)	50 m x 50 m (no additional disturbance due to Stage 2)	1
Site compound and office	50 m x 50 m (no additional disturbance due to Stage 2)	Within Construction Site Compounds
Stockpiles and materials storage compounds	Subject to construction requirements	
Laydown Areas	Subject to construction requirements	
Temporary meteorological masts	110 m–150 m high	1

A small portion of land within the western side of the Stage 2 Project Boundary is approved under the Stage 1 project to host Stage 1 infrastructure. The infrastructure in this area would be used by the Stage 2 Project to connect to Stage 1 electrical network and has been captured in the Stage 2 Project Boundary accordingly. These land parcels for this area are Lots 120 and 124 of DP 752465, Lots 10 and 11 of DP127321 and Lot 145 DP 752465 and are identified on **Figure 3.2.** This would form part of the schedule of lands for the Project Boundary, which would be provided as part of the Project EIS.

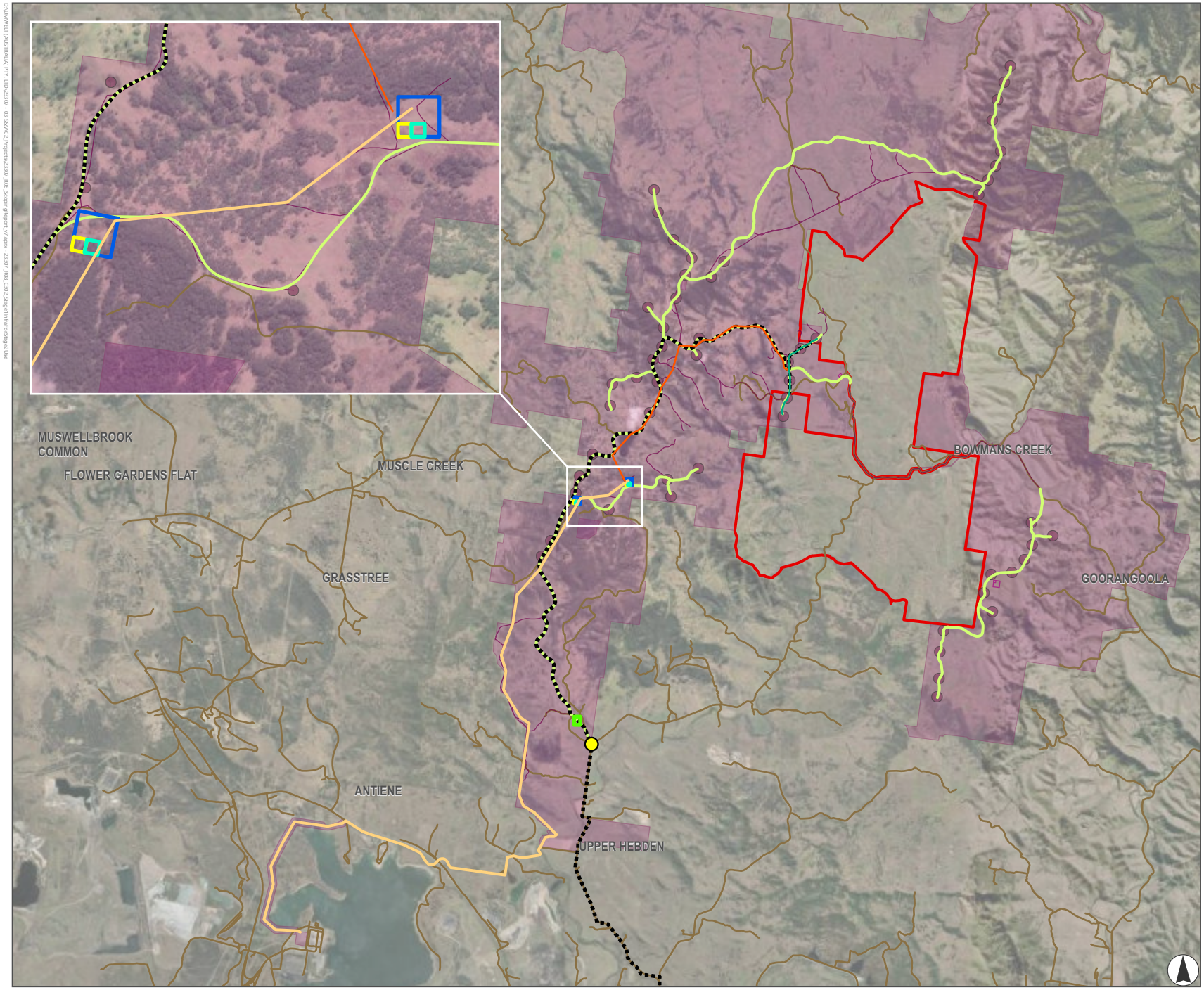


FIGURE 3.2

Proposed use of Stage 1 Project infrastructure for the Stage 2 Project

Legend

- Project Boundary - Stage 2
- Project Boundary - Stage 1
- Roads and Tracks

Stage 1 Project Infrastructure to be used for Stage 2 Project

- Access Point
- Underground Reticulation
- Overhead Reticulation
- Powerline
- Transport Route and Site Access
- Access Track
- O&M Facility
- Batch Plant
- Construction Compound
- Substation

Other Stage 1 Infrastructure

- Tracks/Powerlines/Facilities
- Turbine Locations

0 2.5 5

Kilometres

Scale1:125,000 at A4

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3.2 Anticipated Timeframes

Construction works will commence as soon as practical following Project approval, which is currently estimated to occur in 2025. The timing of construction will be driven by additional permits and authorisations, contractor selection, detailed design and procurement processes, and a final investment decision. The construction phase of the Project is anticipated to be 1.5 to 2 years. The Project has an estimated operational life of 30 years after which it may be decommissioned or re-powered. It is anticipated that approximately 160 personnel will be required during construction of the Project, and approximately 15 personnel required for operations.

In summary the anticipated timeframes for the Project are:

- **Planning and approvals**: in progress and aiming to be completed early 2025.
- **Construction and Commissioning**: planned to commence mid-late 2025, for approximately 1.5 to 2 years.
- **Operation**: planned to commence in 2027, with an estimated operational life of 30 years.

As is typical for projects of this scale and nature, construction and operation could be undertaken in stages. Ark Energy aim to construct the Project as a single stage of development but is seeking flexibility to construct the Project in stages, if required and depending on factors such as grid connection capacity.

3.3 Wind Turbine Generators

The Project is designed to accommodate up to 21 WTGs of up to 250 m in height. This enables a conservative assessment allowing for WTG advances between the time of assessment for the Project and the commencement of construction. A candidate turbine model has not been selected and multiple WTG options will be investigated further during the EIS, with potential worst-case parameters being assessed across various models/options. The WTGs will be three-bladed with the rotor and nacelle mounted on a tower with an internal ladder or lift.

The WTGs would be installed at final locations to be confirmed within a 100 m micro-siting buffer of the proposed locations identified in the EIS, with the current conceptual locations shown on **Figure 3.1**.

3.4 Ancillary Infrastructure

Ancillary infrastructure required to support the construction and operation of the Project is presented in **Table 3.1** above and includes, but is not limited to:

- Collector substation and switchyard.
- Underground and overhead transmission lines.
- Permanent meteorological masts.
- Hardstands.
- Internal access tracks and site access points.

Temporary construction facilities from Stage 1 are proposed to be re-used to facilitate the construction of the Project. These facilities would include site offices and compounds, rock crushing facilities, concrete batching plants, stockpiles and materials storage compounds, temporary laydown areas, minor construction access roads, temporary meteorological masts. All temporary facility sites will be rehabilitated once they are no longer required, in accordance with the anticipated conditions of consent for Stage 1.

3.4.1 Grid Connection

As noted in **Section 3.1** above, the Project will include power infrastructure providing indirect connection to the NEM via Stage 1. This will occur via an on-site substation and transmission line to connect the proposed WTGs to the Stage 1 electrical reticulation network, which then extends approximately 21 km from the Stage 1 on-site substation to the 330 kV Liddell Substation adjacent to the decommissioned Liddell Power Station. A grid connection enquiry has been undertaken by Ark which identified that there is sufficient space for a new bay in the northwest corner of the switchyard at the Liddell Substation to support the Project.

An alternate option was considered, which would have provided grid connection via the transmission line proposed as part of the New England Transmission Project. The preliminary study corridor for the New England Transmission Project travels south from the New England REZ to the 330 kV Liddell Substation within the HCC REZ, passing approximately 7 km west of the Project boundary along its proposed route. Grid connection via the New England Transmission Project was considered and explored during the scoping phase of the Project. However, this option is currently not in active negotiation with the relevant landowners.

Further information regarding the grid connection / transmission line alternatives is provided in **Section 3.7.1** of this report.

3.5 Access

Access to the Project Area is proposed via the existing road network and will follow the preferred route identified for Stage 1. Primary access will likely be via Scumlo Road off the New England Highway, which provides connection to the Port of Newcastle. Scumlo Road traverses the southern extent of Project Area in a north to south direction before connecting to Albano Road which continues north throughout the northern extent of the Project Area. The proposed access points are shown on **Figure 3.3**, which would be gated and secured, and appropriate warning signs erected.

The Project access points, local access road connections and approach routes to the Project will require further investigations during preparation of the EIS and will be developed in combination with site planning and WTG location selection.

The Project will seek to allow heavy and light vehicles to use other public roads not discussed above, but only to:

- Undertake pre-construction minor works.
- Construct intersection upgrades, if necessary.
- Undertake dust suppression.
- Procure resources from licenced operators which are located along these roads.

Over-sized, over-mass (OSOM) vehicle transport will be required to transport WTG components to the Project Area, which may be required from several ports across Australia. The proposed transport route would aim to utilise that which was assessed for Stage 1, as indicated in **Figure 3.3**. Any road upgrades to the proposed transport route would occur for Stage 1 and reused for Stage 2, no further road upgrades are therefore anticipated to be required as a component of Stage 2.

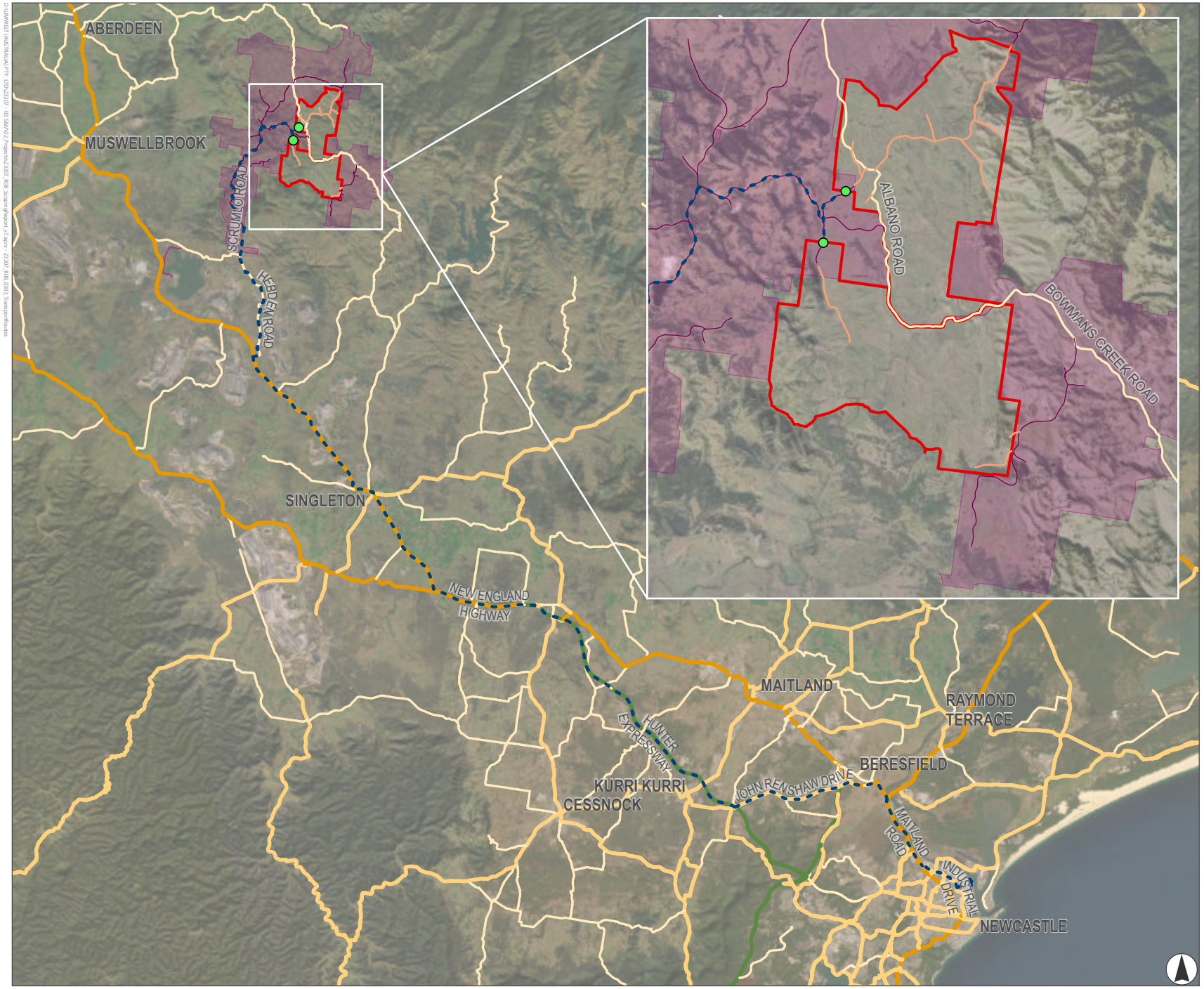


FIGURE 3.3

Project Area Access and Transport Route

Legend

- Project Boundary - Stage 2
- Project Boundary - Stage 1
- Transport Route (as approved under Stage 1)
- Access Tracks - Stage 2
- Access Tracks - Stage 1
- Motorway
- Primary Road
- Arterial Road
- Sub-arterial Road
- Main Site Entry

0 10 20

Kilometres

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3.6 Development Corridor

The Project Boundary is the maximum spatial extent of the Project defined by all current land access available to Ark Energy. It includes all Lot and DP for involved landholders and encompasses all aspects of the Project except for the off-site transport route. The Project Area encompasses all land within and including the Project Boundary and covers approximately 3,552 ha.

The indicative Development Corridor for the Project is shown in **Figure 3.1**. The Development Corridor is defined as the area within which all WTG and associated infrastructure will be placed, providing the necessary flexibility for the detailed design of the Project whilst also allowing a detailed environmental assessment process to be completed. The Development Corridor is of variable width (to avoid key constraints) however it generally comprises:

- A variable (typically 100 m) radius buffer around proposed WTGs.
- A variable (typically 100 m) buffer around access tracks.
- A variable (typically 80 m) buffer measured from the edge of all other Project-related infrastructure.

The proposed Development Corridor associated with the Project is approximately 428 ha based on the current indicative Project layout, which will be subject to further design refinement and revision as the Project progresses. This represents approximately 12% of the total Project Area.

The proposed Disturbance Area for the Project i.e., the area proposed to be disturbed as a result of the Project, will be within the Development Corridor and is subject to further detailed design as the assessment process progresses. The proposed Development Corridor is a conservative area for early assessment purposes and the proposed Disturbance Area will likely be significantly smaller, subject to further detailed assessments and design.

Currently, the Disturbance Area is approximately 168 ha, or approximately 5% of the total Project Area.

3.7 Project Alternatives

The Project location was selected due to:

- A reliable wind resource and access to this wind resource consistently across the Project Area.
- Its position within the Hunter-Central Coast REZ but proximity and access to existing transmission infrastructure including the 330 kV Liddell Substation.
- Its location, being adjacent to Stage 1, which allows for the beneficial re-use of temporary and permanent ancillary infrastructure and grid connection.
- Relatively low density of housing within the closest towns to the Project, including Bowmans Creek, Goorangoola, and Hebden.
- Well progressed neighbour agreements with nearby residences already involved as Host residences for Stage 1.

- Much of the Project Area being historically cleared for agricultural use, resulting in generally large areas of cropped land within and surrounding the Project Area.
- The Project being compatible with existing agricultural land uses, with minimal impact to current farming activities being anticipated during both construction and operation of the Project, refer to **Section 6.2.8.4** of this report for further information.
- Proximity to the existing public road network.
- Consideration of other important social and environmental values.

The indicative Project layout documented in this Scoping Report (refer **Figure 3.1**), informed by discussions with Host residences, has been subject to a number of design iterations to incorporate feedback received during this stage of the Project.

A number of alternative Project options have been considered to date by Ark Energy:

- A 'do nothing' approach. This option does not meet Ark Energy's commercial objectives to develop renewable energy projects in NSW; and does not assist to support the strategic context outlined in **Section 2.0** or achieve the Project Objectives outlined in **Section 1.2**. Accordingly, it has not been considered any further.
- The development of a wind farm of up to 25 WTGs within the Project Boundary. This option was originally proposed at Stage 2 and preliminary investigations were commenced to understand the suitability of this option, including field reconnaissance surveys undertaken by Cumberland Ecology in December 2022 (refer to **Section 6.2.3** below) as well as internal civil design undertaken by Ark Energy. Results of the preliminary investigations identified constraints at a number of proposed WTG locations. WTGs were micro-sited to avoid areas of high value biodiversity and/or areas requiring substantial civil engineering or were removed entirely as impacts were considered too substantial. This in turn formed the reduced project design inclusive of 21 WTG's, which forms the basis of this Scoping Report.
- Options for grid connection and the transmission line route, refer **Section 3.8.1** below.

The option to develop a wind farm of up to 21 WTG within the Development Corridor (summarised in **Section 3.7** and identified in **Figure 3.1**) is currently preferred as it:

- Allows for the positioning of all WTGs to be located on land extensively cleared for agricultural purposes, avoiding areas of intact native vegetation.
- Incorporates feedback from Host residences.
- Optimises the layout with respect to other key environmental matters (e.g., visual, noise, biodiversity and heritage constraints), whilst maintaining a feasible wind farm project that can contribute to both Commonwealth and NSW commitments to increase renewable energy generation and reduce carbon emissions across the NSW and Australian economies.
- Provides the potential for the Project to enable a future modification to Stage 1 that would reduce the overall distance of the combined transmission line infrastructure (because a more direct route is available via the Project's land access) and associated environmental impacts.

This option (as presented in this Scoping Report) is proposed to be progressed to the EIS stage following receipt of the SEARs, noting that the Project layout will be subject to further refinement and ongoing design development to minimise impacts on the environment and community. This will be informed by the further technical and environmental studies and continued community and stakeholder engagement undertaken to support the Project EIS.

At time of lodgement of the EIS, the specific technology provider for the WTGs and ancillary infrastructure may not have been selected and may change during future stages of development. As such, reasonable worst-case assumptions will be used to facilitate impact assessment in the EIS.

3.7.1 Grid Connection / Transmission Line

Several options were considered for the grid connection and transmission line route, including possible connections to the:

- Proposed New England Transmission Project.
- 330 kV Liddell Substation via Stage 1.

The proposed grid connection option (being the 330 kV Liddell Substation via Stage 1) presented in this Scoping Report was selected as it has been subject to assessment and landowner agreement are already successfully secured as a component of Stage 1, thus minimising any additional environmental and social impacts.

This preferred option includes approximately 15 km of internal electrical reticulation to connect the WTGs to Stage 1, which includes an approximate five (5) km long overhead transmission line in the southern portion of the Project Area. This portion of the internal network has the potential to interact with and impact existing native vegetation and habitat that is present. Should unacceptable impacts be identified during the EIS with this alignment, Ark Energy will continue to explore alternative routes/options to minimise the overall impact of the transmission infrastructure.

The alternative New England Transmission Project grid connection option was investigated during the scoping phase but found to not be viable as additional land access requirements for the purpose of that transmission alignment was deemed unviable, as well as substantial competing interest from various renewable energy proponents within the vicinity of the preliminary study corridor proposing connection to the New England Transmission Project.

Options for the Project's grid connection and associated transmission line alignment (and design) will be investigated further during the EIS. Amongst other things, environmental and social aspects of this investigation will focus on the potential to avoid and/or minimise impacts to existing native vegetation present and habitat throughout the proposed transmission line alignment. Further information regarding biodiversity aspects of the Project is summarised in **Section 6.2.3** and detailed within the 'Biodiversity Constraints Assessment' report contained as **Appendix F** of this Scoping Report. Other transmission line alignment options identified during the EIS would be contingent of securing appropriate landowner agreement.

3.8 Strategies to Avoid or Minimise Impacts

The key impact avoidance and minimisation strategies implemented by Ark Energy during the early stages of design development included establishing an area (defined by Ark Energy) beyond which Project WTGs and ancillary infrastructure would not occur. It was established based on:

- A comprehensive review all waterbodies within the Project Boundary.
- A 100 m buffer to road reserves, with the exception of access tracks which may intersect road reserves.
- A ~100 m buffer from the Project Boundary to any WTG, with exceptions for residences already involved in Stage 1.
- WTG locations being placed in locations that are compatible with Host residences' existing land uses.

The key strategies implemented by Ark Energy during the Scoping stage to avoid and minimise impacts ultimately included the reduction of the indicative Project layout, which was undertaken through:

- The completion of a reconnaissance survey to understand ecological constraints and reduce/adjust the Development Corridor accordingly.
- The relocation of WTG and associated ancillary infrastructure to existing areas of cleared land to avoid native vegetation clearing, where possible.
- The reduction of the extent of the Project Area to avoid areas of unfavourable topography.
- The identification of major watering points within the Project Area to inform the siting of Project-related infrastructure.
- Siting of WTGs and other infrastructure (i.e., access tracks) to best utilise the infrastructure of Stage 1, reducing the overall impact of Stage 2 through the sharing of infrastructure.

3.8.1 Summary of Avoidance/Minimisation and Next Steps

During the Scoping stage, the indicative Project layout (and Development Corridor) was revised to accommodate the abovementioned avoidance and minimisation strategies, with each revision incorporating multiple constraints-based changes.

The Project layout will be subject to further refinement during the EIS and further design development to minimise impacts on the environment and community. It will be revised as more social and environmental information is received, constraints are identified, further technical studies and environmental assessments occur and further feedback from stakeholder and community engagement is received.

At time of lodgement of the EIS, the specific technology provider for the WTGs may not have been selected and may change during future stages of development. As such, reasonable worst-case assumptions will be used to facilitate impact assessment in the EIS.

4.0 Statutory Context

The relevant statutory requirements for the Project are summarised in the following sections.

4.1 NSW Approval Pathway

The EP&A Act is the primary instrument which regulates the environmental impact assessment and approval process for development in NSW.

The Project will require development consent under Part 4 of the EP&A Act. Being development for the purpose of electricity generation with a capital investment value of more than $30 million, the Project is declared to be SSD under the provisions of the *State Environmental Planning Policy (Planning System) 2021* (Planning Systems SEPP). The development application will be lodged with DPHI. Currently the Project has a CIV estimated at$210 million dollars.

Section 4.15 of the EP&A Act describes the matters for consideration in assessing SSD, which includes the provisions of relevant environmental planning instruments (EPIs), proposed instruments that have been the subject of public consultation, development control plans, planning agreements and statutory regulations. The assessment of SSD must also consider the likely impacts of the development, suitability of the site, any submissions received and the public interest.

4.1.1 Consent Authority

Under Section 4.5(a) of the EP&A Act the consent authority for SSD is the (if the development is of a kind for which the Commission is declared the consent authority by an environmental planning instrument) or the Minister (if the development is not of that kind).

In accordance with clause 2.7(1) of the Planning System SEPP if any of the criteria identified below are exceeded the IPC is the consent authority:

- Singleton or Muswellbrook Council/s object to the application.
- 50 submissions (other than from the Councils noted above) are made objecting to the Project.
- Ark Energy discloses a reportable political donation.

If none of the above criteria are triggered, DPHI will determine the development application on behalf of the Minister.

4.1.2 Permissibility

As outlined in **Section 2.2**, the Project Area is situated predominately within the Muswellbrook LGA and partly in the Singleton LGA's. The Project Area is zoned as RU1 Primary Production within the Muswellbrook Local Environmental Plan (LEP) 2009 and Singleton LEP 2013 (refer to **Figure 4.1** below). Electricity generating works are not permitted within the RU1 zoning in each of these LEPs.

Clause 2.36(1)(b) of *State Environmental Planning Policy (Transport and Infrastructure) 2021* (TI SEPP) states that 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. Under Clause 2.7(1) of the TI SEPP, the provisions prevail where there are inconsistencies with any other EPIs, including LEPs. Due to the operation of Clause 2.36(1)(b) of the TI SEPP the Project is permissible with development consent.

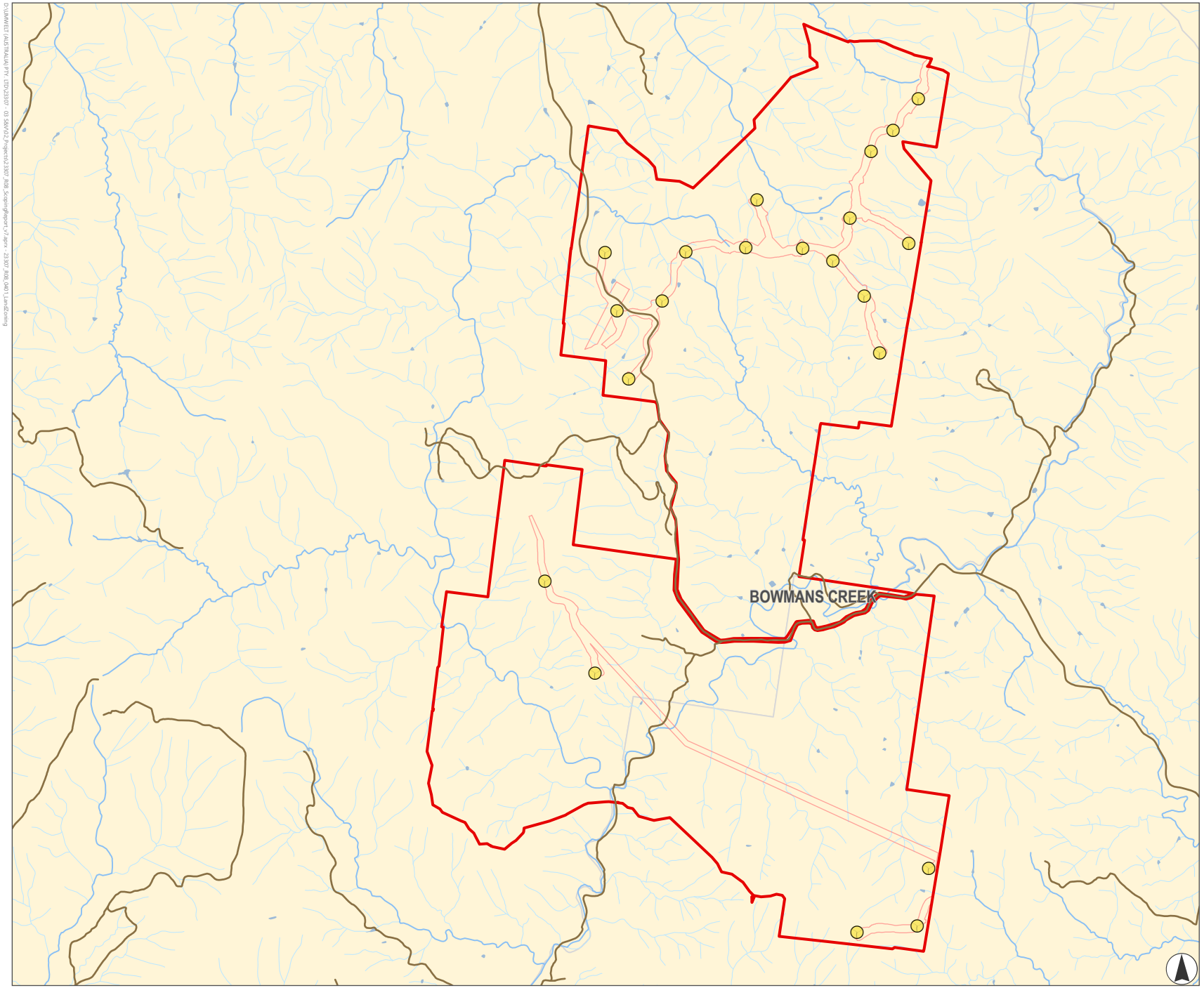
4.1.3 Other Approvals

In addition to development consent under the EP&A Act, several other NSW Acts or planning policies are applicable or potentially applicable to the Project. **Table 4.1** identifies the other NSW legislation and policies and their applicability to the Project.

Table 4.1 NSW Legislation

State Legislation	Description
Biodiversity Conservation Act 2016 (BC Act)	Under the BC Act, biodiversity assessment in accordance with the Biodiversity Assessment Method (BAM) is required for any SSD project. The Project (as SSD) triggers the need to prepare a Biodiversity Development Assessment Report (BDAR) in accordance with the BAM. The EIS will include a BDAR.
Protection of the Environment Operations Act 1997 (POEO Act)	The POEO Act regulates pollution to the environment and requires licences for environment protection including waste, air, water, and noise pollution control. Wind farms are a scheduled activity under the POEO Act and require an Environment Protection Licence (EPL). An EPL would be sought in relation to the construction and operation of the Project.
Water Management Act 2000 (WM Act)	Any water extractions from water sources (i.e. surface and groundwater) regulated by a Water Sharing Plan (WSP) required for construction or operational purposes will require licensing under the WM Act. The potential water requirements during construction and operation will be assessed as part of the Water and Soil Impact Assessment prepared as part of the EIS. Any necessary licences would be obtained for the Project.
Crown Land Management Act 2016 (Crown Land Act)	The Crown Land Act provides for the administration and management of Crown Land in NSW. Crown land may not be occupied, used, sold, leased, licensed, dedicated, reserved or otherwise dealt with unless authorised by the Crown Land Act. There are some areas of Crown Land (e.g. Crown reserves) within the Project Area and should any works be proposed in these areas an approval would be obtained.
Contaminated Land Management Act 1997 (CLM Act)	The CLM Act establishes the process for investigating and if required, remediating land that the NSW EPA considers to be contaminated significantly enough to require regulation. The Project Area does not contain land listed on the Contaminated Lands Register. Relevant mitigation and management measures would be incorporated as part of the Project to address potential contamination issues.

FIGURE 4.1
Land Use Zoning



Legend

- Project Boundary - Stage 2
- Development Corridor - Stage 2
- Turbine Locations - Stage 2
- Waterbodies
- Major Watercourse
- Minor Watercourse
- Roads and Tracks

Land Zoning

(Muswellbrook LEP 2009, Singleton LEP 2013, Upper Hunter LEP 2013)

- RU1 Primary Production

0 1 2

Kilometres

Scale1:60,000 at A4
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4.2 Commonwealth Legislation

4.2.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a framework for protection of the Australian environment, including its biodiversity and its natural and culturally significant places.

Any action which will or is likely to have a significant impact on a matter of national environmental significance (MNES) must be referred to the Commonwealth Minister for the Environment. MNES include:

- World heritage properties.
- National heritage places.
- Wetlands of international importance (listed under the Ramsar Convention).
- Listed threatened species and ecological communities.
- Migratory species protected under international agreements.
- Commonwealth marine areas.
- The Great Barrier Reef Marine Park.
- Nuclear actions (including uranium mines).
- A water resource, in relation to coal seam gas development and large coal mining development.

The Project Area is not within a world heritage property or place, does not have wetlands of international importance, is not within either a Commonwealth marine area or the Great Barrier Reef Marine Park, and does not relate to a nuclear action, coal seam gas or coal mining development.

There is potential for the Project to impact on listed threatened species, ecological communities, and migratory species under the BC Act and EPBC Act, respectively. Further consideration of potential impacts to MNES is provided in **Section 6.2.3**.

A EPBC Act Referral will be lodged to determine whether the Project requires formal assessment and approval under the EPBC Act as a Controlled Action. If deemed a Controlled Action, it is expected that the Project would be assessed under the bilateral agreement between the NSW and Commonwealth Governments.

4.2.2 Civil Aviation Regulations 1988

Reporting of tall structures to the Royal Australian Air Force (RAAF) is required under the *Civil Aviation Regulations 1988*. A detailed assessment in accordance with the regulations and consultation with the relevant agencies will be undertaken as part of the preparation of the EIS.

4.2.3 Heavy Vehicle National Law

Approvals would be required for the transport of WTGs and associated infrastructure by OSOM vehicles. The requirements for such OSOM transport will be assessed via a route analysis study as part of the EIS.

4.3 Statutory Requirements Summary

This section provides an overview of the key statutory requirements for the Project. The statutory requirements addressed in **Table 4.2** are categorised as per the SSD Scoping Report Guideline.

Table 4.2 Statutory Requirements Summary

State Legislation	Detail	Comment
Power to grant consent	The legal pathway under which consent is to be sought, why the pathway applies, and who the consent authority is likely to be.	As outlined in **Section 4.1.1**, the Project requires approval under Part 4 of the EP&A Act being SSD. The consent authority will be the IPC or DPHI based on the number and type of any objections to the Project, or any political donations made by Ark Energy or related entities.
Permissibility	The relevant provisions affecting the permissibility of the Project, including any land use zones. Any provisions or actions being taken that would allow the Project to be considered on its merits, where the Project would otherwise be partly or wholly prohibited.	As outlined in **Section 4.1.2**, the Project Area is zoned RU1 Primary Production within the Muswellbrook LEP 2009 and Singleton LEP 2013. Electricity generating works are not permitted within the RU1 zoning in any of the above-mentioned LEPs. Clause 2.36(1)(b) of the TI SEPP states that 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. Under Clause 2.7(1) of the TI SEPP, the provisions prevail where there are inconsistencies with any other EPIs, including LEPs. Therefore, the Project is permissible with development consent.
Other approvals	Other approvals that are required to carry out the Project and why they are required.	**Section 4.1.3** provides a list of other NSW approvals required or that may be required for the Project. **Section 4.2** discusses potential Commonwealth approvals that may be required for the Project.
Pre-conditions to exercising the power to grant consent	Pre-conditions to exercising the power to grant consent for the Project that may be relevant to setting the SEARs.	An EIS will be prepared in accordance with relevant legislative requirements and guidelines. No pre-conditions to exercising the power to grant consent for the Project are currently envisaged.
Mandatory matters for consideration	Matters that the consent authority is required to consider in deciding whether to grant consent to any development application for the Project that may be relevant to setting the SEARs.	As outlined in **Section 4.1**, Section 4.15 of the EP&A Act describes the matters for consideration in assessing SSD, which includes the provisions of relevant environmental planning instruments, proposed instruments that have been the subject of public consultation, development control plans, planning agreements and statutory regulations. The assessment of SSD must also consider the likely impacts of the development, suitability of the Project site, any submissions received and the public interest. All relevant mattes will be addressed in the EIS based on the outcomes of environmental assessments to be undertaken (refer to **Section 6.0**).

5.0 Engagement

Ark Energy recognise that respectful, inclusive, and meaningful engagement is fundamental to the development of wind farm projects, and that effective engagement is a key component of the SSD process, in line with the NSW Government's Engagement Guidelines (DPIE, 2021f).

Ark Energy acknowledges that effective engagement requires everyone involved to do their part, at the appropriate stage in the process. Ark Energy aims to provide engagement that is meaningful, proportionate and tailored to the needs of the community, councils and government agencies as well as outlining the statutory context that ensures the community can participate in planning and assessment.

Accordingly, Umwelt (on behalf of Ark Energy) has prepared a Community and Stakeholder Engagement Plan (CSEP) for the Project to outline the objectives and approach to community engagement throughout the life of the Project from development through construction and operation. The CSEP is provided as Appendix A of the SISR (**Appendix C**). The following section provides a summary of the CSEP, the consultation undertaken to date and key issues raised.

5.1 Community and Stakeholder Engagement Plan

The CSEP identifies the stakeholder engagement approach and objectives for the Project and the surrounding communities, namely it aims to:

- Identify effective methods to inform the community of Project information and updates, which foster trust and build positive long-term relationships with community stakeholders.
- Ensure delivery of an honest, innovative, flexible and transparent community engagement process.
- Identify ways to facilitate engagement and collaborate with relevant community organisations, including for input into the social and environmental assessment of the Project and ongoing project design and planning including the development of community benefit sharing programs.
- Ensure the broader community and stakeholders are kept informed about benefits, potential impacts, and activities of the Project.
- Identify effective avenues for community members to communicate any concerns and provide valuable feedback with Project personnel.
- Ensure means of community involvement are known and distributed consistently.
- Ensure the commitments made to the community during the Project development stage are being met.

The CSEP provides an overview of Ark's approach to stakeholder engagement throughout all stages of the Project, outlines the Project and the relevant stakeholders, outlines the key messages of the Project and outlines the approach to monitoring and evaluating the effectiveness of the engagement program.

5.2 Stakeholder Engagement

Engagement with local community on the Stage 2 Project commenced in March 2024 and has predominantly been undertaken by the Ark's Project team, supported by Umwelt. The Project team have engaged in a range of activities, including hosting a community drop-in session and discussing the Stage 2 Project with neighbouring landholders and local stakeholders online to build and maintain genuine, trusting relationships. The overall approach to consultation with local community is to be flexible, inclusive, open and responsive.

Stakeholder and community engagement has been undertaken early in the Scoping phase to:

- Proactively inform Project design and development.
- Identify perceived issues/impacts to be addressed in the assessment process.
- Establish stakeholder relationships with Host landholders, near neighbours and key stakeholders for the Project.

The key stakeholders identified for the Project within each stakeholder group are outlined in **Table 5.1**.

Table 5.1 Identified Stakeholders

Stakeholder Group	Stakeholders
Host Landholders	• One (1) landholder.
Proximal Landholders	• 78 landholders within 8 km of a Project WTG.
Residents in Neighbouring Communities	• Study localities SALs - McCullys Gap, Rouchel Brook, Bowmans Creek, Muscle Creek, Hebden, Goorangoola. • Study localities UCLs: Singleton and Muswellbrook.
Local Government	• Singleton Council. • Muswellbrook Shire Council. • Upper Hunter Shire Council. • Mayor, Councillors, Executive Team.
Broader Regional Community	• Study localities LGAs – Singleton, Muswellbrook and Upper Hunter.
Traditional Owners	• Wanaruah Local Aboriginal Land Council. • Wonnarua Nation Aboriginal Corporation. • Other Registered Aboriginal Parties.
Community and Special Interest Groups	• McCullys Gap and Muscle Creek Community Association. • McCullys Gap Rehabilitation Sustainability Community Group Inc. • NSW Farmers – Hunter Branch. • Stop the Spin. • Hunter Region Landcare Network. • Hunter Bird Observers Club. • Local Hall Committees. • Muswellbrook Shire Local and Family History Society Inc. • Singleton Beef and Land Management Association. • Upper Hunter Thoroughbred Breeders Association. • Lions Club of Muswellbrook.

Stakeholder Group	Stakeholders
	• Rotary Club of Muswellbrook. • Country Women's Association (Muswellbrook and Singleton). • Rural Fire Service (Singleton and Aberdeen). Upper Hunter Community Services.
Local/Regional Businesses and Service Providers	• Muswellbrook Chamber of Commerce. • Business Singleton. • Superair. • Westpac Rescue helicopter. • Real estate agents/ social housing support.
State Government	• DPHI Secretary. • DPHI Director-Energy Infrastructure and Renewable Energy Zones. • NSW Environment Protection Authority (EPA). • Aboriginal Affairs NSW. • Transport for NSW. • Regional Development Australia. • Division of Resources and Geoscience. • Department of Industry. • TransGrid. • Local land services. • NSW Rural Fire Service. • Department of Defence (Richmond and Newcastle). • Civil Aviation Authority. • Airservices Australia. • National Park and Wildlife Services (NPWS).
Commonwealth Government	• Department of Environment and Energy. • Federal Wind Commissioner.
Local Media	• Muswellbrook Chronicle. • Singleton Argus. • 98.1 Power. • 2NM Radio Hunter Valley. • ABC Upper Hunter.

5.2.1 Community Engagement

Ark Energy and Umwelt have commenced stakeholder engagement as part of the scoping phase. The community consultation undertaken to date is summarised in **Table 5.2.**

It is noted that the formal notification process for the Aboriginal Cultural Heritage Assessment will commence following submission of the Scoping Report to DPHI. Once commenced, detailed consultation will be undertaken with the Registered Aboriginal Parties (RAPs) for the Project. Consultation will be undertaken in accordance with the Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW, 2010a). Further detail on the proposed EIS stage heritage assessment is provided in **Section 6.2.4.1**.

Table 5.2 Consultation Mechanisms Implemented During the Scoping Phase

Mechanism	Targeted Stakeholder Group	Description	Scoping Phase (Round 1)
Website	Broader community	Project website established with an email address, phone line and feedback form provided: https://arkenergy.com.au/wind/bowmans-creek/	Project website established to provide project updates throughout Project life for all stakeholders.
Phone Call	State Government Local Government	Brief phone call to introduce Ark Energy to the intended recipient of the call (if not introduced already), and to provide a general introduction to the Project.	Phone calls were made to Councils and State MP's to introduce the Stage 2 Project, which was followed up by a Project newsletter, discussed below.
Newsletters	Neighbouring landholders / residences Broader community	Provision of a newsletter to the local community and other interested stakeholders to provide an update on the Project. Newsletters were also made available online via the Project website page.	A Project introduction newsletter was distributed in March 2024 to all residences within 8 km of a Stage 2 WTG, plus existing stakeholder mailing list for Stage 1, and Councils/MP's previously consulted with. This newsletter was distributed to 154 individual addresses.
Project Information Booklet	Neighbouring landholders / residences Broader community	Preparation of a physical booklet which includes Project information to be shared with the local community and stakeholders.	40 physical copies were made available at the community information session.
Project Briefings	State Government Local Government	Formal briefings to key stakeholders and government agencies, with Project Information Sheet and/or slide deck to formally introduce the Projects.	Project briefings were provided to both Singleton Shire and Muswellbrook Shire Councils on 30 April 2024 and 14 May 2024, respectively, to present the Stage 2 Project.
Personal meetings or interviews	Neighbouring landholders / residences Community and Special Interest Groups Traditional Owners Local business and service providers	Personal meetings and briefings to identify any key issues arising from operational activities, suggestions for mitigation and enhancement measures and to share information regarding future planning.	One-on-one phone interviews with nearby and adjacent landholders took place with 5 landholders in April 2024. 40 landholders were contacted by phone or emails to be involved in an interview or complete the survey.

Mechanism	Targeted Stakeholder Group	Description	Scoping Phase (Round 1)
Community information session	Neighbouring landholders / residences Broader community Community and Special Interest Groups Traditional Owners Local business and service providers	Host community information sessions held at local venues to identify any key issues arising from operational activities, suggestions for mitigation and enhancement measures and to share information regarding future planning.	An initial community information session was held on 3 April 2024 from 4-6pm at the Mount Olive Community Centre. An invitation to attend the session was included in the March 2024 newsletter, which was sent to all residences within 8 km of a Stage 2 WTG. 28 community members attended.
Local media	Broader community	Provision of information sharing via local media outlets.	Appearance on ABC Newcastle Radio Station on 2 April 2024 to provide a Project update and details on the upcoming community information session.
Survey	Host residences Neighbouring landholders / residences	The SISR survey was provided to stakeholders during community information sessions, with an online survey also available for stakeholders to complete. Survey links were distributed via email to 32 stakeholders who either did not participate in the information session or had not yet completed the survey. The intent of the survey was to collect feedback about the Project, and more specially: • Perceived impacts and opportunities of the Project. • Community values and needs. • Proposed mitigation and enhancement strategies. • Experience with Ark Energy to date and future engagement preferences.	15 surveys completed between the 5 of April and the 23 of April 2024. Surveys were either completed during the community information session, via phone with an Umwelt representative or online.

5.2.1.1 Community Views

As discussed in the SISR (refer to **Appendix C**), the following key community views were identified in engagement conducted for the social scoping phase. When stakeholders and community members were asked directly about potential negative impacts of the Project, the top issues raised included:

- Visual amenity and changes to the landscape character.
- Increased traffic generation and potential road safety issues.
- Impacts to biodiversity.
- Changing land uses, including potential impacts to agricultural lands.
- Impacts to Aboriginal cultural values.

When community members were asked directly to identify potential positive impacts of the Project, the most frequently cited responses relate to:

- Training and education opportunities for the local community.
- Employment and business opportunities.
- Community investment initiatives.
- Positive role in the transition to low carbon-emission energy.

5.2.1.2 Community Consultation for Visual Impacts

In accordance with the Visual Assessment Bulletin, community consultation was undertaken by Ark Energy (supported by Umwelt) to establish key landscape features, define areas of scenic quality and identify key public viewpoints valued by the community.

As of May 2024, a total of 15 community engagement surveys have been completed of which 11 responded specifically to the visual related questions. These responses were incorporated into the Preliminary Visual Impact Assessment (PVIA) (attached as **Appendix D**). Further discussion on preliminary visual consultation is discussed in **Section 5.4**.

The community engagement identified the “view & picnic areas along the Rouchel/Albow/Storey Creek roads from Goorangoola to Aberdeen”, and the “Mount Royal - World Heritage Gondwana Forest” as the key public viewpoints in the local area.

5.2.1.3 Continued Engagement

Ark Energy will continue to implement the CSEP throughout the Project assessment phase, with support from Umwelt. Key consultation mechanisms and activities will include:

- One-on-one meetings and phone calls.
- Email/letter updates and Project newsletters.
- The maintenance of a Project website.

- Community information sessions.
- Community surveys.

Further detail on the planned consultation mechanisms is provided in the CSEP (Appendix A of **Appendix C**).

5.3 Agency and Elected Official Stakeholder Engagement

Agency and elected official consultation undertaken to-date in relation to the Stage 2 Project is provided in **Table 5.3** below.

Table 5.3 Summary of Agency Consultation undertaken during the Scoping phase

Agency	Date	Mechanism	Details
Member for Hunter (Dan Repacholi)	15 March 2024 25 March 2024	Phone call Newsletter	Phone call introducing the Project. Newsletter issued to introduce Project
Member for Upper Hunter (Dave Layzell)	15 March 2024 25 March 2024	Phone call Newsletter	Phone call introducing the Project. Newsletter issued to introduce Project
Mayor – Singleton Council (Sue Moore)	15 March 2024 25 March 2024	Phone call Newsletter	Phone call introducing the Project. Newsletter issued to introduce Project
Mayor – Muswellbrook Shire (Steve Reynolds)	15 March 2024 25 March 2024	Phone call Newsletter	Phone call introducing the Project. Newsletter issued to introduce Project
Singleton Shire council (Mary-Anne Crawford)	15 March 2024 22 March 2024	Phone call Newsletter	Phone call introducing the Project. Newsletter issued to introduce Project
Muswellbrook Shire Council (Sharon Pope)	15 March 2024 22 March 2024	Phone call Newsletter	Phone call introducing the Project. Newsletter issued to introduce Project
Singleton Shire Council	30 April 2024	Meeting	Meeting to introduce the Stage 2 Project.
Muswellbrook Shire Council	14 May 2024	Meeting	Meeting to introduce the Stage 2 Project to Council Development team and SSD committee.
DPHI	17 May 2024	Meeting	Scoping Meeting prior to requesting SEARs.
Commonwealth DCCEEW	June 2024	Meeting	Planned pre-EPBC Act Referral lodgement meeting to discuss Stage 2 Project and potential impacts to MNES.

Consultation with agencies and elected officials to date has been primarily to commence engagement, introduce the Project and key Project team members. As outlined in **Section 2.3**, the Project Area is situated largely within the Muswellbrook Shire Council LGA, with the south-eastern portion of the Project Area falling within the Singleton Shire LGA. Consultation with these Councils has occurred with briefings provided by Ark Energy. Council personnel were also invited to attend the community information session.

Consultation with further agencies will be undertaken throughout the assessment process, in accordance with the SEARs for the Project.

5.4 Preliminary Visual Consultation

A key component of the Scoping phase consultation conducted for the Project was gaining an understanding of community opinions and views regarding visual and landscape values. Consultation with proximal neighbours included targeted questions relating to visual aspects of the Project. To avoid known issues with consultation fatigue these questions were incorporated into the broader community and stakeholder engagement that occurred for the Project.

In summary, the format of this visual consultation included written notification/newsletter, online surveys, phone interviews and face-to-face meetings, in addition to the community drop-in session held in April 2024. Where possible, participants were asked targeted questions relating to visual and landscape features, including:

> What are the most significant landscape features in the area? (i.e., significant hills, ridgelines etc.)
>
> What are the key public viewing locations in the area of the Project and its surrounds?

By comparison to online surveys and questionnaires, phone interview and face-to-face meeting based consultation was able to be extended (via open communicative dialogue) to seek deeper insights and feedback from participants on these specific matters. This information was reviewed by the Umwelt social team and specialist visual consultant to evaluate community views relating to the visual significance of landscape features as outlined in the Visual Bulletin.

Attendees at the community information session raised concerns around landscape and visual impacts associated with the Project, particularly those who may already be subject to visual impacts associated with Stage 1:

> "Visual impact on existing Stage 1 participants"
>
> "Landscape change, concern with Stage 1"

Residents of nearby communities also raised concerns relating to changes the Project may have to the broader visual landscape in the area, and the inability to manage outstanding visual impacts.

> “Due to the enormous height of the turbines it will be impossible to remove them from the view just about anywhere ."

There were 15 online surveys completed at the time of preparation of this report (June 2024), of which 11 responses were received relating to the general visual questions. Additional methods for broader community engagement as described in **Section 5.2**, include the Project newsletter, which was delivered by Australia Posts Unaddressed mail system to all receivers within 8 km of a Stage 2 WTG, plus existing stakeholder mailing list for the Stage 1 project. This mail out also included a QR code to access the online survey. The verbatim responses to the general visual questions are outlined in **Table 5.4** below.

Ongoing consultation on these matters will occur during the EIS and incorporated into the detailed Landscape Character and Visual Impact Assessment (LCVIA) that is to be prepared in accordance with the requirements of the Visual Bulletin. This ongoing consultation represents the first step in the detailed LCVIA process which relates to the preparation of visual baseline study inputs, including consulting the community on aspects of the baseline study. The detailed LCVIA is a key component of the EIS, as described further in **Section 6.2.1**.

Table 5.4 Verbatim Responses to General Visual Questions

Question	Verbatim Response
What are the most significant landscape features in the area? (i.e. significant hills, ridgelines etc.)	• *"Yellow Rock – We ware hilly to undulating we do have big hills and we do have little hill and we have this majestic valley and the majority of the ridgelines have been extensive cleared so they are ticking the boxes for this project."* • *"All the hills and ridge lines are significant".* • *"Yellow Rock mountain; Up the creek - Brothers at head creek; the whole 360 degree view".* • *Yellow Rock; Bulla Ridge".*
What are the key public viewing locations in the area of the Project and its surrounds?	• *"The view & picnic areas along the Rouchel/ Albow/ Storey Creek roads from Goorangoola to Aberdeen".* • *"Mt Royal - World Heritage Gondwana forest".* • *"Greenlands valley looking to the West".* • *"Top of hill - entrance to airstrip paddock and top of hill on Albana road".*
What do you see as the negative impacts associated with the current Project (Stage 2) and why? What could Ark Energy do to reduce these impacts	• *"Decline of visual amenity".* • *"Industrialisation of the landscape".* • *"Navigation lights and light flicker".* • *"…Have been offered visual screening and $1000 off power bill – but it's not good enough."* • *"Screening won't work for visual (take time to grow)".*

5.4.1 Proximal Neighbours (Blue and Black Line of Visual Magnitude)

Given feedback from community, and the potential for visual impacts to occur at residences with direct views of (and in close proximity to) a wind farm, a proactive approach to stakeholder engagement with proximal neighbours has occurred, most notably those within the 'black line' of visual magnitude (refer **Section 6.2.1** and **Appendix D**).

There are a total of 12 residences within the 'black line', of which three (3) are residences of one (1) host landholder. Of the remaining nine (9) residences, Ark Energy has substantially progressed engagement activities with four (4) residences and has neighbour agreements in place at these locations. These locations are nominated as 'associated' residences throughout this Scoping Report.

Of the remaining five (5) non-associated residences within the 'black line' of visual magnitude, Ark Energy has been able to progress potential negotiated agreements with three (3) of these residences. However, these negotiations are not yet concluded and hence these locations are nominated as non-associated residences in this Scoping Report. Further consultation with these residences will occur throughout the preparation of the EIS.

6.0 Proposed Assessment of Impacts

6.1 Key Environmental, Social and Economic Matters

A review of the environmental, social and economic matters relevant to the Project have been conducted to determine which issues need to be assessed as part of the EIS and the level of assessment that is required. This review has been undertaken with reference to the categories of assessment matters identified in the SSD Scoping Report Guideline (DPIE, 2021b) with the key issues and the proposed level and scope of assessments discussed in the following sections. The environmental and social matters relevant to the Project are identified and have been characterised (in accordance with the SSD Scoping Report Guideline) as follows:

- Matters requiring further assessment in the EIS (refer to **Section 6.2**).
- Matters requiring no further assessment in the EIS (refer to **Section 6.3**).

For the matters requiring further assessment in the EIS, **Section 6.2** identifies whether detailed or standard assessment is required (as defined by Appendix D of SSD Scoping Report Guideline). **Appendix A** presents a Scoping Summary Table showing the outcome of the scoping stage review of matters as required under the SSD Scoping Report Guidelines.

6.2 Matters Requiring Further Assessment in the EIS

The environmental, social and economic matters discussed in this section have been identified as key issues requiring further assessment as part of the EIS to fully understand the potential impacts and identify project-specific mitigation measures and/or alternatives. The relevant assessments will be undertaken in consideration of the Wind Energy Guideline (DPE, 2016a).

6.2.1 Amenity - Visual

A Preliminary Visual Impact Assessment (PVIA) has been undertaken by Moir Landscape Architecture Pty Ltd (Moir) in accordance with the requirements of the Visual Bulletin (DPE, 2016b). This section provides a summary of the outcomes of the PVIA with the full report provided in **Appendix D**.

6.2.1.1 Methodology

The following key steps were undertaken to inform the PVIA, in accordance with the Visual Bulletin:

- Desktop assessment, which involved the:
    - Application of preliminary assessment tools (including visual magnitude and multiple wind turbine tool) to determine receptors requiring further assessment.
    - Preparation of a preliminary Zone of Visual Influence (ZVI) to establish a theoretical zone of visibility of the Project.
    - Identification of key viewpoints and landscape features using available information.

- Field investigations, including undertaking photographic survey from publicly accessible land to support the preliminary assessment of the existing landscape character.
- Community consultation, to gain perspective on the landscape values held by the community to inform the PVIA.

6.2.1.2 Existing Landscape Character

The Project Area is situated on the foothills and slopes associated with the Mount Royal Range, comprising shales, sandstones, conglomerates, volcanics, and coal measures. Its surroundings are primarily characterised by undulating to rolling hills with narrow valleys transitioning to wide valleys adjoining creeks and rivers to the south of the Project Area. General elevations range from approximately 200 m in the valley flats to 800 m along the ridgelines associated with Mount Royal. Undulating to steep foothills and ridgelines associated with the Mount Royal National Park occur to the northeast of the Project Area. Extensive areas within and surrounding the Project Area have been cleared for agricultural purposes, with patches of remnant vegetation scattered on steeper sections of the Project Area.

Based on the landscape features presented above and throughout the PVIA, the following landscape character units (LCU's) were identified as occurring within the Project Area:

- LCU01 – National Parks & Nature Reserves.
- LCU02 – Vegetated Hills.
- LCU03 – Pastures & Rural Residential Properties.
- LCU04 – Mining & Electrical Production Infrastructure.

6.2.1.3 Consultation

Consultation with the community was undertaken during preparation of the PVIA to establish key landscape features and areas of scenic quality, and identify key public viewpoints valued by the community. As outlined in **Section 5.4** above, targeted questions relating to visual aspects of the Project were incorporated into the broader community and stakeholder engagement with proximal neighbours.

Attendees at the community information session raised concerns around landscape and visual impacts associated with the Project, particularly those who may already be subject to visual impacts associated with Stage 1. Residents of nearby communities also raised concerns relating to changes the Project may have to the broader visual landscape in the area, and the inability to manage outstanding visual impacts.

Community consultation will continue through the EIS phase of the Project to further inform the key landscape features and values present in the region.

6.2.1.4 Impact Assessment

Visual Magnitude Assessment

In accordance with the Visual Bulletin, proposed WTGs below the 'black line' must be identified along with the dwellings or key public viewpoints. The proposed WTGs are based on a worst-case scenario with a tip height of 250 m. As shown on Figure 10 of the PVIA, the 'black line' intersects at a distance of 3,350 m and the 'blue line' intersects at 4,950 m. Results of the visual magnitude assessment within the PVIA indicate that:

- Within the black line of visual magnitude (within 3,350 m to nearest WTG), five (5) non-associated residences were identified.
- Between the black and blue lines of visual magnitude (between 3,350 m and 4,950 m to the nearest WTG) nine (9) non-associated residences were identified.
- Between the blue line of visual magnitude and purple line (between 4,950 m and 8,000 m to the nearest WTG) 57 non-associated residences were identified.
- In total there are 78 residences (seven (7) associated and 71 non-associated) within 8,000 m of the proposed WTG locations.

As per the Visual Bulletin, the WTGs proposed under Stage 2 which are located below the 'black line' of visual magnitude at the closest residence have been identified as per **Table 6.1** below.

Table 6.1 WTGs below the 'black line' of visual magnitude

WTG within the black line (3,350 m)	Closest Residence	Residence Status
73	R17-1	Associated with the Project
74	R17-1	Associated with the Project
75	R17-1	Associated with the Project
76	Q17-1	Associated with the Project
77	Q17-1	Associated with the Project
78	Q17-3	Associated with the Project
83	S15-1	Associated with the Project
84	S15-1	Associated with the Project
85	S15-1	Associated with the Project
86	S15-1	Associated with the Project
87	S15-1	Associated with the Project
88	S15-1	Associated with the Project
89	S15-1	Associated with the Project
90	S15-1	Associated with the Project
91	S15-1	Associated with the Project
92	S15-1	Associated with the Project
93	S15-1	Associated with the Project

Multiple Wind Turbine Tool

The Multiple Wind Turbine Tool (MWTT) is designed to assess the potential cumulative impacts of multiple WTGs on public viewpoints or residences from the Project, by mapping proposed and existing WTGs within an eight (8) km radius of a residence or key public viewpoints into six sectors of 60 degrees (°).

The PVIA provides an overview of the number of 60° sectors visible from residences and public viewpoints within an 8 km radius of the Project Area, indicating the potential visibility of WTGs in the landscape. **Figure 6.3** below (Figure 12 of the PVIA) illustrates examples of how nearby residences or key public viewpoints could have visibility to WTGs in multiple 60° sectors.

The MWTT considered the presence of Stage 1 and Stage 2 WTGs to non-associated residences within the 8 km radius. A summary of the results is presented below.

- WTGs are predicted in up to four (4) 60° sectors for seven (7) non-associated residences.
- WTGs are predicted in up to three (3) 60° sectors for 13 non-associated residences.
- All the remaining non-associated residences within 8 km of the nearest WTG are predicted to have two (2) 60° sectors or less. This is deemed an acceptable level in accordance with the Bulletin.

It is important to recognise that the MWTT analysis is based on topography and does not consider factors such as orientation, vegetation, and other potential screening elements. Consequently, the actual visibility of WTGs may vary, with the possibility of complete screening or partial visibility, such as seeing only the tip of the WTG.

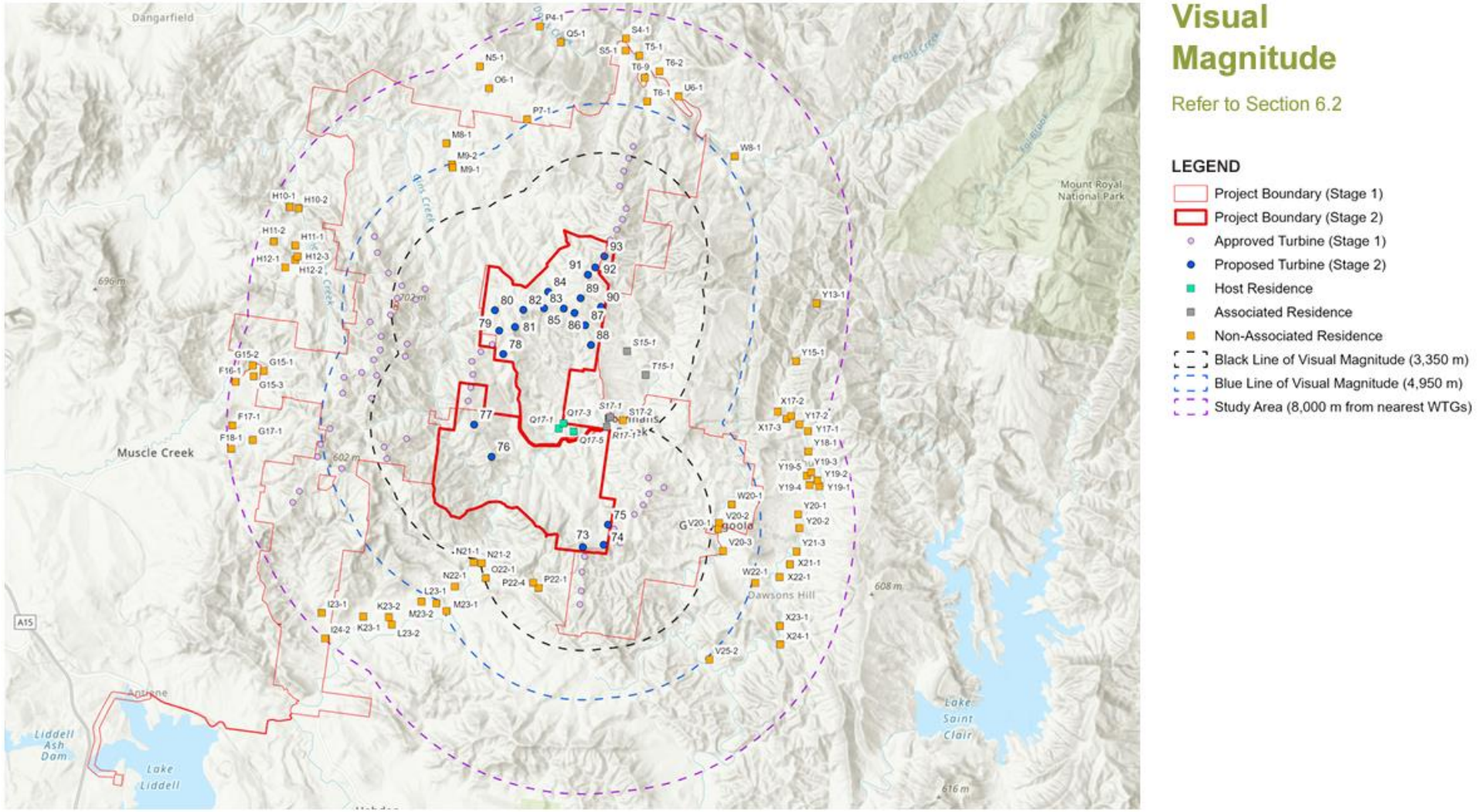


Figure 6.1 Preliminary Assessment Tool 1: Visual Magnitude

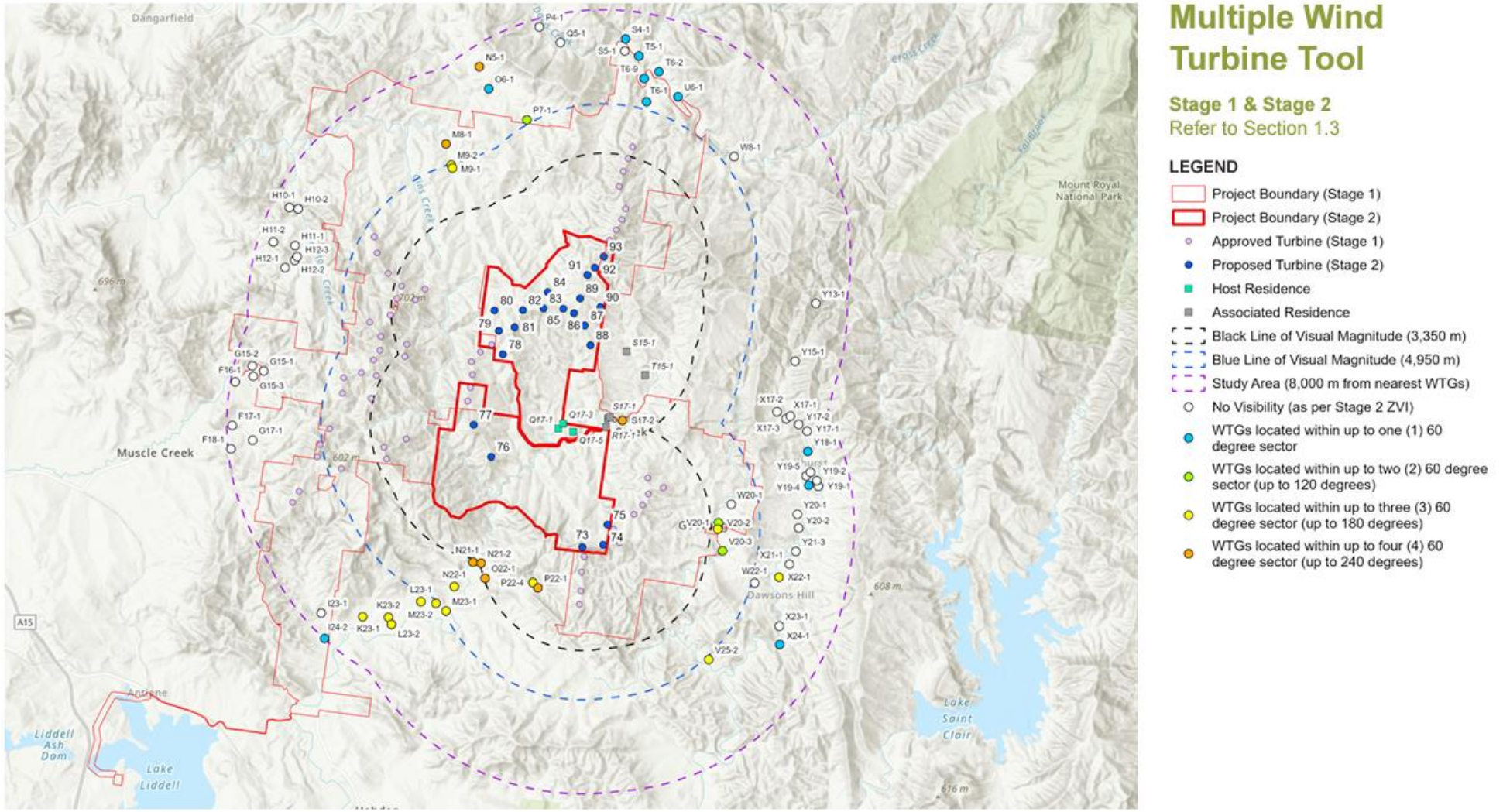


Figure 6.2 Multiple Wind Turbine Tool

Zone of Visual Influence

The Zone of Visual Influence (ZVI) analysis is a theoretical calculation of the number of WTGs that can be seen based on terrain. The ZVI does not consider vegetation screening, the impact of the built environment, distance, orientation or perspective, but assists in providing an early indication of where the placement of WTGs will require further detailed assessment and justification during the EIS.

The results of the ZVI analysis are summarised below and illustrated on **Figure 6.2**:

- 38 non-associated residences are identified as having potential views of the Project.
    - Five (5) non-associated residences are identified as having potential views of up to 100% of Stage 2 WTG's.
    - Five (5) non-associated residences are identified as having potential views of up to 75% of Stage 2 WTG's.
    - Eight (8) non-associated residences are identified as having potential views of up to 50% of Stage 2 WTGs.
    - 20 non-associated residences are identified as having potential views of up to 25% of Stage 2 WTG's.
- 33 of the 71 non-associated residences within 8 km of Stage 2 will have no visibility of the Project due to intervening topography.

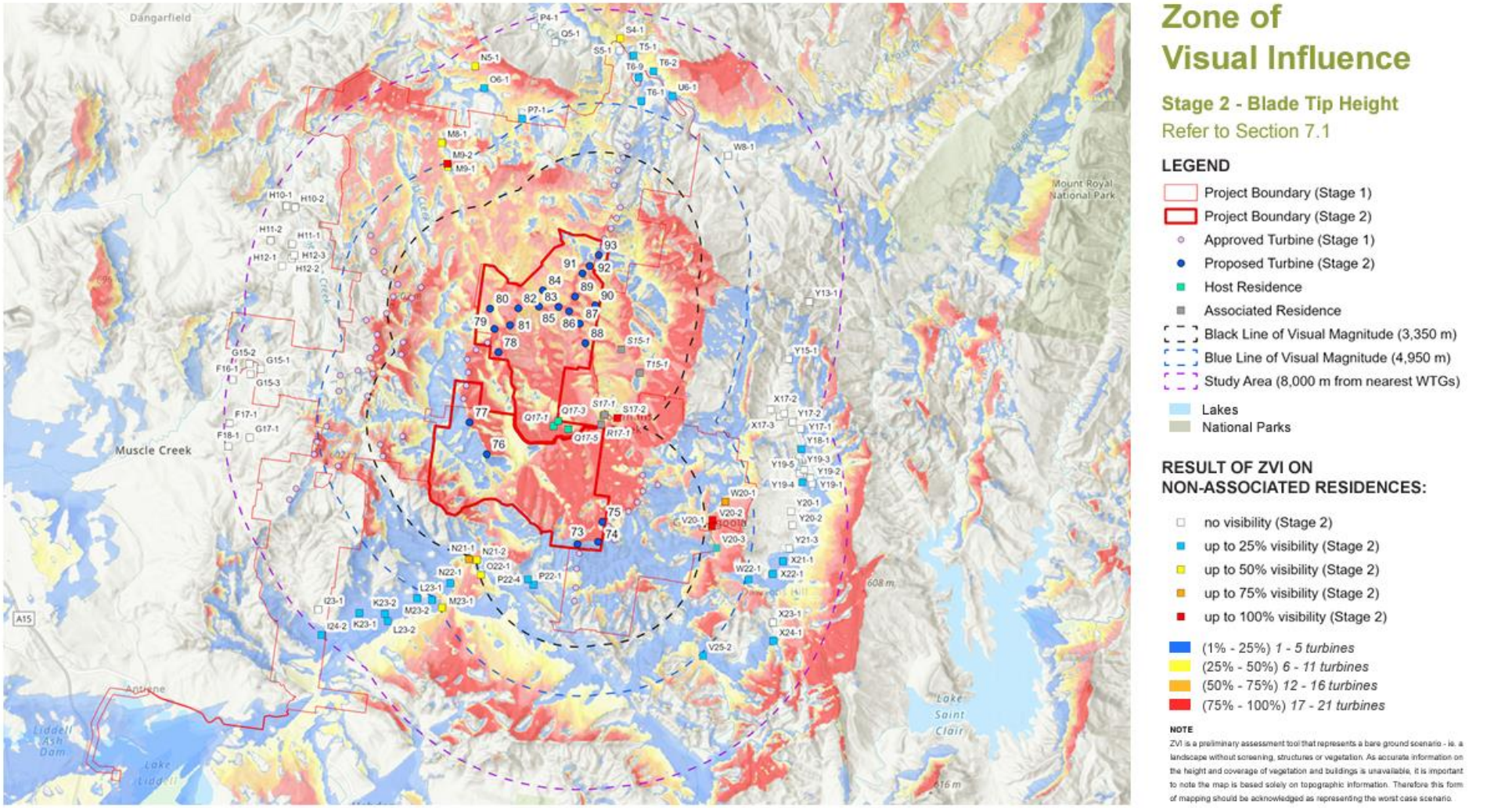


Figure 6.3 Zone of Visual Influence

6.2.1.5 Further Landscape Visual Impact Assessment

A detailed LCVIA will be prepared in accordance with the requirements of the Visual Bulletin to support the Project EIS, and will comprise the following tasks:

- Preparation of visual baseline study inputs, including additional community consultation.
- Establishing visual influences zones from viewpoints using data collected in the baseline study.
- Visual performance evaluation of the proposed WTG layout.

The detailed LVIA will also include:

- A detailed assessment of the Project layout with consideration to all influencing factors such as topography, relative distance, perspective, orientation and existing vegetation that may obscure views of the Project.
- An assessment of cumulative visual impacts associated with other approved and proposed renewable energy projects in the surrounding locality, including the Stage 1 project.
- Consultation with potentially impacted residences.
- Ground truthing, photography and photomontages of the Project.
- A description of the proposed mitigation measures to reduce visual impacts.

Potential mitigation measures to reduce visual impacts may include, but will not necessarily be limited to:

- Removal of WTGs from the Project design or repositioning of WTGs.
- Screening and/or supplementary planting.
- Night lighting of ancillary infrastructure being limited to low-level lighting for security, nighttime maintenance and emergency purposes.
- Consideration of WTG and Project infrastructure colour and design during final commercial tender process to minimise visibility and contrast.
- Entering into negotiated agreements with impacted residences.

6.2.2 Amenity – Noise and Vibration

A Preliminary Noise Assessment has been undertaken by Marshall Day Acoustics Pty Ltd (Marshall Day) in accordance with the NSW Noise Assessment Bulletin (DPE, 2016c). The results of the preliminary noise assessment are summarised below, with the full report provided in **Appendix E**.

As a WTG model with the proposed Project specifications is not yet commercially available, an alternative WTG model with slightly altered dimensions (for which manufacturer's noise data is currently available) was used for the purposes of the preliminary noise assessment. A candidate WTG model (or models) with specifications consistent with the Project design would be used for the purposes of the detailed noise assessment in the EIS.

6.2.2.1 Potential Noise and Vibration Impacts

The NSW Noise Assessment Bulletin provides a baseline noise criterion of 35 dB(A) or 5 dB(A) above the background noise level at each integer wind speed for non-associated dwellings (whichever is greater). The NSW Noise Assessment Bulletin enables the baseline criteria to be higher for host or associated dwellings. It is noted that background noise level monitoring conducted as part of the detailed EIS process may result in an increase in the noise assessment criteria for the Project above that of the 35 dB(A) baseline noise criterion, however this is unlikely given the remoteness of the Project Area.

The preliminary noise assessment assumes a WTG sound power level of 105.8 dB(A), including 1 dB for test uncertainty, which is considered typical of noise emissions from comparable multi-MW WTG models. The preliminary noise assessment includes modelled noise predictions for all dwellings within 5 km of a proposed WTG. The modelling adopted a single worst-case scenario with emission source values being based on wind speeds of 11 m per second (m/s) at hub height, with wind direction travelling from the WTG to the dwelling.

The results of the PNA are summarised below:

- Predicted noise levels from the Project are below the NSW Noise Assessment Bulletin base criterion of 35 dB L_{Aeq} at all of the assessed non-associated receivers (refer to **Figure 6.4**).
- Predicted noise levels from the Project are below the 45 dB L_{Aeq} reference level for all associated receivers, comprising Host properties and receivers where a noise agreement is in place.
- Low frequency noise levels remain below the applicable thresholds for both Host and non-associated receivers, no adjustments for special noise characteristics are applicable under the NSW Noise Assessment Bulletin.

6.2.2.2 Cumulative Noise and Vibration Impacts

Due to the proximity of Stage 1 to the Project, cumulative noise impacts have been considered in the preliminary noise assessment.

As detailed in **Section 1.4.1**, Stage 1 comprises 54 WTGs, located to the north, south, and west of the Project. The PNA notes that only receivers classed as associated for both the Project and Stage 1 can be considered as associated for the purposes of cumulative noise assessment.

For receiver P22-1, predicted noise levels related to Stage 1 and the Project are below the base noise limit of 35 dB L_{Aeq}, however, cumulative noise levels (i.e. Stage 1 and Stage 2 combined) are predicted to be 0.1 dB above the base noise limit. Predicted noise contours for Stage 1, and Stage 1 and the Project cumulatively are provided in Figure 5 and Figure 6 of the PNA, respectively.

Potential mitigation measures for cumulative noise would be considered in the EIS stage for the Project, following the completion of baseline noise monitoring and wind-speed based noise limits being established.

6.2.2.3 Further Noise and Vibration Impact Assessment

A detailed Noise and Vibration Impact Assessment (NVIA) will be prepared as part of the EIS in accordance with the Noise Bulletin (DPE, 2016c), NSW EPA Noise Policy for Industry (NPfI) (EPA, 2017), Interim Construction Noise Guideline (DECC, 2009), NSW Road Noise Policy (DECCW, 2011) and Assessment Vibration: A technical Guideline (DECC, 2006).

The NVIA will:

- Establish the relevant level of background noise.
- Provide predictive noise modelling of the Project's construction and operational activities.
- Assess the road traffic noise during construction and operational activities.
- Assess any vibration impacts at sensitive receivers.
- Identify any reasonable and feasible mitigation and management measures.

Reasonable and feasible mitigation and management measures for noise will be considered as part of the NVIA process and may include, but will not necessarily be limited to:

- Deletion of WTGs from the Project or repositioning of WTGs.
- Fixed construction noise sources such as concrete batching plant, generators and compressors being located at the maximum practicable distance to the nearest non-associated dwellings, where practicable.
- Investigate alternative construction processes where feasible and reasonable to reduce noise.
- Implement a Construction Environmental Management Plan (CEMP), including regular updates to the local community.
- Entering into negotiated agreements with impacted landholders.

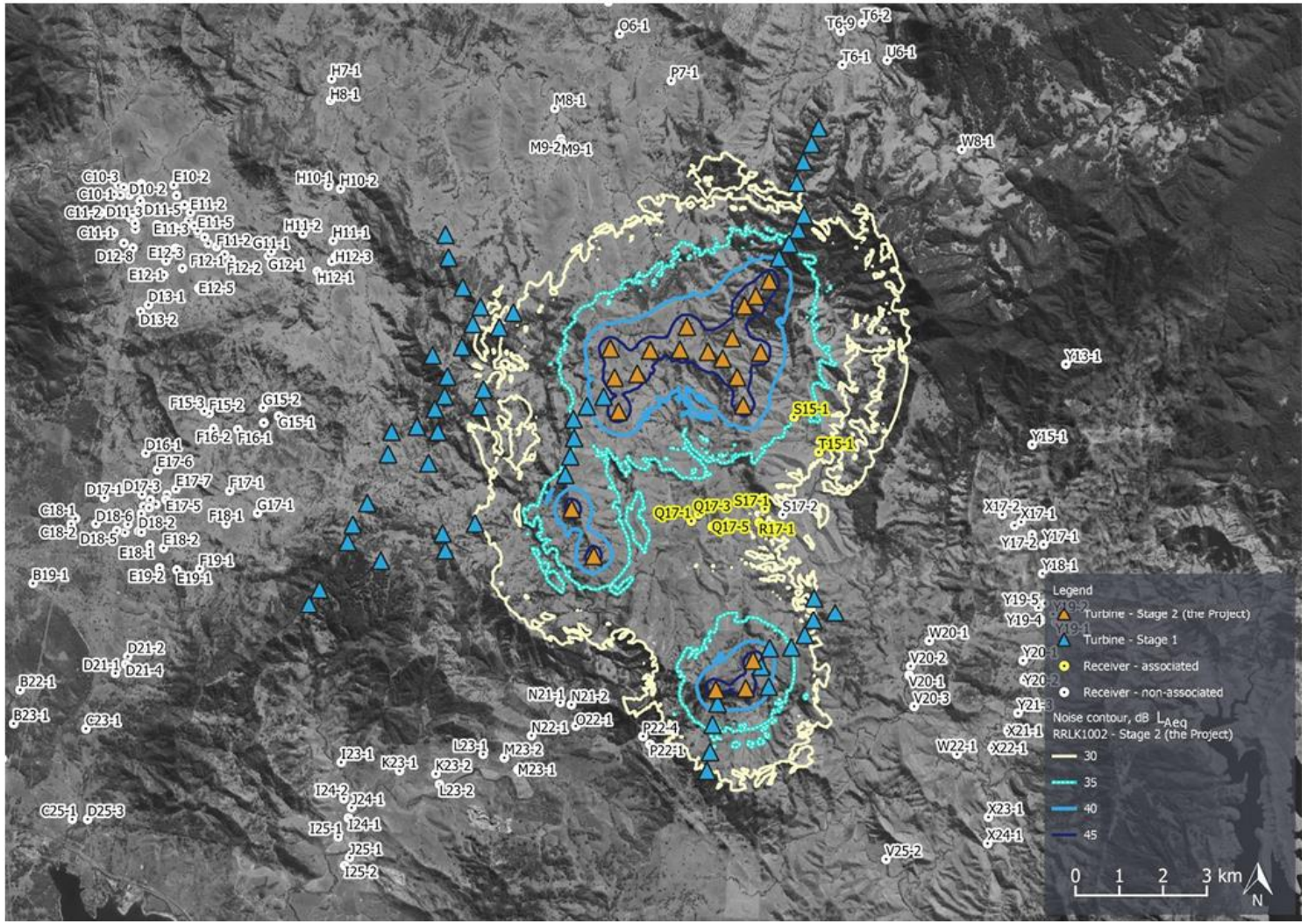


Figure 6.4 Highest Predicted Noise Levels (Hub Height Wind Speed 11 m/s)

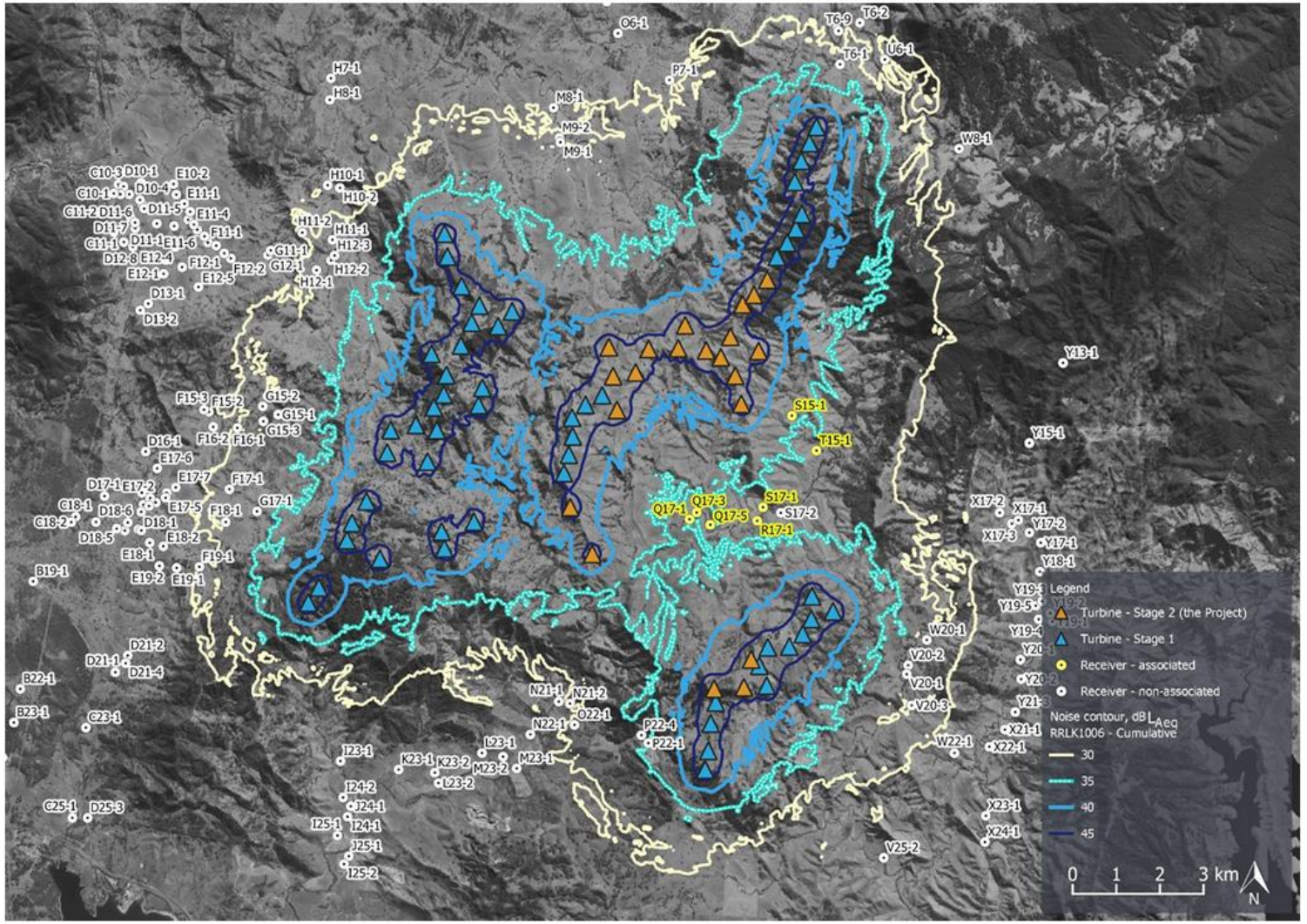


Figure 6.5 Stage 1 and Stage 2 cumulative predicted noise results contour

6.2.3 Biodiversity

Biodiversity is a key consideration in the Project design and assessment work commenced in late-2022 aiming to progressively gather information to inform the Project design process, assisting to avoid and minimise impacts.

A Biodiversity Constraints Assessment (BCA) was undertaken to support this Scoping Report, incorporating desktop analysis, vegetation mapping and preliminary field surveys. The BCA identified potential ecological constraints present within the Project Area listed under the BC Act and the EPBC Act including Plant Community Types (PCTs), threatened species, populations or threatened ecological communities (TECs). The BCA also outlines potential direct, indirect, prescribed, and serious and irreversible impacts (SAII) that may result from the Project.

The BCA is provided in **Appendix F** of this Scoping Report, with the key aspect summarised in the subsequent sections below.

6.2.3.1 Potential Vegetation Communities

Desktop assessments of the Eastern NSW State Vegetation Type Map (SVTM) and the preliminary field surveys by Cumberland Ecology identified 24 Plant Community Types (PCTs) within the Project Area. The extent of these PCTs within the Project Area, the Development Corridor and the Disturbance Footprint is summarised in **Table 6.2** and illustrated in **Figure 6.6**.

Table 6.2 Preliminary PCTs and their Extent in the Project Area

Plant Community Type (PCT)	Area (ha) within Disturbance Area	Area (ha) within Development Corridor	Area (ha) within Project Area
3056 - Central Eastern Ranges Riparian Dry Rainforest	-	-	1.18
3076 - Hunter Valley Whalebone Dry Rainforest	-	1.19	69.53
3086 - Lower North Hinterland Riparian Dry Rainforest	-	5.62	83.71
3091 - Lower North Waterhousea-Water Gum Rainforest	-	-	0.78
3114 - Upper Hunter Ranges Moist Gully Forest	0.30	0.31	1.17
3120 - Hunter-Peel Ranges Dry Rainforest	-	-	1.80
3236 - Hunter Valley Hills Wet Vine Forest	-	2.56	27.47
3240 - Lower North Escarpment Red Gum Grassy Forest	63.43	85.74	141.03
3241 - Lower North White Mahogany-Spotted Gum Moist Forest	25.62	33.02	107.62
3245 - West Mount Royal Slopes Grassy Forest	-	3.90	6.86
3285 - Lower North Escarpment Blue Gum Grassy Forest	-	0.18	3.19

Plant Community Type (PCT)	Area (ha) within Disturbance Area	Area (ha) within Development Corridor	Area (ha) within Project Area
3315 - Central Hunter Ironbark-Spotted Gum Forest	9.17	9.41	13.07
3354 - Liverpool Range Box-Silvertop Stringybark Forest	1.65	1.65	1.75
3395 - Northwest Elevated White Box Woodland	-	0.28	0.95
3396 - Northwest Flats Box-Blakelys Red Gum Forest	30.48	32.51	60.68
3397 - Northwest Flats Yellow Box Woodland	-	-	5.98
3401 - Upper Hunter Sheltered Viney Shrub Forest	-	-	0.17
3431 - Central Hunter Ironbark Grassy Woodland	0.46	11.68	79.96
3439 - Hunter Escarpment Grey Gum Sheltered Forest	-	3.78	58.30
3446 - Lower North Foothills Ironbark-Box-Gum Grassy Forest	-	0.09	11.90
3521 - Northwest White Box Woodland	2.00	7.05	92.41
3525 - Upper Hunter Box-Blakelys Red Gum Grassy Forest	-	1.81	10.36
4073 - Lower North Hinterland River Oak Forest	1.10	2.79	65.41
4079 - Northern Hinterland Grassy River Oak Forest	-	-	0.16
Not classified/Non-native vegetation	33.08	224.01	2705.88
Total	**167.30**	**427.56**	**3,551.60**

It is noted that the calculations presented above are preliminary and are subject to further refinement as part of future biodiversity assessments carried out to support the Biodiversity Development Assessment Report (BDAR) and Project EIS.

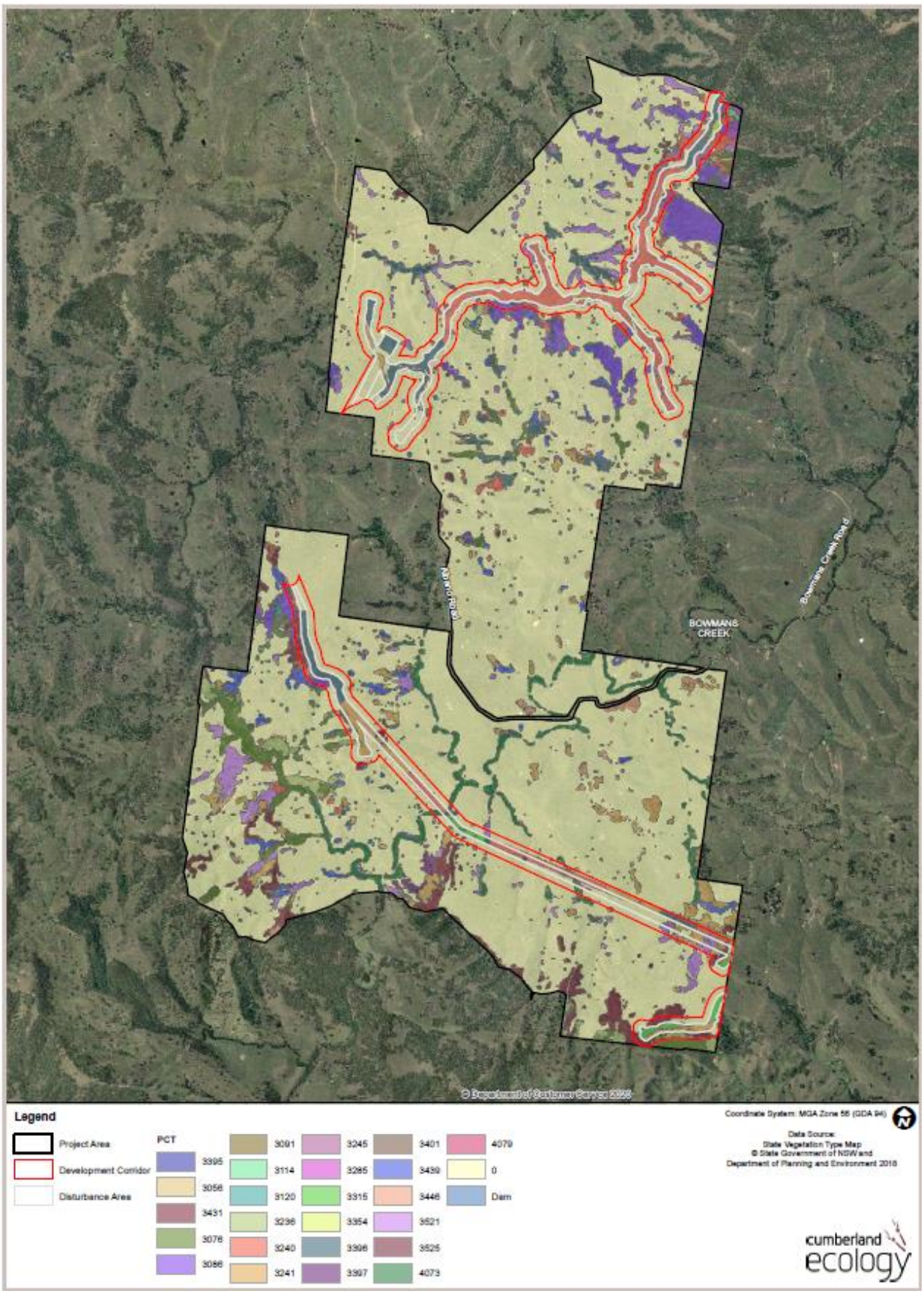


Figure 6.6 Preliminary Plant Community Types mapped within the Project Area

6.2.3.2 Threatened Ecological Communities

Of the 24 PCTs identified in **Table 6.2**, 11 are associated with a TEC under the BC Act and/or EPBC Act. These TEC associations are summarised in **Table 6.3** below and mapped in **Figure 6.7** Following the preliminary site surveys, two (2) were determined as occurring within the Development Footprint, including the Central Hunter Valley eucalypt forest and woodland CEEC (as PCT 3315) and White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC (as PCT 3396).

Based on the results of the preliminary field surveys and consideration of the outcomes presented in the Stage 1 Project BDAR, the other nine potential TECs are considered unlikely to occur within the Disturbance Area. However, as detailed vegetation surveys and analysis across the Disturbance Footprint has not been carried out to date, the presence of other TECs occurring, although unlikely, cannot be discounted at this stage.

Further information regarding each of the two (2) TEC determined as occurring within the Development Footprint is provided in Section 3.4.2.1 of the BCA.

Table 6.3 Threatened ecological communities in the Project Area and Disturbance Area

Plant Community Type	BC Act Association(s) of PCT	EPBC Act Association of PCT	Candidate Serious and Irreversible Impact Entity	Recorded within Disturbance Area
3056 - Central Eastern Ranges Riparian Dry Rainforest	EEC: Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions	-	No	No
3076 - Hunter Valley Whalebone Dry Rainforest	VEC: Lower Hunter Valley Dry Rainforest in the Sydney Basin and NSW North Coast Bioregions EEC: Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions	CEEC: Lowland Rainforest of Subtropical Australia	No	No
3086 - Lower North Hinterland Riparian Dry Rainforest	EEC: Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions	-	No	No
3120 - Hunter-Peel Ranges Dry Rainforest	EEC: Hunter Valley Vine Thicket in the NSW North Coast and Sydney Basin Bioregions EEC: Semi-evergreen Vine Thicket in the Brigalow Belt South and Nandewar Bioregion	EEC: Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	**Yes (part)**	No
3315 - Central Hunter Ironbark-Spotted Gum Forest	EEC: Central Hunter Ironbark—Spotted Gum—Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions	CEEC: Central Hunter Valley Eucalypt Forest and Woodland	No	**Yes (~3.21 ha)**
3395 – Northwest Elevated White Box Woodland	CEEC: 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 Bioregion	CEEC: White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	**Yes**	No
3396 - Northwest Flats Box-Blakelys Red Gum Forest	CEEC: 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	CEEC: White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	**Yes**	**Yes (~2.41 ha as Woodland and ~28.07 ha as Derived Native Grassland (DNG)).**

Plant Community Type	BC Act Association(s) of PCT	EPBC Act Association of PCT	Candidate Serious and Irreversible Impact Entity	Recorded within Disturbance Area
	Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregion			
3397 - Northwest Flats Yellow Box Woodland	CEEC: 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 Bioregion	CEEC: White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	**Yes**	No
3401 - Upper Hunter Sheltered Viney Shrub Forest	EEC: Hunter Valley Vine Thicket in the NSW North Coast and Sydney Basin Bioregions	-	**Yes**	No
3431 – Central Hunter Ironbark Grassy Woodland	EEC: Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions	CEEC: Central Hunter Valley Eucalypt Forest and Woodland	No	No
3446 - Lower North Foothills Ironbark-Box-Gum Grassy Forest	EEC: Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions	CEEC: Central Hunter Valley Eucalypt Forest and Woodland	No	No

Notes: Critically Endangered Ecological Community (CEEC)
Endangered Ecological Community (EEC)
Vulnerable Ecological Community (VEC)

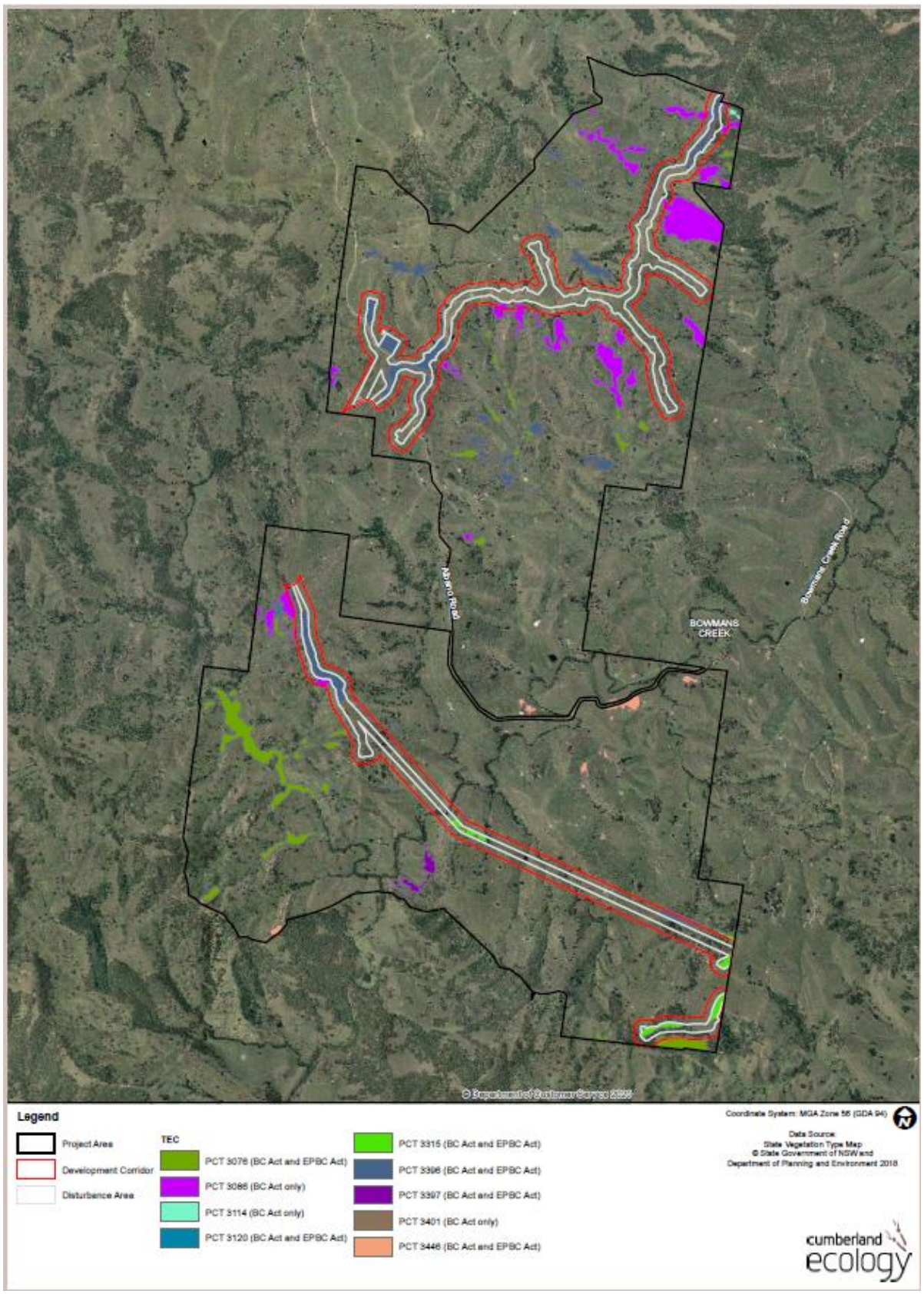


Figure 6.7 Threatened Ecological Communities within the Project Area

6.2.3.3 Threatened Flora

The NSW BioNet Wildlife Atlas search, Commonwealth PMST search and threatened flora species associations with recorded PCTs for the Tomalla and Upper Hunter IBRA subregions identified 35 threatened flora species known or with potential to occur within a 20 km radius of the Project Area. An assessment of the likelihood of occurrence for these species based on records and results of surveys conducted to date is provided in Table 5 of the BCA, and is summarised below:

- Five flora species with a high likelihood of occurrence within the Project Area.
- 13 flora species with a moderate likelihood of occurrence within the Project Area.

6.2.3.4 Threatened Fauna

The NSW BioNet Wildlife Atlas search, Commonwealth PMST search and threatened fauna species associations with recorded PCTs for the Tomalla and Upper Hunter IBRA subregions collectively identified 84 threatened fauna species (excluding fish) known or with potential to occur within a 20 km radius of the Project Area. Threatened fish, as per the PMST search, were assessed unlikely to occur in the Project Area and were not considered further within the BCA.

An assessment of the likelihood of occurrence for these species based on records, including known records within the Stage 1 project, and results of surveys conducted to date is provided in Table 6 of the BCA and is summarised below:

- 11 fauna species that are known to occur within the Project Area.
- Seven (7) fauna species with a high likelihood of occurrence within the Project Area.
- 13 fauna species with a moderate likelihood of occurrence within the Project Area.

6.2.3.5 Migratory Species

The Commonwealth PMST search identified 16 migratory species with potential to occur within a 20 km radius of the Project Area. An assessment of the likelihood of occurrence for these species based on records, including known records within the Stage 1 project, and results of surveys conducted to date is provided in Table 7 of the BCA and are summarised below:

- One (1) migratory species known to occur within the Project Area.
- One (1) migratory species with a high likelihood of occurrence within the Project Area.
- Four (4) migratory species with a moderate likelihood of occurrence within the Project Area.

6.2.3.6 Matters of National Environmental Significance

The EPBC Act provides protection of the environment from actions proposed to '*have the potential to significantly impact on MNES or the environment of Commonwealth land*'. A search of the Commonwealth PMST was undertaken as part of the BCA on 8 September 2023 and updated on 22 January 2024. The search included a 20 km buffer from the Project Area. The search results are summarised below in **Table 6.4** and a record of the PMST report is provided in Appendix A of the BCA (refer to **Appendix F**).

Table 6.4 MNES Within 20 km of the Project Area

MNES	Within 20km Buffer
World Heritage properties	0
National heritage properties	0
Wetlands of international importance	0
The Great Barrier Reef Marine Park	0
Commonwealth marine area	0
Threatened ecological communities	Nine (9)
Threatened species	62
Migratory species	15
State and territory reserves	Three (3)

Surveys to determine the presence and likelihood of impacts to MNES would be undertaken during the preparation of the EIS. Regardless, it is understood that the Project would be referred to the Commonwealth DCCEEW (Cth DCCEEW). The purpose of this 'referral' to Cth DCCEEW is to determine whether the proposed action (i.e. the Project) will need formal assessment and approval under the EPBC Act. The EBPC Act Referral provided to Cth DCCEEW would be the principal basis for the Commonwealth Minister's decision as to whether approval is necessary and, if so, the type of assessment that will be taken. In this case, the EPBC Act Referral would be made even though the action may not have a significant impact, and potential impacts are uncertain.

6.2.3.7 Species-Credit Species Survey Requirements

Preliminary Biodiversity Assessment Method Calculator (BAM-C) assessments based on recorded PCTs, in conjunction with BioNet Atlas records, were conducted as part of the BCA to determine preliminary lists of species credit species (or species components of dual credit species) that would likely require survey and assessment in accordance with the BAM.

The survey requirements for flora and fauna species-credit-species are detailed in **Table 6.5** and **Table 6.6** respectively.

Table 6.5 Threatened Flora Species Credit Species Likely Requiring Survey

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat Constraints	Geographic Limitations	Entity with the potential for SAII	Survey Period											
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Acacia pendula population in the Hunter catchment *(Acacia pendula)*	E	-	-	Within Hunter River Catchment	**Yes**												
Austral Toadflax (*Thesium australe)*	V	V	-	-	No												
Black-eyed Susan (*Tetratheca juncea)*	V	V	-	-	No												
Bluegrass (*Dichanthium setosum*)	V	V	-	-	No												
Brown Pomaderris (*Pomaderris brunnea*)	E	V	-	-	No												
Charmhaven Apple (*Angophora inopina)*	V	V	-	Within 10km of Wallaroo National Park	No												
Craven Grey Box (*Eucalyptus largeana*)	E	E	-	-	No												

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat Constraints	Geographic Limitations	Entity with the potential for SAII	Survey Period											
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cymbidium canaliculatum (Cymbidium canaliculatum)	E	-	Epiphytic in a range of eucalypts; Cut stumps or logs on the ground	Hunter Catchment as defined by Australia's River Basins	No												
Eucalyptus camaldulensis (Eucalyptus camaldulensis)	E	-	Floodplains of watercourses, including rivers, creeks, intermittent streams or billabongs	Hunter catchment as per the Determination	No												
Heath Wrinklewort (*Rutidosis heterogama*)	V	V	-	-	No												
Native Guava (*Rhodomyrtus psidioides*)	CE	CE	-	-	**Yes**												
Netted Bottle Brush (*Callistemon linearifolius*)	V	-	-	-	No												
Pterostylis chaetophora (Pterostylis chaetophora)	V	-	-	-	No												

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat Constraints	Geographic Limitations	Entity with the potential for SAII	Survey Period											
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Red Helmet Orchid (*Corybas dowlingii*)	E	-	-	Columbey National Park and east of the Park	No												
Scrub Turpentine (*Rhodamnia rubescens*)	CE	CE	-	-	**Yes**												
Slaty Red Gum (*Eucalyptus glaucina*)	V	V	-	-	No												
Small-fruited Mountain Gum (*Eucalyptus oresbia)*	V	-	-	-	**Yes**												

Table 6.6 Threatened Fauna Species Credit Species Likely Requiring Survey

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat Constraints	Geographic Limitations	Potential for SAII	Survey Period											
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Barking Owl (*Ninox connivens*) (Breeding)	V	-	Living or dead trees with hollows greater than 20 cm diameter and greater than 4 m above the ground	-	No												
Booroolong Frog (*Litoria booroolongensis*)	E	E	-	-	No												
Brush-tailed Phascogale (*Phascogale tapoatafa)*	V	-	-	-	No												
Brush-tailed Rock-wallaby (*Petrogale penicillate)*	E	V	Land within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or clifflines	-	**Yes**												
Davies' Tree Frog (*Litoria daviesae)*	V	-	Streams or swamps or within 250 m of waterbodies	-	No												
Eastern Pygmy-possum (*Cercartetus nanus)*	V	-	-	-	No												

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat Constraints	Geographic Limitations	Potential for SAII	Survey Period											
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Gang-gang Cockatoo (*Callocephalon fimbriatum*) (Breeding)	V	E	Eucalypt tree species with hollows at least 3 m above the ground and with hollow diameter of 7 cm or larger	-	No												
Glossy Black-Cockatoo (*Calyptorhynchus lathami*) (Breeding)	V	V	Living or dead tree with hollows greater than 15 cm diameter and greater than 8 m above ground.		No												
Green and Golden Bell Frog (*Litoria aurea)*	E	V	Within 1km of wet areas, swamps, or waterbodies	-	No												
Grey-headed Flying-fox (*Pteropus poliocephalus*) (Breeding)	V	V	Breeding camps	-	No												
Koala (*Phascolarctos cinereus*)	E	E	Presence of Koala use trees	-	No												

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat Constraints	Geographic Limitations	Potential for SAII	Survey Period											
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Large Bent-winged Bat (*Miniopterus orianae oceanensis*) (Breeding)	V	-	Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records with microhabitat code "IC - in cave;" observation type code "E nest-roost;" with numbers of individuals >500	-	**Yes**												
Large-eared Pied Bat (*Chalinolobus dwyeri)*	V	V	Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels.	-	No												
Little Bent-winged Bat (*Miniopterus australis)* (Breeding)	V	-	Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave'; observation type code 'E nest-roost'; with numbers of individuals >500; or from the scientific literature.	-	No												
Little Eagle (*Hieraaetus morphnoides*) (Breeding)	V	-	Nest trees - live (occasionally dead) large old trees within vegetation	-	No												

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat Constraints	Geographic Limitations	Potential for SAII	Survey Period											
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Masked Owl (*Tyto novaehollandiae*) (Breeding)	V	-	Living or dead trees with hollows greater than 20 cm diameter	-	No												
Parma Wallaby (*Macropus parma)*	V	V	-	-	No												
Powerful Owl (*Ninox strenua*) (Breeding)	V	-	Living or dead trees with hollow greater than 20 cm diameter	-	No												
Red Goshawk (*Erythrotriorchis radiatus*)	CE	V	-	-	**Yes**												
Red-backed Button-quail (*Turnix maculosus)*	V	-	-	-	No												
Red-crowned Toadlet (*Pseudophryne australis*)	V	-		-	No												

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat Constraints	Geographic Limitations	Potential for SAII	Survey Period											
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Sooty Owl (*Tyto tenebricosa*) (Breeding)	V	-	Caves or clifflines/ledges; Living or dead trees with hollows greater than 20 cm diameter.	-	**Yes**												
Southern Greater Glider (*Petauroides volans)*	E	E	-	-	No												
Southern Myotis (*Myotis Macropus)*	V	-	Waterbodies with permanent pools/stretches 3 m or wider, including rivers, large creeks, billabongs, lagoons, estuaries, dams and other waterbodies, on or within 200 m of the site	-	No												
Square-tailed Kite (*Lophoictinia isura*) (Breeding)	V	-	Nest trees	-	No												
Squirrel Glider (*Petaurus norfolcensis*)	V	-	-	-	No												

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat Constraints	Geographic Limitations	Potential for SAII	Survey Period											
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Stephens' Banded Snake (*Hoplocephalus stephensii*)	V	-	Hollow bearing trees, arboreal vine tangles, fallen/standing dead timber or within 500 m of these habitats	-	No												
Stuttering Frog (*Mixophyes balbus*)	E	V	-	-	**Yes**												
White-bellied Sea-Eagle (*Haliaeetus leucogaster)* (Breeding)	V	-	Living or dead mature trees within suitable vegetation within 1 km of a rivers, lakes, large dams or creeks, wetlands and coastlines	-	No												

6.2.3.8 Potential Impacts

The BAM requires the assessment of discrete types of impacts on biodiversity values resulting from proposed development during both construction and operational phases. Based on the findings of the desktop assessment and preliminary field surveys undertaken as part of the BCA, the potential impacts to biodiversity from the Project are detailed in **Table 6.7** below. The purpose of the table below is to provide a preliminary overview of direct, indirect, prescribed and SAII that could theoretically occur as a result of the Project, and which will therefore require detailed assessment in the BDAR.

Table 6.7 Potential Impacts Associated with the Project

Impact Type	Potential Impact
Direct Impact	• Removal of native vegetation. • Removal of threatened species and their habitat.
Indirect impacts	• Inadvertent impacts on adjacent habitat or vegetation. • Reduced viability of adjacent habitat due to edge effects. • Reduced viability of adjacent habitat due to noise, dust, or light spill. • Transport of weeds and pathogens from the site to adjacent vegetation.
Prescribed impacts	• Impacts from WTG strike. • Impacts to water bodies, water quality and hydrological processes. • Impacts to habitat connectivity. • Impacts from vehicle strike.
Serious and Irreversible Impacts (SAII)	• Clearing of vegetation or habitat for species comprising candidate SAII entities.

6.2.3.9 Indicative Clearing of Native Vegetation

Based on the information above and the indicative Project layout represented in **Figure 3.1**, it is estimated that the total indicative Disturbance Area for the Project would be approximately 167 ha, or approximately 5% of the total Project Area. This area may reduce further from this conservative estimate as the Project design is developed, and the results of ongoing biodiversity investigations are used to refine the Project footprint. The Disturbance Area and likely area of native vegetation that would be impacted as a result of the Project will be confirmed during the EIS.

The PCT vegetation mapping identified that 134.22 ha of the 167.30 ha within the Disturbance Footprint comprises native vegetation. This represents approximately 80% of the Disturbance Footprint as native vegetation with the remainder classified as either not classified or non-native vegetation. These calculations are preliminary and based primarily on desktop mapping and preliminary survey results. Further biodiversity surveys will be undertaken during the EIS to ground-truth these findings.

6.2.3.10 Additional Biodiversity Assessment

Additional detailed biodiversity surveys will be undertaken within the Project Area with a focus on the proposed Development Area and Disturbance Footprint. Following the completion of the surveys, a BDAR will be prepared which will include:

- Field surveys and GIS mapping:
    - PCT survey and GIS mapping.
    - Targeted species-credit survey.
    - Bird and bat utilisation survey.
- Results of the literature review.
- Methods and results of vegetation surveys including a vegetation community map (based on PCTs and including TECs).
- Methods and results of surveys targeting species-credit species.
- Assessment of prescribed impacts.
- Outcomes of the calculator assessment identifying the credits generated by the PCTs (and ecosystem-credit species) and species-credit species.
- Relevant data and mapping for Agency submission including field sheets, figures and associated GIS files.

6.2.3.11 Avoidance Strategy

The Biodiversity Offset Scheme (BOS) is underpinned by the hierarchy of 'avoid-minimise-offset'. Consequently, the BAM requires proponents to demonstrate how impacts on biodiversity have been avoided and minimised through project development and design, including during the process of selecting project location.

An avoid-minimise hierarchy to assist with avoiding and minimising impacts during project development is summarised in Table 12 of the BCA, reproduced as **Table 6.8** below.

Table 6.8 Potential impacts and associated avoidance measures associated with the Project

Avoid – minimise hierarchy (from highest to lowest priority)	Relevant strategy
SAII Candidate Entities	Impacts to entities with the potential for SAII should be avoided and minimised as a priority. To date one candidate SAII entity, namely 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 Bioregion (as PCT 3396) has been recorded in woodland and grassland forms within the Development Corridor. This candidate SAII entity is potentially also present as PCT 3395 or PCT 3397 within the wider Disturbance Area and Project Area. Based on the SVTM mapping, a further candidate SAII Entity, namely Hunter Valley Vine Thicket in the NSW North Coast and Sydney Basin Bioregions (as PCT 3120 and PCT 3401) is present within the Project Area and could potentially occur within the Development Corridor and Disturbance Area.

Avoid – minimise hierarchy (from highest to lowest priority)	Relevant strategy
Threatened Ecological Communities (Woody vegetation)	Where feasible impacts to TECs comprising of woody vegetation should be avoided or minimised. Large patches of TEC or patches of TECs which are contiguous with large tracts of non-threatened woody vegetation should be prioritised for retention over smaller, fragmented patches or scattered trees. Impacts to these smaller patches or scattered trees may be avoided or minimised at a later stage of project development.
Non-threatened woody vegetation	Where feasible impacts to woody vegetation not conforming to a TEC but comprising habitat for a large variety of threatened species should be avoided or minimised. Large tracts of non-threatened woody vegetation should be prioritised for retention over smaller, fragmented patches or scattered trees. Impacts to these smaller patches or scattered trees may be avoided or minimised at a later stage of project development.
Biodiversity Corridors	Where feasible, impacts to biodiversity corridors should be avoided and/or minimised. Examples of biodiversity corridors include riparian vegetation, significant roadside vegetation and corridors mapped by Councils, LLS, DPHI etc. for conservation purposes.
Threatened species and their habitat	Where feasible, impacts to known locations of threatened species should be avoided and/or minimised. The feasibility of avoiding/minimising impacts may be species dependent, with flora species more easily avoided. It should be noted that the importance of avoiding impacts to threatened species and their habitat will become more important once detailed biodiversity surveys for the project commence, and more accurate on-ground data is available.
Threatened Ecological Communities (Grassy vegetation)	Where feasible impacts to grassland forms of TECs should be avoided or minimised.
Riparian land	Impacts to riparian corridors (width dependent on Strahler stream order) should be avoided (with exception of creek crossings). Where feasible avoid locating WTGs, roads, ancillaries within 40 m of creeklines (riparian land as per Water Management Act 2000).

6.2.4 Heritage

A Cultural Heritage Scoping Report (CHSR) has been prepared for the Project and is included in this Scoping Report as **Appendix G**. A summary of the CHSR is provided below.

6.2.4.1 Aboriginal Heritage

Desktop heritage investigations were undertaken utilising available resources to map and then provide an indication of potential heritage constraints that may occur within the Project Area. In addition to this, a predictive model for Aboriginal archaeological site locations was used based on environmental parameters and proximity to places of cultural significance.

The Project borders the country of the Wonnarua, Geawegal and Kamilaroi tribal areas of the upper Hunter River Valley. There are no known native title schedule, applications, determinations, or Indigenous Land Use Agreements over the Project Area.

AHIMS database searches undertaken on 19 July 2023 which indicated that a total of 42 AHIMS registered sites were identified within a 10 km by 10 km search area around the Project Boundary (i.e. the Study Area for the purposes of heritage assessment considerations). The results of the AHIMS search are detailed in **Table 6.9** and illustrated on **Figure 6.8** below.

No sites were identified within the Project Area.

Three (3) Aboriginal sites, including two (2) artefact scatters and an isolated find were recorded within the road corridor of Bowmans Creek Road which extends through the Project Boundary, but does not form part of the Development Corridor.

Table 6.9 Site types and frequencies of AHIMS sites near the Project Area

Site Type	Number	% Frequency
Isolated find	17	40.48
Artefact scatter	14	33.33
Open camp site	10	23.81
Grinding grooves	1	2.38
Total	**42**	**100**

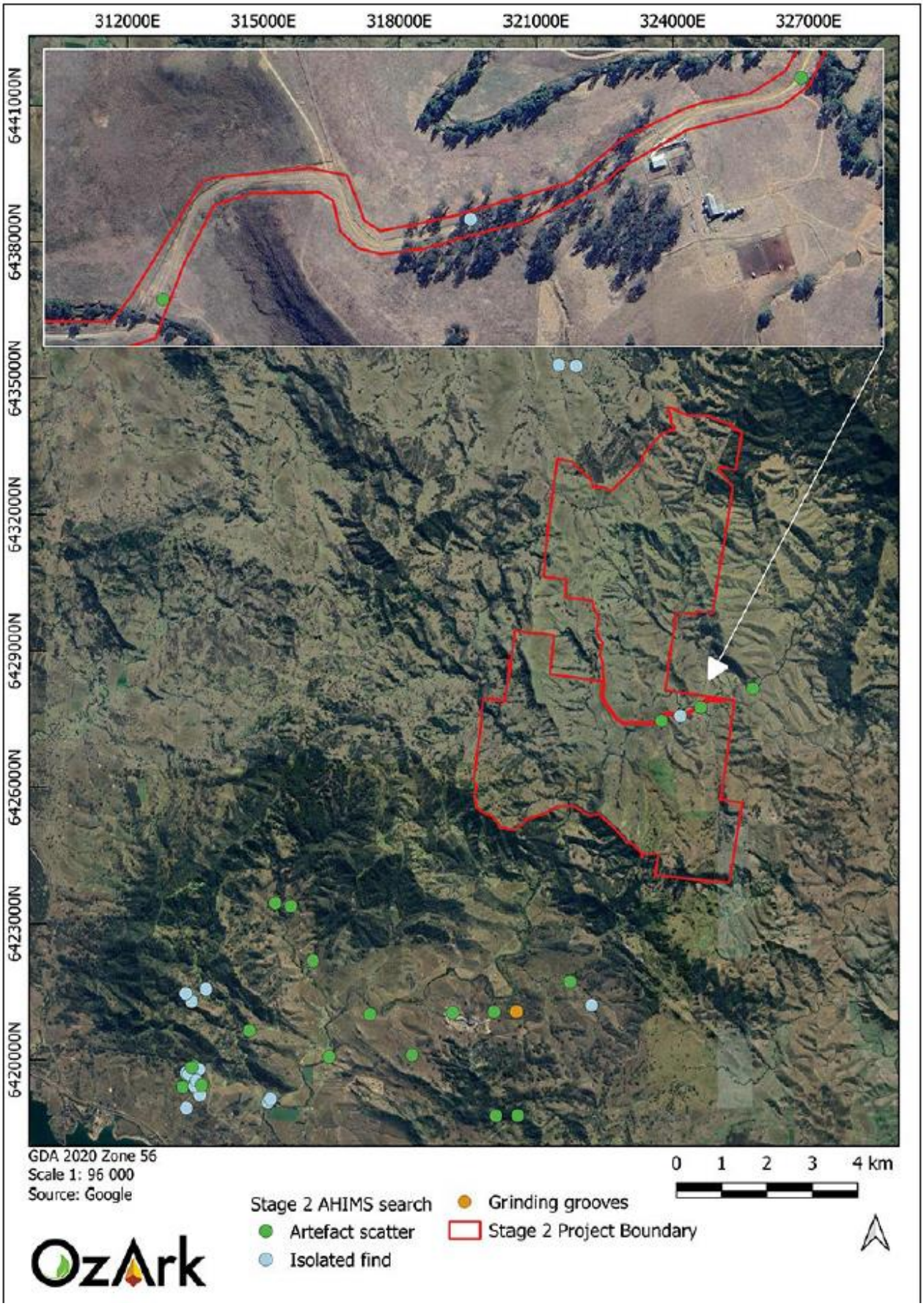


Figure 6.8 Aboriginal Heritage Sites

Aboriginal Site Predictive Model

A predictive model based on environmental factors such as permanent water sources, plant composition across the landscape, stone resources and rock shelters as well as proximity to culturally significant sites was used to determine likely Aboriginal archaeological sites within the study area. The model also utilises previously identified sites within the Study Area to determine potential sites.

Based on the environmental aspects and archaeological context of the broader Study Area, the probability of the location and type of sites within the Project Boundary can be predicted. It is predicted that flat landforms near waterways have moderate-high potential for Aboriginal sites, with this likelihood reducing further from water sources. Moderate to steep slopes are not identified as likely to present Aboriginal sites with the exception of flat terraces.

The likelihood of certain sites being present in the Project Area is presented in **Table 6.10**.

Table 6.10 Likelihood of Certain Site Types Being Present in the Project Area

Site Type	Likelihood of presence in the Project Area
Artefact scatters	Artefact scatters are one of the most recorded sites within the Study Area with higher density sites located in close proximity to permanent water sources. Artefact scatter density is predicted to be lower within the moderate to steeply sloping landforms within the Project Area.
Isolated finds	As isolated finds can occur anywhere, particularly within disturbed contexts, it is predicted that this site type could be recorded within the site boundary.
Grinding grooves	Grinding grooves are most likely to occur on flat outcrops of course or fine-grained sandstone in the vicinity of water sources. Given the low prospect of such rock exposure, grinding grooves are unlikely to be present.

Likely Impacts to Aboriginal Objects

There is a low likelihood that further Aboriginal objects will be recorded within the Project Area. Low elevation landforms near watercourses have the highest likelihood of hosting Aboriginal objects which aligns with the survey results of the Stage 1 Aboriginal Cultural Heritage Assessment Report (ACHAR).

As such, the most likely landforms where Aboriginal objects may be recorded in the Stage 2 Project Boundary are within the lower elevation landforms near watercourses such as Bowmans Creek and a tributary to Bowmans Creek crossed by the overhead transmission line in the south of the Project Area.

Based on the landforms present it is not expected that any Aboriginal objects within the Project Boundary will be of sufficient scientific significance to warrant their conservation, however this would be subject to further assessment and consultation with the local Aboriginal community during preparation of the EIS.

Further Assessment

Given the potential presence of Aboriginal sites within the Project Area, a detailed ACHAR will be undertaken to assess potential impacts in consultation with the registered Aboriginal parties for the Project. The ACHAR will be undertaken in accordance with the following key guidelines:

- The Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH, 2011).
- The Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW (DECCW, 2010).
- Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW, 2010).

The ACHAR will include consultation with the registered Aboriginal parties for the Project in determining and assessing impacts, developing and selecting options and mitigation measures.

The investigation for the ACHAR will include following steps:

- Desktop review to develop a predictive model for the location of Aboriginal objects.
- Site survey with the assistance of the Aboriginal community to identify any Aboriginal objects that may be present, as well as identifying any landforms where subsurface archaeological deposits may be present.
- Identify any areas/landforms of cultural significance in consultation with the Aboriginal community.
- Undertake test excavation if warranted.
- Determination of the significance of the Aboriginal objects and/or landforms identified during the site survey in consultation with the Aboriginal community.
- Assessment of the impact to identified Aboriginal heritage values including both tangible and intangible values.
- Development of mitigation measures to minimise impacts to Aboriginal cultural values.

A range of management strategies may be available in relation to the Project that include varying levels of mitigation of identified sites or potential harm to Aboriginal cultural heritage. The micro-siting of infrastructure will allow for some flexibility in the management of Aboriginal cultural heritage. When impacts to sites or areas of archaeological potential are unavoidable, a strategy will be developed that involves implementing appropriate measures to manage and mitigate these impacts with reference to the archaeological and Aboriginal cultural significance of the sites/areas of potential.

6.2.4.2 Historic Heritage

The CHSR also included consideration of potential historic heritage values within the Project Boundary and broader heritage Study Area. The results of the CHSR presented in **Appendix G** are summarised below:

- A review of aerial imagery shows several groups of buildings within the Project Area. Without further assessment it is not possible to determine the historical heritage significance of these buildings.
- There one listed heritage item approximately 530 m from the Project Boundary (Former Roman Catholic Church, item I156). This item is located over 2.6 km from the Development Corridor.
- Within a 10 km buffer of the Project Boundary there are 3 locally listed items which are not expected to have any indirect impacts given the distance to the Project Boundary. The local heritage listings include:

- 'Greylands' and outbuildings (I23).
- Richards Family Cemetery (I38).
- Timber house (I82).

With the above-mentioned heritage items being located within the Study Area (the Project Area plus a buffer of 10 km), it is expected that preparation of a Historic Heritage Assessment (HHA) would be a requirement within the SEARs, which would be undertaken to support the Project EIS.

The HHA would assess the potential for unlisted heritage items and non-Aboriginal archaeological remains to be present within the Project Area and evaluate the potential direct and indirect impacts of the Project. The HHA will be prepared with regard to the NSW Heritage Manual, relevant Heritage Council of NSW guidelines and with consideration of the principles contained in The Burra Charter: the Australia International Council on Monuments and Sites (ICOMOS) Charter for Places of Cultural Significance (ICOMOS, 2013).

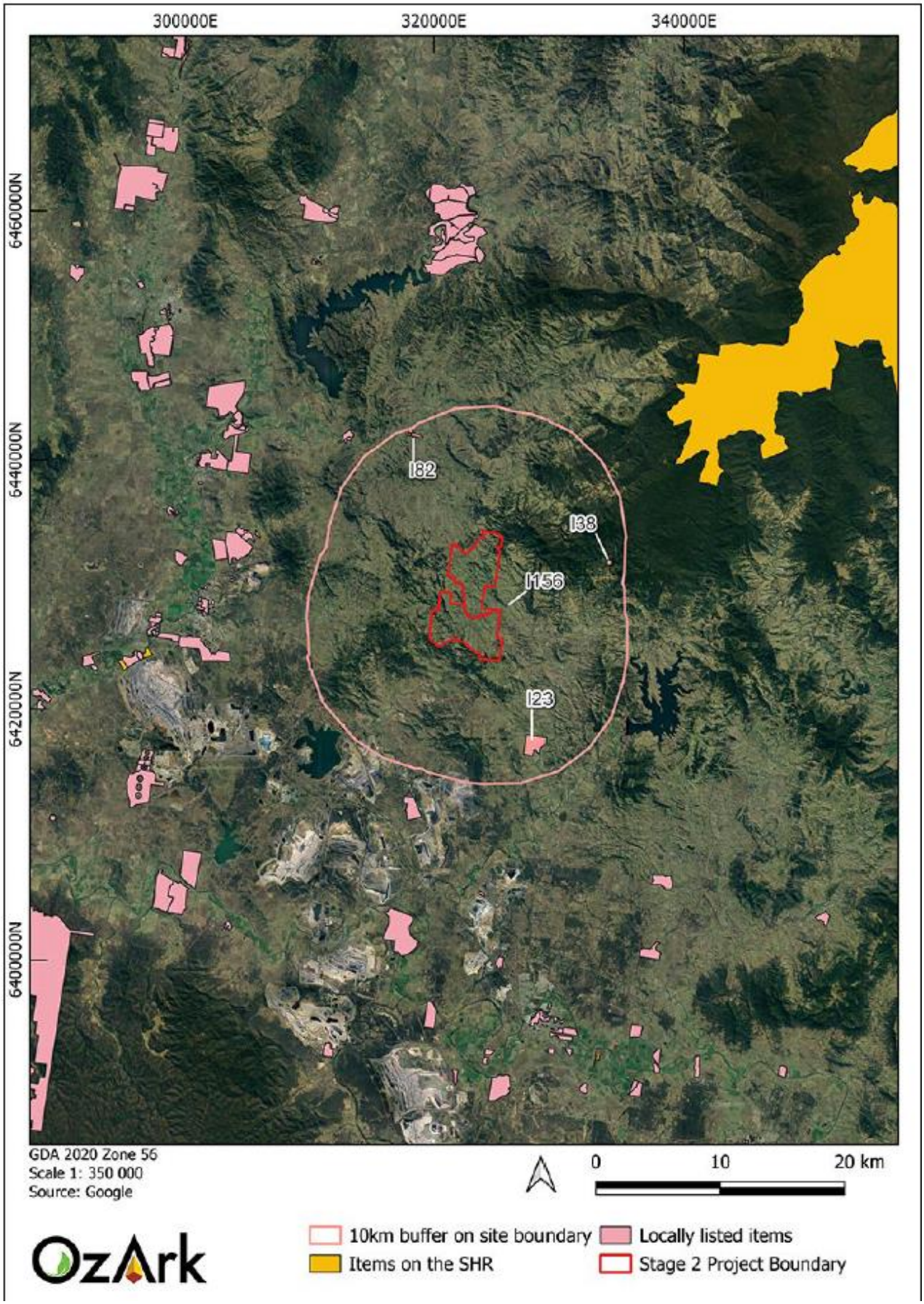


Figure 6.9 Historic Heritage Sites within a 10 km buffer of the Project Boundary

6.2.5 Traffic and Transport

6.2.5.1 Project Access and Transport Route

Access to the Project is proposed via the existing public road network and will follow the preferred route identified by the Stage 1 project, including a newly constructed access point on Scrumlo Road. Primary access will likely be through the Stage 1 Project Area via Scrumlo Road, Hebden Road (south), the New England Highway, and the Hunter Expressway, which provides connection to the Port of Newcastle.

The proposed Project access points and transport route are shown on **Figure 3.3**.

Scrumlo Road traverses the southern extent of Stage 1 in a north to south direction before connecting to Albano Road via Bowmans Creek Road which continues north throughout the northern extent of the Stage 2 Project Area. Scrumlo Road is anticipated to be utilised as the primary haulage route during construction of the Project, consistent with the Stage 1 project. Road upgrades and infrastructure works on Hebden Road (south), Scrumlo Road, Albano Road and Bowmans Creek Road were approved under Stage 1, and are expected to assist facilitate access to the Stage 2 Project.

Muscle Creek Road, Sandy Creek Road, Goorangoola Road and Rouchel Road are not being considered to provide access to the Stage 2 Project as they were assessed as unsuitable within the Stage 1 EIS, due to road condition and community concerns raised during consultation.

As noted in **Section 3.5**, a preferred port and transport route was established during Stage 1, and it is expected that the Project will utilise the same access and route arrangements. This will be investigated further during preparation of the Stage 2 Project EIS.

Access tracks will be constructed on site to provide access to the proposed WTG locations (refer to **Figure 3.1**). The proposed delivery route, access tracks and level of construction/maintenance required will be confirmed and assessed during the preparation of the EIS. Existing access tracks within the Project Area will also be upgraded (where appropriate) to facilitate delivery of the WTGs and other materials. All access tracks will be maintained during the construction phase of the Project.

6.2.5.2 Further Assessment

The construction phase of the Project will result in increased traffic movements by both light vehicles transporting construction personnel and minor light construction material. Heavy vehicle movements (including OSOM vehicles) transporting the WTGs, blades and other materials will also be required for construction purposes. Traffic increases associated with the operational phase of the Project will be minimal and will generally only involve the movement of light vehicles transporting operational staff to and around the Project site intermittently.

A Traffic and Transport Impact Assessment (TTIA) will be undertaken to assess the proposed transport route required for the construction of the Project and any potential impact to the road network, including consideration of cumulative impacts with neighbouring major projects (i.e. Stage 1) within the Huner-Central Coast REZ.

The assessments will be undertaken following relevant NSW Government guidelines and assessment standards including Guide to Traffic Generating Developments (RTA, 2002), Road Design Guide and relevant Austroads Standards and Austroads Guide to Traffic Management.

The TTIA will be include:

- A review and assessment of the existing road network.
- A review of any previous traffic impact assessments undertaken for the surrounding area including assessment undertaken for Stage 1.
- Traffic counts in selected areas along the proposed traffic routes (if data is not readily available).
- A detailed assessment of the likely Project-specific and cumulative traffic impacts during the construction and operational phases of the Project (including intersection performance, capacity, and safety) with a focus on cumulative impacts associated with Stage 1 and nearby major projects.
- Identification of any mitigation and management measures that may be required.

Potential mitigation measures to reduce traffic impacts may include, but will not necessarily be limited to:

- Preparation of a Construction Traffic Management Plan that will outline the controls required during the construction phase and will be prepared in consultation with relevant roads authorities.
- Undertaking any necessary road upgrade works to facilitate access to the Project site and along the proposed transport route.
- Undertake consultation with relevant Councils regarding an infrastructure or maintenance agreement to cover any required mitigation works to manage the expected pavement impacts of the Project on the lower order, local government-controlled road links.

It is reiterated that other approvals would be required for the transport of WTGs and associated infrastructure by OSOM vehicles, under National Heavy Vehicle Law. These requirements will be assessed via a route analysis study as part of the EIS.

6.2.6 Social and Economic

A SISR has been undertaken by Umwelt in accordance with the scoping phase requirements of the SIA Guideline (DPIE, 2021f). The SISR has been provided in **Appendix C** and is summarised in the subsequent section below.

6.2.6.1 Methodology

The SISR been prepared in accordance with the SIA Guideline (DPIE, 2023f), and includes the following key components:

- Social baseline profiling – to define the baseline social context in which the Project is situated and area of social influence.
- Issues scoping – preliminary identification and evaluation of social impacts and issues relevant to the Project, to determine the level of assessment required for the EIS, proportionate to the scale of the Project and the matters of importance to the community.

6.2.6.2 Social Baseline

A social baseline profile was developed using the Project's social locality, and taking into consideration demographic, social and economic indicators and natural and physical attributes of the area. The social locality is generally defined as the area considered to be impacted by a Project, based on a range of direct and indirect, tangible and intangible impacts across a localised and regional context. The primary communities of interest that comprise the social locality for the purpose of the SISR is summarised below in **Table 6.11.**

Table 6.11 Social Locality

Settlement Aspect	Township/ Locality/ Community	Reason for Inclusion
The Suburb and Locality (SAL) within the Project area, including landholders and neighbours of the Project.	Much of the Project Area is predominately utilised for agricultural purposes, particularly grazing. There is one landholder. The Project Area is located within Bowmans Creek, which according to ABS (2021) has a population of 17 people.	The host SAL is the smallest geographical unit available to analyse demographic data surrounding the Project location. It provides indicative insights into the characteristics of landholders likely to experience the highest impacts from the Project.
Immediate neighbours of the Project	8 km radius from the Project Area. Seven (7) associated dwellings and 71 non-associated dwellings identified in the PVIA prepared to support the request for SEARs.	8 km radius aligns with the distance used to identify 'sensitive receivers', as identified by the PVIA.
Immediate surrounding transport routes	Hebden Road North Albano Road Bowmans Creek Road Scrumlo Road New England Highway	These roads will likely see traffic changes due to the Project construction activities.
Geographically adjacent	Hebden SAL Muscle Creek SAL Rouchel Brook SAL McCullys Gap SAL Goorangoola SAL	These settlements are included due to their physical proximity which indicates that they may be most likely to be impacted by the Project, and more likely to provide services or accommodation to support the Project. The larger settlements of Singleton and Muswellbrook are also likely to serve as higher-order townships with a greater density of businesses, services and infrastructure.
Proximal (within 60-minute drive) and primary order (population over 10,000 people) urban centres/localities (UCLs)	Singleton UCL Muswellbrook UCL	
Proximal (within 60-minute drive) and secondary order (population between 1,000 and 10,000 people) UCLs	Scone UCL (5,013)	
Local Government Area (LGA)	Muswellbrook LGA (16,357) Singleton LGA (24,577) Upper Hunter Shire LGA (14,229)	The broader LGA are included as they provide an overview of regional community issues and strengths

Settlement Aspect	Township/ Locality/ Community	Reason for Inclusion
First Nations Communities	Wonnarua nation	Traditional owners of the land and other Aboriginal people who value the land and may have concerns relating to cultural heritage and sites of significance within or surrounding the Project
Proximal projects with the capacity to generate cumulative impacts	Projects outlined in **Section 2.4** (with detailed consideration in Appendix D of the SISR).	There are a number of renewable energy, mining and infrastructure projects in this locality. These projects are included as they generate cumulative impacts by exacerbating or enhancing the impact of the Project.

6.2.6.3 Social Issues Scoping and Preliminary Impact Evaluation

Scoping of issues was addressed with due consideration of outcomes and responses from consultation undertaken during the scoping phase, along with the findings of the social baseline profile and the outcomes of analysis of EIS and IPC submissions for Stage 1.

As per the SIA Guideline, social impacts can be grouped according to several different categories and may involve impacts and changes to people's way of life, community, accessibility, culture, health and wellbeing, surroundings, livelihoods, and decision-making systems.

Impacts to surroundings was the most frequently raised social impact category, and more specifically within this, impacts to social amenity. When the community were asked directly about potential negative impacts of the Project, the top concerns included the potential for the Project to impact on the visual amenity of the social locality and reduced social amenity due to noise disturbances from the operation of WTGs.

Reduced community cohesion and lack of distributional equity, altered landscape affecting people's sense of place, and increased traffic and road disruptions impacting road safety, were also noted as potential social impacts.

A preliminary evaluation of the likely social and economic impacts and opportunities is presented in Table 6.1 and Table 6.2 of the SISR (**Appendix C**), respectively. These impacts and opportunities will be further validated through engagement with key stakeholders in Phase 2 of the SIA, and any further social and economic impacts identified for assessment during preparation of the EIS.

6.2.7 Hazards and Safety

The following section addresses the proposed approach to assessing potential hazards and safety impacts associated with the Project including aviation safety, electromagnetic fields, impacts to telecommunications, blade throw, shadow flicker, blade glint, bushfire threat, and the inclusion of potential hazardous materials associated with the Project.

6.2.7.1 Aviation Safety

The Project, like all wind farms, will need to consider the potential for interaction with air services. WTG height and placement will consider potential safety hazards for aircraft including intrusion into the airspace and potential for effects on navigation instruments. The Project Area is located approximately 40 km, 55 km, and 60 km from three (3) registered airports/aerodromes including Scone, Maitland and Cessnock, respectively. There are also numerous nearby local aircraft landing areas within the vicinity of the Project Area which will be considered in the assessment. The EIS will include an Aviation Impact Assessment (AIA) which will include the following specific requirements as advised by Airservices Australia:

- Aerodromes:
    - Specify all registered/certified aerodromes that are located within 30 nautical miles (55.56 km) of the Project Area.
    - Nominate all instrument approach and landing procedures at these aerodromes.
    - Review the potential effect of the Project on the operational airspace of the aerodromes.
- Air Routes: nominate published air routes which are located near/over the Project Area and review potential impacts of the Project on aircraft using those air routes.
- Airspace: nominate the airspace classification where the Project Area is located.
- Navigation/Radar: nominate radar navigation systems with coverage overlapping the Project Area.
- A risk assessment in relation to night lighting of the WTGs will also be undertaken in accordance with Australian Standard AS/NZS ISO 31000:2018 Risk Management – Guidelines.
- During the development of the AIA, consultation will be undertaken with Airservices Australia, the Department of Defence, relevant local Councils and aerodrome operators.

6.2.7.2 Electromagnetic Fields

Electromagnetic fields (EMF) are present where electric current flows, including overhead and underground transmission lines, substations, and electrical appliances. The standard SEARs for wind farm developments require proponents to *"consider and document any health issues having regard to the latest advice of the National Health and Medical Research Council, and identify potential hazards and risks associated with electric and magnetic fields and demonstrate the application of the principles of prudent avoidance."*.

The EIS will include an assessment which will consider potential health issues and risks associated with EMF produced by the wind farm and associated electrical infrastructure within the Project Area in accordance with the ICNIRP Guidelines for Limiting Exposure to Time-varying Electric, Magnetic and Electromagnetic Fields (ICNIRP, 1998). This will include any cumulative impacts associated with the Stage 1 project.

6.2.7.3 Telecommunications

Telecommunications and radar services (civil and meteorological) can be impacted by WTGs through electromagnetic interference (EMI).

As part of the preliminary constraint assessments undertaken to inform the design of the Project, a review of telecommunications services in the area was undertaken. This included point to point microwave links, meteorological radar, mobile voice-based communications, wireless and satellite internet services, broadcast and digital radio, and broadcast, digital and satellite television. Appropriate buffer distances have been applied in the current Project layout to avoid potential interference from WTGs with these communication links.

The EIS will include an EMI Assessment which will address any impact to radiocommunication services within and surrounding the Project Area as a result of the Project and identify any required mitigation measures. This will include any cumulative impacts associated with the Stage 1 project.

6.2.7.4 Blade Throw

Blade throw typically involves the failure of the turbine rotor which has the potential to result in the turbine blade becoming detached from the WTG. This risk is addressed by the WTG design; however, an assessment will be undertaken for the Project. The blade throw assessment will consider the potential risk of blade throw associated with the proposed WTG layout. The blade throw assessment will include:

- General review and assessment of the likelihood of blade throw occurring and typical blade throw distances.
- Calculation of the separation distance between WTGs and neighbouring residences and property boundaries, including consideration of ant cumulative impacts with Stage 1 WTGs.
- Consideration of mechanisms to reduce the likelihood of blade throw occurring, including:
    - Relevant standards against which WTGs should be certified.
    - Typical overspeed and failsafe protection mechanisms.
    - Management and maintenance procedures, including regular inspections.
    - Provisions for blade replacement.

6.2.7.5 Shadow Flicker and Blade Glint

Shadow flicker is a moving shadow cast by the blades of a WTG from the sun which can cause a nuisance at surrounding dwellings and in rare cases can cause health impacts such as photosensitive epilepsy or motion sickness. Blade glint can result from sunlight reflecting off the white components of the WTGs. The risk of blade glint from WTG is low given majority of manufacturers treat the WTGs with non-reflective finishes to reduce the risk of this occurring.

The EIS will include a Shadow Flicker Assessment which will:

- Review sensitive receiver locations.
- Estimate the annual hours of shadow flicker received at each nearby residence.
- Identify any residence where there is potential for the shadow flicker duration to exceed the limits specified in the relevant guidelines.
- Identify the specific WTGs contributing to the shadow flicker for each residence.

- Assess the likely reduction in shadow flicker duration due to WTG orientation and cloud cover.
- Generate maps of theoretical and predicted actual shadow flicker duration.
- Consider the potential sources of conservatism in the assessment.

The Shadow Flicker Assessment will also include an assessment of blade glint and will include consideration of any cumulative impact associated with the Stage 1 project.

6.2.7.6 Preliminary Hazard Analysis

The Project will result in the introduction of potentially hazardous materials during construction that are likely to be transported to the Project Area, stored, and used at the Project Area, and transported from the Project Area, including detonators/explosives, welding gases, diesel, and gasoline/petrol. Hazardous substances during operation will be limited to gear oils and transformer oils.

A preliminary risk screening for all hazardous materials and dangerous goods to be stored and transported to/from the Project will be undertaken during the EIS in accordance with Chapter 3 (Hazardous and Offensive Development) of *State Environment Planning Policy (Resilience and Hazards) 2021* (Resilience and Hazards SEPP) to determine the requirement for a Preliminary Hazard Analysis (PHA).

Notwithstanding the preliminary risk screening process, it is anticipated that a PHA incorporating a Level 1 Qualitative Risk Analysis and Level 2 Semi-quantitative will be required to estimate the level of risk posed to surrounding off-site land users. The PHA is expected to involve the following key tasks:

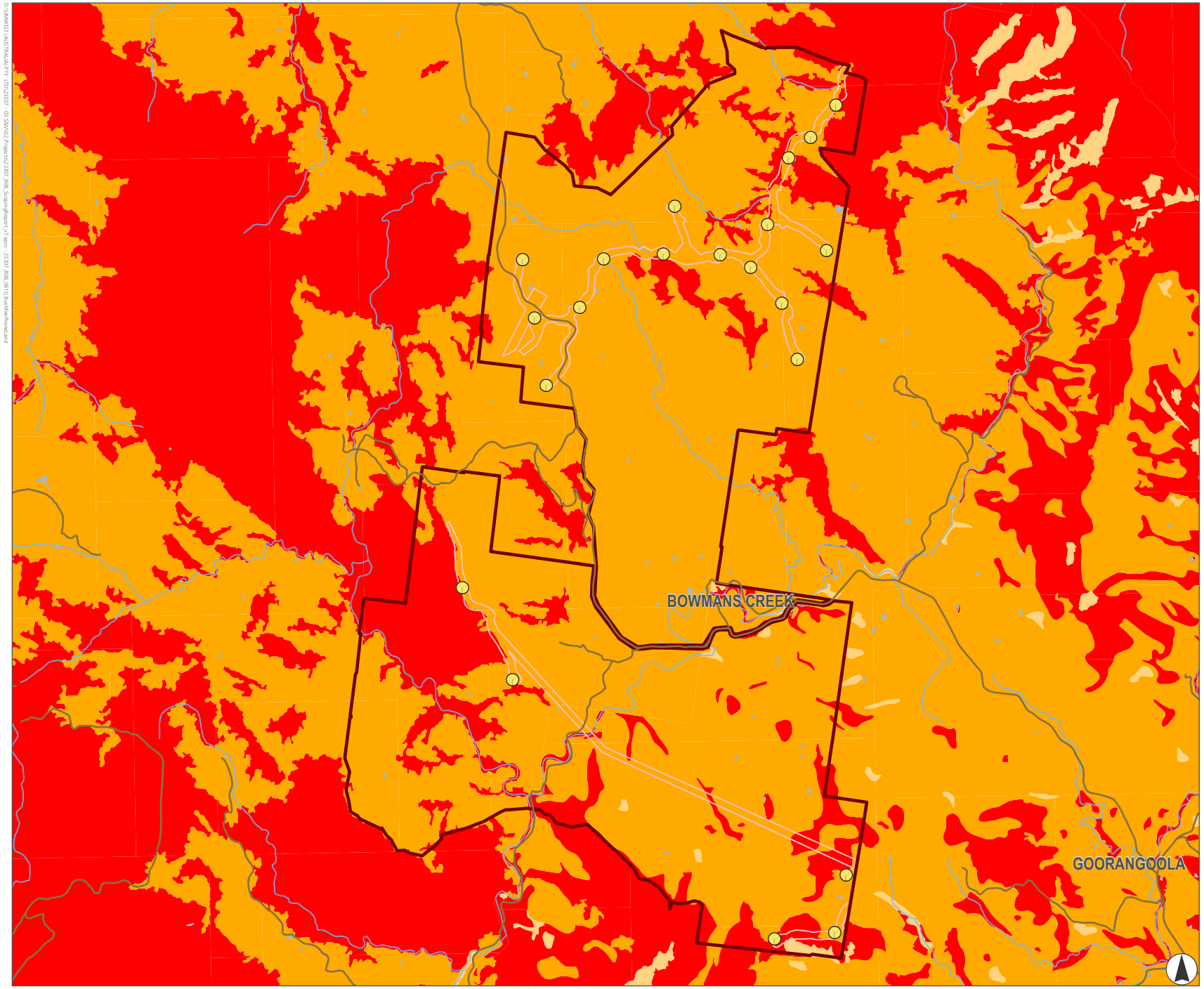
- A preliminary risk screening for all hazardous materials and dangerous goods to be stored and transported to/from the Project will be undertaken in accordance with Chapter 3 of the Resilience and Hazards SEPP.
- Risk classification and prioritisation and estimation of societal risk in accordance with the Multi-Level Risk Assessment Guideline (NSW Department of Planning, 2011a).
- A qualitative risk assessment (for the Level 1 analysis) workshop to identify Project hazards that pose an off-site risk.
- Consequence (e.g., fire, explosion, toxic release) and frequency analysis (Level 2 analysis) for hazard scenarios identified as requiring further assessment in the qualitative risk assessment.
- Assessment of the Level 2 analysis results with respect to Hazardous Industry Planning and Advisory Paper No 4 Risk Criteria for Land Use Planning (NSW Department of Planning, 2011b).
- Consultation with Fire and Rescue NSW regarding fire and life safety systems.

6.2.7.7 Bushfire Hazard

The Project Area has land categorised ‘Vegetation Category 1’, ‘Vegetation Category 2’ and ‘Vegetation Category 3’ bushfire prone land under the NSW RFS Bushfire Prone Land Mapping Tool, as illustrated on **Figure 6.10** below.

There are areas of remnant vegetation within the Project Area, which form a potentially significant fuel load capable of sustaining and spreading bushfire. Areas of vegetation within the Project Area also represent a potential linkage between vegetated areas within and adjoining the Project Area, with the potential to support the spread of bushfire. A bushfire threat assessment will be undertaken in accordance with the requirements of Planning for Bushfire Protection 2019 (PBP) (NSW Rural Fire Service, 2019). Consultation with the NSW RFS will also be undertaken during the preparation of the EIS.

FIGURE 6.10
Bushfire Prone Land



Legend

- Project Boundary - Stage 2
- Development Corridor - Stage 2
- Turbine Locations - Stage 2
- Waterbodies
- Major Watercourse
- Roads and Tracks

NSW Bush Fire Prone Lands

- Vegetation Category 1
- Vegetation Category 2
- Vegetation Category 3

0 1 2

Kilometres

Scale 1:60,000 at A4
GDA2020 MGA Zone 56

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Image Source: ESRI Basemap (2023) | **Data Source:** NSW DFSI (2023), NSW RFS (2023)

6.2.8 Water and Soil Resources

6.2.8.1 Surface Water and Flooding

The Project Area falls within the Hunter River Catchment and is located approximately 20 km southeast of Lake Glenbawn, which connects to the Hunter River, a major regulated river. The principal watercourse networks that traverse the Project Area include Bowmans Creek, Millers Creek, Sandy Creek, Alexander Creek and Fish Hole Creek (all sixth order streams) as shown in **Figure 6.11**.

The generally flat topography in and around the Project Area provides for a broad floodplain with numerous watercourses with streamflow contributions emanating from local catchment runoff and potential flood breakouts from the major river systems in flood events. The Project Area also has topographical depressions which are likely to accumulate surface water under local catchment flooding conditions.

No flood studies have been undertaken within the Project Area, and it is not currently mapped as flood prone. However, there may be the potential for flows from the Hunter River to be conveyed through the interconnected floodway network in major flood events. Potential for flood-related impacts will also be assessed in detail during the preparation of the EIS.

6.2.8.2 Groundwater

According to the Groundwater Dependent Ecosystem (GDE) Atlas (BoM, 2017), the Project Area is mapped as containing sparse medium and low probability for GDE, as illustrated on **Figure 6.12**. The main creeks are identified as having low and medium potential aquatic GDE.

Further desktop investigation will be undertaken during the EIS phase to understand groundwater characteristics (including groundwater levels) within the Project Area, and this may be supplemented by a baseline groundwater monitoring program where existing data proves insufficient.

The EIS would include an assessment of any anticipated groundwater take and consideration of water licensing requirements under relevant Water Sharing Plans.

6.2.8.3 Land and Soil Capability

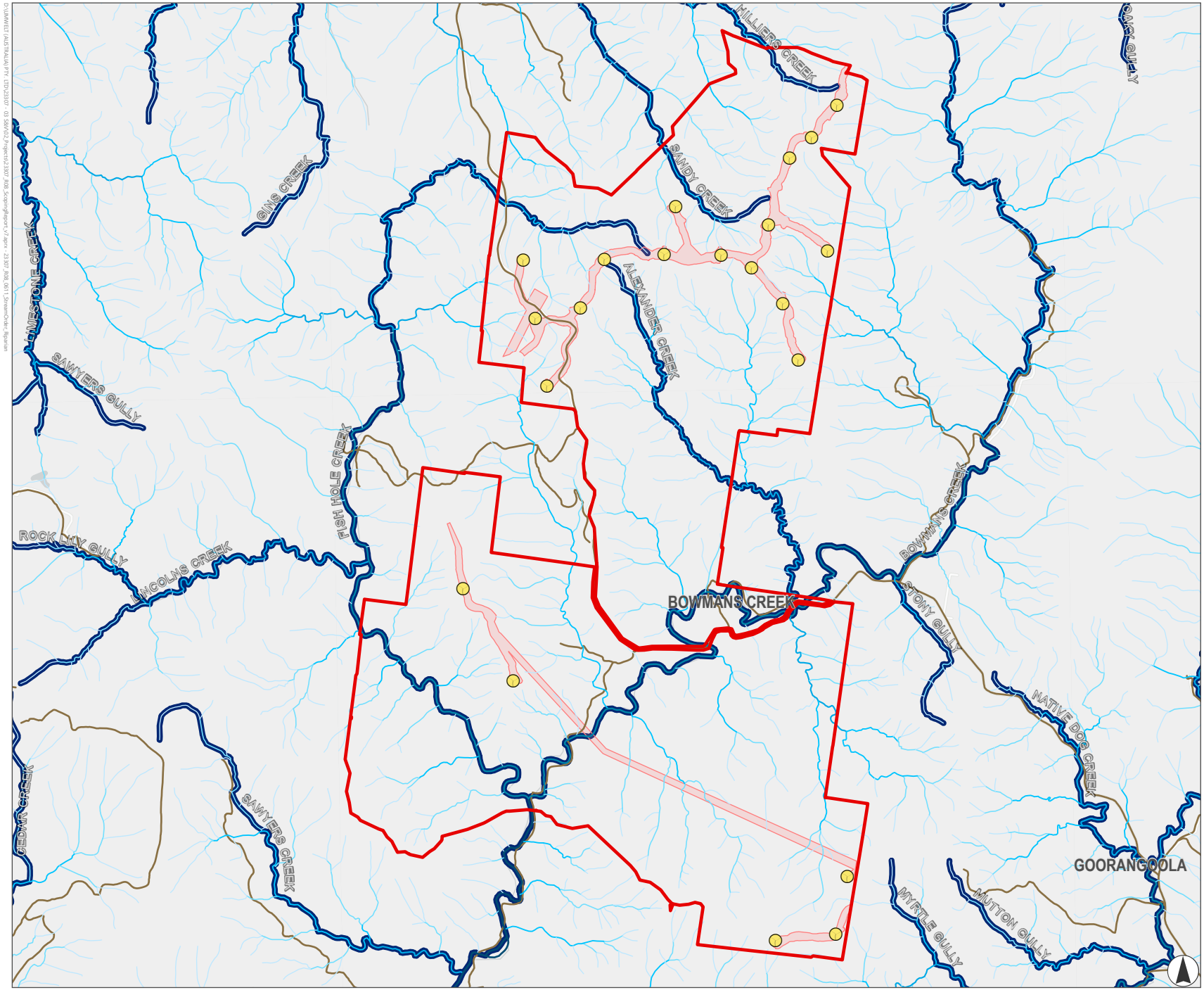
There is no Strategic Agricultural Land – Biophysical (BSAL) present within or in the vicinity of the Project Area. Additionally, there are no mapped Class 1-2 soils under the Land and Soil Capability (LSC) Assessment Scheme present within the Project Area, as illustrated on **Figure 6.13** below.

There are Class 3 soils predominantly along the Bowmans Creek watercourse alignment in the southern portion of the Project Area, however disturbance to these areas would be limited to pole foundations and minor earthworks to support the proposed overhead transmission line network connecting the southern WTGs to the Stage 1 project. The remainder of land within the Project Area is mapped as Class 5, Class 6 or Class 7 LSC. Existing agricultural activities within the host properties will continue and co-exist with the Project.

There are no mapped high-risk areas for acid sulfate soils within the Project Area.

FIGURE 6.11

Strahler Stream Order



Legend

- Project Boundary - Stage 2
- Developement Corridor - Stage 2
- Turbine Locations - Stage 2
- Roads and Tracks
- Biodiverse Riparian Land (Biodiversity Values)

Strahler Stream Order

- 1
- 2
- 3
- 4
- 5
- 6

0 1 2

Kilometres

Scale 1:60,000 at A4
GDA2020 MGA Zone 56

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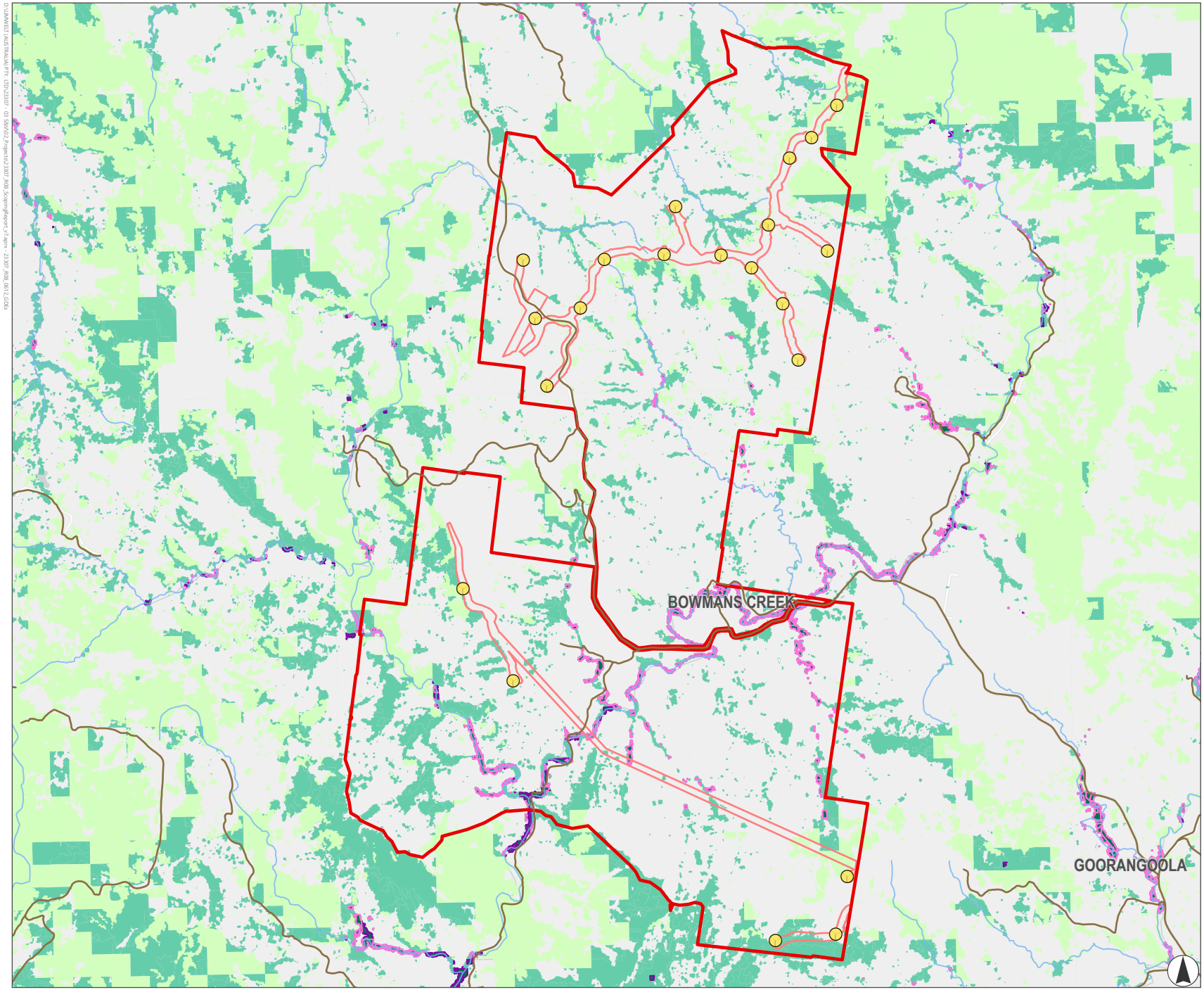


FIGURE 6.12

Groundwater Dependent Ecosystems

Legend

- Project Boundary - Stage 2
- Development Corridor - Stage 2
- Turbine Locations - Stage 2
- Major Watercourse
- Roads and Tracks

Aquatic GDE - HAVAE Class

- Low Value
- Medium Value

GDE Probability

- High Probability
- Medium Probability
- Low Probability

0 1 2

Kilometres

Scale 1:60,000 at A4
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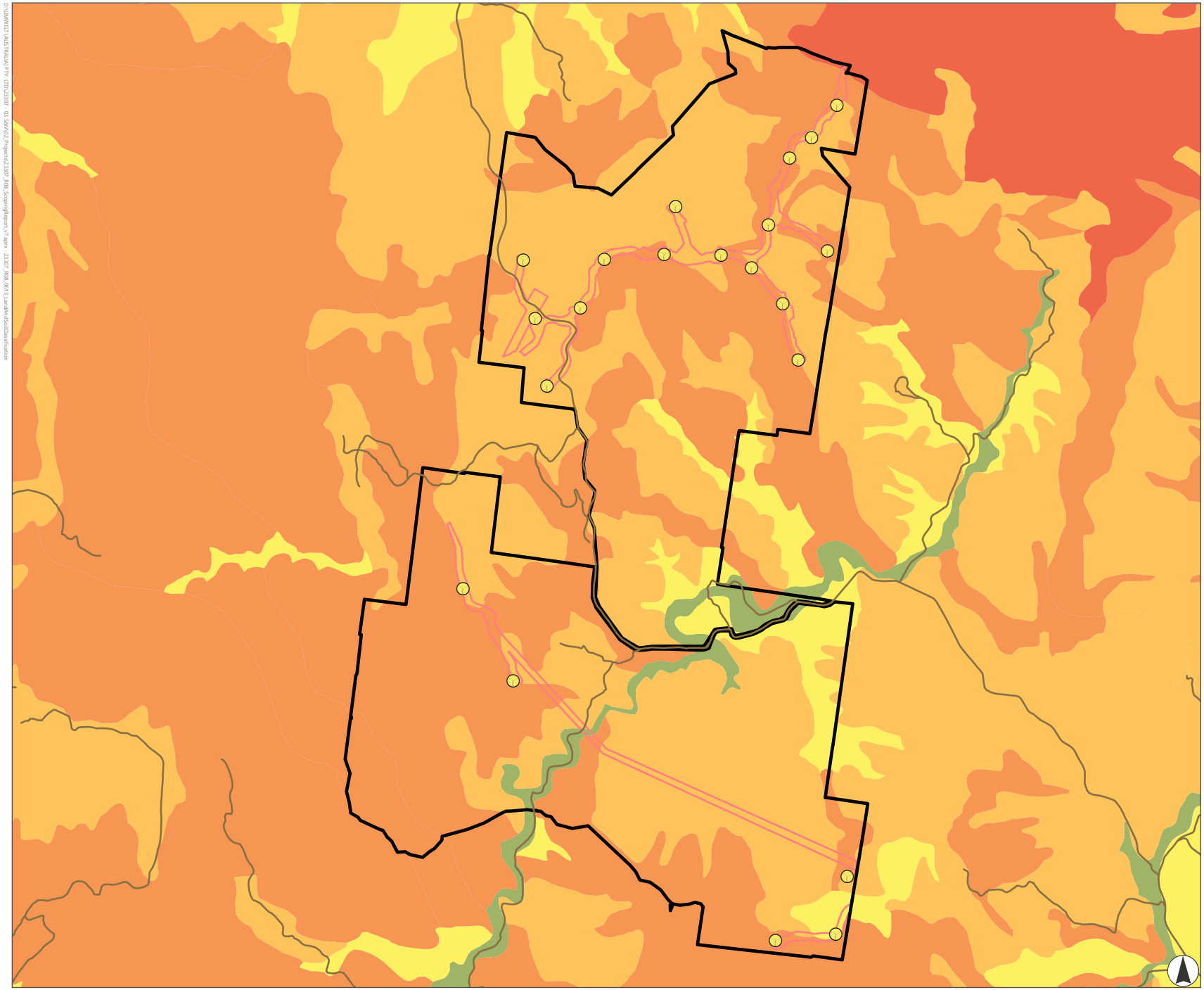


FIGURE 6.13
Land and Soil Classification

Legend

- Project Boundary - Stage 2
- Development Corridor - Stage 2
- Turbine Locations - Stage 2
- Roads and Tracks

Land and Soil Capability

- 3 - Moderate limitations
- 5 - Severe limitations
- 6 - Very severe limitations
- 7 - Extremely severe limitations
- 8 - Extreme limitations

0 1 2

Kilometres

Scale 1:60,000 at A4
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6.2.8.4 Potential Impacts and Matters Requiring Further Assessment

An overview of potential impacts on water and soil resources associated with the Project that will require further assessment in the EIS is provided in **Table 6.12** below.

A Water Resources Impact Assessment (WRIA) will be undertaken as part of the EIS that will consider potential impacts on both surface water and groundwater resources and the catchment, including flooding, erosion and sediment control, water quality, water users, water sourcing and licensing, and any required management and mitigation measures to minimise the potential impacts of the Project on water and soil resources.

Table 6.12 provides an overview of matters requiring specific consideration in the WRIA, including a summary of potential mitigation measures to address these impacts.

Table 6.12 Potential Water Resource Impacts Associated with the Project

Aspect	Nature of Potential Impact	Matters Requiring Further Assessment/Consideration in EIS	Potential Mitigation Measures
Surface Water	• Potential changes to surface water runoff quantity and distribution associated with localised earthworks, including obstruction of overland flows and increased runoff potential due to vegetation removal and the establishment of hardstand and compacted areas. • Potential erosion and sedimentation associated with vegetation clearing and earthworks (including the establishment/upgrading of creek crossings). • Potential fish passage obstruction and impacts to downstream riparian ecology associated with erosion and sedimentation and establishment/upgrading of creek crossings. • Potential water quality impacts associated with accidental spills or leaks from sources such as construction machinery, stored construction and waste materials, fertilisers used for revegetation.	The WRIA would include: • A baseline assessment of regional catchments, existing hydrological regimes, geomorphic character and condition. • A qualitative assessment of potential surface water impacts (including erosion and sedimentation risk and associated impacts to downstream water users and riparian ecosystems) over the life of the Project. This assessment will have regard to NSW Water Quality Objectives and environmental values and will include detailed measures to mitigate potential impacts, including upstream and downstream monitoring to detect changes in water quality and facilitate adaptive management of surface water impacts.	• Implementation of appropriate erosion and sediment control measures, developed in accordance with relevant guidelines. • Minimising the number of new creek crossings and ensuring that any new/upgraded creek crossings are appropriately sited and constructed to minimise impacts to stream flows in accordance with relevant guidelines. • Implementation of spill containment measures, including bunding where appropriate.
Flooding	• Potential loss of floodplain storage and/or flow obstruction and associated changes to flood behaviour/risk.	The WRIA would include a Flood Impact Assessment, which would comprise: • A review of existing flood information, including historical studies for the Hunter River and other nearby significant waterways. • Additional flood modelling (e.g. direct rainfall coarse grid TUFLOW 2D) to define local flood conditions (flood extent, depth, velocity and hazard) where no existing information is available.	• Minimising the disturbance footprint and rehabilitating areas impacted during the construction phase that are not required for ongoing operations.

Aspect	Nature of Potential Impact	Matters Requiring Further Assessment/Consideration in EIS	Potential Mitigation Measures
		• An assessment of likely impacts on low flow and high flow regimes, with consideration of potential changes to flood depth, velocity and hazard classification, and an overview of avoidance and mitigation measures. • Base case flood modelling would be undertaken for a range of flood events, including the 1% Annual Exceedance Probability (AEP) and Probable Maximum Flood events, as well as a sensitivity analysis for climate change scenarios (0.2% and 0.5%). Project case modelling may also be undertaken on a risk basis, for example, if any proposed Project infrastructure would be located within the 1% AEP flood extent.	• Minimising works within protected lands along waterways. • Refinement of Project design (e.g. re-siting of Project infrastructure, where required) based on preliminary modelling.
Water Supply	• Project-related demands on local water supply, particularly during drought periods.	The WRIA would include: • A high-level assessment of water demands over the life of the Project. • Identification of suitable water sources and transport arrangements to meet the demands of the Project, informed by stakeholder consultation. • Identification of any relevant water licensing requirements under the WM Act, and a strategy for meeting those requirements.	• Identification of potential water sources in consultation with key stakeholders (e.g. local council) and having regard to cumulative water demand associated with other renewable energy projects in the locality.
Groundwater Resources	• Impacts to the quantity and quality of groundwater and associated impacts to GDEs.	The WRIA would include: • A qualitative assessment of impacts to groundwater resources and GDEs, including consideration of potential cumulative impacts, and detailed measures to mitigate potential impacts. • Identification of any anticipated groundwater take, consideration of relevant water licensing requirements under the WM Act, and a strategy for meeting those requirements.	• Minimising the extent and depth of ground disturbance, particularly in proximity to potential terrestrial GDE.

6.2.9 Summary of Key Constraints

The key constraints currently mapped or known to be within the Project Area are presented in **Figure 6.14** and **Figure 6.15** below. They are based on the:

- Existing strategies implemented by Ark Energy to avoid and/or minimise impacts, as discussed in **Section 3.8** of this Scoping Report.
- The environmental matters discussed in **Section 6.2** above.

A single WTG proposed within the southeastern corner of the Project Area marginally intercepts the 100 m 'Internal Project Boundary Constraints Buffer' as presented in **Figure 6.14**. This WTG is located approximately five (5) m within the buffer (or ~95 m from the Project Boundary) which is considered an acceptable distance from the Project Boundary. Other WTGs in this portion of the Project Area may appear to fall within the buffer due to the scale of **Figure 6.14**, however it is noted that these WTGs are situated outside of the buffer.

There is potentially the need to micro-site the Stage 1 project WTG closest to this location to ensure there are no detrimental effects to the available wind resource. Any potential micro-siting of Stage 1 WTGs would be carried out in line with the Conditions of Consent for the Stage 1 project (i.e. SSD 10315), and does not form part of this SSD application. This information is provided simply to assist justify the proximity of this WTG with respect to the Stage 2 Project Boundary.

Figure 6.15 is reproduced from the BCA (refer to **Appendix F** of this Scoping Report) and shows mapped PCT and TEC across the Project Area. It is provided separately to **Figure 6.14** to improve readability but these environmental constraints, have been to date, and will continue to be considered collectively during the EIS.

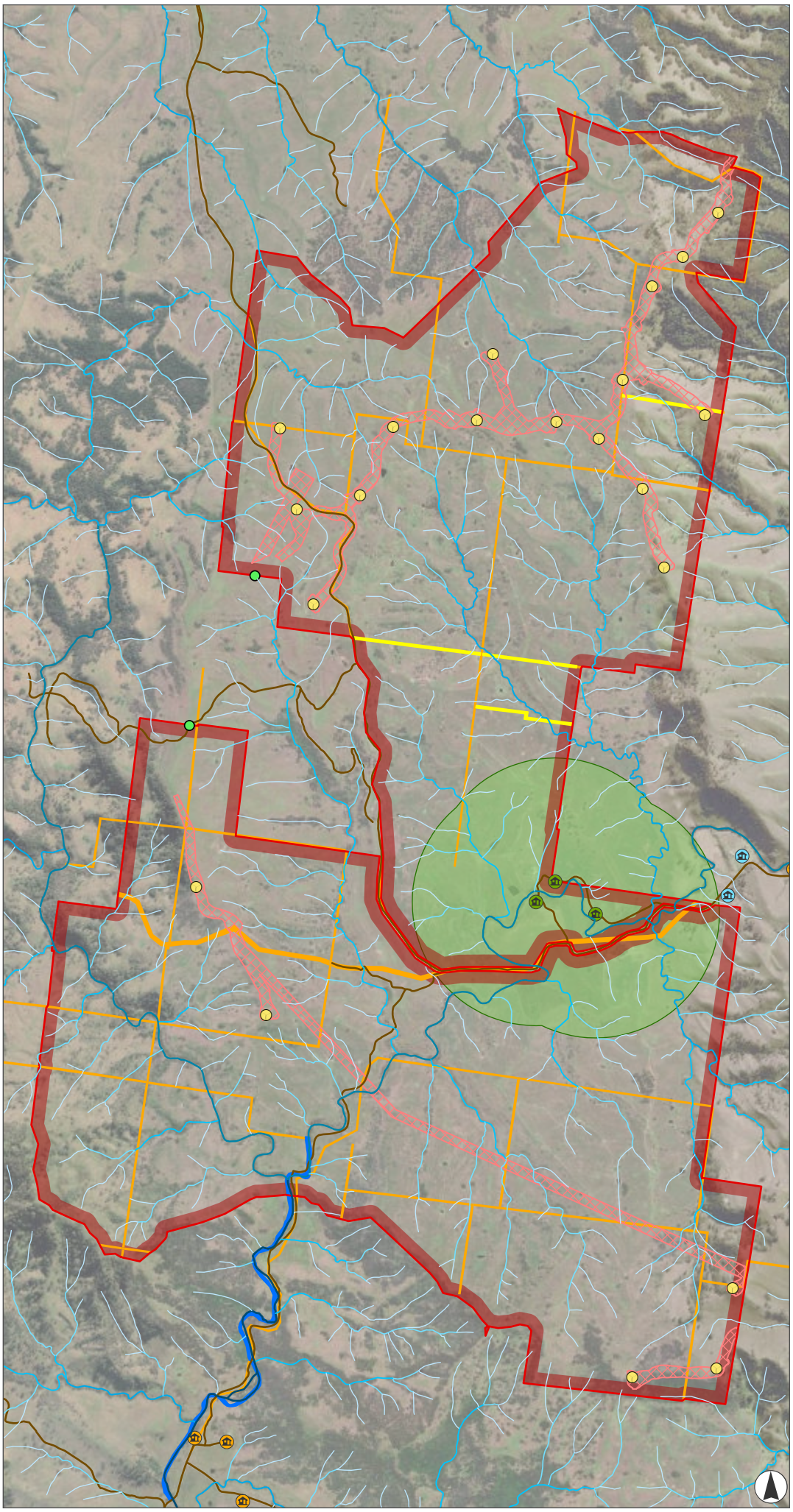


FIGURE 6.14

Key Environmental Constraints – General

Legend

- Project Boundary - Stage 2
- Development Corridor - Stage 2
- Internal Project Boundary Constraints Buffer (100m)
- Host Residence Constraints Buffer (1km)
- Crown Easement - Unidentified
- Crown Water Feature Corridor
- Crown Road Corridor
- Roads and Tracks
- Turbine Locations - Stage 2
- Main Site Entry

Residences within 8km

- Host
- Associated
- Non-associated

Strahler Stream Order

- 1
- 2
- 3
- 4
- 5
- 6

0 1 2

Kilometres

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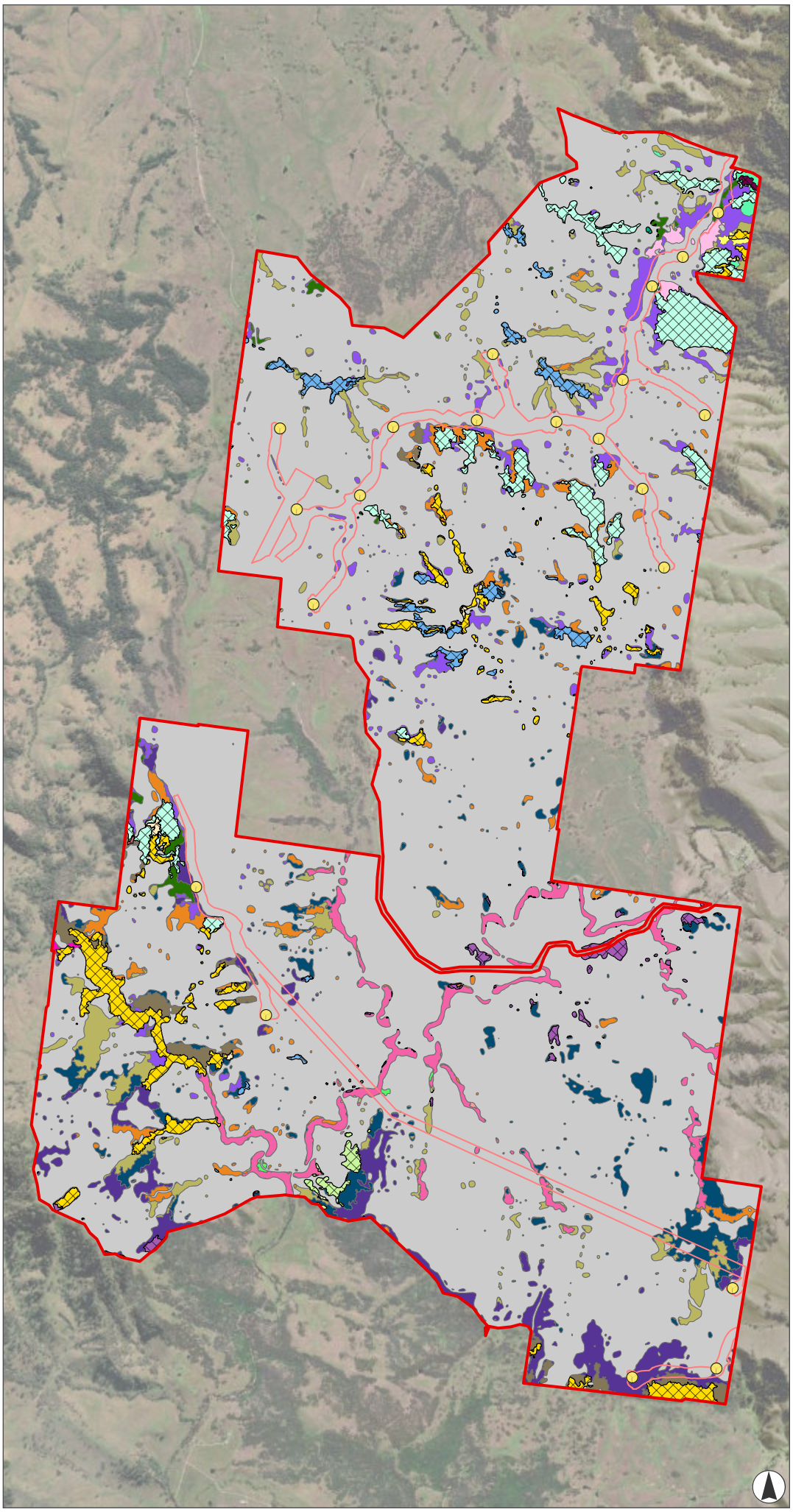


FIGURE 6.15

Key Environmental Constraints – PCTs and TECs

Legend

- Project Boundary - Stage 2
- Development Corridor - Stage 2
- Turbine Locations - Stage 2
- BC Act or BC & EPBC Act Threatened Ecological Communities

State Vegetation Type Mapping - PCT ID

- 3056
- 3076
- 3086
- 3091
- 3114
- 3120
- 3236
- 3240
- 3241
- 3245
- 3285
- 3315
- 3395
- 3396
- 3397
- 3401
- 3431
- 3439
- 3446
- 3521
- 3525
- 4073
- 4079
- 0

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6.2.10 Cumulative Impacts

The NSW Wind Energy Guideline (DPE, 2016a) identifies the requirement to address cumulative impacts in relation to any other proposed, approved or operating wind energy projects in the vicinity particularly with regard to landscape, noise, biodiversity and traffic impacts. The CIA Guidelines (DPIE, 2021h) are also applicable to the Project.

As discussed in **Section 2.3**, the Project is located within the Hunter-Central Coast REZ and there are numerous existing and proposed renewable energy projects within the region (refer to **Section 2.4** and **Figure 2.2**). The relevant detailed environmental assessments will include an assessment of the potential cumulative impacts associated with the Project and will follow the relevant guidelines.

Given the proximal location to these projects to the proposed Project, there is potential for cumulative impacts across key environmental matters including (but not limited to) visual, noise, socio-economic, and traffic and transport. The impacts are difficult to quantify at this stage of Project development and would be dependent on the final size, timing and duration of the construction and operation of the surrounding projects. However, these key matters (as well as other relevant environmental matters) will be subject to a detailed cumulative impact assessment during the preparation of the EIS for the Project. **Appendix A** outlines where a CIA will be undertaken for the relevant matters including the level of assessment and engagement. A CIS scoping summary has also been prepared as **Appendix B** to support this Scoping Report.

Table 6.13 below provides a summary of the key considerations in relation to CIA for the Project. The relevant detailed environmental assessments required to support the EIS will include an assessment of the potential cumulative impacts associated with the Project, in accordance with the CIA Guidelines (DPIE, 2022h) and other relevant guidelines specific to each technical discipline.

Table 6.13 Cumulative Impact Assessment Considerations

Scoping Cumulative Impact Assessment	Detail
What to assess?	As outlined in **Appendix A**, the following key matters will require consideration of CIA: • Visual amenity. • Noise and vibration. • Traffic and transport. • Socio-economic.
What study area?	The study area will vary depending on the specific characteristics of the assessment matter and the scale and nature of the potential impacts on the matter resulting from the Project with other relevant future projects. Each CIA will be undertaken in accordance with the relevant guidelines and will be broad enough to capture all relevant cumulative impacts.
Over what time period?	Life of the Project including construction, operation and decommissioning.
What projects to include?	The effects of past developments and actions, as well as currently operating projects will be captured in the baseline environmental studies for the Project. The CIA will consider the cumulative impacts of the Project on key matters with other proposed developments, including those outlined in **Table 2.1**, as relevant. This includes changes to existing projects, approved projects, or projects under assessment.
What is the approach to assessment?	All CIAs will be undertaken in accordance with approved assessment methods for relevant matters, e.g. the NPfI and the BAM.

Scoping Cumulative Impact Assessment	Detail
What are the key uncertainties?	Key uncertainties to undertaking the CIAs will include availability and quality of data on proposed future projects at the time of preparation of assessments. CIAs will identify realistic development scenarios with relevant future projects over the life of the Project.

6.2.11 Other Matters

The EIS will also address other issues relating to:

- Land use – the EIS will assess the potential interactions of the Project with other land uses, including agricultural land uses. This assessment will draw on the findings of other related assessments including impacts on visual amenity, water, soil, noise, air quality, traffic, hazards and safety.
- 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.
- Air quality – in accordance with relevant NSW guidelines in relation to construction via a qualitative assessment, including specifying relevant construction phase air quality controls.
- Decommissioning and rehabilitation.

Whilst these matters will be appropriately assessed in the EIS, detailed assessments are not proposed as the issues can be readily defined, assessed and mitigated using well recognised approaches.

6.3 Matters Requiring No Further Assessment in the EIS

Table 6.14 outlines the matters that are considered to not require further assessment in the EIS based on the scoping phase assessment along with a comment justifying why no further assessment is required.

Table 6.14 Matters Requiring No Further Assessment in the EIS

Issue	Comment
Greenhouse gas and energy	As the Project will generate renewable energy, the emissions resulting from the construction, operation or decommissioning will be readily offset by the reduction in energy generation emissions. GHG emissions will be addressed in the justification for the Project as part of the EIS.
Port and airport facilities	The Project does not result in any change to port or airport facilities, other than the delivery of Project components to the nominated port. The transportation of Project components to the Project Area will be assessed as part of the TIA.
Rail facilities	The Project does not propose to utilise any rail facilities.
Odour	The Project is not anticipated to cause any odour.
Coastal hazards	The Project is not located within a coastal zone and will not result in any impacts to coastal zones.
Dam safety	The Project does not require the construction or maintenance of a dam.
Land movement	The Project is not anticipated to result in any land movement. The Project results in relatively minor excavation works only.

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APPENDIX A

Scoping Summary Table

Appendix A Scoping Summary Table

Group	Matter	Scale of Impact	Nature of Impact	Sensitivity of Receiving Environment	Level of Assessment	Mitigation Measures Required	Cumulative Impact Assessment Required?	Engagement	Relevant government plans, policies and guidelines	Section in Scoping Report
Access	Traffic Port facilities Road facilities	Moderate	Direct Indirect Cumulative	Sensitive (change in road usage/ amenity, nearby dwellings, townships and land uses)	Detailed	Likely	Yes	Specific	• Austroads – Guide to Road Design (Austroads) – Part 1 to 7 • Austroads - Guidelines for Traffic Management (Austroads) • Guide to Traffic Management – Part 3 Traffic Studies and Analysis (Austroads, 2013)	**Section 3.5**
Air	Atmospheric emissions Gases Particulate matter	Low	Direct Indirect	Sensitive (local and regional air quality)	Standard	Likely	No	General	• NSW Climate Change Policy Framework – Office of Environment and Heritage (OEH), dated 2016 • National Greenhouse Accounts Factors – Australian Government, dated 2021	**Section 6.2.11**
Amenity	Noise	High	Direct Cumulative Perceived	Sensitive (change in noise amenity, nearby dwellings, townships and land uses)	Detailed	Likely	Yes	Specific	• Noise Bulletin (DPE, 2016c) • NSW Government – Environment Protection Authority (EPA) – Noise Policy for Industry, dated 2017 (NPfI, 2017) • NSW Government – Department of Environment, Climate Change – Interim Construction Noise	**Section 6.2.2**

Group	Matter	Scale of Impact	Nature of Impact	Sensitivity of Receiving Environment	Level of Assessment	Mitigation Measures Required	Cumulative Impact Assessment Required?	Engagement	Relevant government plans, policies and guidelines	Section in Scoping Report
									Guidelines, dated 2009 (ICNG, 2009) • NSW Government – Department of Environment, Climate Change and Water (DECCW) – Road Noise Policy, dated 2011 (RNP, 2011) • NSW Government – Department of Environment and Conservation – Assessing Vibration: A Technical Guideline, dated 2006 (vibration guideline, 2006).	
Amenity (cont'd)	Visual	High	Direct Cumulative Perceived	Sensitive (change in visual amenity, nearby dwellings, townships and public viewpoints)	Detailed	Likely	Yes	Specific	• Wind Energy: Visual Assessment Bulletin for State Significant Wind Energy Development, 2016.	**Section 6.2.1**
Biodiversity	Conservation areas Aquatic flora and fauna Terrestrial flora and fauna	High	Direct Indirect Cumulative	Sensitive (potential high sensitivity for select flora and fauna species, some being endangered and critically endangered)	Detailed	Likely	Yes	Specific	• NSW Biosecurity Strategy 2013-2021 – NSW Department of Primary Industries, dated 2013 • Biodiversity Assessment Method (BAM) – NSW Government, dated 2020.	**Section 6.2.3**

Group	Matter	Scale of Impact	Nature of Impact	Sensitivity of Receiving Environment	Level of Assessment	Mitigation Measures Required	Cumulative Impact Assessment Required?	Engagement	Relevant government plans, policies and guidelines	Section in Scoping Report
Economic	Livelihood	Low	Indirect Perceived Cumulative	Sensitive (potential resource sterilisation, reduced agricultural land uses)	Standard	Likely	Yes	General	• Social Impact Assessment Guidelines for State Significant Projects (DPIE, 2021b) • Undertaking Engagement Guidelines for State Significant Projects (DPIE, 2021d).	**Section 6.2.6**
Hazards and risks	Bushfire	Low	Direct Indirect	Sensitive (emergencies, safety)	Standard	Likely	No	Specific	• Planning for Bushfire Protection – NSW Rural Fire Service, dated 2019.	**Section 6.2.7.7**
	Flooding	Low	Direct Indirect	Sensitive (on-site activities, emergencies, safety)	Standard	Likely	No	General	• Floodplain Risk Management Guidelines (OEH), dated 2019 • Floodplain Development Manual: The management of flood liable land – NSW Government, dated 2005.	**Section 6.2.8**
	Hazardous and offensive development (Battery Energy Storage System, BESS)	Low	Direct	Sensitive (emergencies, safety)	Detailed	Likely	No	General	• State Environmental Planning Policy No 33—Hazardous and Offensive Development – 1992 EPI 129 • Hazardous and Offensive Development Application Guidelines: Applying SEPP 33 – Department of Planning, dated 2011 • Assessment Guideline: Multi-level Risk Assessment –	**Section 6.2.7.6**

Group	Matter	Scale of Impact	Nature of Impact	Sensitivity of Receiving Environment	Level of Assessment	Mitigation Measures Required	Cumulative Impact Assessment Required?	Engagement	Relevant government plans, policies and guidelines	Section in Scoping Report
									Department of Planning and Infrastructure (DPI), dated 2011 • Hazardous Industry Planning Advisory Paper No 6: Hazard Analysis – Department of Planning, dated 2011.	
Hazards and risks (cont'd)	Waste	Low	Direct Indirect	Sensitive (safety, environment)	Standard	Likely	No	General	• NSW Government – DECCW – Waste Classification Guidelines, dated 2009.	**Section 6.2.11**
	Aviation	Moderate	Direct Cumulative	Sensitive (impacts on to local/regional agricultural/ recreational aviation)	Detailed	Likely	No	Specific	• Department of Infrastructure, Transport, Regional Development and Communications – National Airports – Safeguarding Framework – Guideline D: Managing the Risk of Wind Turbine Farms as Physical Obstacles to Air Navigation, dated 2019.	**Section 6.2.7.1**
	Tele-comms and EMI	Moderate	Direct Cumulative	Sensitive (interference with local/ regional communications)	Detailed	Likely	Yes	Specific	• Wind Energy Guideline for State Significant Wind Energy Development (DPE, 2016a).	**Section 6.2.7.3**
	EMF	Low	Direct Indirect Perceived	Sensitive (amenity of nearby residences,	Standard	Likely	No	General	• National Health and Medical Research Council advice, as updated from time to time.	**Section 6.2.7.2**

Group	Matter	Scale of Impact	Nature of Impact	Sensitivity of Receiving Environment	Level of Assessment	Mitigation Measures Required	Cumulative Impact Assessment Required?	Engagement	Relevant government plans, policies and guidelines	Section in Scoping Report
				community concern)						
Hazards and risks (cont'd)	Blade Throw	Low	Direct	Sensitive (safety)	Standard	Likely	No	General	• Applicable international standards for design of wind turbine components.	**Section 6.2.7.4**
	Shadow Flicker	Low	Direct Cumulative Perceived	Sensitive (change in visual amenity, nearby dwellings, townships and public viewpoints)	Standard	Likely	No	General	• Refer Visual above.	**Section 6.2.7.5**
	Flooding	Moderate	Direct Indirect	Sensitive (local hydrology)	Detailed	Likely	No	General	• Refer to Water below.	**Section 6.2.8**
Heritage	Aboriginal, encompassing any natural heritage	High	Direct Indirect Cumulative Perceived	Sensitive (Aboriginal cultural heritage value, Traditional Custodians)	Detailed	Likely	Yes	Specific	• NSW Government – OEH – Department of Premier and Cabinet – Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW, dated 2011 • NSW Government – DECCW – Aboriginal Cultural Heritage Consultation Requirements for Proponents, dated 2010 • NSW Government – DECCW – Code of Practice for Archaeological Investigation of	**Section 6.2.4.1**

Group	Matter	Scale of Impact	Nature of Impact	Sensitivity of Receiving Environment	Level of Assessment	Mitigation Measures Required	Cumulative Impact Assessment Required?	Engagement	Relevant government plans, policies and guidelines	Section in Scoping Report
									Aboriginal Objects in NSW, dated 2010.	
Heritage (cont'd)	Historic	Low	Direct Indirect	Sensitive (potential heritage values)	Standard	Likely	No	General	• Local and State heritage registers • Heritage Office – NSW Skeletal Remains: Guidelines for Management of Human Remains, dated 1998.	**Section 6.2.4.2**
Land	Land capability	Low	Direct Indirect Perceived	Sensitive (existing local agricultural activity and economy)	Standard	Likely	No	General	• DPI – Agricultural Land Use Mapping Resources in NSW, dated 2017 • NSW Government – OEH – The Land and Soil Capability Scheme, dated 2012.	**Section 6.2.8.3**
	Soil chemistry Acid sulfate soils		Sensitive (erosion, contamination and fertility of soils)						• NSW Government – OEH – The Land and Soil Capability Scheme, dated 2012 • Soil and Land Survey Handbooks • Landcom – Managing Urban Stormwater: Soils and Construction Volume 1, dated 2004 • NSW Government – Department of Environment and Climate Change – Managing Urban Stormwater: Soils and	

Group	Matter	Scale of Impact	Nature of Impact	Sensitivity of Receiving Environment	Level of Assessment	Mitigation Measures Required	Cumulative Impact Assessment Required?	Engagement	Relevant government plans, policies and guidelines	Section in Scoping Report
									Construction Volume 2, dated 2008 • DPI – Agricultural Land Use Mapping Resources in NSW, dated 2017.	
Social	Way of life Community Accessibility Culture Health and wellbeing Surroundings Livelihoods Decision-making systems	Moderate	Direct Indirect Cumulative Perceived	Sensitive (social, environmental and economic values of local community)	Detailed	Likely	Yes	Specific	• Social Impact Assessment Guideline for State Significant Projects, dated 2021 • Undertaking Engagement Guideline Guidelines for State Significant Projects, dated 2021.	**Section 6.2.6**
Water	Surface Water Flooding Water Supply Groundwater	Moderate	Direct Indirect Cumulative	Sensitive (local hydrology, groundwater and water quality) + access to water (local community values)	Detailed	Likely	Yes	General	• Australian and New Zealand Guidelines for Fresh and Marine Water Quality, 2018 • NSW Government – NSW Water and River Flow Objectives, dated 2006 • NSW Government – Department of Environment and Climate Change – Floodplain Risk Management Guidelines, dated 2016	**Section 6.2.8**

Group	Matter	Scale of Impact	Nature of Impact	Sensitivity of Receiving Environment	Level of Assessment	Mitigation Measures Required	Cumulative Impact Assessment Required?	Engagement	Relevant government plans, policies and guidelines	Section in Scoping Report
									• NSW Government – Floodplain Development Manual: The management of flood liable land, dated 2005 • Landcom – Managing Urban Stormwater: Soils and Construction Volume 1, dated 2004 • NSW Government – Department of Environment and Climate Change – Managing Urban Stormwater: Soils and Construction Volume 2, dated 2008 • Department of Land, Water and Climate – NSW State Groundwater Dependent Ecosystem Policy, dated 2002.	
Cumulative Impacts	Overall cumulative impacts associated with the Project	Moderate	Direct Indirect Perceived	Sensitive (local and regional social, environment and economic values)	Detailed	Likely	Detailed	Specific	• Cumulative Impact Assessment Guidelines for State Significant Projects, dated 2021.	**Section 6.2.10**

APPENDIX B

CIA Scoping Summary Table

Appendix B.1 Cumulative Impact Assessment Scoping Summary Table – Assessment Matrix

Level of Assessment	Description
Detailed Assessment	The Project may result in significant impacts on the matter, including cumulative impacts. Detailed assessment is characterised by: • Potential overlap in impacts between a future project and the proposed Project. • Potential for significant cumulative impacts as a result of the overlap, requiring detailed technical studies to assess the impacts. • Sufficient data is available on the future project to allow a detailed assessment of cumulative impacts with the proposed Project for the relevant matter. • Uncertainties exist with respect to data, mitigation, assessment methods and criteria.
Standard Assessment	The Project is unlikely to result in significant impacts on the matter, including cumulative impacts. Standard assessments are characterised by: • Impacts are well understood. • Impacts are relatively easy to predict using standard methods. • Impacts are capable of being mitigated to comply with relevant standards or performance measures. • the assessment is unlikely to involve any significant uncertainties or require any detailed cumulative impact assessment.
No Assessment Required	No potential overlap in impacts between a future project and the proposed Project that would warrant any consideration in the cumulative impact assessment.

Appendix B.2 Cumulative Impact Assessment Scoping Summary Table

Future Project	Approx. Distance to Project	Project Status	Potential Overlap Between Impacts of Project and Impact of Other Projects			
			Access (Traffic)	Amenity (Visual)	Amenity (Noise)	Social (e.g. Accessibility, Health and Wellbeing, Livelihoods etc.)
Bowmans Creek Wind Farm – Stage 1	Directly north, east and west of the proposed Project Area.	• Approved February 2024.				
	Key features: • Up to 441 MW. • Up to 52 WTGs. • Development Footprint of ~417 ha		Transport of project-related materials and access to each project will utilise the same roads. Cumulative impacts are anticipated, as such a detailed cumulative impact assessment will be required.	Cumulative visual impacts anticipated at nearby sensitive receptors given proximity of proposed Project to the Bowmans Creek Wind Farm Stage 1 project. Detailed cumulative impact assessment required.	Cumulative noise impacts anticipated at nearby sensitive receptors given proximity of proposed Project to the Bowmans Creek Wind Farm Stage 1 project. Detailed cumulative impact assessment required.	Cumulative social impacts anticipated at nearby sensitive receptors given proximity of proposed Project to the Bowmans Creek Wind Farm Stage 1 project. Detailed cumulative impact assessment required.
Muswellbrook Solar Farm	15 km west of the proposed Project Area	• Currently responding to a DPHI request for additional information.				
	Key features: • Capacity of up to 135 MW and a BESS with a storage duration of approximately two (2) hours • Approximately 300,000 solar panels		Potential risk of cumulative traffic and transport-related impacts subject to the selection of the transport route. Further assessment of cumulative impacts required.	Low risk of cumulative visual-related impacts given the distance of the proposed Project to the Muswellbrook Solar Farm. No further consideration required.	Low risk of cumulative noise-related impacts given the distance of the proposed Project to the Muswellbrook Solar Farm. No further consideration required.	Potential for cumulative social impacts within the rural community of Muswellbrook, and smaller local towns of Muscle Creek and Hebden. Further assessment of cumulative impacts required.

Future Project	Approx. Distance to Project	Project Status	Potential Overlap Between Impacts of Project and Impact of Other Projects			
			Access (Traffic)	Amenity (Visual)	Amenity (Noise)	Social (e.g. Accessibility, Health and Wellbeing, Livelihoods etc.)
Muswellbrook Pumped Hydro Energy Storage Project	18 km west of the proposed Project Area	• Scoping Report prepared December 2023, SEARs issued February 2024 • Proponent currently preparing EIS.				
	Key features: • Pumped hydro technology. • 500 MW, eight (8) hour pumped hydro project including construction of a hydroelectric power station and high voltage transmission line connecting to Muswellbrook 330 kV substation		Potential risk of cumulative traffic and transport-related impacts subject to the selection of the transport route. Further assessment of cumulative impacts required.	Low risk of cumulative visual-related impacts given the distance of the proposed Project to the Muswellbrook Pumped Hydro Energy Storage project. No further consideration required.	Low risk of cumulative noise-related impacts given the distance of the proposed Project to the Muswellbrook Pumped Hydro Energy Storage project. No further consideration required.	Potential for cumulative social impacts within the rural community of Muswellbrook, and smaller local towns of Muscle Creek and Hebden. Further assessment of cumulative impacts required.
Muswellbrook Battery Energy Storage System (BESS)	20 km west of the proposed Project Area	• Approved 7 July 2023				
	Key features: • 150 MW / 300 MWh battery energy storage facility with associated infrastructure. • Includes new 132 kV transmission line connecting the project to the adjacent Muswellbrook 330 kV substation		Potential risk of cumulative traffic and transport-related impacts subject to the selection of the transport route. Further assessment of cumulative impacts required.	Low risk of cumulative visual-related impacts given the distance of the proposed Project to the Muswellbrook BESS. No further consideration required.	Low risk of cumulative noise-related impacts given the distance of the proposed Project to the Muswellbrook BESS. No further consideration required.	Potential for cumulative social impacts within the rural community of Muswellbrook, and smaller local towns of Muscle Creek and Hebden. Further assessment of cumulative impacts required.

APPENDIX C

Social Impact Scoping Report

umwelt
Environmental & Social Consultants



ARK ENERGY

SOCIAL IMPACT SCOPING REPORT

Bowmans Creek Wind Farm Stage 2

FINAL

June 2024

ARK ENERGY

SOCIAL IMPACT SCOPING REPORT

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Bowmans Creek Wind Farm Pty Ltd, on behalf of Ark Energy

Project Director: Karen Lamb
Project Manager: Sarah Bell
Report No. 23307/R03
Date: June 2024

umwelt
Environmental & Social Consultants

APPROVED COMPANY ISO 9001 QMS Certification Services

This report was prepared using Umwelt's ISO 9001 certified Quality Management System.

Acknowledgement of Country

Umwelt would like to acknowledge the traditional custodians of the country on which we work and pay respect to their cultural heritage, beliefs, and continuing relationship with the land. We pay our respect to the Elders – past, present, and future.

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	Name	Date	Name	Date
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Appendix C	Regional and Community Strategic Plans Review
Appendix D	Major Project Developments Review

Abbreviations

Abbreviation	Definition
ABS	Australian Bureau of Statistics
Australian Labour Party	Australian Labor Party
Ark Energy	Ark Energy Pty Ltd
CSEP	Community and Stakeholder Engagement Plan
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DFID	Department for International Development
DPE	Department of Planning and Environment (former, now Department of Planning, Housing and Infrastructure)
DPHI	Department of Planning, Housing and Infrastructure (formerly the Department of Planning and Environment)
EIS	Environmental Impact Statement
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EnergyCo	The Energy Corporation of NSW
GP	General Practitioner
GHG	Greenhouse gas
IPC	Independent Planning Commission
Km	Kilometre
LGA	Local Government Area
LOTE	Languages other than English
LVIA	Landscape and Visual Impact Assessment
MW	Megawatt
NP	National Party
NSW	New South Wales
PHIDU	Public Health Information Development Unit
REZs	Renewable Energy Zones
SAL	Suburb and Locality
SEARs	Sectary's Environmental Assessment Requirements
SEIFA	Socio Economic Indexes of Areas
SIA	Social Impact Assessment
SISR	Social Impact Scoping Report
SSD	State Significant Development
TOs	Traditional Owners
The Project	Bowmans Creek Wind Farm Stage 2
The Proponent	Bowmans Creek Wind Farm Pty Ltd, on behalf of Ark Energy Pty Ltd
UCL	Urban Centre and Locality
WTG	Wind Turbine Generator

1.0 Introduction

This Social Impact Scoping Report (SISR) documents the process and outcomes of the scoping phase of the Social Impact Assessment (SIA) undertaken by Umwelt for the Bowmans Creek Wind Farm Stage 2 (the Project). The Report supports the broader Scoping Report and forms part of the Project's application for the Secretary's Environmental Assessment Requirements (SEARs) lodged with the NSW Department of Planning, Housing and Infrastructure (DPHI) by Bowmans Creek Wind Farm Pty Ltd on behalf of Ark Energy. The Project is considered a State Significant Development (SSD) requiring approval under Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

This Report has been prepared in accordance with the scoping phase requirements of the NSW Social Impact Assessment Guideline for State Significant Projects (DPE, 2023) or 'the Guideline'. An Environmental Impact Statement (EIS) will be prepared for the Project and will include a Social Impact Assessment (SIA) of which this report forms the foundation.

1.1 Project Overview

The Bowmans Creek Wind Farm Stage 2 (i.e. the Project) proposed by Bowmans Creek Wind Farm Pty Ltd, wholly owned by Ark Energy Pty Ltd (the Proponent), comprises the construction, operation and decommissioning of additional large-scale wind farm infrastructure in the Muswellbrook Shire Council and Singleton Council Local Government Area (LGAs) in the Upper Hunter region of New South Wales (NSW), Australia. The Project will involve 21 wind turbines generators (WTG) and 120 megawatt (MW) generation capacity.

The wind farm infrastructure associated with the Project is proposed to increase capacity of the 'Bowmans Creek Wind Farm' (SSD-10315) (i.e., Stage 1), which was approved by the NSW Independent Planning Commission (IPC) on 6 February 2024. The approved Stage 1 involves the construction and operation of a wind farm containing up to 54 WTGs, a transmission line, grid connection and associated infrastructure. Stage 1 is located approximately 12 km east of Muswellbrook and is situated within the Hunter-Central Coast Renewable Energy Zone (REZ), however the Project does not anticipate using any Hunter-Central Coast REZ infrastructure to support the connection to the grid.

The current Project (Stage 2) is to be situated within the centre of Stage 1 (refer to **Figure 1.1**). Because of the scale of additional infrastructure, and other requirements under the NSW planning system, the Project is proposed as a separate State Significant Development (SSD) to that already approved under 'Stage 1'.

Staging of the Bowmans Creek Wind Farm was not proposed within the SSD-10315 approvals documentation, however for simplicity and to assist differentiate between the two (2) projects, all WTGs and ancillary infrastructure associated with SSD-10315 are referred to as 'Stage 1' throughout.

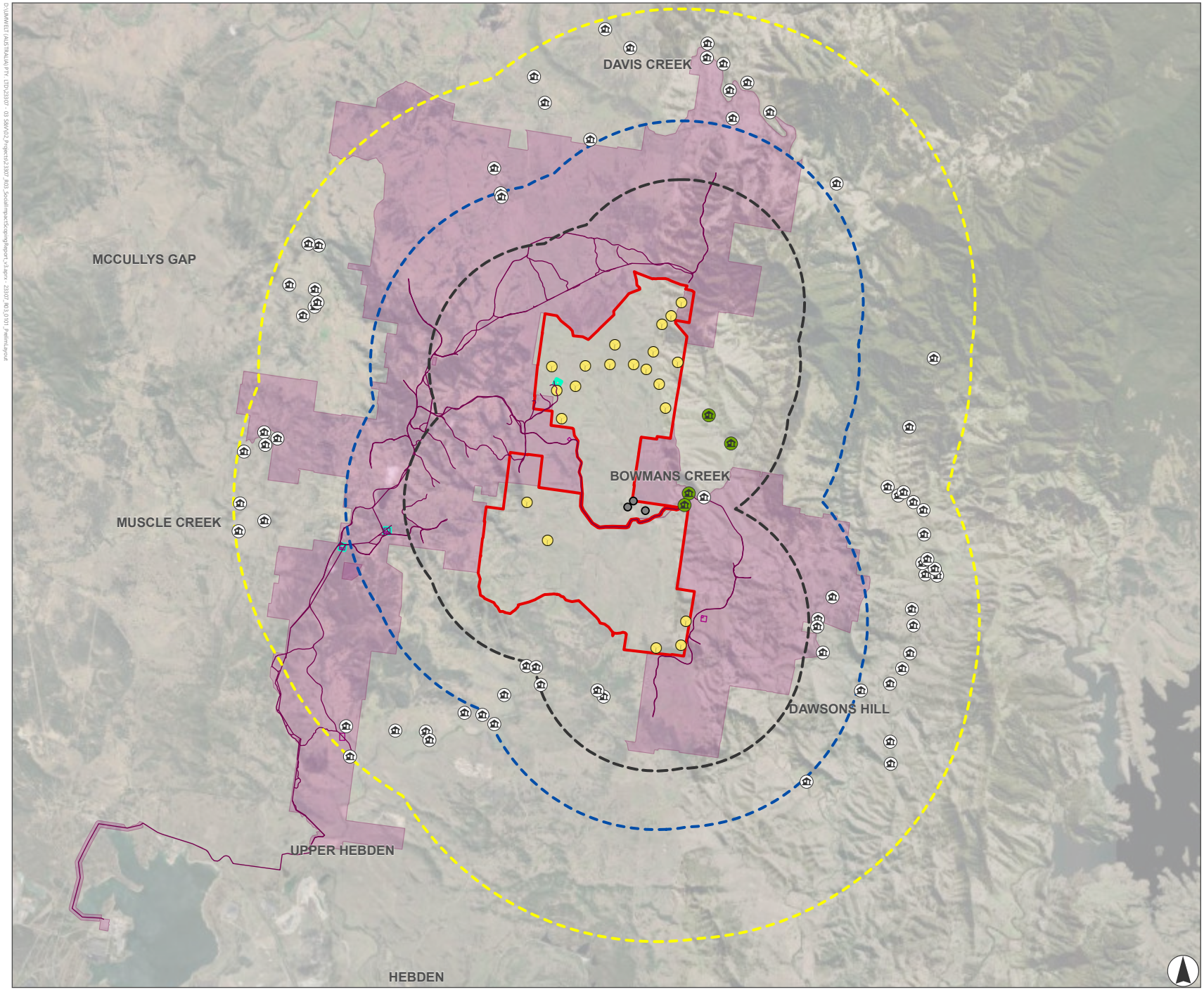


FIGURE 1.1
Preliminary Project Layout

Legend

- Project Boundary - Stage 2
- Development Footprint - Stage 2
- Access Tracks - Stage 2
- Turbine Locations - Stage 2
- Main Site Entry
- Preliminary Sub-station
- Roads and Tracks
- Railway
- Turbine Locations - Stage 1
- Tracks/Powerlines - Stage 1
- Facilities - Stage 1
- Project Boundary - Stage 1

Dwellings within 8km

- Associated
- Non-associated
- <all other values>

Lines of Visual Magnitude

- 3,350m to nearest WTG
- 4,950m to nearest WTG
- 8,000m to nearest WTG

0 2.5 5

Kilometres

Scale1:145,000 at A4

GDA2020 MGA Zone 56

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Image Source: ESRI Basemap (2023) | **Data Source:** NSW DFSI (2023)

1.2 The Proponent

The proponent for the Project is Bowmans Creek Wind Farm Pty Ltd, wholly owned by Ark Energy Pty Ltd, a company with a proud 25-year history in Australia through its Sun Metals Corporation Pty Ltd zinc refinery in Townsville.

Established in January 2021, Ark Energy is a leading Australian renewable energy company specialising in wind, solar and hydrogen. Ark Energy's mandate is to decarbonise the energy supply of the Korea Zinc group starting with Sun Metals, which involves notoriously difficult-to-abate industry sectors including nonferrous metals refining and heavy haulage transport.

In 2022 Ark Energy completed its friendly acquisition of Australian wind and solar developer Epuron, and now owns a growing portfolio of wind and solar energy projects in Queensland, NSW and Tasmania. It is also at the forefront of development of Australia's green hydrogen industry through its Sun HQ Hydrogen Hub in Townsville and the Han-Ho H2 consortium focused on establishing a green energy export corridor from Queensland to South Korea.

1.3 Project Objectives

The objectives of the Project are to:

- Establish a reliable and affordable source of energy for the people of NSW and contribute to reducing Greenhouse Gas (GHG) emissions associated with energy generation.
- Positively contribute to State and Commonwealth renewable energy goals.
- Align with the NSW Government's emissions reduction targets and Electricity Strategy.
- Create employment opportunities during Project construction, operations and decommissioning in addition to community benefit sharing, assist to:
    - diversify the local economy
    - create training and employment opportunities for the local community
    - create business opportunities for local suppliers
    - provide a significant investment in local infrastructure.
- Maintain partnerships with stakeholders and the community to minimise environmental, social and economic impacts (including potential cumulative impacts) and maximise benefits.
- Ensure that the highest safety and environmental standards are met during construction, operation and decommissioning of the Project.

1.4 Report Purpose

Pursuant to the objectives of the Guideline, the purpose of the SISR is to:

- Obtain an understanding of the Project's social locality, including the community's socio-economic and demographic characteristics.
- Identify stakeholder groups that may have an interest in, or be affected by, the Project.
- Document outcomes from community consultation undertaken during the scoping phase.
- Identify issues or opportunities that the Project presents within the social locality.
- Provide an initial evaluation of predicted social impacts associated with the Project.
- Consider potential Project refinements in response to identified social impacts.
- Describe the approach for undertaking the remaining phases of the Social Impact Assessment (SIA).

2.0 Methodology

SIA is an approach to predicting and assessing the likely social consequences of a proposed action and developing options and opportunities to improve outcomes for people. Best practice SIA is participatory and involves understanding impacts from the perspectives of those involved in a personal, community, social or cultural sense, to provide a complete picture of potential impacts, their context, and implications.

2.1 Assessment Requirements

This Report has been prepared in accordance with the Guideline (DPE, 2023), as part of the scoping phase, as illustrated in **Figure 2.1**.

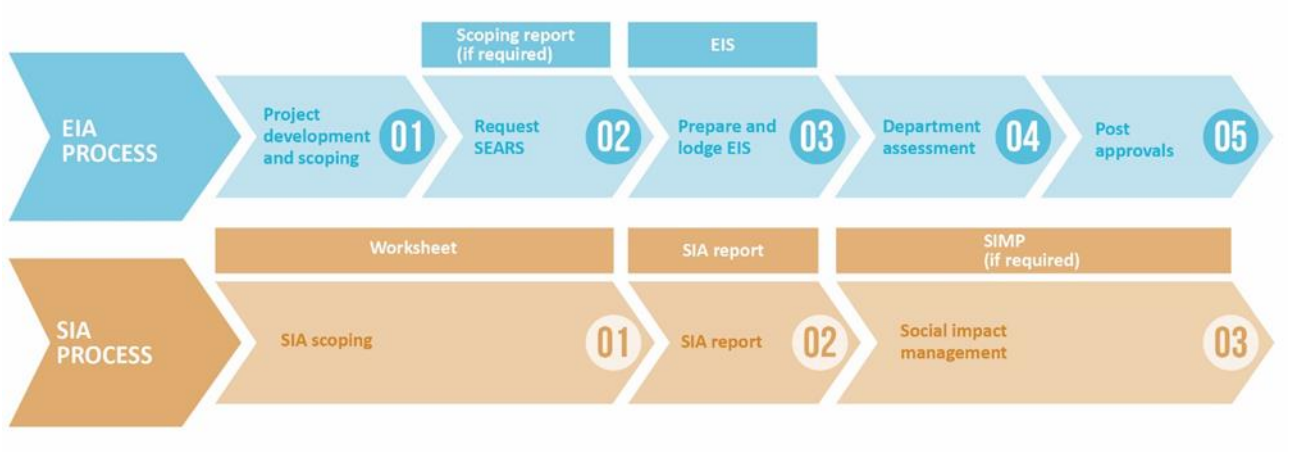


Figure 2.1 SIA and EIA Process Alignment

Source: (DPE, 2023).

This Report forms part of the Scoping Report, and the accompanied request for SEARs, and includes the following key components:

- **Social baseline profiling** – to define the baseline social context in which the Project is situated and area of social influence.
- **Issues scoping** – preliminary identification and evaluation of social impacts and issues relevant to the Project, to determine the level of assessment required for the EIS, proportionate to the scale of the Project and the matters of importance to the community.

Commencement of SIA early in the Project, informed by community and stakeholder consultation, affords opportunities to effectively assess and integrate social outcomes within the detailed Project planning, design, and assessment phase.

As is the case with any type of change, some individuals or groups within the community may benefit, while others may experience negative impacts. If negative impacts are predicted, it is the role of the SIA to determine how such impacts may be addressed effectively to reduce the degree of disruption to those affected. If positive impacts are predicted, the aim of the SIA is to maximise these opportunities and identify how they might be further enhanced and realised.

Figure 2.2 provides an overview of the key SIA program phases, with this report relevant to the scoping phase.



01

SCOPING

- Prepare a community and stakeholder engagement strategy that outlines recommended and requested engagement activities, materials and proposed responsibilities.
- Identify the extent of the Project's social locality, which includes the specific geographies and communities relevant to the SIA, which are unique to the Project and its potential impacts.
- Develop a social baseline of the locality in which the Project is located to understand the current social environment and the communities, groups and individuals potentially affected by a project. This profile is created using both primary and secondary data and is essential for identifying and predicting social impacts.
- Engage key stakeholders to validate social baseline and inform initial prediction and evaluation of likely social impacts.

02

IMPACT ASSESSMENT AND PREDICTION

- Work collaboratively with the Project team to ensure that relevant stakeholders (individuals and groups) are aware of the Project and have been provided with an opportunity to provide input.
- Undertake specific SIA engagement to identify key social impacts from the perspectives of those likely to be most affected/interested in the project, particularly any vulnerable or marginalised groups.
- Undertake an assessment of the social impact(s) of each project activity, providing an evidence base for impact significance through review of relevant literature and other technical studies.
- Identify mitigation and/or enhancement measures in collaboration with impacted stakeholders to reduce negative impacts and enhance social/community benefits and outcomes.
- Determine social impact rankings/significance with consideration of likelihood and magnitude dimensions – extent, duration, severity or scale, intensity or importance and level of stakeholder concern/interest - combining stakeholder and expert perceptions of risk and impact.

03

SOCIAL IMPACT MANAGEMENT AND REPORTING

- Identify relevant/ appropriate management and enhancement measures, utilising stakeholder input identified as part of the impact assessment and prediction phase.
- Ensure key stakeholders and communities are aware of the outcomes of key technical studies, including the SIA, and how significant impacts are to be managed and enhanced; including any residual impacts post management.
- Develop a Social Impact Management Framework and Plan that outlines how social impacts associated with the Project will be managed and monitored throughout the development lifecycle.
- Prepare the SIA to DPHI requirements.

Figure 2.2 SIA Program Phases

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According to the Guideline, and as outlined in **Figure 2.3**, social impacts can be grouped according to several different categories and may involve impacts and changes to people's way of life, community, accessibility, culture, health and wellbeing, surroundings, livelihoods, and decision-making systems.



Figure 2.3 Social Impact Categories

Source: DPE 2023.

While some social impacts may directly occur because of the Project, others may be indirectly caused by changes in the biophysical environment and biophysical impacts, as outlined in **Figure 2.4**. Consequently, both direct and indirect social impacts should be considered.

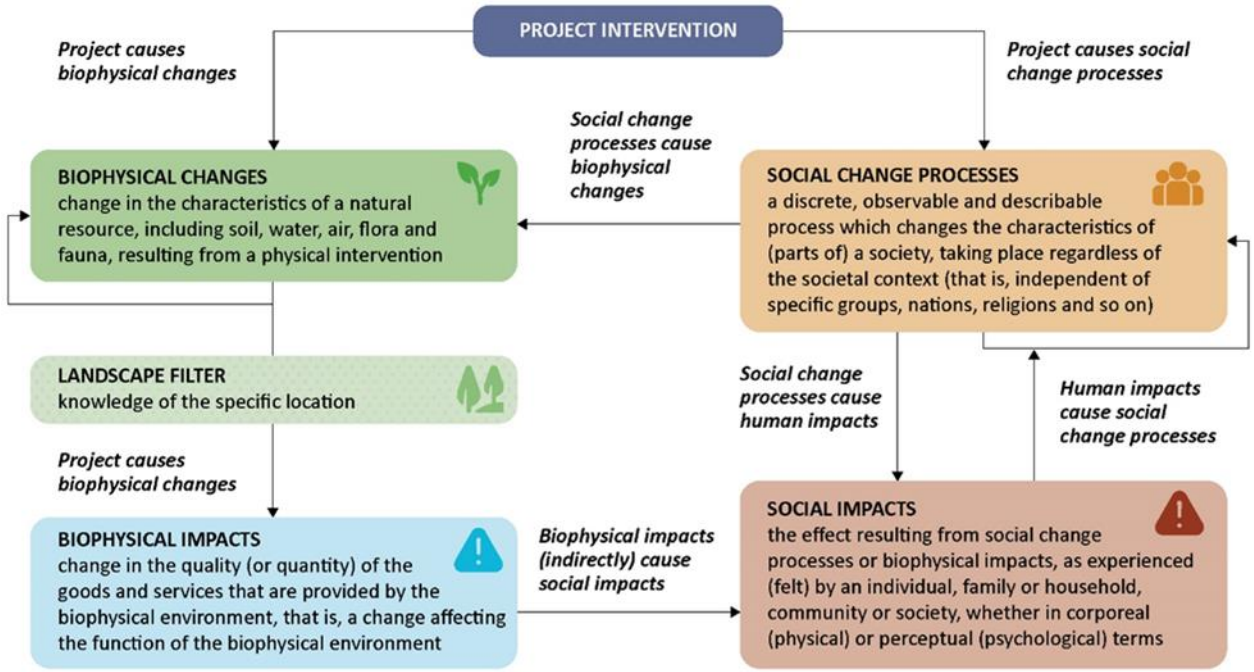


Figure 2.4 Direct and Indirect Social Impacts

Source: Umwelt, 2023, adapted from Slootweg et al, 2013 (p.28).

2.2 Social Locality and Baseline Development

2.2.1 Defining the Social Locality

The term 'social locality' is equivalent to 'area of social influence' commonly used in SIA practice. There is no fixed meaning or predefined geographic boundary to a social locality (e.g., the local suburb, or 'within 500 m'). Instead, the scale of the social locality should be established on a case-by-case basis, having regard to the nature of the project and its impacts (DPE, 2023). For further direction, the Guideline states that the social locality is defined by:

- **The scale and nature of the project**; its associated activities including ancillary works and infrastructure; potential direct and indirect impacts (for example, transport and logistics corridors or property acquisitions); and potential cumulative impacts.
- **Who may be affected by the project**; how they may be affected; their social, cultural and demographic characteristics; their relevant interests and values; the things that differentiate groups (such as cultural diversity) as well as things that they have in common; and the broader community and public interest.
- **Whether any vulnerable or marginalised people may be affected by the project**; including people on low incomes; people living with disabilities, chronic medical conditions or in poor health requiring access to services; culturally and linguistically diverse communities; people who are homeless or in insecure housing; people who are unable to represent themselves or other vulnerable people such as elderly people, children or single-parent households.
- **Built or natural features on or near the project that could be affected, and the intangible values** that people may associate with these features, such as a sense of place or belonging, rural character,

community cohesion and connection to Country and value of stories within the cultural landscapes, community cohesion, and use of natural areas and resources.

- **Relevant social, cultural, demographic trends or social change processes** occurring now or in the past near the project area and in the broader region, including how people have felt or experienced these changes; community resilience; different trends and patterns around issues like rental affordability, employment, shifting land uses, or population and demographic; or experiences of extreme weather and natural hazards.

- **The history of the proposed project and the area**, and any similar experiences people near the project have had, including change prior to, or created by, the planning assessment process; how people reacted to early discussions; and how these discussions and other experiences affected the broader community; and the traditional Aboriginal use of the place, recent history of the place and people and any ongoing traumas.

- **Section 3.0** identifies the currently identified social locality for the Project.

2.2.2 Social Baseline

A social baseline profile gathers knowledge from both primary and secondary data sources to increase understanding of the social locality ad existing social environment in which a project is proposed, and of potentially affected communities. The social baseline profile is a foundational component of SIA, as it provides the basis from which social impacts associated with the Project may be predicted, assessed, monitored, and managed over time.

To understand the communities of interest to the Project, and to evaluate their resilience and adaptive capacity to change, the social baseline provided within this report has utilised the Sustainable Livelihoods Approach or 'community capitals' analysis approach (UK Department for International Development, 2001)

According to this framework, people seek to maintain their livelihood within a context of vulnerability (Coakes & Sadler, 2011). Specifically, threats to their livelihood include shocks (such as sudden onsets of natural disasters, health problems, conflicts, and economic crises), trends (for instance, those relating to the economy, health, resources, and governance) and seasonality (such as cyclical fluctuations in prices or employment). People draw upon these assets to build and maintain their livelihood. A livelihood is considered sustainable '…when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base'.

The UK Department for International Development (DFID) approach (UK Department for International Development, 2001) draws on broad categories of community capitals (human, social, natural, physical and economic/financial) as a fundamental basis to identifying and further enhancing community capacity and resilience. This methodology has been further developed by Coakes & Sadler (2011) and applied in SIA practice. The vulnerability of each capital area can be assessed through the selection of a suite of social and economic quantitative and qualitative indicators specific to each capital area to assess a community's vulnerability to change, or conversely adaptive capacity of each capital area are further outlined in **Figure 2.5**.



Figure 2.5 Capitals Framework

Source: Umwelt, 2023. Adapted from Coakes and Sadler, 2011.

Profiling provides a comprehensive summary of the key characteristics of the people of a community or project area and involves developing a detailed understanding of the social and economic context in which a project is based to inform impact prediction.

2.2.3 Data Sources

The social baseline included within this Report has made use of a range of data sources to understand the socioeconomic, cultural, and demographic characteristics of the communities within the Project's social locality. The social profile is used as a basis to determine how the Project may affect different aspects of

people's lives – i.e. the Project's social impacts (refer to **Figure 2.3**). To gain an understanding of the demographic characteristics and composition of communities within the area of social influence, and to ascertain how the Project may change or affect people, socio-economic and demographic data has primarily been gathered and summarised from the ABS Census (2021) and the Social Health Atlas of Australia (PHIDU, 2020), as well as through a review of local media, regional and local government plans and strategies and other literature as it relates to the social locality

Appendix B contains the community profile dataset that has been used to inform the social baseline. The data sources analysed and key indicators of interest, including a brief explanation of their relevance to the Project are outlined in **Table 2.1.**

Table 2.1 Assessment Questions, Indicators and Data Sources

Questions	Indicators of Interest	Data Sources
Natural Capital		
The living environment • What are the key landscape features in proximity to the Project. How important are these features to residents and their sense of place? • How does weather and climate change conditions impact communities? • What is the prevalence of natural resources and dependence on these? • How vulnerable/concerned are communities to extreme weather events? **Land and Natural Resources** • Have there been notable changes in land use overtime? • Are there key environmental strengths that support economic, community, or environmental activities that may be impacted by the Project?	• Existing climatic conditions • Key landscape features • Water Resources • Prevalence of natural resources • Biodiversity • Land use.	Local and Regional Strategic Planning Documents NSW National Parks and Wildlife Services, 2023 Department of Planning and Environment, 2023 Bureau of Meteorology, 2021
Human Capital		
Peoples' Capacities and Abilities • Is the population increasing or declining? Is the population aging? What are the implications of this? • What is the level of formal education in the community? What are people's qualifications? • What are the key occupations? • What is the health status of the community? Are there any key health concerns. **Community safety** • Is road safety a major issue for communities?	• Educational Attainment • Labour force status, including unemployment • Occupations • Age profile • Industry of employment and occupation. • Levels of health • SEIFA Index of Education and Occupation.	ABS General Community Profiles (2021) DPE NSW Population Projections (2022) Socio-Economic Indexes for Areas (SEFIA, 2022)
Economic Capital		
Livelihood Assets and Activities • How diverse is the economy? • What is the capacity of the existing workforce? i.e. what is the unemployment rate? • How many people are employed in different industries of employment?	• Gross economic value of industry • Proportion (%) of the labour force that are: employed full-time, part-time, unemployed, and trends • Median household income	Socio-Economic Indexes for Areas (SEFIA, 2022) ABS General Community Profiles (2021) REMPLAN, 2021 Real Estate Investor, 2023

Questions	Indicators of Interest	Data Sources
• What is the significance of agriculture for the local economy? How does the Project align with this significance? • What are the key drivers of the economy? • Do residents receive welfare payments? **Housing** • What are the median weekly rent and mortgage repayments and how do they compare to the State?	• Median rental payment • Median mortgage repayments • Rental vacancy rate • Industries of Employment • Strategic economic planning • SEIFA Index of Economic Resources • Herfindahl Index Score.	
Social Capital		
Community Values, Uses and Sense of Place • What does the community value in the area? • Are there tangible and intangible sites of cultural significance within the Project area? How will the Project impact these? • How close-knit are the community? **Community Safety** • What is the perceived level of safety, and what are the rates of crime? Could the Project exacerbate perceived and actual safety of the community?	• Living at a different address one year ago & five years ago • Participation in volunteering • Population born overseas & in Australia • Family and household composition • Prevalence of major health issues • SEIFA Index of Socio-economic Disadvantage.	Government strategic plans ABS General Community Profiles (2021) Socio-Economic Indexes for Areas (SEFIA, 2022)
Political Capital		
Community Representation and Networks • What is the degree to which communities are represented by individuals and groups, including levels of government? • What local governance structures are in place? • What is the socio-political context of the communities of interest? • What are the key strategic priorities of councils? Do they align with the Project? • What issues are being discussed in the public domain through various media channels? How are people hearing or receiving information about the project?	• Elected representatives and recent political history • Traditional Owners and Native Title Claims and Determinations • Community strategic planning and development priorities • Community perceptions of local governance systems • Community priorities and concerns.	Australian Electoral Commission, 2023 NSW Electoral Commission, 2023 National Native Title Tribunal, 2023 Australian Broadcast Corporation, 2023 LGA Council Strategic Planning Documents

Questions	Indicators of Interest	Data Sources
Physical Capital		
Housing and Business Structures • What is the demand for rental properties? • What is the supply and demand for temporary / emergency accommodation? Is their existing capacity should demand increase associated with an influx of workers? **Infrastructure and Services** • What are the key social infrastructure and services? • Are there any service gaps that may be further exacerbated by an incoming construction workforce?	• Housing tenure characteristics • Financial housing stress • Dwellings with internet access • Strategic infrastructure planning and development • Access to health services and infrastructure.	ABS General Community Profiles (2021) Social Health Atlas of Australia (PHIDU, 2021) Social Health Atlas of Australia (PHIDU, 2016) AirDNA, 2023 Real Estate Investar, 2023
Cultural Capital		
• Who are the Traditional Owners and how are they represented? • What other groups exist that represent First Nations people? • What are the values, histories and aspirations of First Nations peoples within the social locality? What is their ongoing connection to Country and language? • Are there tangible and intangible sites of cultural significance within the study area? How will the Project impact these? • Is the area culturally diverse? Is there a high proportion of people born overseas? • What is the size of the First Nations population?	• Place of Birth • Language spoken at home • Proportion of the population identifying as Aboriginal and/or Torres Strait Islander • Built heritage and tangible heritage items • Community perceptions and values.	ABS General Community Profiles (2021) Local and Regional Strategic Plans Australian Broadcast Corporation, 2023 Wonnarua Nation Aboriginal Corporation, 2023

2.3 Stakeholder Identification

SIA involves the participation and collaboration of people that may have an interest in, or those that are affected by, a project. As Burdge (2004) outlines, stakeholders may be affected groups or individuals that:

- live, work, or recreate near the project
- have an interest in the proposed action or change
- use or value a resource associated with the project
- are affected by the project e.g., may be required to relocate because of the project.

A stakeholder identification process was undertaken during the scoping phase to support the planning and delivery of community and stakeholder consultation to inform the SIA/EIA. This process has involved identifying stakeholders with an interest in the Project, or those that may be directly or indirectly affected by the Project, including any potentially vulnerable or marginalised groups. Further definition of the stakeholder identification process is outlined in the Community and Stakeholder Engagement Plan (CSEP) provided at **Appendix A**. The process of identifying relevant stakeholders for the Project was informed by review of a range of material, including the recent assessment processes for Stage 1 and associated publicly available submissions along with existing stakeholders identified and engaged for that project.

There were 168 submissions made on the EIS for Stage 1, during public exhibition (of the EIS) between 31 March and 11 May 2023, and subsequent 46 submissions made to the Independent Planning Commission (IPC) between 21 November and 21 December 2023. Of the 168 submissions made, 87% of these were made by community stakeholders (**Figure 2.6**) with submissions from those primarily located within Muscle Creek (20.1%), Muswellbrook (13.2%), Hebden (8.2%), McCullys Gap (5.7%), Greenlands (4.4%) and Bowmans Creek (3.8%) (**Figure 2.7**). Submissions were also submitted from an additional 59 locations with each representing less than 2% of all submissions. These additional submissions were primarily from those located from within elsewhere across NSW, with another 4% from interstate (WA, ACT, QLD, and VIC).

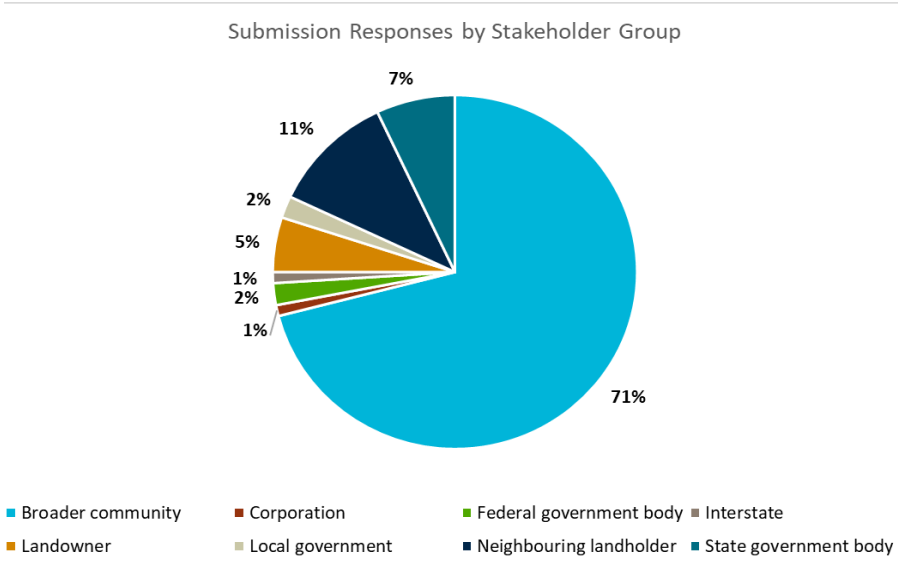


Figure 2.6 Submission Responses by Stakeholder Group (EIS Phase)

Source: Umwelt, 2023.

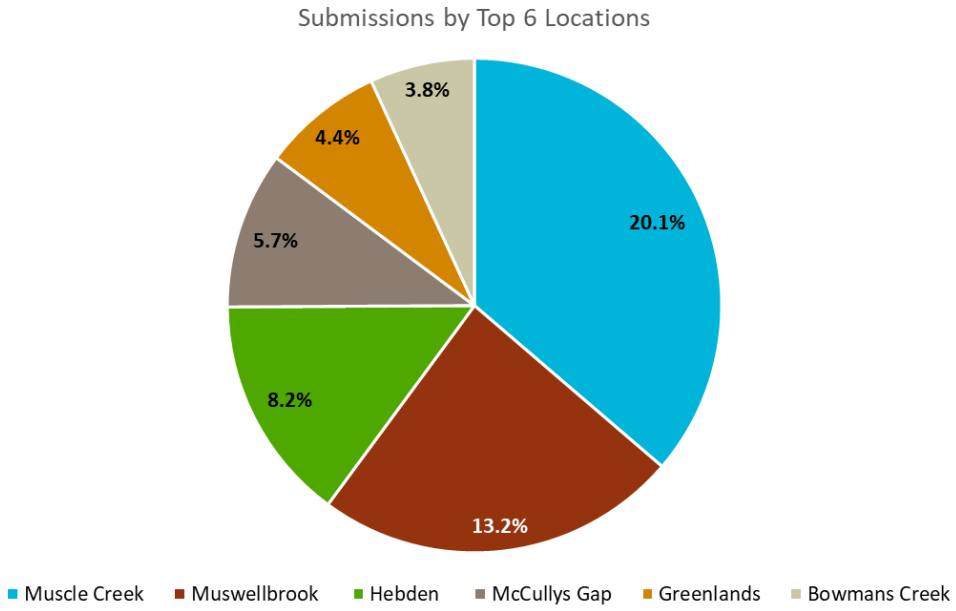


Figure 2.7 Submissions by Location (top 6 submission origin locations) (EIS Phase)

Source: Umwelt, 2023.

Of the 46 submissions lodged with the IPC stage for Stage 1, a large proportion of these (19) were made by neighbouring landholders (refer to **Figure 2.8**).

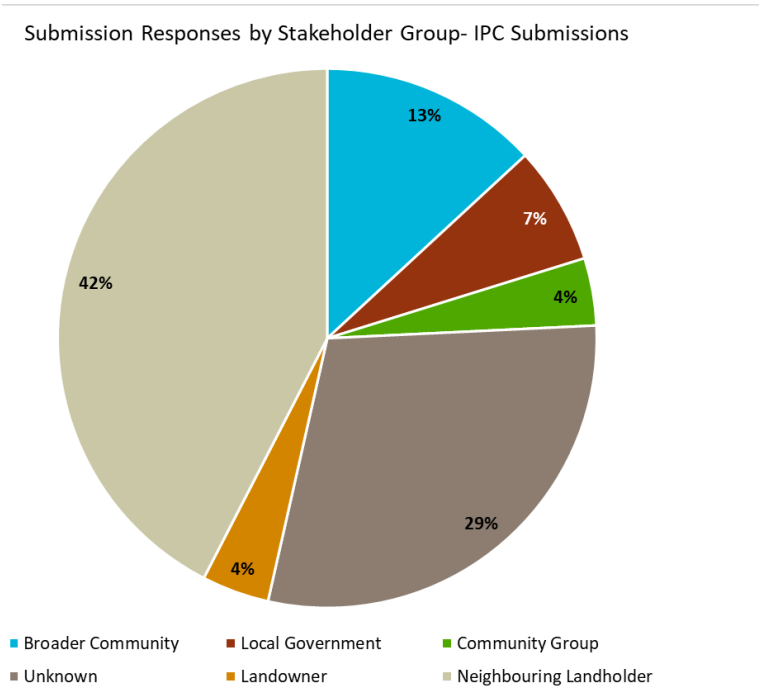


Figure 2.8 Submission Responses by Stakeholder Group- IPC Submissions

Source: Umwelt, 2023.

The stakeholder analysis and planning stage undertaken to support the preparation of this SISR has therefore identified the key stakeholder groups outlined in **Figure 2.9**.

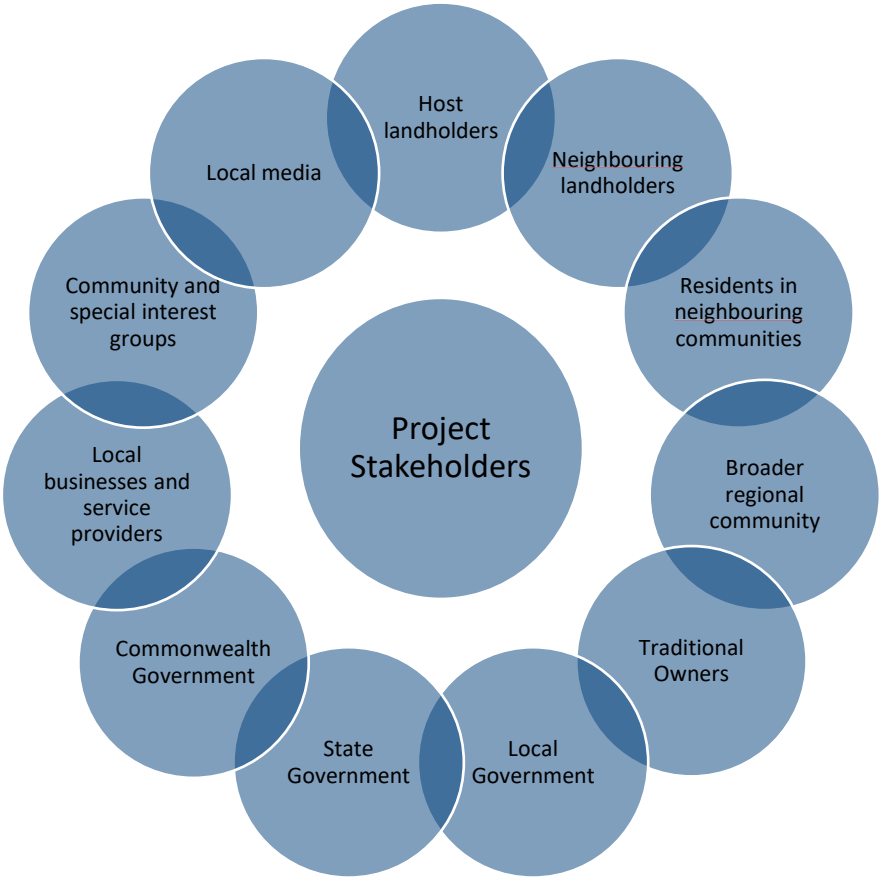


Figure 2.9 Key Stakeholder Groups

Source: Umwelt, 2024.

As illustrated on **Figure 1.1** there are 84 private landholders located within 8 km of a WTG proposed under the Project.

2.4 Community and Stakeholder Consultation

Ark Energy has undertaken community and stakeholder engagement to build relationships with host landholders, near neighbours, landholders in the local area and other key stakeholders in relation to the Project during Stage 1 and has continued to build on these existing relationships and established mechanisms as to inform the design and development of the Project.

For the purposes of this SISR, consultation data largely draws on submission processes for Stage 1 and targeted engagement with neighbouring landholders with whom Ark Energy already has a relationship along with any additional engagement outcomes compiled, collected, and supplied by Ark Energy and subsequently analysed by Umwelt for the purposes of this SISR. Information provision and consultation activities that have been undertaken to date during the scoping phase are outlined in **Table 2.2** along with proposed mechanisms for the SIA phase**. Table 2.3** following this provides a breakdown of stakeholder groups that have participated directly in the Project's planning and assessment process to date.

Table 2.2 Consultation mechanisms for Round 1 (Scoping) and Proposed Round 2

Mechanism	Objective	Targeted Stakeholder Group	Description	Scoping Phase (Round 1)	SIA / EIS Phase (Proposed)
Website	To inform the community about key project information and assessment update. The website also provides and outlet for feedback.	Broader community	Project website established with an email address, phone line and feedback form provided: https://arkenergy.com.au/wind/bowmans-creek/	Project website established to provide project updates throughout Project life for all stakeholders.	The website, phone line and email address will be monitored and updated when required across subsequent phases.
Newsletters	To inform stakeholders about key project milestones and invitations to community information sessions.	Neighbouring landholders / residences Broader community	Provision of a newsletter to the local community and other interested stakeholders to provide an update on the Project. Newsletters were also made available online via the Project website page.	**No.1:** An introduction newsletter was distributed in March 2024 to all residences within 8 km of a Stage 2 WTG, plus existing stakeholder mailing list for Stage 1, and Councils/MP's previously consulted with. This included 154 households.	**No. 2:** Project update and outcomes of scoping phase to be distributed in the assessment phase. **No. 3:** Project update and outcomes of technical studies to be distributed following the completion of the EIS and SIA reports
Project Information Booklet	To inform stakeholders about key information about the proposed Project.	Neighbouring landholders / residences Broader community	Preparation of a physical booklet which includes Project information to be shared with the local community and stakeholders.	40 physical copies were made available at the community information session.	Additional booklets to be prepared and provided to the community at subsequent info session during preparation of the EIS.
Project Briefings	To provide a briefing of the proposed Project.	State Government Local Government	Formal briefings to key stakeholders and government agencies, with Project Information Sheet and/or slide deck to formally introduce the Projects	Project briefings were provided to both Singleton Shire and Muswellbrook Shire Councils on 30 April 2024 and 14 May 2024, respectively, to present the Project.	

Mechanism	Objective	Targeted Stakeholder Group	Description	Scoping Phase (Round 1)	SIA / EIS Phase (Proposed)
Personal meetings or interviews	To collaborate with various stakeholder groups to inform the development of the Project, identify impacts and develop mitigation strategies.	Neighbouring landholders / residences Community and Special Interest Groups Traditional Owners Local business and service providers	Personal meetings and briefings to identify any key issues arising from operational activities, suggestions for mitigation and enhancement measures and to share information regarding future planning.	One-on-one phone interviews with nearby and adjacent landholders took place with 5 landholders in April 2024. 40 landholders were contacted by phone or emails to be involved in an interview or complete the survey.	Follow up interviews and meetings will occur during the preparation of the EIS. Interviews with local businesses and services providers, community and special interest groups, Traditional Owners will occur during the preparation of the EIS.
Community information session	To involve various stakeholder groups about key project information.	Neighbouring landholders / residences Broader community Community and Special Interest Groups Traditional Owners Local business and service providers	Host community information sessions held at local venues to identify any key issues arising from operational activities, suggestions for mitigation and enhancement measures and to share information regarding future planning.	An initial community information session was held on 3 April 2024 from 4-6pm at the Mount Olive Community Centre. An invitation to attend the session was included in the March 2024 newsletter, which was sent to all residences within 8 km of a Stage 2 WTG. 28 community members attended.	Additional session/s will be used to provide an update on the Project and the assessment and approvals process, and an overview of results and outputs of the EIS and technical studies.

Mechanism	Objective	Targeted Stakeholder Group	Description	Scoping Phase (Round 1)	SIA / EIS Phase (Proposed)
Survey	To collaborate with various stakeholder groups to identify impacts, opportunities and develop mitigation strategies.	Host residences Neighbouring landholders / residences	The SISR survey was provided to stakeholders during community information sessions, with an online survey also available for stakeholders to complete. Survey links were distributed via email to 32 stakeholders who either did not participate in the information session or had not yet completed the survey. The intent of the survey was to collect feedback about the Project, and more specially: • Perceived impacts and opportunities of the Project • Community values and needs • Proposed mitigation and enhancement strategies • Experience with Ark Energy to date and future engagement preferences.	15 surveys completed between the 5 of April and the 23 of April 2024. Surveys were either completed during the Information Session, via phone with an Umwelt representative or online.	A SIA survey will be developed to guide discussions with key stakeholders and community members. This survey will focus on validating social impacts identified in the scoping phase and identifying and developing mitigation and enhancement measures.
Local media	To inform stakeholders about the Project and upcoming community information session	Broader community	Provision of information sharing via local media outlets	Appearance on ABC Newcastle Radio Station on the 2 April 2024 to provide a Project update and details on the upcoming community information session.	

Table 2.3 Consultation Statistics - Scoping Phase

Stakeholder Group	No. contacted	No. consultations
Neighbouring Landholders/ Residents	40	19
Councils	2	1
Mayors	2	1
State and Federal Members	2	1

With regards to those specifically participating in personal interviews or surveys with Umwelt during this scoping phase, the majority were residents of Bowmans Creek were aged 55 years and over, reflective of the median age of the localities neighbouring the Project (refer to **Section 3.6** and **Appendix B**). Engagement participants had also on average resided in the community for over 60 years, indicating long residential historical linkages with the area and a close sense of connection.

2.5 Issues Scoping and Preliminary Impact Evaluation

Quantitative and qualitative information collected through the above Phase 1 consultation activities has been analysed and considered, along with public submissions on Stage 1, to inform the preliminary analysis of stakeholder concerns and potential social impacts associated with the Project, as outlined in **Section 4.0**.The Social Scoping Worksheet (DPE, 2023) is a decision support tool to consider the social impacts of a project and is used to demonstrate how issues scoping will inform the level of assessment undertaken for each identified impact in the SIA.

Each project activity is assessed by its potential impacts on people, whether previous investigation of the impact has been undertaken, the potential for cumulative impacts, and possible mitigation or enhancement measures to reduce negative impacts and enhance positive impacts. Social impact characteristics that have been considered in this preliminary evaluation include:

- **extent** – geographical area and stakeholders identified that are affected directly, indirectly, or cumulatively by the impact
- **duration** – the timeframe over which the impact occurs
- **severity or scale** – likely scale or degree of change from the existing condition because of an impact (e.g., mild, moderate, severe)
- **intensity or importance** – sensitivity susceptibility or vulnerability of people, receivers or receiving environments to adverse changes caused by the impact, including value or importance to the community, the extent to which it is tied to their identity and their capacity to cope with or adapt to change.

Based on an assessment of these impact characteristics, the likelihood and magnitude of the potential impact (positive or negative) and its occurrence across differing stakeholder groups is determined making use of the impact significance matrix in the Guideline (DPE, 2023). Refer to **Figure 2.10** below.

		Magnitude level				
		1	2	3	4	5
Likelihood level		Minimal	Minor	Moderate	Major	Transformational
A	Almost certain	Low	Medium	High	Very High	Very High
B	Likely	Low	Medium	High	High	Very High
C	Possible	Low	Medium	Medium	High	High
D	Unlikely	Low	Low	Medium	Medium	High
E	Very unlikely	Low	Low	Low	Medium	Medium

Figure 2.10 Social Impact Significance Matrix

Source: DPE, 2023.

A key objective of the scoping phase SIA is to identify the level of assessment required for each impact in the assessment phase, as per the SIA Guideline. The level of assessment determines the extent of effort and data required to assess the impact and will fall into one of four categories as outlined in **Table 2.4.**

Table 2.4 Guide to Determining Levels of Assessment for Each Social Impact

Level of assessment of the impact	Meaning
Detailed Assessment	The project may result in significant social impacts, including cumulative impacts.
Standard Assessment	The project is unlikely to result in significant social impacts, including cumulative impacts.
Minor Assessment	The project may result in minor social impacts.
Not Relevant	The project will have no social impact, or the social impacts of the project will be so small that they do not warrant consideration.

Source: NSW DPE, 2023.

2.6 Assessment Limitations

This report comprises the issues scoping phase of the broader SIA process framework. Matters identified hereafter are based on preliminary identification and evaluation of social impacts and issues relevant to the Project only, to determine the level of assessment required for the EIS, proportionate to the scale of the Project and the matters of importance to the community.

Due to its nature, this report does not (and cannot) offer a full treatment of all ideas, perspectives, and nuances in the rich and wide-ranging opinions and perspectives of potentially affected stakeholders. Instead, this report highlight's themes that have emerged through consultation to date and in consideration of the interrelationships, complementary and contradictory insights which will be explored in detail in subsequent SIA Phases.

Further, ABS based data for some localities must be interpreted with caution due to their small population size. In small populations, there's a higher risk of identifying specific individuals based on demographic

characteristics or other sensitive information. As such, some ABS data may have been adjusted to ensure the confidentiality of individuals.

Additionally, limitations in the current SISR that may affect assessment outcomes include:

- Community consultation outcomes have focussed primarily on affected landholders (host and proximal) within an 8 km radius of the Project that either attended the initial community drop- in session or responded to an email distribution of the survey link to 32 residents for whom contact details were available. Targeted follow up phone calls were also made with 6 known neighbouring landholders. Survey and interview participants did express difficulty in differentiating in the potential impacts and opportunities between Stage 1 and Stage 2, seeing both projects as one. Additional targeted consultation with the broader community and additional stakeholder groups to be undertaken at the SIA stage will seek to further explore and identify concerns associated more specially with the proposed Stage 2. These activities will also seek more diverse perspectives on the Project.
- Some consultation outcomes (i.e. Local Councils, and selected elected representatives) have been sourced, complied or supplied by the client, therefore the independent authenticity and integrity of the data supplied has not been validated by Umwelt.

3.0 Social Baseline

This section describes the social baseline profile of the social locality of relevance to the Project. It provides initial analysis of the defining characteristics of the communities considering demographic, social and economic indicators. Further, it considers the natural and physical attributes of the area of social influence and an understanding of how people currently live, work and recreate in the area.

The social locality for the Project has been defined at both a localised and regional scale, given the likely social impacts that may be experienced because of the Project.

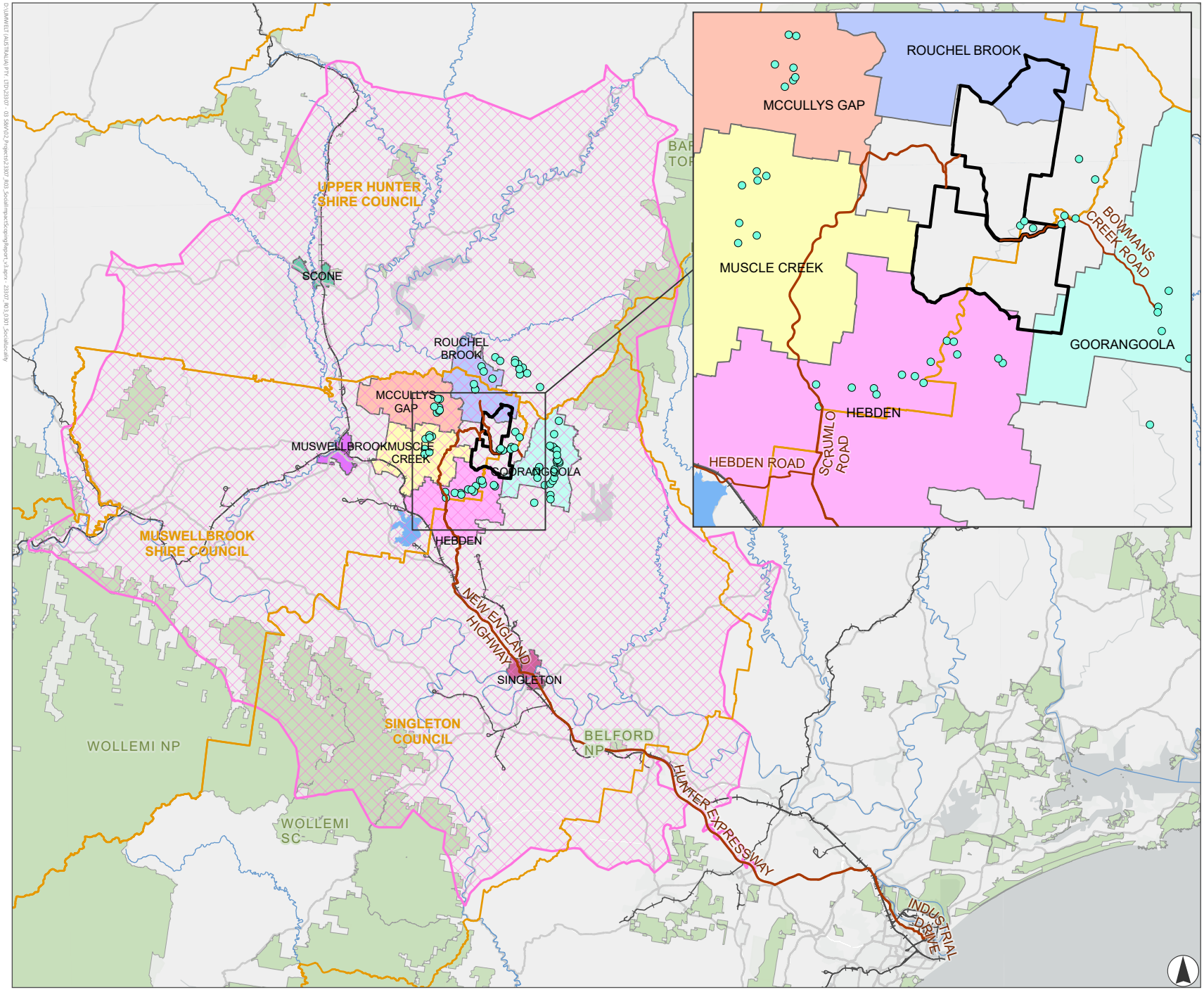
A social locality or 'area of social influence' is defined as the area considered to be impacted by a Project, based on a range of direct and indirect, tangible and intangible impacts (DPE, 2023). The primary communities of interest that comprise the social locality for the purpose of this assessment include those outlined in **Table 3.1.**

Table 3.1 Social Locality

Settlement Aspect	Township/ Locality/ Community	Reason for Inclusion
The Suburb and Locality (SAL) within the Project area, including landholders and neighbours of the Project.	Much of the Project Area is predominately utilised for agricultural purposes, particularly grazing. There is one landholder. The Project Area is located within Bowmans Creek, which according to ABS (2021) has a population of 17 people.	The host SAL is the smallest geographical unit available to analyse demographic data surrounding the Project location. It provides indicative insights into the characteristics of landholders likely to experience the highest impacts from the Project.
Immediate neighbours of the Project	8 km radius from the Project Area. 7 associated dwellings and 71 non-associated dwellings identified in the Preliminary Landscape and Visual Impact Assessment (PLVIA) prepared to support the request for SEARs.	8 km radius aligns with the distance used to identify 'sensitive receivers', as identified by the LVIA.
Immediate surrounding transport routes	Hebden Road North Albano Road Bowmans Creek Road Scrumlo Road New England Hwy	These roads will likely see traffic changes due to the Project construction activities
Geographically adjacent	Hebden SAL (67) Muscle Creek SAL (313) Rouchel Brook SAL (22) McCullys Gap SAL (262) Goorangoola SAL (52)	These settlements are included due to their physical proximity which indicates that they may be most likely to be impacted by the Project, and more likely to provide services or accommodation to support the Project. The larger settlements of Singleton and Muswellbrook are also likely to serve as higher-order townships with a greater density of
Proximal (within 60-minute drive) and primary order (population over 10,000 people)	Singleton UCL (14,229) Muswellbrook UCL (10,901)	

Settlement Aspect	Township/ Locality/ Community	Reason for Inclusion
Proximal (within 60-minute drive) and secondary order (population between 1,000 and 10,000 people)	Scone UCL (5,013)	businesses, services and infrastructure.
Local Government Area (LGA)	Muswellbrook LGA (16,357) Singleton LGA (24,577) Upper Hunter Shire LGA (14,229)	The broader LGA are included as they provide an overview of regional community issues and strengths
First Nations Communities	Wonnarua nation	Traditional owners of the land and other Aboriginal people who value the land and may have concerns relating to cultural heritage and sites of significance within or surrounding the Project
Proximal projects with the capacity to generate cumulative impacts	Projects outlined in **Appendix D**.	These projects are included as they generate cumulative impacts by exacerbating or enhancing the impact of the Project. A broader assessment of cumulative impact is covered in **Section 3.2.1** There are a number of renewable energy, mining and infrastructure projects in this locality.

FIGURE 3.1
Social Locality



Legend

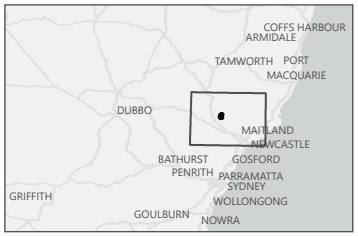
- Nearby Residents
- Project Boundary - Stage 2
- Areas Within a 60 Minute Drive
- Local Government Area Boundary
- National Park
- State Forest
- Lake Liddell
- Site Access Roads
- Major Watercourse
- Major Roads
- Railway

Urban Centres and Localities Boundaries

- Muswellbrook
- Scone
- Singleton

Suburb and Localities Boundaries

- Goorangoola
- Hebden
- McCullys Gap
- Muscle Creek
- Rouchel Brook



0 10 20

Kilometres

Scale 1:750,000 at A4
GDA2020 MGA Zone 56

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Image Source: ESRI Basemap (2023) | **Data Source:** NSW DFSI (2024), Energy Co. (2024), Ark Energy (2024)

The extent of influence of a project, its impacts, and associations may change as projects and communities develop and evolve over time. Consequently, the social locality may be adapted, minimised, or extended beyond the parameters identified in **Table 3.1** at subsequent stages of Project planning and assessment, to include locations where construction workforces may be based and where suppliers and/or materials may be sourced for the Project.

The following components have been considered in the social baseline for this Project, namely:

- Geographic and spatial – identification of communities of interest and relevant stakeholders.
- Governance – an understanding of the relevant governance structures including those of the Traditional Owners and local, State and Federal government jurisdictions.
- Development context – a review of the recent history of local communities, including cultural characteristics and community values, as well as previous experiences with renewable energy development projects and other development issues to ascertain the response of local communities to these changes.
- Community capital/assets – an assessment of levels of vulnerability or resilience across the communities of interest and their capacity to respond to change.
- Key community values, issues, and concerns – documentation of current community issues, as identified in key strategic planning documents, regional plans and/or studies as well as within local and regional media.

3.1 Energy Policy in NSW

The current Project is well-aligned with current policy priorities of both the Federal and State Governments. Australia's commitment at the international level to the 2015 Paris Climate Accord has influenced the growth of and investment in the renewable energy sector across the country in recent years, with further commitments to reduce national greenhouse gas emissions by 26-28%, below 2005 levels by 2030, and achieve net zero emissions by 2050 committed to as part of the 2021 UN Climate Change Conference (Parliament of Australia, 2022).

In 2013, the NSW Government released the NSW Renewable Energy Action Plan (2013) outlining the State Government's intention to work with communities and the renewable energy industry to increase renewable energy generation across the State. The Plan was implemented alongside the Energy Efficiency Action Plan (2013)), with the successful implementation of the Plan completed in December 2018.

The NSW Government's Electricity Strategy and Electricity Infrastructure Roadmap (Electricity Strategy) set out a plan to deliver the State's REZs. REZs are designed to group new wind and solar power generation into locations where it can be efficiently stored and transmitted across NSW. Five zones have so far been identified and will keep NSW electricity reliable as coal-fired power stations retire, delivering large amounts of new energy to power our regions and cities The Project is located in the Hunter Central Coast REZ (refer to **Section 3.1.1**).

The Energy Corporation of NSW (EnergyCo) is a statutory authority established under the *Energy and Utilities Administration Act 1987* which is responsible for leading the delivery of all REZ zones in NSW (EnergyCo, 2023).

In November 2020, the Electricity Infrastructure Roadmap was also released, enabled by the *Electricity Infrastructure Investment Act 2020 (NSW)*. The roadmap builds on the foundations of the Electricity Strategy released in 2019 and is expected to attract up to $32 billion of private investment in regional energy infrastructure by 2030 ; with investment generating around 6,300 construction jobs and 2,800 ongoing jobs, along with $1.5 billion in lease payments for landowners, especially in regional NSW, as a result of the development of wind and solar farms (NSW Energy, 2020).

In late September 2021, the NSW Government announced its Net Zero Plan Stage 1: 2020-2030 that outlines an objective to achieve net zero emissions by 2050 by 'creating new jobs, cutting household costs and attracting investment' (NSW Department of Planning, Industry and Environment, 2020)). The document outlines the following priorities:

- Drive uptake of proven emissions reduction technologies that grow the economy, create new jobs, or reduce the cost of living.
- Empower consumers and businesses to make sustainable choices.
- Invest in the next wave of emissions reduction innovation to ensure economic prosperity from decarbonisation beyond 2030.
- Ensure the NSW Government leads by example.

3.1.1 The Hunter-Central Coast Renewable Energy Zone

This Project is located within the Hunter-Central Coast REZ. As **Figure 3.2** illustrates, the Hunter-Central Coast REZ encompasses the townships of Muswellbrook, Singleton, Cessnock, Maitland and Newcastle. It crosses the borders of the Upper Hunter Shire LGA, Muswellbrook LGA, Singleton LGA, Maitland LGA, Cessnock LGA, Lake Macquarie LGA and Newcastle LGA. The Hunter and Central Coast region was selected due to its unique features that makes it an ideal location for a REZ (EnergyCo, 2023). The region is recognised to have excellent renewable energy resources and is an ideal location because of the possibility to connect to existing power stations, rehabilitated mine sites, electricity network infrastructure and port and transport infrastructure. There is also potential to tap into the existing skilled workforce (EnergyCo, 2023).

Based on the current mapping, the Project is wholly located within the current Hunter-Central Coast REZ.

While the proposed Project is located within the Hunter-Central Coast REZ, it will not connect into the REZ and associated transmission infrastructure. The Project will connect to the grid via the approved Stage 1 project electrical reticulation network, connecting to the Liddell 330 kV substation.



Figure 3.2 Map of Hunter-Central Coast Renewable Energy Zone

Source: (EnergyCo, 2023).

3.2 Regional Development Context

The Project Area is located within the Hunter Region in NSW, a diverse and productive region with good connectivity to Sydney and Newcastle. Key regional cities within the region include Muswellbrook and Singleton. As of the 2021 ABS Census, the population of the Upper Hunter SA3 was 30,584 people, a 3.5% increase from the 2011 Census. Further, the population of the Lower Hunter SA3 was 97,927 people.

Historically, the Upper Hunter Shire, Muswellbrook and Singleton LGAs have been heavily dependent on mining, employing a large proportion of the population (refer to **Section 3.9**). However, it is recognised that the Hunter is undergoing a transition with major transformations occurring in power generation and emerging technologies. With this change, the Hunter Regional Plan (NSW Government, 2021) acknowledges that the economy is expected to further diversify and cater to the demand for renewable energy. The Plan outlines the role renewable energy will play in creating a sustainable future for the region, particularly by promoting local jobs and upskilling locals and providing clean energy.

With parts of NSW and Australia experiencing a large-scale renewable energy transition, community attitudes towards the renewable energy transition and the associated infrastructure have been at the forefront. In April 2024, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) released a report analysing such topics. The report, based on consultation with 6,707 participants, highlights that the majority of Australian's are open to living near renewable energy infrastructure, with solar farms being the most favoured. However, the report revealed that people living in regional areas are less likely to be accepting of renewable energy projects. Key drivers of social acceptance include perceived benefits, narrative of energy transition, perceived impacts, distributional fairness, governance, and trust in industry (CSIRO , 2024).

Appendix C contains an overview of local government strategic plans relevant to the social locality which assist in providing an understanding of the local context, as well as strategic priorities and interests for the area that may be relevant to the Project. Such plans also consider planning and governance priorities for the region, and key community issues and needs.

3.2.1 Project Developments in the Hunter Region

This section draws on several data sources to build an understanding of the project development context of the region, to capture any ongoing social change processes in the area of social influence, and to identify how local communities have responded to change over time. There are several other major projects which have been recently developed or currently being considered within the Hunter Region. Such project developments, in combination with the number of renewable projects approved or in the planning phase, could result in changes to the community, or which may have further cumulative effects, particularly in relation to impacts associated with concurrent construction activities. These activities are in addition to existing developments in the locality which have been operating for many years.

A select number of comparable projects in the region have been reviewed to identify how relevant stakeholders and communities have responded to these proposed developments, and to inform an understanding of the potential concerns and community perceptions in relation to the Project. These projects are summarised at **Appendix D** and illustrated at **Figure 3.3** below. A review of publicly available documentation, and media coverage of comparable projects in the region and that are summarised at **Appendix D**, has highlighted key community sentiments that relate to:

- disruptions to agricultural practices and changing land use
- concern about the potential for land devaluation on host and proximal land sites
- potential for increased bushfire risk, concerns relating to site access for fire-fighting activities and public safety
- local road disruptions and decrease in road safety during construction
- visual impacts to the landscape's amenity and change in rural and landscape aesthetic
- concern for the harm caused to wildlife and native flora
- contamination of soil and decrease in water quality
- noise disturbance caused by construction, traffic and operations
- reduced attraction of tourism in the region due to increase of major project developments
- impediments to future land development as a result of projects use of private land
- a lack of transparency in consultation processes
- reduction in dust and air quality impacting on health.

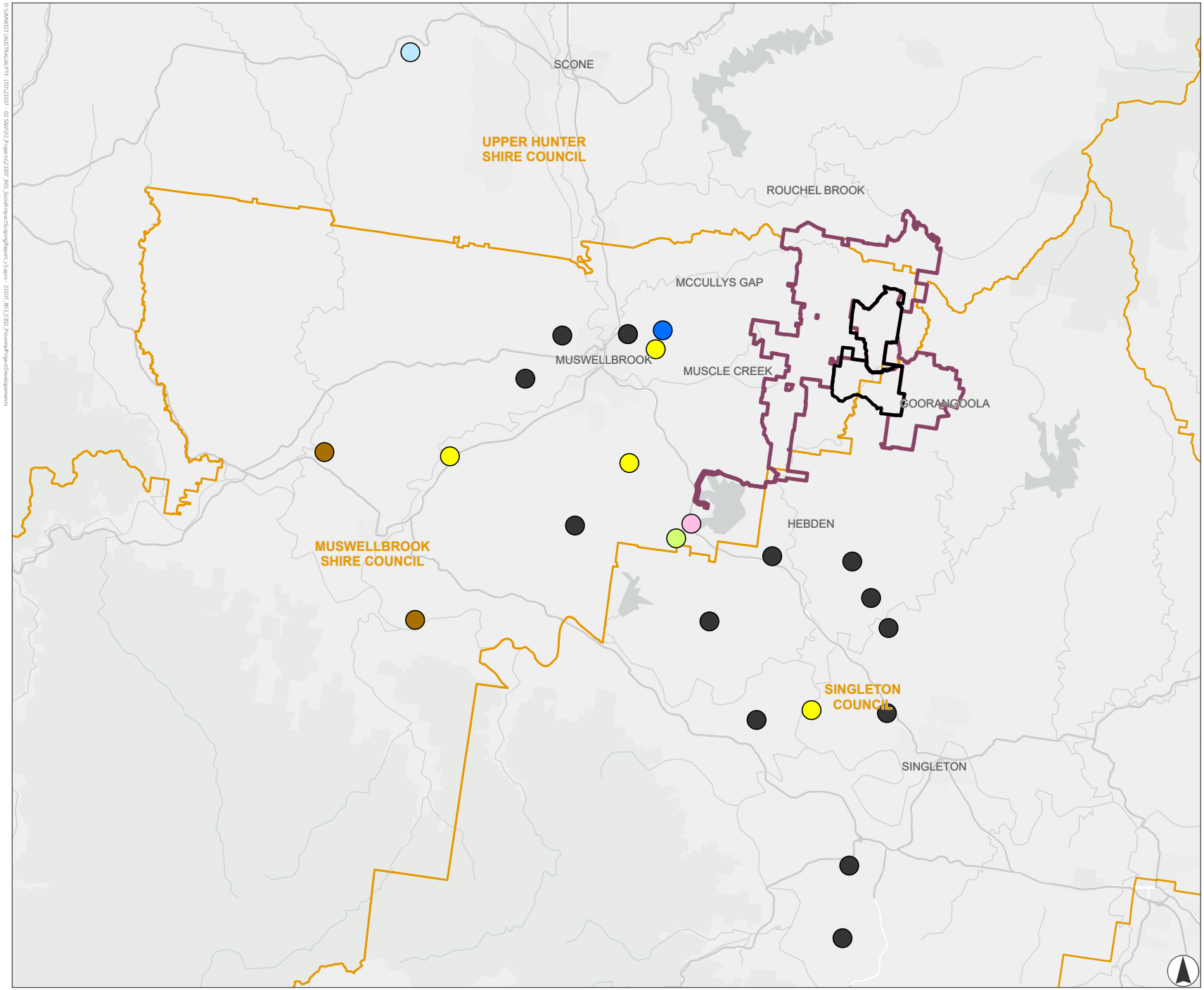


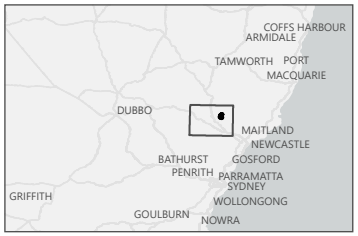
FIGURE 3.3
Major Project Developments

Legend

- Project Boundary - Stage 2
- Project Boundary - Stage 1
- Local Government Area Boundary
- Major Roads

Major Project Developments

- Battery Storage Systems
- Mines
- Power Stations
- Pumped Hydro
- Quarries
- Solar Farms
- Wind Farms



0 5 10

Kilometres

Scale 1:431,571 at A4
GDA2020 MGA Zone 56

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Image Source: ESRI Basemap (2023) | **Data Source:** NSW DFSI (2024), Energy Co. (2024), Plannin NSW (2024),Ark Energy (2024)

Additional projects covering an extended area that may instigate cumulative impacts include the Energy Co Transmission Line and the Hunter gas pipeline:

- **Hunter Gas Pipeline:** The Hunter Gas Pipeline is a significant energy infrastructure project in Australia, which aims to build an underground natural gas pipeline connecting the gas hub. The total distance covered by the pipeline is approximately 833 km, with 611 km of it passing through New South Wales (NSW), including the town of Singleton. Construction is expected to commence in late 2024 (Singleton Council , 2024).
- **Energy Co Transmission Line:** The New England REZ includes the LGAs of Armidale, Walcha, Glen Innes and Uralla. The New England REZ will be serviced by new transmission network infrastructure, including transmission lines. The proposed transmission line extends from the North Hub (near Armidale) to Bayswater and passes through McCullys Gap and Muscle Creek (refer to **Figure 3.4**). As such, the NE REZ transmission line will be proximal to the Project Area and has the potential to cause heightened concerns and cumulative impacts.

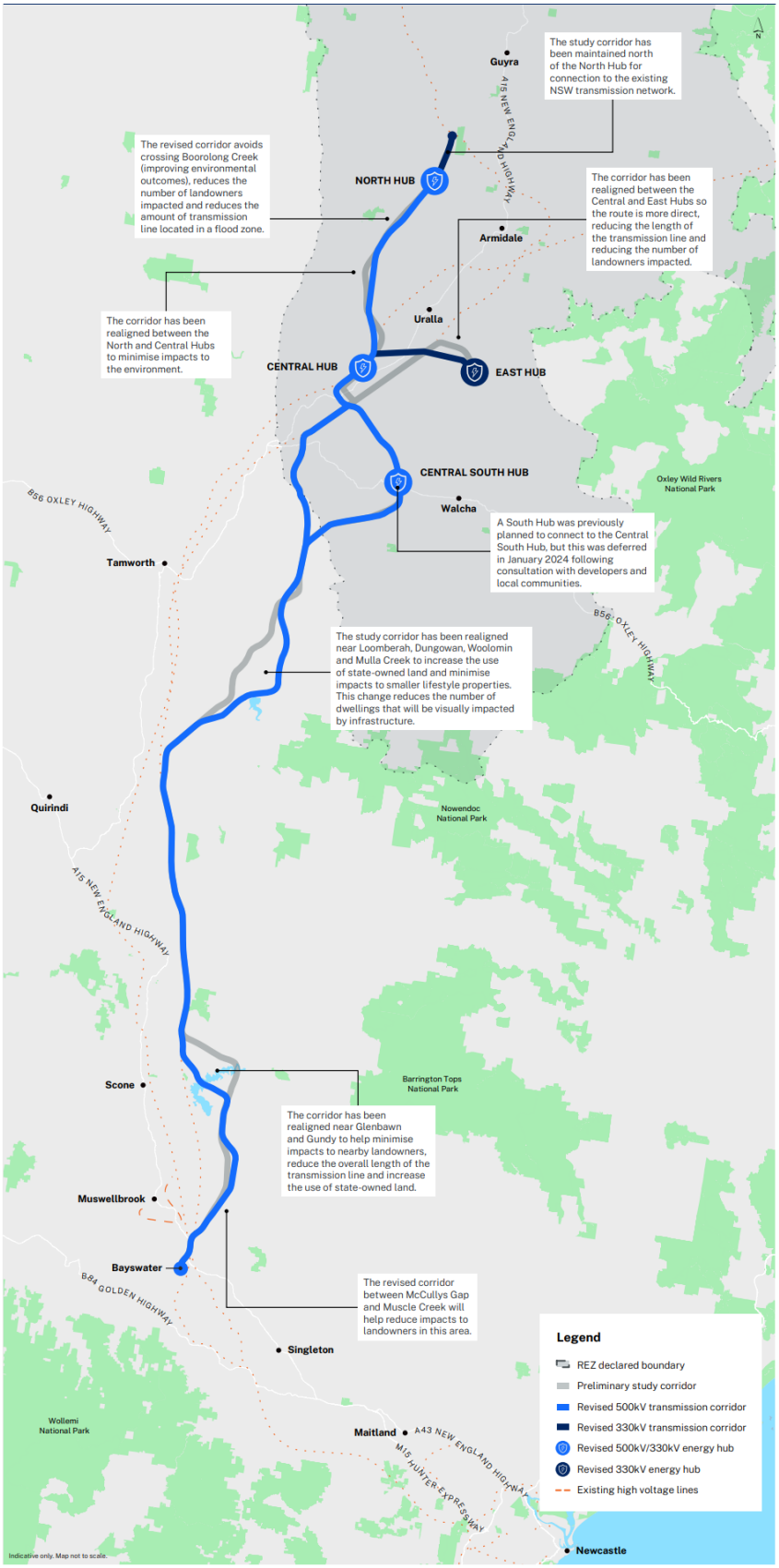


Figure 3.4 New England REZ transmission project study corridor

Source: (EnergyCo, 2024).

With these major developments expected to increase the overall population of the region, it is possible that accommodation and housing shortages may be exacerbated and an increased pressure on services may be evident. Alongside this, any influxes of population also have the potential to disrupt community cohesion and reduce a community's sense of place.

3.2.2 Bowmans Creek Wind Farm – Stage 1

As previously noted, Stage 1 was approved by the IPC in February 2024. As noted at **Section 2.3** above, the preparation of this SISR has included a review and analysis of submissions on that particular project.

While primary issues of stakeholder concern varied between submissions made at the EIS and IPC stage for Stage 1, the most frequent concern noted was reduced visual amenity due the industrialisation of the landscape, light pollution/ flicker (54% and 49% submissions respectively). At the EIS submission stage, this was followed by concerns associated with the following project aspects with numbers provided referring to the number of submissions received noting each issue:

- decline in social amenity due to wind turbine noise disturbance and dust emissions (n=55)
- reduced property values (n=38)
- loss of birds and other fauna (n=37).

Comparatively, primary concerns raised in IPC submissions related to:

- poor quality engagement and community involvement (n=17)
- concerns regarding increased bushfire risk (n=14)
- loss of birds and other fauna (n=14).

With regards to positive impacts and opportunities, the most frequently raised opportunity related to opportunities for regional economic benefits (SSD=9/ IPC=3). Other benefits identified included:

- intergenerational equity and contribution to sustainability (SSD =5/ IPC=3)
- increased opportunities for economic diversity (SSD= 2 IPC n=2) (refer to **Table 3.2**).

Table 3.2 Identified Negative Impacts – SSD and IPC Submissions

Impact Category	Impact Description	No. of Times Raised by SSD Submissions	No. of Times Raised by IPC Submissions
Surroundings	Reduced visual amenity due the industrialisation of the landscape, light pollution/ flicker	88	19
	Decline in social amenity due to wind turbine noise disturbance and dust emissions	55	13
	Loss of birds and other fauna	37	14
	Reduced attachment to place due to noise and visual landscape disruptions	38	8
	Loss of habitat and other ecological values	31	13
	Intergenerational equity and decommissioning	11	7

Impact Category	Impact Description	No. of Times Raised by SSD Submissions	No. of Times Raised by IPC Submissions
	Erosion due to the loss of vegetation	7	5
	Changes to surface water quality	4	5
	Increased bushfire risk	27	14
	Increased risk of traffic incidents	10	3
NET		**308**	**123**
Livelihoods	Reduced property values	38	9
	Impact to farming livelihoods/ increased land care costs	27	6
	Lack of local economic benefit (e.g. employment and procurement)	14	1
	Changing land use	5	2
NET		**84**	**18**
Decision Making Processes	Poor quality engagement and community involvement	21	17
	Lack of trust in the planning process	12	7
	Poor planning in decommissioning	10	3
	Inadequate set back of turbines	0	1
NET		**43**	**48**
Health and Wellbeing	Decline of mental health/ increased stress and anxiety	20	13
	Sleep disturbance due to noise	12	8
	Decline of physical health due to environmental discharges, dust and noise	11	6
NET		**43**	**27**
Way of Life	Obstruction to aircraft flight paths	12	3
	Unreliable power source	6	3
	TV/ telecommunications/ internet interference	6	0
NET		**24**	**6**
Accessibility	Increased traffic volumes	23	3
	Reduced access to/ control over water	2	0
	Strain on local accommodation services	0	2
NET		**25**	**5**
Community	Impact to community cohesion	7	2
	Limited local community benefits	2	2
	Out migration due to the presence of wind farms	0	3
NET		**9**	**7**
Culture	Impacts to cultural and local heritage	7	0
NET		**7**	**0**

Source: Umwelt, 2024.

Table 3.3 SSD and IPC Identified Positive Impacts

Impact Category	Impact Description	No. of Times Raised by SSD Submissions	No. of Times Raised by IPC Submissions
Livelihoods	Opportunities for regional economic benefits	9	3
	Increased opportunities for economic diversity	2	2
NET		**11**	**5**
Surroundings	Intergenerational equity and contribution to sustainability	5	3
	Changing land use	0	1
NET		**5**	**4**
Accessibility	Road upgrades increasing accessibility	0	1
NET		**0**	**1**

Source: Umwelt, 2024.

Further details of specific concerns and opportunities identified at the submission phases for Stage 1 as relevant to the Project are provided throughout **Section 4.0**.

3.3 Local Setting

By road, the Project Area is located closest to the surrounding localities of Bowmans Creek (8.3 km), Rouchel Brook (11 km), and Goorangoola (13 km). The nearest larger population centres include Muswellbrook (10 km east) and Singleton (49 km south).

Due to a hill range separating the Project Area and the rural localities of McCullys Gap, Muscle Creek and Hebden, there is no direct access between these and the site and consequently, these townships are approximately a 50 km to 70 km drive from the Project Area. However, these townships are still geographically close and considered to be neighbouring communities and likely to have an interest to their interest and involvement in Stage 1.

Therefore, the small townships of Bowmans Creek, Rouchel Brook, McCullys Gap, Goorangoola, Hebden, Muscle Creek are considered for the purposes of this SISR to be the key communities of interest due to both their proximity of the Project Area and their degree of interest in Stage 1. The population of these towns are relatively small, ranging from 17 people in Bowmans Creek to 313 in Muscle Creek (as of 2021 Census).

The closest largest population centre is Muswellbrook (12 km west of the Project area) with a population of 10,901 people recorded in the 2021 Census, followed by township of Scone (22 km north-west of the Project area with a population of 5,013. The township of Singleton is also located 25 km southeast of the Project area and has population of 14,229. These towns serve as large regional centres for the surrounding localities and contain a wide range of services and facilities to support the surrounding population.

3.3.1 Land Use and Tenure

Land within and surrounding the Project Area is primarily used for farming and grazing, with the area being associated with long history of agricultural land uses. The Hunter Region also supports a number of coals mines.

There are 78 private landholders located within 8 km of a WTG proposed under Stage 2, with 7 of these being considered as 'associated' landholders, i.e. those who have reached an agreement with the proponent in relation to the development and management of impacts associated with the Project. One host landholder is present within the Project Area.

3.4 Political Capital

Political capital refers to the individuals, institutions, and systems that contribute to a community's ability to maintain a governance structure. Political capital can determine the extent to which people are able to participate in decisions that affect their lives, the level of democratisation within a community, and the resources provided for this purpose. A summary of the political capital relating to the social locality is provided below.

The Singleton LGA and Muswellbrook LGAs and their townships fall under the Federal electorate of Hunter. The Hunter boundary was first used in 2016 Federal election and is currently governed by the Australian Labor Party (ALP). This seat is currently held by Dan Repacholi. Hunter has been held by the ALP Since 1910.

The Upper Hunter Shire LGA falls under the Federal Electorate jurisdiction of New England which is currently held by the National Party (NP) and is represented by Barnaby Joyce who received 64.4% of votes in the last election.

All study area localities are represented under the Legislative Assembly District of Upper Hunter on a state level. This district is currently represented by David Robert Layzell from the NP. The district has been represented by the NP since 1962.

The following provides a summary of current and recent political representation at a local level:

- **Singleton LGA:** is represented by the Singleton Council who is comprised of one Mayor and nine Councillors. The current Major is Cr Sue Moore, who was elected in 2021.
- **Muswellbrook LGA:** is represented through the Muswellbrook Shire Council who is comprised of Mayor Steve Reynolds, Deputy Mayor Graeme McNeil and 10 Councillors.
- **The Upper Hunter Shire LGA:** is governed by the Upper Hunter Shire Council LGA. The council consists of 9 Councillors who are elected every 4 years, and a Mayor and Deputy Mayor elected every 2 years. The current Mayor is Maurice Collison.

The Project Area is located within the traditional lands of the Wonnarua nation people whose traditional lands extend over the Hunter Valley of NSW. The Wonnarua people are represented by the Wonnarua Nation Aboriginal Corporation which was established in 1999.

- There are a number of native title claims surrounding the Project Area. Two Native Title claimant applications have been registered for the Upper Hunter LGA. They are registered as NC2011/006 – Gomeroi People (20 January 2012), and NC2018/002 – Warrabinga-Wiradjuri #7 (31 August 2018).
- One Native Title claimant application has been registered been registered for Singleton LGA. It is registered as NC2018/002 Warrabinga-Wiradjuri #7 (22 of November 2018).

- Two Native Title claimant applications have been registered for Muswellbrook LGA. They are registered as NC2011/006 – Gomeroi People (20 January 2012), and NC2018/002 – Warrabinga-Wiradjuri #7 (22 November 2018).
- **Figure 3.5** below shows the Native Tile Claims in the regions surrounding the Project Area.

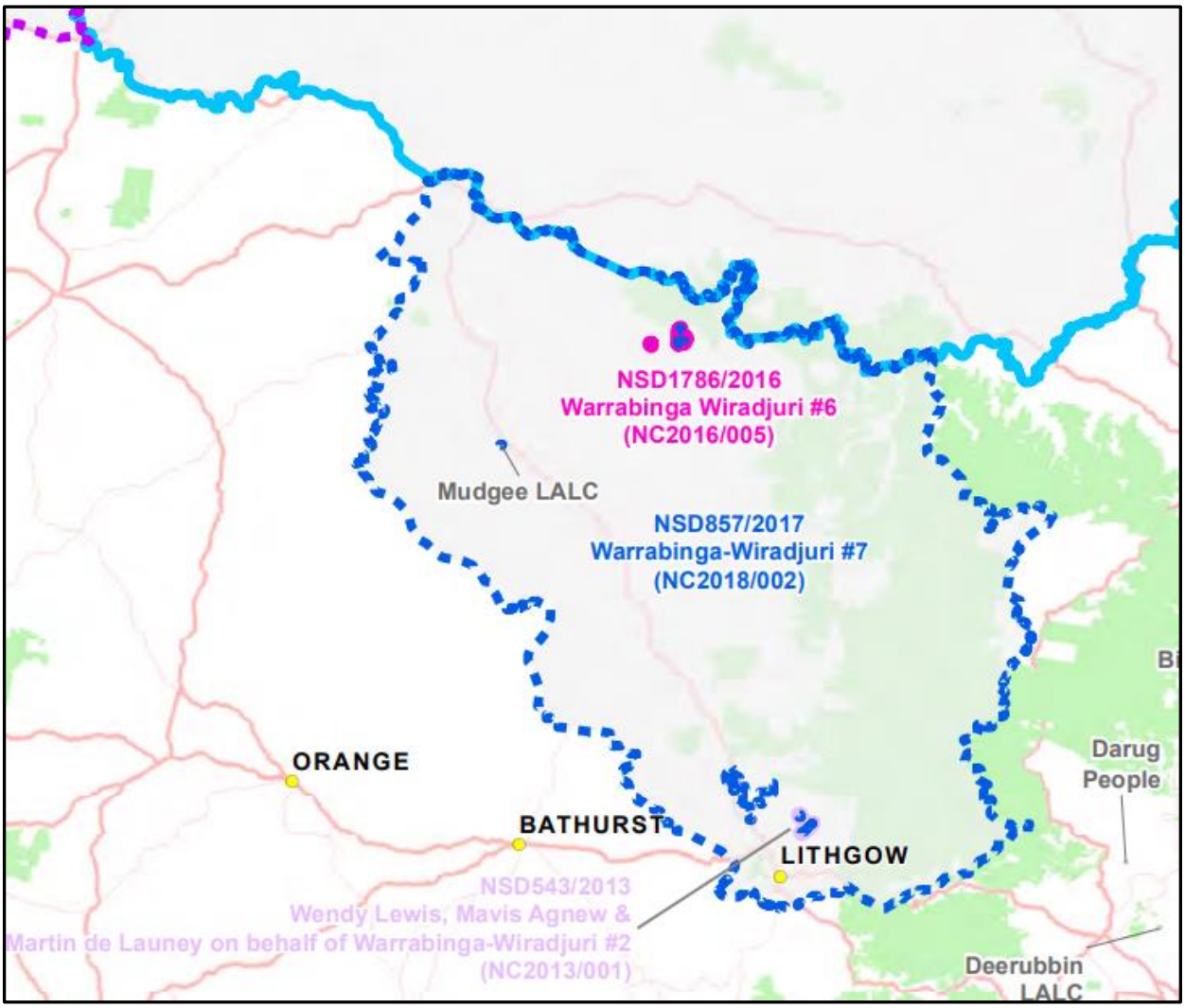


Figure 3.5 Map of Native Title Claims

Source: (National Native Title Tribunal , 2024).

3.5 Natural Capital

Natural capital refers to the natural assets and resources that contribute to community sustainability. Natural capital can include resources such as minerals, land, forests, and waterways, which provide benefit to the community, as well as environmental assets that provide social, cultural, or recreational value.

Approximately 8.4% of land in the Upper Hunter Shire LGA is protected for conservation, while 43% of Muswellbrook and 40% of Singleton LGA's land coverage are national parks (Muswellbrook Shire Council, 2024; Singleton Council, 2024; Upper Hunter Shire Council, 2024). Surrounding the relevant townships are various nature reserves, parks and lakes. Key areas include Lake Liddell, Lake St Clair, Mount Royal National Park, Belford National Park, Wollemi State Conservation Area and Barrington Tops National Park.

The Hunter Region has a temperate climate, with hot summers and cool winters, which is favourable for rural industry. Subsequently, within the Upper Hunter Shire LGA rural industries represent the predominant land use (agriculture, specifically for grazing and growing crops), with key economic and employment sectors including the equine industry, agricultural production (predominately beef, viticulture, and dairying), coal and other mineral mining, and tourism. Farm holdings comprise around 80% of the Upper Hunter Shire land area, with large extents classified as prime agricultural land. Consequently, the Upper Hunter LGA contains 50% of the agricultural area, 25% of the farms, and over 30% of the agricultural production value of the Hunter Region as a whole (DPIE, 2013).

Conversely, Muswellbrook and Singleton LGAs have a variety of different land uses. This includes land for mining associated activities, agricultural land, and smaller rural retreats (Opteon, 2017). Notably, large areas of vineyards are now being removed due to the nationwide wine glut (Opteon, 2017).

There are also challenges associated with the maintenance and further development of agricultural productivity in the Hunter region, whilst also supporting the development of competing industries. Key challenges will continue to emerge in relation to balancing the benefits and risks associated with mining, coal seam gas, and continued urban expansion (NSW Government, 2012). The regions' agriculture, tourism, and mining industries are also highly sensitive to climate change, with a greater risk of hazards expected into the future for these key land uses.

Above-average rainfall in March 2021 has eased long-term rainfall deficiencies and encouraged optimism in agricultural communities in the region, where extended drought conditions and large-scale bushfires have negatively affected agricultural communities in recent years, the most recent of which was from 2017 to 2020 (BOM, 2021). The rate of warming in the region has accelerated since 1960, and in the mid- to long-term, the Bureau of Meteorology have projected decreases in winter rainfall and harsher fire weather with high confidence (Ekström, 2015).

The implications of climate change on agricultural viability are also particularly relevant to the social locality with changes to agricultural growing seasons, impact of water availability, and higher temperatures potentially placing significant demand on water and land resources in the area (Upper Hunter Shire Council, 2017).

3.6 Human Capital

The level of human capital within a community is assessed by considering population size, age distribution, education and skills, general population health and the prevalence of vulnerable groups within the community. The following provides a summary of the key characteristics of the study areas from a human capital perspective with further information provided at **Appendix B**.

Population projections for the Singleton and Upper Hunter Shire LGAs suggest that population numbers will generally decline over the next two decades with it is predicted that by 2041, the population of the Upper Hunter Shire LGA will decline by 7.45%. Likewise, it is estimated that Singleton LGA will decline by 5.77%. (refer to **Appendix B**). Contrary to this, population projection estimates that Muswellbrook LGA will have a population increase of 5.6% by 2041 (**Appendix B**). Comparatively, all LGAs will likely experience a decrease in younger age groups and an increase in older age groups (NSW Government , 2023). This is likely due to the aging of the existing population.

Levels of post-secondary educational attainment in all social localities are low for postgraduate and graduate diploma and graduate certificate levels. Further, compared to the State, the proportion of people who have attained a bachelor degree is generally lower than NSW (10%). Rouchel Brook SAL recorded the highest percentage of those holding a post-secondary qualification (18%), followed by Hebden SAL (11%). All other localities recorded percentages below 7%.

The proportion of the population with certificate level qualifications in the social localities is higher than the State average of 15%. McCullys Gap SAL recorded the highest proportion (29%), followed by Muscle Creek SAL (26%), Singleton LGA (25%) and Singleton UCL (25%).

Top occupations at the LGA level include technicians and trades workers, which comprises of 17.0% of the population in the Upper Hunter Shire, 18.0% in Singleton and 19.4% in Muswellbrook. Following this, the second top occupation in Singleton and Muswellbrook LGAs is machinery operators and drivers (16.0% and 18.0% respectively).

At the suburb level, the top occupations include:

- Managers in the Rouchel Brook, Bowmans Creek and Goorangoola SALs (46.2%, 44.4% and 30.3% respectively).
- Machinery operators and drivers in the Muscle Creek and Hebden SALs (19.1% and 29.4% respectively).
- Technicians and trades workers in the McCullys Gap SAL (19.2% of residents).
- Labourers in Scone UCL (19.3% of residents).

By way of summary, **Figure 3.6** outlines the Socio-Economic Indexes for Areas (SEIFA) – Index of Education and Occupation, prepared by the ABS. A low score indicates a greater degree of disadvantage, with the lowest 10% of areas receiving a decile of one, and the highest, a ten. It should be noted that no comparison can be made between LGAs and SALs on ranking, as rankings are only comparative within each geographic classification.

Hebden SAL and Muscle Creek SAL recorded the lowest level of education and occupation-related skills compared to the other study communities (at a suburb level). However, Bowmans Creek SAL and Goorangoola SAL decile ranking is still relatively low. Comparatively, Rouchel Brook SAL recorded a substantially higher decile ranking, indicating a higher level of advantage amongst the other SALs. At an LGA level, the Muswellbrook LGA records the lowest decile ranking compared to the other study area LGAs.

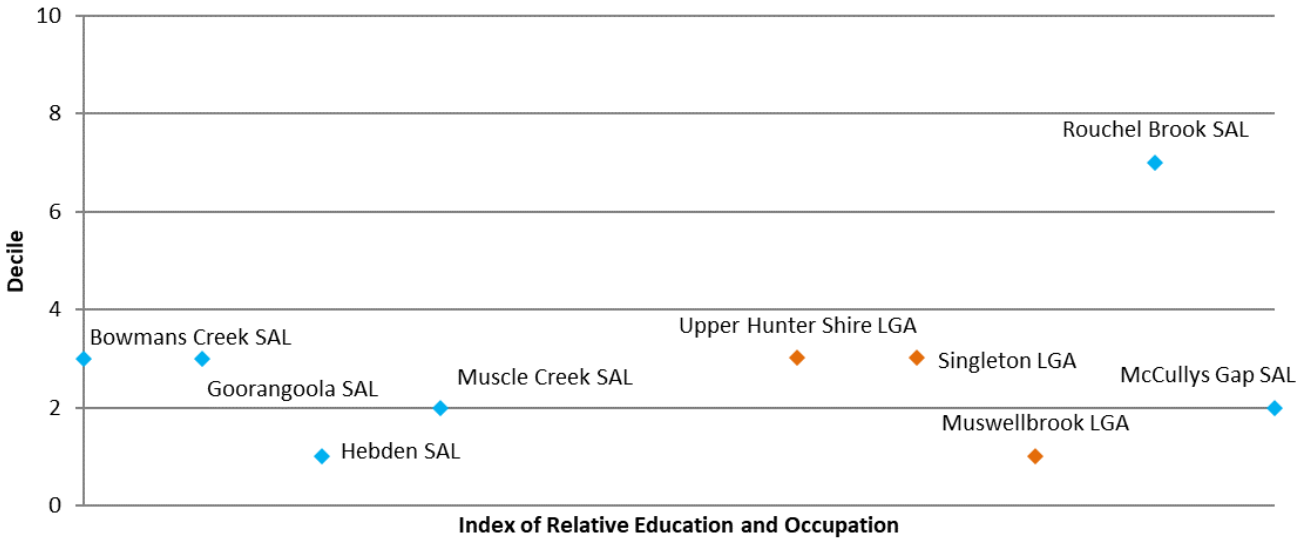


Figure 3.6 Index of Relative Education and Occupation[123]

Source: SEFIA, 2021.

An analysis of Public Health Information Development Unit data (PHIDU) reveals the following:

- Muswellbrook LGA has the greatest proportion of people with one or more long-term health conditions (33.1 ASR per 100), followed by Singleton LGA (30.9 ASR per 100). The Upper Hunter Shire LGA recorded the lowest at 28.7 ASR per 100.
- The top three health conditions across all three LGAs are asthma, arthritis, and mental health conditions (including depression or anxiety).
- The prevalence of arthritis is highest in Upper Hunter Shire LGA (10.3%), followed by Singleton LGA (10%) and lastly Muswellbrook (9.7%).
- Those with a mental health condition is highest in Muswellbrook LGA (10.7%) followed Singleton LGA (9.6%), and lowest in Upper Hunter Shire LGA (8.2%).
- The proportion of people with asthma is higher in Muswellbrook LGA (10.8%), followed by Upper Hunter Shire (9.9%) and Singleton (9.1%).
- Overall, all LGAs recorded lower percentages of people without a long-term health condition(s) compared to NSW, indicating a greater prevalence of health issues. This could be correlated to an aging population.

[1] It should be noted that a comparison cannot be made between LGAs and SALS on ranking, as rankings are only comparative within each geographic classification.
[2] SEIFA scores for SALs with small populations should be used with caution, because the SA1 boundaries may not correspond closely to the higher level area.
[3] Data is not available at the UCL level.

3.7 Cultural Capital

Cultural capital refers to underlying factors that provide human societies with the means to adapt to their environment (Cochrane, 2006). It includes the way people know and understand their place within the world. It may also refer to the extent to which the local culture, traditions, or language, may promote or hinder wellbeing, social inclusion, and development (IAIA, 2015). This section provides a summary of the key characteristics of the social locality from a cultural capital perspective.

Across the LGAS, English is predominately the only language used at home. In Singleton LGA, 90.6% only speak English at home. Other languages include Tagalog (0.4%) and Afrikaans (0.4%). Further, in Muswellbrook LGA, 88% only use English at home. Other top languages include Punjabi (0.3%), Tagalog (0.3%) and Filipino (0.3%). Lastly, in the LGA of Upper Hunter Shire 89.5% only use English at home. Mandarin accounts for 0.7% of other language spoken, while Filipino accounts for 0.3%.

The proportion of the population who identify as Aboriginal and/or Torres Strait Islander is higher in Hebden SAL and Muswellbrook UCL/LGA, with proportions of 13.4%, 12.7% and 11.3%. Singleton LGA/ UCL, Upper Hunter Shire LGA, McCullys Gap SAL and Muscle Creek SAL have a lower proportion of people who identify as Aboriginal and/or Torres Strait Islander (7.9%, 8.7%, 6.7%, 3.8% and 3.5%). However, this still above the State average of 3.3%. Bowmans Creek SAL, Rouchel Brook SAL and Goorangoola SAL recorded 0%.

Aboriginal cultural heritage sites and places represent a direct link to Aboriginal traditional and cultural life. These sites are important in themselves as well as the landscape in which they are situated given Aboriginal people's relationship and connections to Country.

The Wonnarua People are the Traditional Owners of the Hunter Valley. The Wonnarua people have occupied the Upper Hunter for at least 30,000 years. The Hunter Valley has a rich Aboriginal history that is shown through numerous Aboriginal rock art and engravings. This includes the Baiame Cave near Singleton, which is considered a place of great spiritual significance to the Wonnarua people (ABC, 2015). Overall, Singleton has 4 protected Aboriginal places, 6,347 recorded Aboriginal Cultural Heritage Sites (Singleton Shire Council, 2022).

Aboriginal people have occupied the greater Muswellbrook region for thousands of years. Evidence of this is found through a number of archaeological sites which include open camp sites, rock shelters, scarred trees and grinding grooves. One such site includes the scarred tree which was salvaged from the Dartbrook Mine Site. The scarred tree is now located in Simpsons Park (Muswellbrook Shire Council, 2023).

3.8 Social Capital

Various indicators can be used to examine and assess social capital. Such indicators may include the level of volunteering, population mobility, crime rates, and the demographic composition of the community, such as the percentage of people born overseas, language proficiency etc. The following provides a summary of the key characteristics of the study areas from a social capital perspective.

Rates of mobility across the study locality communities are variable when considering the proportions of the population who were living at a different address 5 years ago. Bowmans Creek SAL (17.6%), Goorangoola SAL (28.8%), McCullys Gap SAL (27.9%), Muscle Creek SAL (29.7%), Rouchel Brooks SAL (31.8%) and Upper Hunter Shire LGA (33.3%) have the lowest rates of mobility and are below levels

recorded across the State suggesting a population that is more settled and invested in changes to the community Muswellbrook LGA (37.7%), Singleton LGA (38.4%), Hebden SAL (38.8%) and Muswellbrook UCL (38.8%) are consistent with NSW (37.8%). Conversely, Singleton UCL and Scone UCL have a higher proportion of those living at a different address than five years ago (41.6% and 40.2%).

The proportion of people living at a different address one year ago is generally consistent with NSW (14.8%). Foremost, Bowmans Creek SAL, Scone UCL, Singleton UCL and Muswellbrook UCL had the greater percentages of people living at a different address (17.6%, 16.7% 16% and 15.7%). Following this, Hebden SAL (14.9%) and Singleton LGA (14.7%) were closer to the State average. Upper Hunter Shire LGA, Muscle Creek SAL, McCullys Gap SAL, Rouchel Brook SAL and Goorangoola SAL have a lower or very low proportions (13.4%, 11.8%, 11.8%, 0% and 0%).

In Goorangoola SAL, 30.8% of the population did volunteering work in the last 12 months. This is closely followed by Bowmans Creek SAL (29.4%) and McCullys Gap SAL 21.8%. This is substantially higher than all other social localities. Following Bowmans Creek SAL, 16.4% of Hebden SAL, 14.7% of Muscle Creek SAL, 13.6% of Rouchel Brook SAL and 13.4% of Upper Hunter Shire LGA participated in volunteering. The larger localities of Singleton LGA (11.7%), Scone UCL (11.1%) Singleton UCL (10.8%), Muswellbrook LGA (9.5%) and Muswellbrook UCL (8.2%) have the lowest volunteering rates.

Participation in volunteering activities, along with lower rates of mobility, suggests that the smaller social localities have greater sense of social cohesion and connection.

All social localities have a more homogenous society than NSW, with low rates of people born overseas. The smaller communities of Bowmans Creek SAL (100%), Hebden SAL, (97%), Muscle Creek SAL (93%) all recorded the highest proportion of people born in Australia. All other localities were above 81%. This is approximately 15% higher than NSW, of which 65.4% of the population is born in Australia.

A comparison of household composition across the social localities indicates that households are primarily made up of 1) couple families with children and 2) families without children. Localities with the highest proportion of couple families with children were Bowmans Creek SAL (72.7%) and Muscle Creek SAL (69.9%), which are smaller communities. Moreover, localities with the highest proportion of families without children include Rouchel Book SAL (81.0%) and Goorangoola SAL (44.7%). This is likely a reflection of an aging population.

Rates of crime can also impact on the social capital of localities. Over the last 24 months, Muswellbrook LGA has seen an annual percentage change of fraud (73.5% increase), followed by an 52.9% increase in the possession and/ or use of cannabis. Singleton LGA has not seen a significant increase in any offences. Between January and December 2022, top offences in Singleton include malicious damage to property (235 incidents), fraud (139 offences) and intimidation, stalking and harassment (133 incidents). Comparably, Upper Hunter Shire also did not experience any significant increase in offences between January and December 2022. Top offences include malicious damage to property (74 incidents), intimidation, stalking and harassment (72 incidents) and domestic violence related assault (65 offences) (BOSCAR, 2023).

The Index of Relative Socio-economic Disadvantage (IRSD) is a SEIFA score prepared by the ABS which ranks areas in Australia according to relative socio-economic disadvantage. A low score indicates a greater degree of disadvantage.

Figure 3.7 indicates Muswellbrook LGA is experiencing the greatest degree of disadvantage when compared to other LGAs. At a community level, the localities of Muscle Creek SAL and McCullys Gap are in the 8th decile within NSW, indicating relatively low socio-economic disadvantage. Comparatively, Hebden SAL has the greatest degree of socio-economic disadvantage amongst the other SALs.

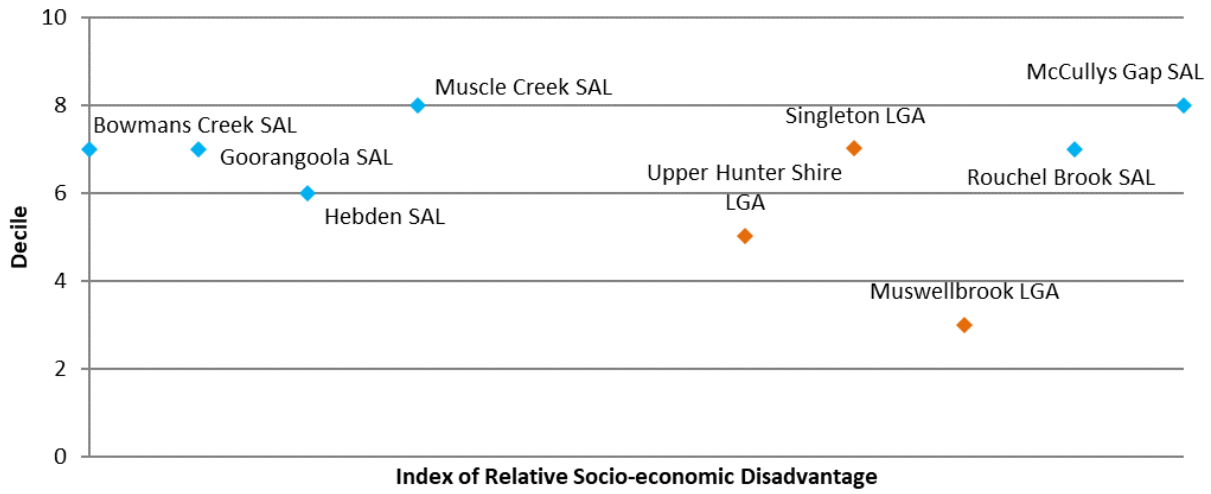


Figure 3.7 Index of Relative Socio-economic Disadvantage[4][5][6]

Source: SEIFA, 2021.

The connection of the social locality was also reflected in stakeholder engagement activities undertaken to support the scoping phase, as outlined in **Section 2.4**. When participants were asked *How would you describe your community?*, they noted:

'We are close knit, and we really do look out for each other mostly.'

'Very established connected community, with great local support/ education/ events. Quiet & beautiful & a wonderfully productive area to house children and cattle.'

'We are close knit community, very local. All generational. No new families arriving from town from Sydney. I grew up there. My great, great grandparents settled here. Known each other all of our life.'

3.9 Economic Capital

Examining a community's economic capital involves consideration of several indicators, including industry and employment distribution, workforce participation and unemployment, income levels and cost of living pressures, such as weekly rent or mortgage repayments. The following provides a summary of the key characteristics of the communities within the area of social influence from an economic capital perspective with additional information provided at **Appendix B**.

[4] It should be noted that a comparison cannot be made between LGAs and SALS on ranking, as rankings are only comparative within each geographic classification.
[5] SEIFA scores for SALs with small populations should be used with caution, because the SA1 boundaries may not correspond closely to the higher level area.
[6] Data is unavailable at the UCL level.

Mining is currently the Singleton LGAs largest output generating sector which has an estimated annual output of $9.7 billion. The same is true for the Muswellbrook LGAs where mining provides an output of approximately $5.2 billion per year. Comparatively, agriculture, forestry and fishing industry is the Upper Hunter Shire LGAs largest output generating sector, with an estimated annual output of $496.7 million.

Historically, unemployment rates have remained higher in Muswellbrook LGA compared to Singleton and Upper Hunter Shire LGAs. Singleton LGA and Muswellbrook LGA have continued to demonstrate similar unemployment trends throughout the last 10 years. As of March 2023, Muswellbrook LGA recorded an unemployment rate of 5.3%, while Singleton recorded 3% and Upper Hunter Shire 2.8%.

Latest data available on the SAL/ UCL level from the 2021 Census indicate that unemployment rates across the relevant social localities were mostly lower when compared to than NSW. Bowmans Creek SAL, Hebden SAL, Rouchel Brook SAL and Goorangoola SAL recorded an unemployment rate of 0%, while Muscle Creek SAL is 1.6%. Following this, McCullys Gap SAL (3.2%), Scone (3.5%) and Singleton UCL (4.7%) recorded unemployment rates below NSW (4.9%). Unemployment rates were highest in Muswellbrook UCL (6.1%) (**Appendix B**).

With regards to household income, median weekly incomes across the LGAs are highest in Singleton ($2,016), followed by Muswellbrook LGA ($1,628) and lastly Upper Hunter Shire LGA ($1560). Further, median weekly household incomes across the SALs/ UCLs are the highest in Hebden SAL ($3,416), followed by Muscle Creek SAL ($3,083), Goorangoola SAL ($2,583) and McCullys Gap SAL ($2299). Lowest weekly household incomes are found in the localities of Bowmans Creek SAL ($1,249), Scone UCL ($1,435), Muswellbrook UCL ($1,547) and Rouchel Brook SAL ($1,583). These three localities are all below the median weekly household income in NSW ($1,829). Localities with a higher median weekly income have a higher proportion of people employed in the mining industry.

With regards to household expenditure:

- **Median weekly rent payments** across the social localities are lower than those being paid on average across NSW ($420). Localities with the highest median weekly rent payments include Goorangoola ($400) and Hebden SAL ($350), which are primarily employed in the mining industry. Localities with the lowest median weekly payments include Muscle Creek SAL/ Rouchel Brook ($243) and Upper Hunter Shire LGA ($270). Unlike those localities with a higher income, these latter localities are not employed in the mining industry or have a greater degree of employment diversity.
- **Median monthly mortgage repayments** vary across the different social localities with repayments highest in Rouchel Brook SAL ($3,734) Goorangoola SAL ($2,700), Muscle Creek SAL ($2,383), McCullys Gap SAL ($2,167) and Singleton LGA ($1,917). Repayments are lower in the localities of Bowman Creek SAL ($1,270), Hebden SAL, Muswellbrook UCL, Scone UCL, Muswellbrook LGA (all $1,517) and Upper Hunter Shire LGA ($1560).

Highest industries of employment within the LGAs are mining for Singleton and Muswellbrook LGA (21.6% and 21.5%) and agriculture, forestry, and fishing in Upper Hunter Shire LGA (17.3%). Comparatively, the largest industry of employment across most localities is mining, with higher proportions recorded in Hebden SAL (32.4%), Muscle Creek SAL (23.5%) and Scone UCL (11.6%) Moreover, the highest industry of employment in Bowmans Creek SAL (66.7%), Rouchel Brook SAL (46.2%) and Goorangoola (36.4%) is agriculture, forestry, and fishing.

The Socio-Economic Indexes of Areas (SEIFA) Index of Economic Resources is a product developed by the ABS to rank relative socio-economic advantage and disadvantage across LGAs and reflects the general level of economic resources available by an LGA. A low score indicates a relative lack of access to economic resources indicates that Muswellbrook LGA has the greatest degree of disadvantage compared to the other LGAs. All SALs have high decile rankings, indicating that the localities have a high level of economic resources available (**Figure 3.8**).

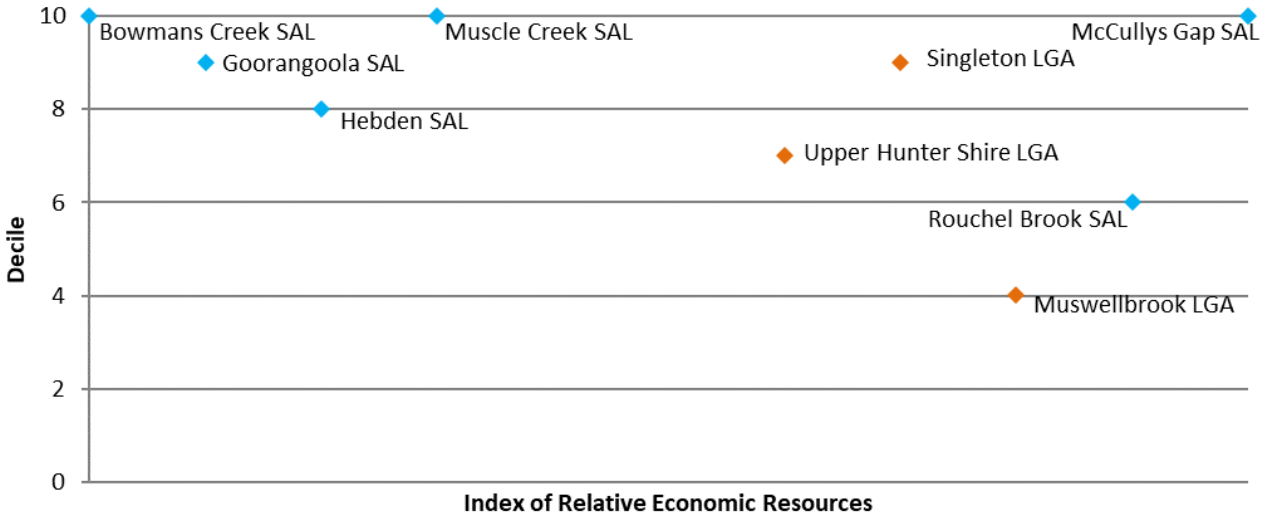


Figure 3.8 Index of Relative Economic Resources[789]

Source: SEIFA, 2021.

The Herfindahl Index provides an indication of market concentration within a region, and specifically provides an indication of how many industries are competing for market share within a given locality. The higher the index, the more concentrated the market by industry composition, demonstrating a low level of economic diversity, while a low index indicates a greater number of industries and occupations being serviced within the social locality. As shown in **Figure 3.9** all LGAS have a score below 0.05 indicating a competitive industry. Data indicates that Muswellbrook and Singleton LGAs have a higher market concentration compared to Upper Hunter Shire LGA. This is likely given Muswellbrook and Singleton LGAs reliance on mining as indicated by the high level of employment in the mining industry.

7 It should be noted that a comparison cannot be made between LGAs and SALS on ranking, as rankings are only comparative within each geographic classification.

8 SEIFA scores for SALs with small populations should be used with caution, as the SAL boundaries may not correspond closely to the higher level area.

9 Data is unavailable at the UCL level.

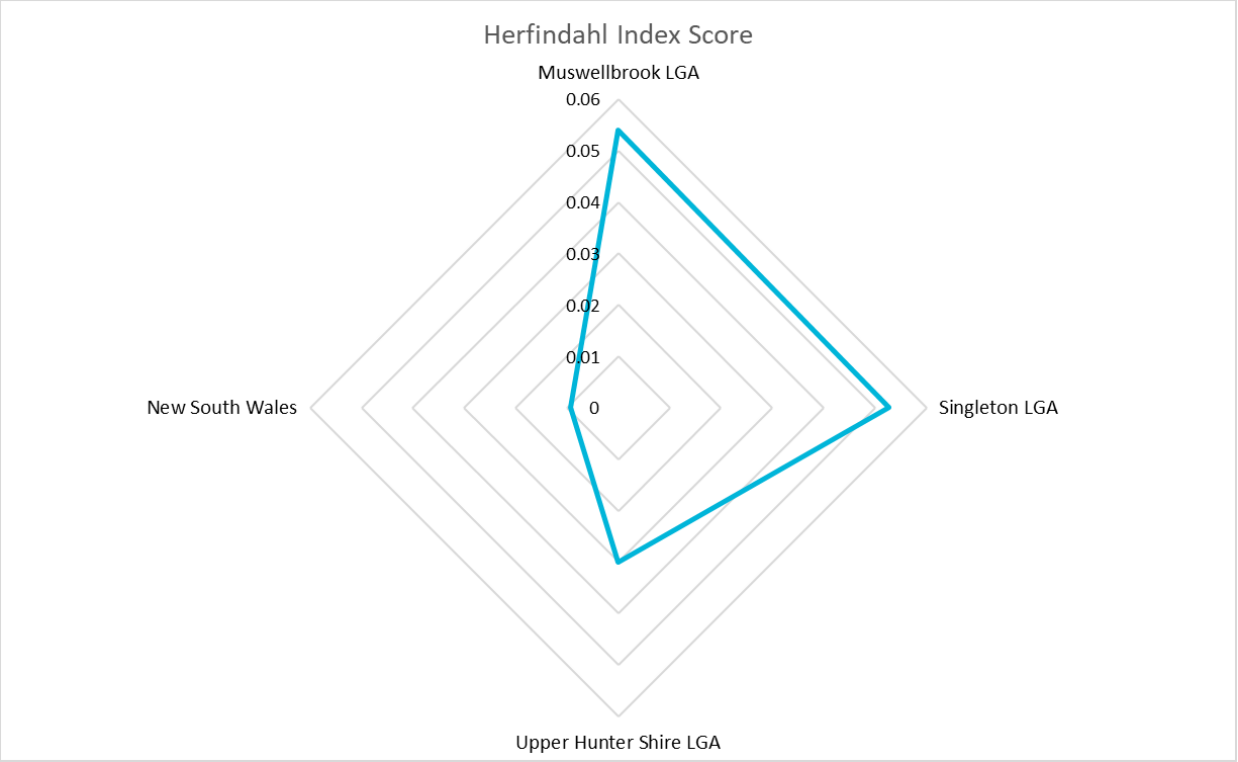


Figure 3.9 Herfindahl Index Score

Source: ABS TableBuilder, 2021.

3.10 Physical Capital

Physical or built capital includes provision of infrastructure and services to the community. Within this capital area it is important to consider the type, quality, and degree of access to public, built and community infrastructure (including amenities, services, and utilities) as well as housing.

3.10.1 Housing

Levels of home ownership within in the study communities are generally very high. In summary:

- Most study communities within the social locality have a higher proportion of people who own a house with a mortgage, including Hebden (68.4%), Muscle Creek (66.3%) and McCullys Gap (41.3%).
- Localities with a greater proportion of houses owned outright include Bowmans Creek SAL (100%), Goorangoola SAL (50%) and Upper Hunter Shire LGA (36.7%).
- Rouchel Brook has an equal percentage of people who owned a house outright and with a mortgage (25%).
- Localities where the largest proportion of houses are rented include Muswellbrook UCL (35.8%) and Muswellbrook LGA (34.2%).
- As of April 2024, rental vacancy rates in the Singleton LGA are currently very low (0.96%) and even lower in the Muswellbrook and Upper Hunter LGAs (0.90% and 0.62% respectively) (Real Estate Investor, 2023). This indicates a high level of demand in the rental market.

- With the rise of major developments in the region, strains on vacancy rates may increase and impact on the accessibility and affordability of housing.

Across the LGAs, financial stress from mortgage and stress from mortgage and rent was recorded to be lower than NSW in 2021. Across the State of NSW, 31.9% of people experience mortgage and rental stress. Comparatively, 28.4% of Singleton LGA, 29.9% of Muswellbrook LGA and 20.1% of Upper Hunter Shire LGA experience mortgage or rental stress.

3.10.2 Short-term Accommodation

The largest markets for short-term accommodation within the relevant study localities are within the townships of Muswellbrook, Singleton and Scone. Within Muswellbrook township, there are 12 hotels/ motels available and 10 Airbnb, with 27 Airbnb availably more broadly across the Muswellbrook LGA (Booking.com, 2024; Airbnb, 2024). Singleton township has 7 accommodation providers and 22 Airbnb available with a total 345 Airbnb available across the broader Singleton LGA. Within Scone, there are 16 hotels/ motels available and 19 Airbnb (Booking.com, 2024; Airbnb, 2024). There are 47 Airbnb available within Upper Hunter Shire LGA.

An analysis of Airbnb occupancy rates indicates that there is some capacity within the local short-term accommodation market to service the Project should it be required (refer to **Figure 3.10**). Occupancy rates are highest in Muswellbrook LGA, with an average of 62%. This is followed by Upper Hunter Shire LGA, with an average of 52.3%. Singleton LGA has the lowest average occupancy rate of 43.9%.

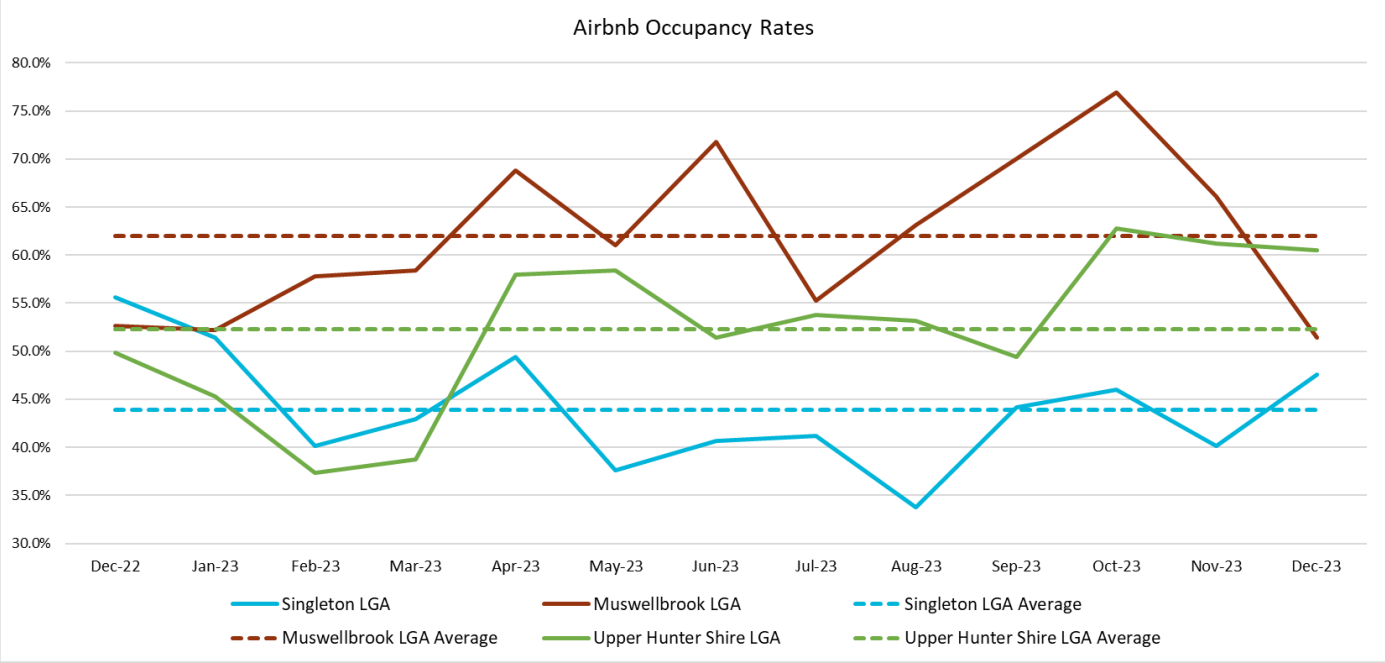


Figure 3.10 Airbnb Occupancy Rates

Source: AIRDNA, 2023.

3.10.3 Social Infrastructure

The majority of the study communities have a lower proportion of dwellings with internet access when compared to NSW; Singleton LGA has the highest percentage with 81.4%, followed by Muswellbrook LGA

(76.5%) and Upper Hunter Shire LGA 73.8%. In comparison, the percentage of dwellings where internet is accessed in NSW is 82.5% (PHIDU 2016).

The availability of General Medical Practitioners (GPs) in the LGAS are lower than NSW. In Muswellbrook, the rate of GPs per 100,000 people is 85.0, while Upper Hunter Shire LGA is 98.2 and Singleton LGA is 101.1. Comparatively, NSW has 123 GPs available per 100,000 people (PHIDU,2021). In line with the limited availability of GPs, rates of long-term health conditions are above the NSW average (refer to **Section 3.8** for further information on health).

Regarding the provision of social infrastructure, a number of recent redevelopments have occurred within the region to keep up with increasing demand:

- **Singleton Hospital:** in 2018, a $7 million infrastructure investment into Singleton Hospital saw an expansion of the west wing which has allowed for new clinical areas including (NSW Government , 2023):
    - Community Health consultation rooms
    - Imaging Department
    - Renal Unit.
- **Muswellbrook Hospital Redevelopment:** this $21.5 million redevelopment was completed in 2019. This redevelopment included the expansion and refurbishment of the existing hospital and included (NSW Government , 2023):
    - Chemotherapy department
    - Renal Dialysis Unit
    - Expanded Ambulatory care clinic
    - Day Stay Unit consisting of six recovery bays
    - A new medical imaging facility.

Figure 3.11, **Figure 3.12**, **Figure 3.13, Figure 3.14** and Figure 3.15 show the locations of education, health care and emergency services in relation to the Project, in addition to major transportation networks which are further explored in the following sections. As evident in the figures, services are primarily concentrated within the population centres of Muswellbrook, Singleton and Scone.

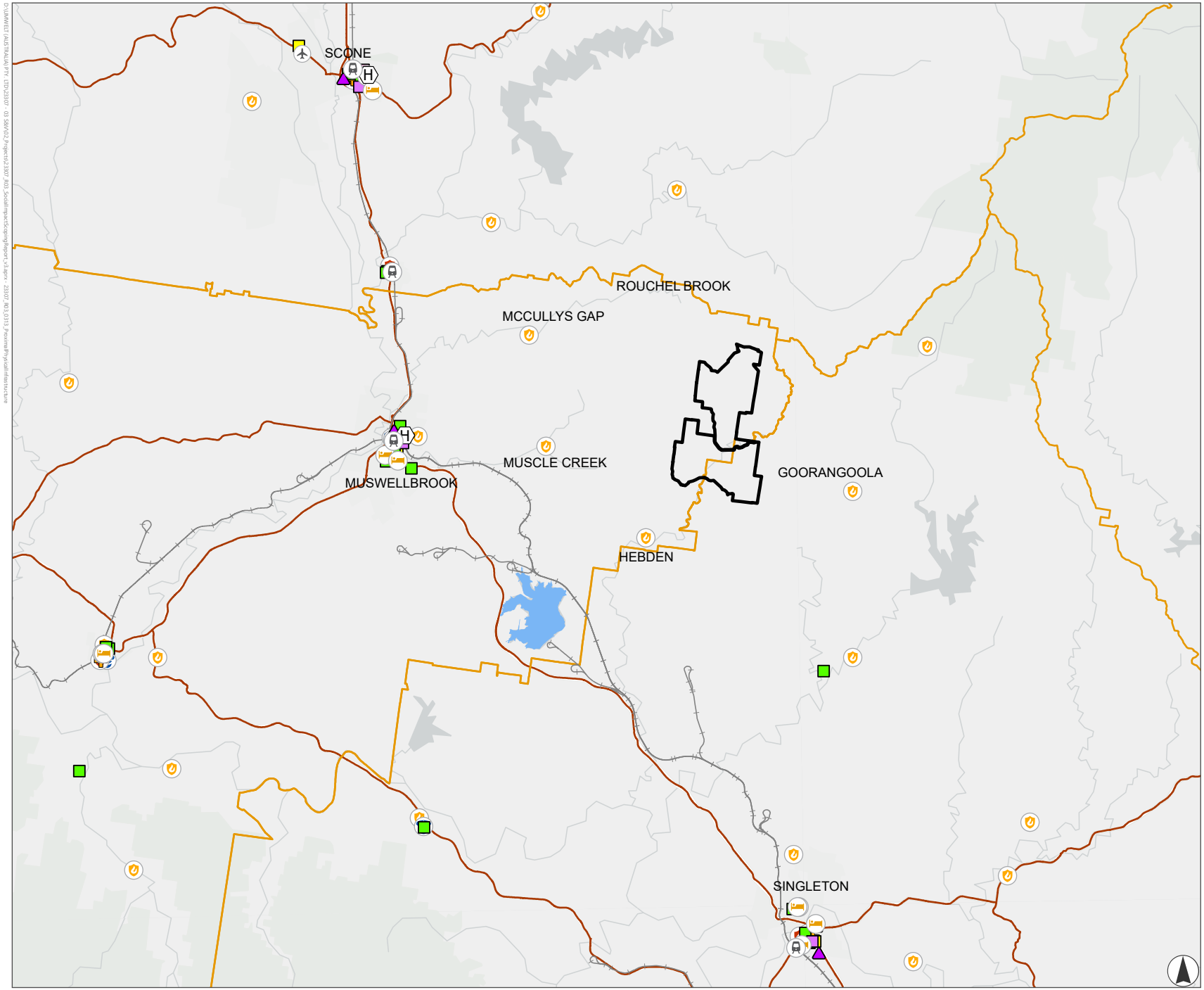


FIGURE 3.11
Proximal Physical Infrastructure

Legend

- Railway Station
- Helipad
- Airport
- Nursing Home
- Combined Primary Secondary School
- High School
- Pre School
- Primary School
- Technical College
- Hospital
- NSW Ambulance Station
- Fire and Rescue NSW
- NSW Police
- NSW Rural Fire Service
- Project Boundary - Stage 2
- Local Government Area Boundary
- Lake Liddell
- Railway

0 5 10

Kilometres

Scale 1:350,000 at A4
GDA2020 MGA Zone 56

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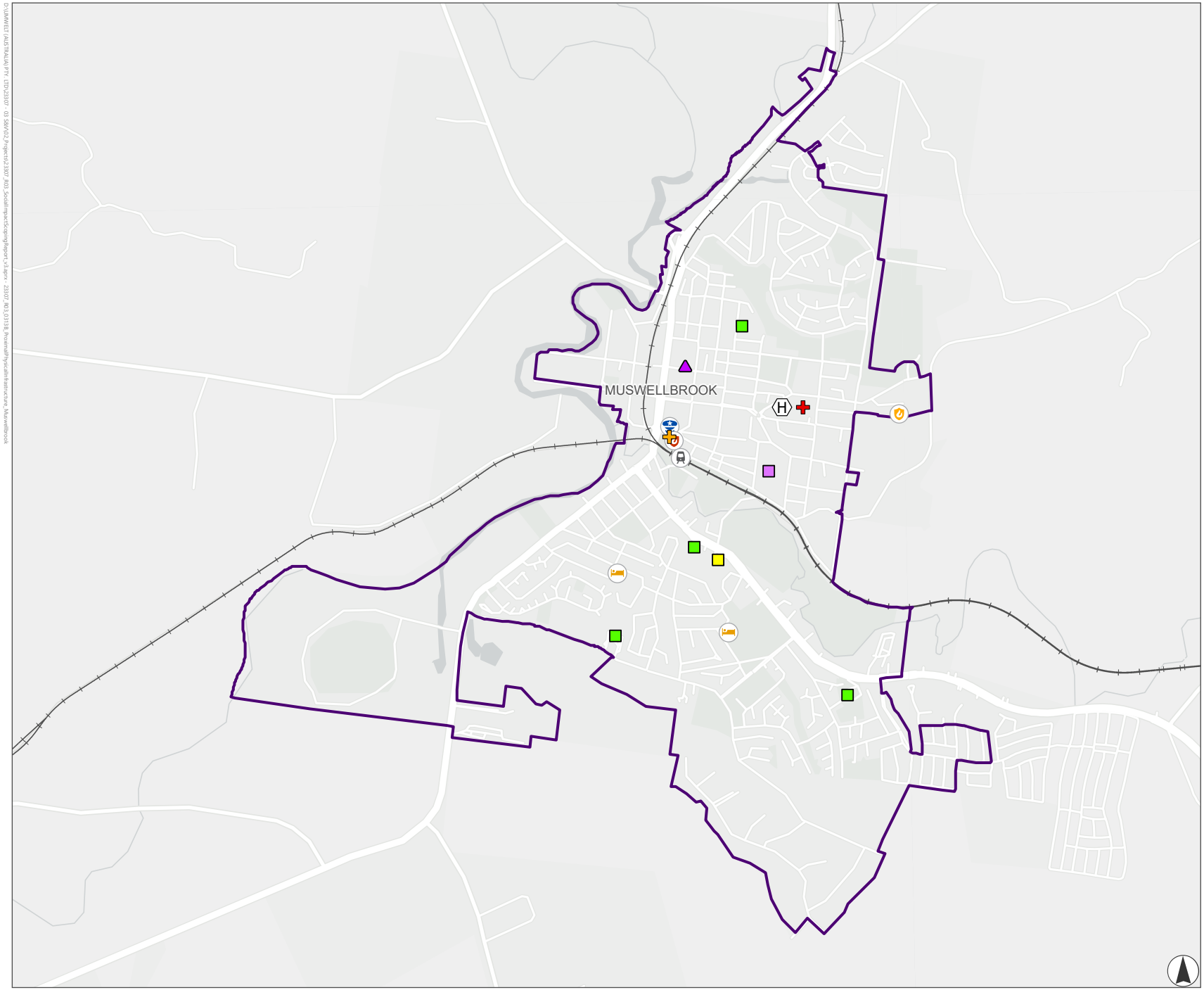


FIGURE 3.12
Proximal Physical Infrastructure - Muswellbrook UCL

Legend

- Railway Station
- Helipad
- Nursing Home
- Combined Primary Secondary School
- High School
- Primary School
- Technical College
- Hospital
- NSW Ambulance Station
- Fire and Rescue NSW
- NSW Police
- NSW Rural Fire Service
- Urban Centres and Localities Boundaries
- Major Watercourse
- Railway

0 0.5 1

Kilometres

Scale 1:40,000 at A4
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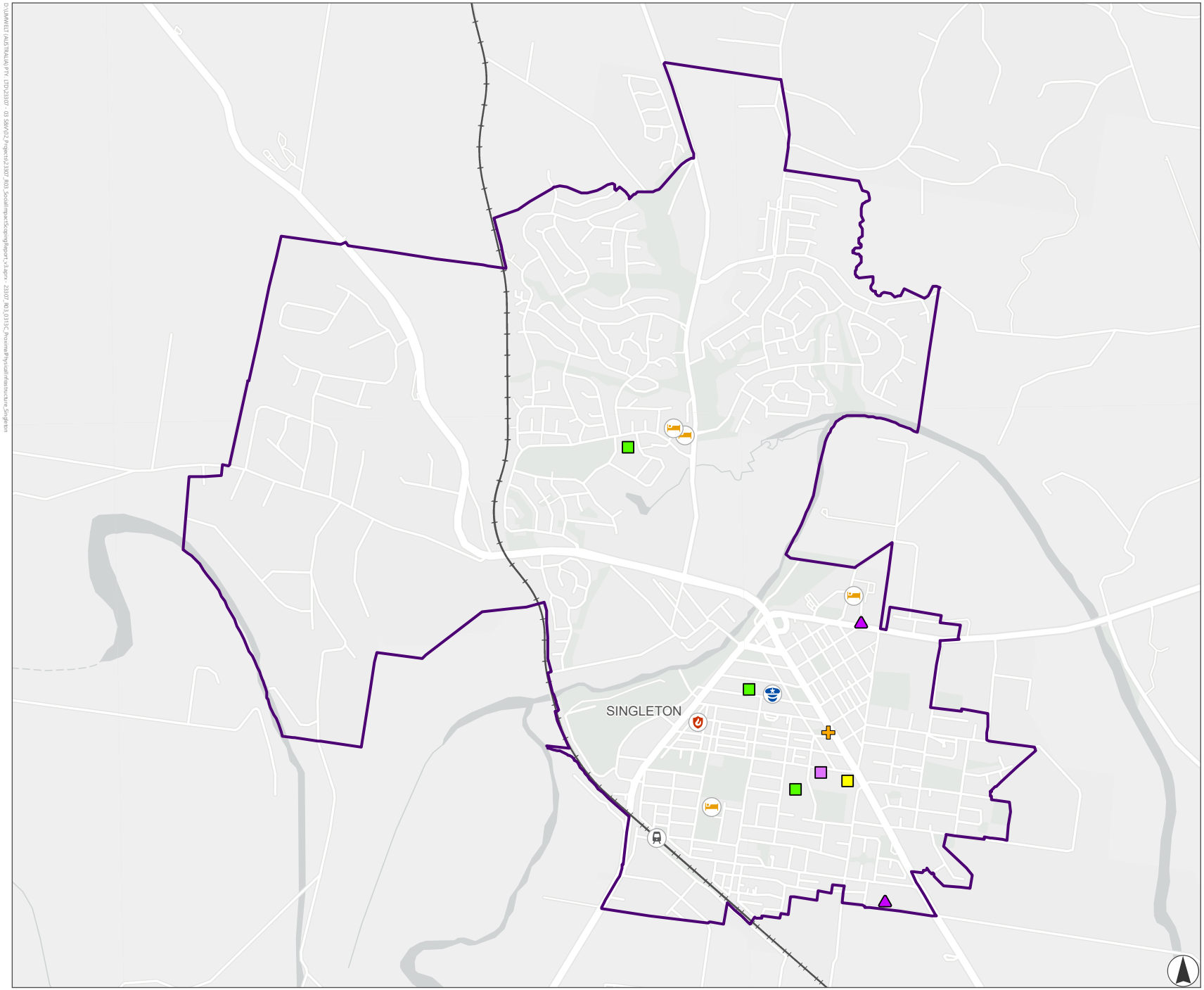


FIGURE 3.13

Proximal Physical Infrastructure - Singleton UCL

Legend

- Railway Station
- Nursing Home
- Combined Primary Secondary School
- High School
- Primary School
- Technical College
- NSW Ambulance Station
- Fire and Rescue NSW
- NSW Police
- Urban Centres and Localities Boundaries
- Major Watercourse
- Railway

0 0.5 1

Kilometres

Scale 1:35,000 at A4
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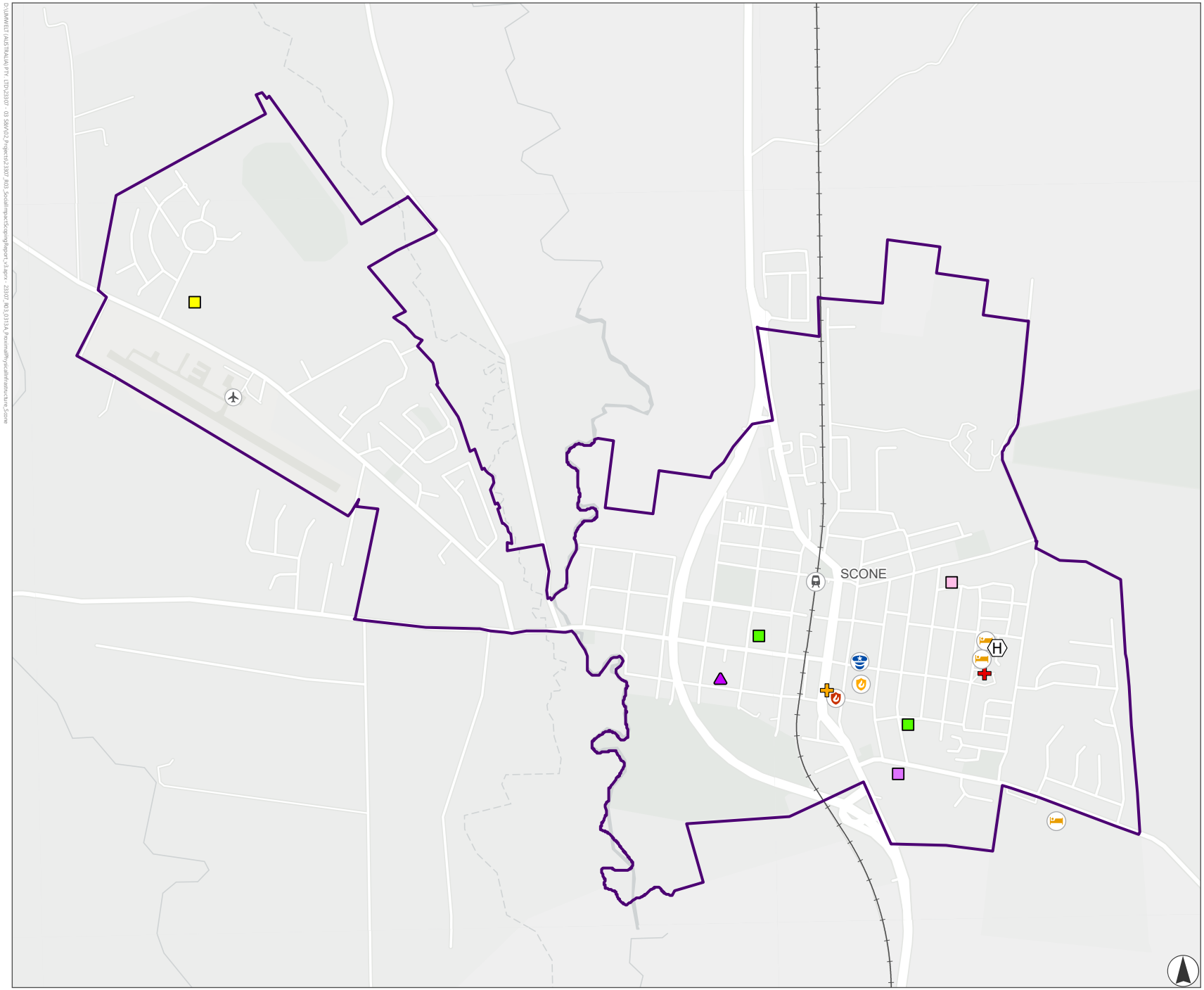


FIGURE 3.14

Proximal Physical Infrastructure - Scone UCL

Legend

- Railway Station
- Helipad
- Airport
- Nursing Home
- Combined Primary Secondary School
- High School
- Pre School
- Primary School
- Technical College
- Hospital
- NSW Ambulance Station
- Fire and Rescue NSW
- NSW Police
- NSW Rural Fire Service
- Urban Centres and Localities Boundaries
- Major Watercourse
- Railway

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Kilometres

Scale 1:30,000 at A4
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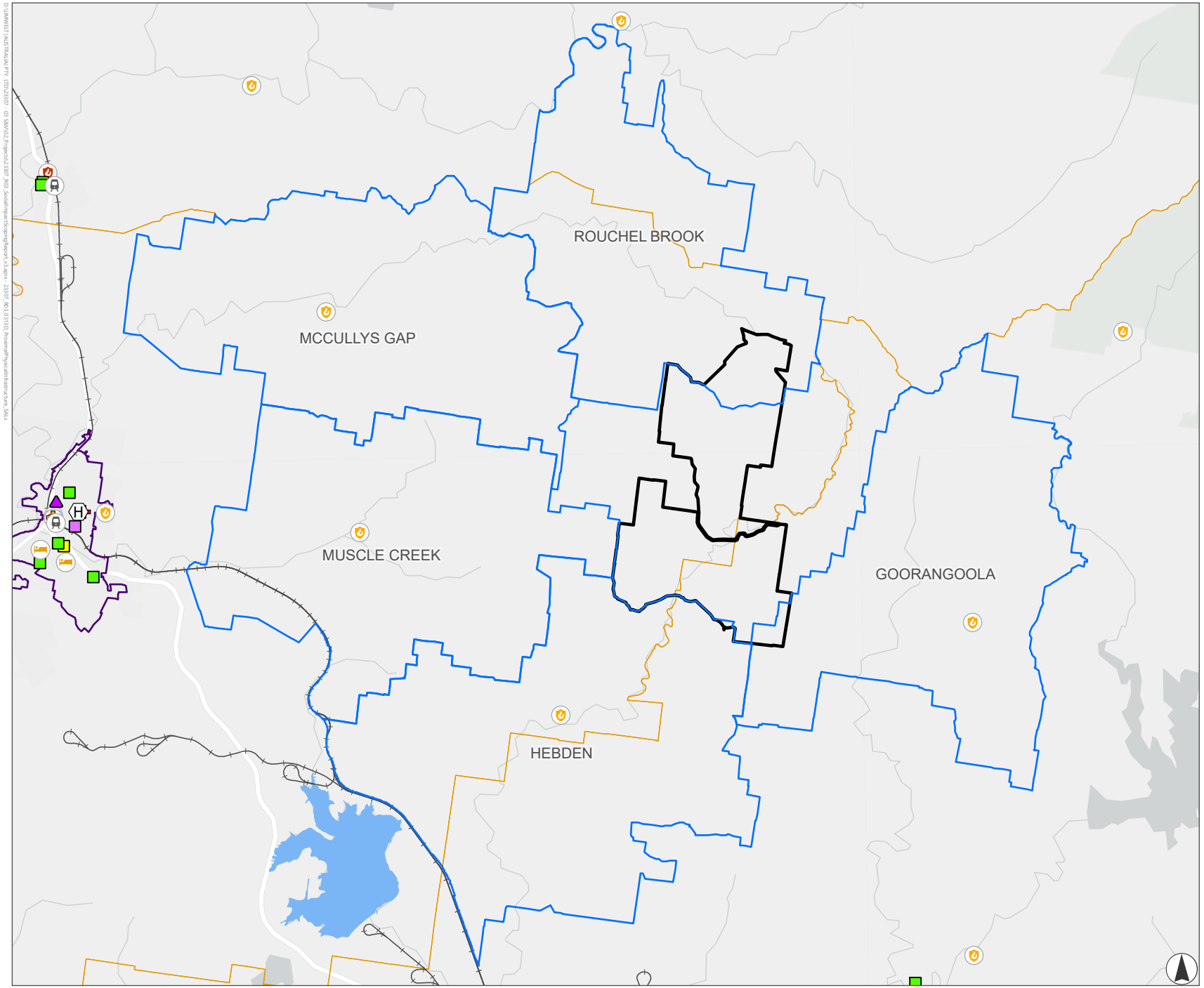


FIGURE 3.15 Proximal Physical Infrastructure - Rouchel Brook, McCullys Gap, Muscle Creek, Hebden, Goorangoola.

Legend

- Railway Station
- Helipad
- Nursing Home
- Combined Primary Secondary School
- High School
- Primary School
- Technical College
- Hospital
- NSW Ambulance Station
- Fire and Rescue NSW
- NSW Police
- NSW Rural Fire Service
- Project Boundary - Stage 2
- Suburb and Localities Boundaries
- Urban Centres and Localities Boundaries
- Local Government Area Boundary
- Major Watercourse
- Railway

0 2.5 5

Kilometres

Scale 1:175,000 at A4
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3.10.4 Connectivity

Compared to NSW, most of the social locality generally has a higher than average number of motor vehicles per dwelling. Hebden SAL and Goorangoola SAL have the highest average with 2.7 motor vehicles. Rouchel Brook SAL has an average of 1.6 motor vehicles, which is below NSW by 1% which has an average of 2.6 cars.

The area has strong rail and road connections to key locations, including the Port of Newcastle. However, upgrades to transport infrastructure are a key consideration across the region, with councils placing an emphasis on improving local road infrastructure and the state and federal government committing $710 million to build the Singleton Bypass due to be open to traffic in 2026 (Transport for NSW, 2023).

3.11 Local Challenges and Opportunities

Table 3.4 outlines the key challenges and opportunities for the host LGAs of Muswellbrook, Singleton and Upper Hunter Shire and the proximal localities of Bowmans Creek, Hebden, Muscle Creek, Rouchel Brook, McCullys Gap and Goorangoola as obtained from the review of local, regional, and state government reports, strategies and plans, ABS Census data and other secondary sources of data and local media.

In summary, the key challenges faced by the Upper Hunter Shire, Muswellbrook and Singleton LGAs include the need to provide for an ageing population with limited health services and addressing the existing strain on short-stay accommodation provision. The abundant natural resources and strong agricultural sector, combined with the growth in renewable energy projects, place the LGAs in a good position to further diversify the local and regional economy.

The increasing number of transient workforces, due to the development of multiple major projects either proposed, or in construction, in the social locality, results in some flow-on challenges for the region in maintaining an existing strong sense of community and managing the potential rise in anti-social behaviour. However, the low mobility of the community is suggestive of a sustained sense of community, and the relatively high rate of volunteerism indicates that the community is willing to participate in community initiatives. This will likely result in positive social development for the community more broadly.

Table 3.4 Local Challenges and Opportunities

Challenges	Capital	Opportunities/ Strengths
• Increased political and community division regarding renewable energy and mining transition.	**Political**	• Strong Aboriginal representation through the Wonnarua Nation Aboriginal Corporation. • TO land is protected through various native title claims.
• Lower percentage of conservation areas. • Challenges associated with the maintenance and further development of agricultural productivity in the Hunter region. • Cumulative developments on natural environment require management and regulation.	**Natural**	• Area has quality agricultural land and an ideal climate for the rural industry. • Community members values the beautiful natural environment and aesthetic values of the landscape. • Area has been identified as having favourable natural resources for renewable energy development (sun and wind).

Challenges	Capital	Opportunities/ Strengths
• Climate change impacting on agricultural viability. • Water security and drought prone area. • Bush fire prone area.		• Region hosts large areas of National Parks.
• Population decreasing in Upper Hunter Shire and Singleton LGAs. • Lower levels of educational attainment. • Lower levels of relative education and occupation in all localities except Rouchel Brook. • Higher levels of long-term health conditions.	**Human**	• Population increasing in Muswellbrook LGA. • Proportion of residents undertaking tertiary education increasing. • Upper Hunter Region has a strong technical training and skills base and a high proportion of people employed as technicians and trades workers.
• Low languages ither than English (LOTE) in the region. • The area has an extensive post-colonial occupation resulting in destruction of many Aboriginal sites of cultural significance.	**Cultural**	• There is a long history of European cultural heritage exemplified through heritage buildings and places and the landscape. • A number of cultural heritage site demonstrating the established presence of the Wonnarua People in the Hunter region. • Residents' cultural identity is tied with the landscape and land uses contained within the region.
• Decreasing levels of social cohesion. • Increasing crime rates in Muswellbrook LGA.	**Social**	• Tight-knit community. • Representation of Aboriginal and Torres Strait Islander people in the community. • Low mobility of residents resulting in sustained sense of community.
• Higher unemployment rates. • Low median weekly household incomes for localities with a low mining workforce resulting in less spending in the local economy.	**Economic**	• Region has strong and diverse industries including mining and agriculture. • Low cost of living relative to other localities in NSW.
• Road infrastructure and road surfaces require upgrade. • Lack of public transport options. • No accommodation facilities immediately proximal to the Project. • Broadband and mobile coverage need upgrading. • Limited availability of GPs.	**Physical**	• Higher rates of home ownership. • Lower rates of financial stress for mortgage and rent than NSW. • Some accommodation capacity to service the Project in the region, particularly in Muswellbrook and Singleton UCLs.

3.11.1 Identification of Vulnerable Groups

Through the development of the social baseline profile, the following population groups within the area of social influence have been identified as potentially having vulnerability to the social or economic changes that the Project, and the cumulative effects of other developments across the region, may bring:

- landholders/property owners affected by the Project
- local farmers
- regular users of short-stay accommodation and tenants within the private rental market
- local Aboriginal and/or Torres Strait Islander residents.

4.0 Issues Scoping and Impact Identification

4.1 Introduction

This section summarises the scoped issues and impacts (positive and negative) in relation to the Project and has been framed in accordance with the social impact categories outlined in the SIA Guideline.

The issues scoping exercise has been compiled based on outcomes and responses from consultation undertaken during the scoping phase as outlined at **Section 2.4**, considered with the findings of the social baseline profile and also outcomes of analysis of submissions for Stage 1.

A preliminary evaluation of the likely social and economic impacts is presented in **Table 6.1** and **Table 6.2** as part of the SIA scoping phase. These impacts and opportunities will be further validated through engagement with key stakeholders in Phase 2 of the SIA and any further social and economic impacts identified for assessment at that phase.

4.2 Summary of Findings

A summary of the perceived and likely social impacts for the Project raised by interview and survey participants during the scoping phase is outlined at **Figure 4.2** with these categorised by the overarching social impact categories as per the NSW SIA Guideline (DPE, 2023). However, it is important to note that social impacts can often be categorised into more than one category, given that social impacts are often highly interrelated. This complexity is reflected throughout the following sections.

Figure 4.1 outlines the social impacts raised by stakeholders by social impact category, while **Figure 4.2** represents the number of consulted stakeholders that raised a particular impact or opportunity. Impacts identified in red represent those considered negative, whereas those in blue reflect positive impacts.

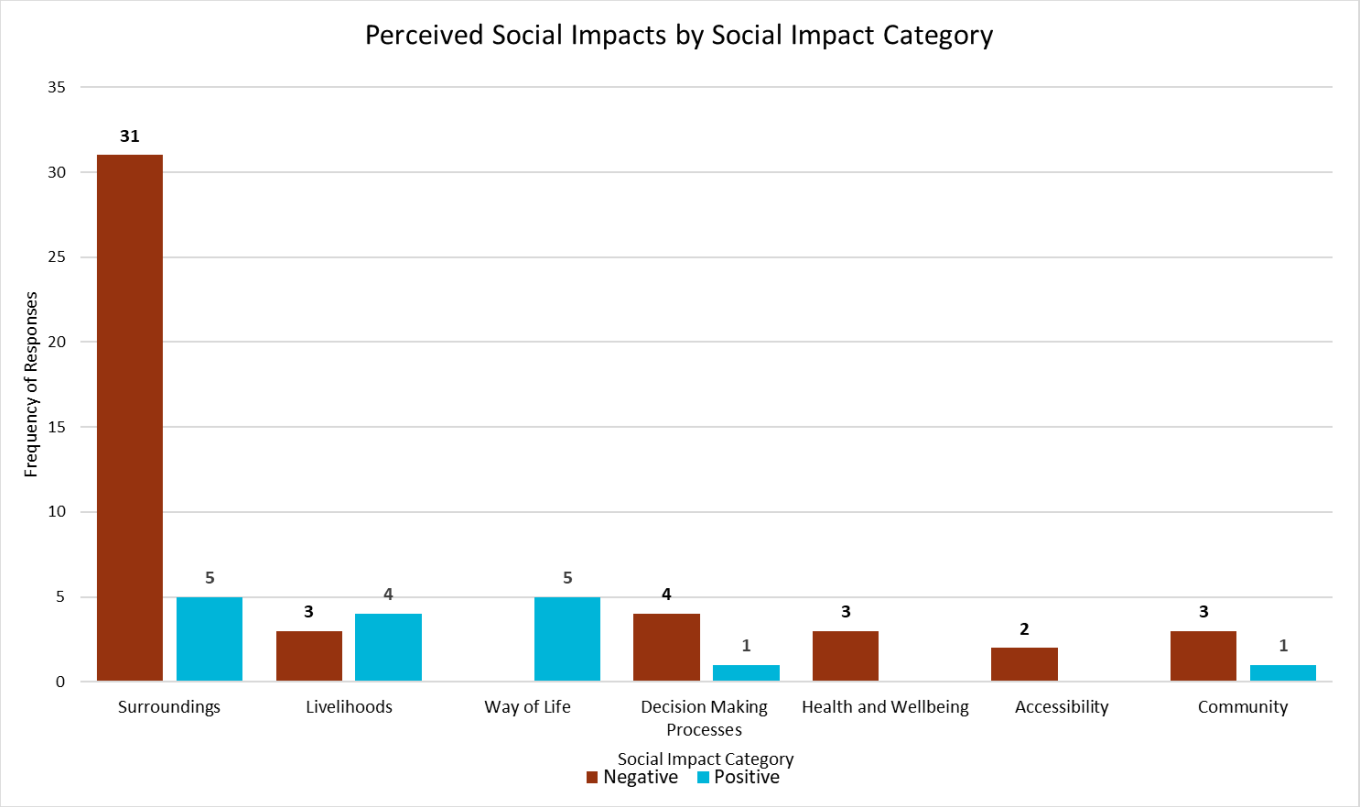


Figure 4.1 Perceived Social Impacts by Social Impact Category

Source: Umwelt, 2024; n=15

Table 4.1 Perceived Negative Impacts

Impact Category	Impact Description	No. of Times Raised
Surroundings	Reduced visual amenity	11
	Noise disturbance of WTGs	6
	Loss of birds and other fauna	2
	Loss of birds and other ecological values	2
	Reduced amenity due to dust from construction activities	2
	Increased risk of traffic incidents	2
	Decline in community safety due to increased visitation rates	2
	Increased risk of landslips due to blasting	1
	Increase in noise vibrations due to blasting	1
NET		**31**
Decision Making Systems	Poor quality engagement and community involvement	4
NET		4
Livelihoods	Changing land use	1
	Impact to farming businesses	1
	Reduced property values/ inability to sell	1
NET		**3**
Health and Wellbeing	Increased bushfire risk	1

Impact Category	Impact Description	No. of Times Raised
	Decline of physical health	1
	Sleep disturbance due to noise	1
NET		**3**
Community	Community division regarding Project development	2
	Increased opportunities for community investment/ contributions	1
NET		**3**
Accessibility	Increased traffic volumes	2
NET		**2**

Source: Umwelt, 2024; n=15

Table 4.2 Perceived Positive Impacts

Impact Category	Impact Description	No. of Times Raised
Surroundings	Contribution to sustainability	3
	Increased opportunities for energy generation	1
	Proximity to existing infrastructure	1
NET		**5**
Livelihoods	Employment opportunities	3
	Additional income for host landholders	1
NET		**4**
Decision Making Systems	Finalisation of project design process	1
NET		**1**
Community	Increased opportunities for community investment/ contributions	1
NET		**1**

Source: Umwelt, 2024; n=15.

Impacts to **surroundings** was the most frequently raised social impact category, and more specifically within this, impacts to **social amenity.** When asked directly about potential negative impacts of the Project, the top concerns included the potential for the Project to impact on the visual amenity of the social locality (n=5) and reduced social amenity due to noise disturbances from the operation of turbines (n=5).

The following sections detail the stakeholder perceived impacts identified during recent engagement activities to support the preparation of this SISR in further detail along with outcomes from the review of Stage 1 submissions where relevant given the perceived cumulative nature of each of the Stages.

It should be noted that references to impacts identified during consultation were at times talking of the project as a whole as opposed to being specific to Stage 2, with consulted landholders typically struggling to distinguish between Stage 1 and Stage 2 and how the impacts may differ between these noting '*it is all the same!'*

Conversely it was also acknowledged by some landholders that Stage 2 was '*not going to be as impactful as Stage 1'*.

When asked to note their level of concern with regards to the Project on a scale of 1 to 10, consultation participants noted an average level of concern of 5.6 out of 10 (**Figure 4.2**).

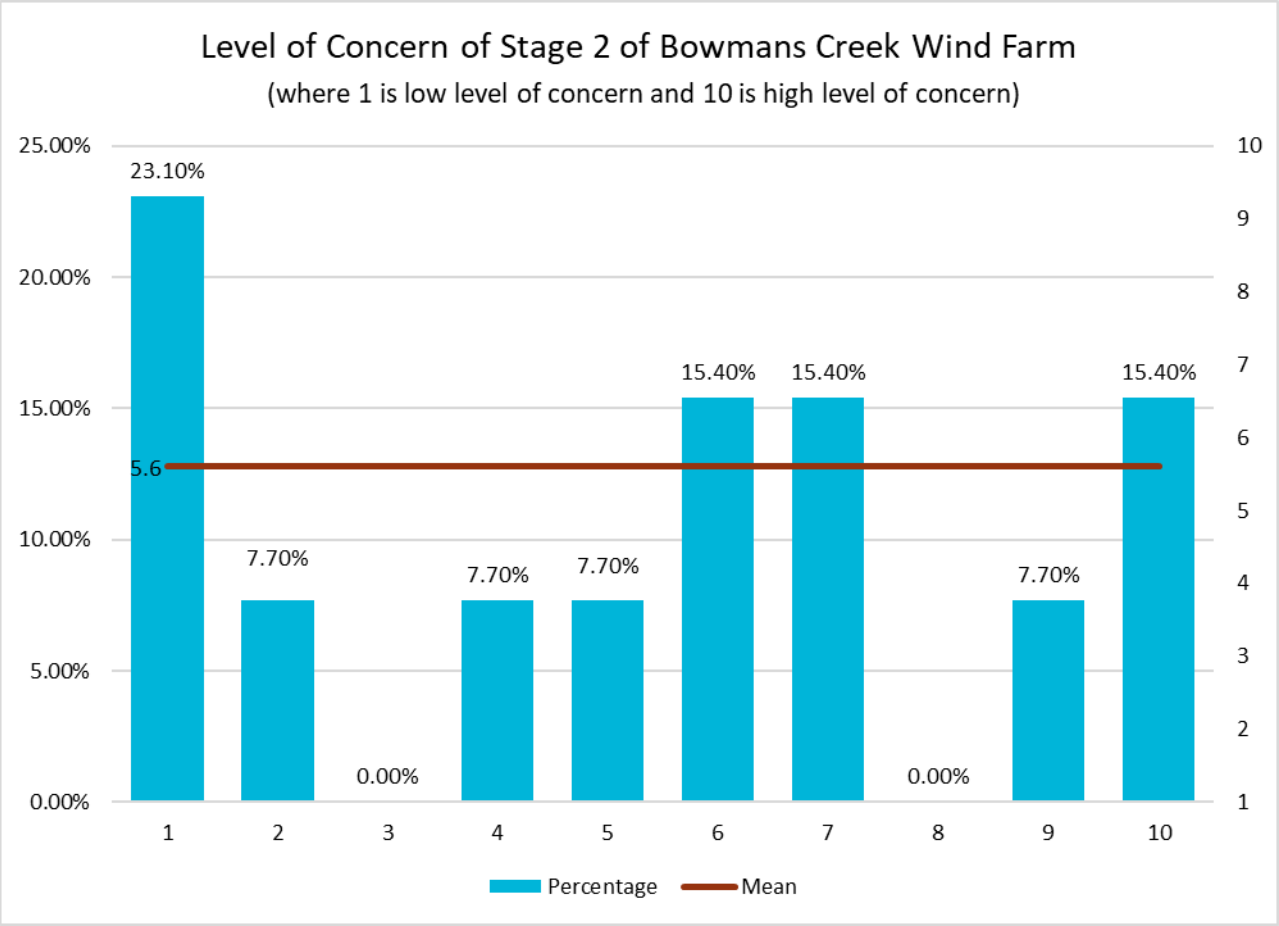


Figure 4.2 Levels of concern regarding Stage 2

Source: Umwelt, 2024, n=14.

4.3 Surroundings

As outlined in the SIA Guideline (DPE, 2023), impacts upon people's surroundings refer to changes that the Project may cause on a community's experience of the landscape, environmental assets, and resources and/or ecosystem services. This can include people's amenity, their access to and use of the natural and built environment, and the aesthetic value of the surrounds.

4.3.1 Social Amenity

Social amenity impacts were raised against a backdrop of a community that values its rural lifestyle.

'It is peaceful and with great views of the hills and valleys.'

'It is quiet with picturesque surroundings.'

'I absolutely treasure the rural ambience of the area. Whenever I leave the property to travel somewhere, I feel that I am leaving part of myself behind, because it is part of me.'

4.3.1.1 Visual amenity and character

As indicated in **Table 4.1** a general **loss of visual amenity** as a result of the Project due to wind turbine development was the most frequently noted concern for those landholders that provided feedback during engagement activities (n=6) with many noting the high values attached to the local landscape and a number of key landscape features including Bullock Ridge, Yellow Rock, Scrumlo Woolshed and Yards, Scrumlo Hill, Tudor Ridge and Wallaby Hill.

'All the views from the dirt road from Bowmans Creek to Rouchel.'

'Every cattle farm here is beautiful and scenic.'

'"Yellow Rock" is an escarpment which forms part of the local scenic amenity.'

When asked to rank key landscape features and scenic quality on a scale of high, medium and low, hills and ridgelines, grazing land and natural/undisturbed landscape were most frequently identified as of high landscape value (refer to **Figure 4.3**).

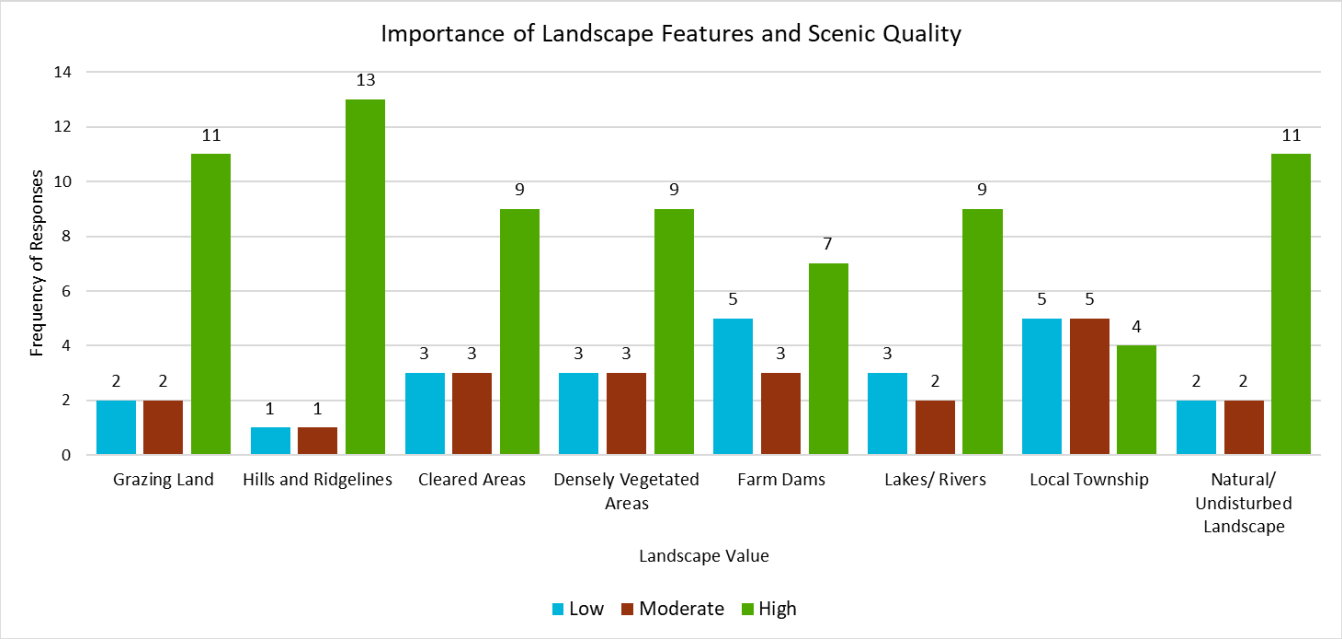


Figure 4.3 Landscape Features and Scenic Quality

Source: Umwelt, 2024, n=15.

Furthermore, when asked what participants value most about the local area, Local history was raised 13 times. Landscape views were also raised 13 times, with landholders also noting the 'peace, quiet and natural tranquillity' of the area. Community was raised 12 times (refer to **Figure 4.4**).

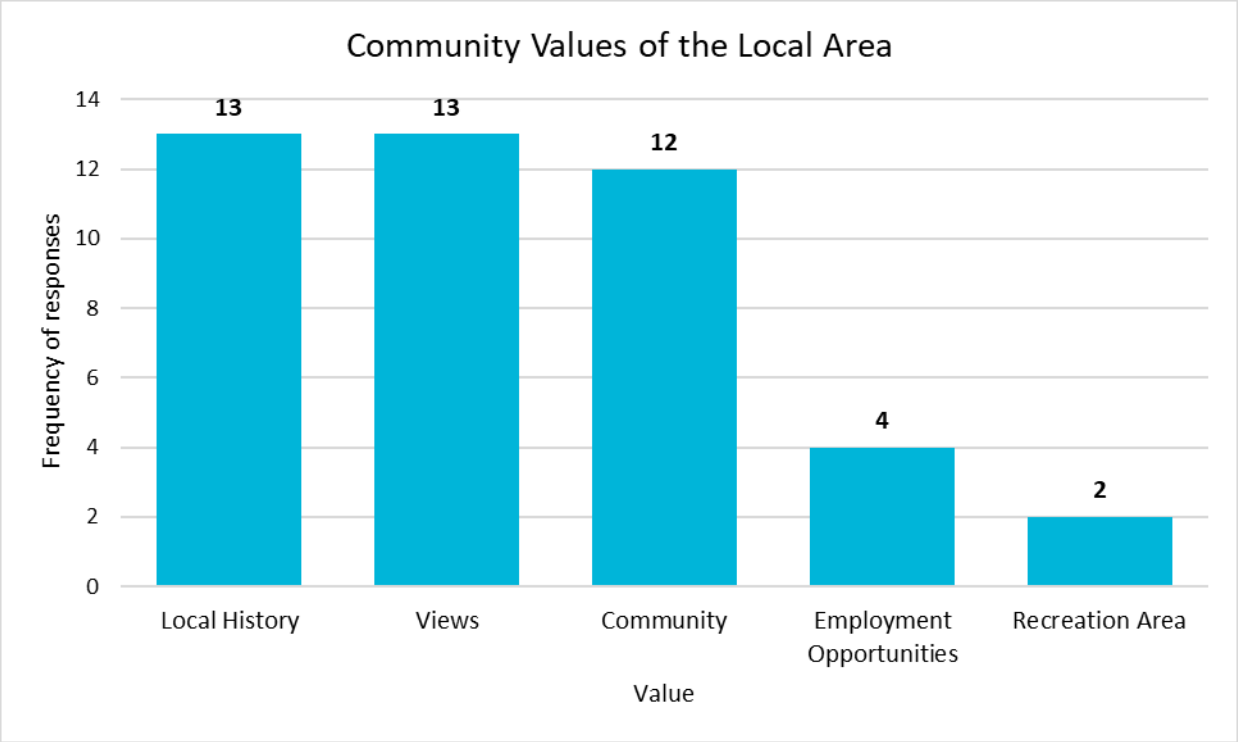


Figure 4.4 Community Values of Local Area

Source: Umwelt, 2024, n=15.

Participants also noted concerns regarding further **industrialisation of the landscape** (1) and highlighted concerns for visual amenity being impacted by **light flicker** resulting from the movement of wind turbine blades (1) and use of flashing navigation lights or beacons operating at night for safety (1) and how these would interrupt enjoyment of the landscape from neighbouring residences.

'Fifth generation in that area, to have that landscape turned into a wind farm is not ideal.'

'I have looked at this view for over 58 years…it provides a sense of place.'

'Due to the enormous height of the turbines it will be impossible to remove them from the view just about anywhere.'

'I don't want such an industrial estate in my backyard….wind turbines 220m high and 42 decibels.'

'Navigation lights – will they be on all turbines? We will see the night lights. We currently have excellent visual amenity but this will change if we can see the red lights.'

'Assume that lights will impact us – the red lights will light up the sky particularly in fog or cloud.'

'Blade flicker and glint, I will be surrounded.'

Visual impacts were also mentioned with regards to the cumulative impacts that would be experienced in combination with Stage 1 with one consulted stakeholder specifically referring to visual screening proposed for that project not going far enough to address the issue.

'It's not good enough.'

‘Screening won't work for visual…it takes time to grow.’

Cumulative impacts are addressed further at **Section 4.10**.

Visual amenity impacts were also a key issue of concern with respect to Stage 1 with submissions at that time expressing particular concerns about the industrialisation of the landscape resulting from the construction of the WTGs and how the wind farm may affect their current *enjoyment of the natural features and rurality of the landscape* and result in light flicker from the movement of wind turbine blades and flashing beacons (SSD=88/ IPC=19) (**Figure 3.4**).

‘It's the sheer size of these turbines which present such an overbearing presence.’(SSD)

’Visual amenity of the region will be destroyed.’ (IPC)

‘They will dominate the views from this home.’ (IPC)

‘The morning sun will rise behind the turbines likely to cause sun flickering to our property and dwelling as most of my house windows face to the east with an open view in the direction of the wind turbines and morning sun.’ (SSD)

‘The constant… shadow flicking on the homes will be terrible to deal with.’ (IPC)

‘The issue of night lighting hasn’t been adequately addressed in that in cloudy nighttime conditions, the light shining upwards will reflect back off the clouds onto the ground; we have this phenomena occurring very often with night lighting from the various coal mines in the Valley.’ (IPC)

Stage 1 submissions also spoke to the potential that the **disruption to the visual landscape and noise** could result in a reduced attachment to place (38 SSD submissions and eight IPC submissions) with these emphasising historical and emotional ties to the area surrounding Stage 1 and a strong connection to the natural beauty of the landscape with concerns that project development would disrupt this connection and create an altered sense of place.

‘We also expect the suffer a loss of the sense of place which currently have. This is extremely important to our family which has had connection with this land for over 70 years.’ (SSD)

‘I love the stunning views and adore the abundant flora and fauna that this special place provides. The thought of the Bowman Creek Wind Farm and how it will affect the visual aspect has horrified me and made me realise that my sanctuary will be no more.’ (SSD)

4.3.1.2 Noise

During engagement, landholders also noted concerns regarding **social amenity impacts arising from noise**, specifically referring to continuous output of noise generated from the turbines (n=6). The potential for noise impacts to arise from blasting activities associated with construction activities was also raised given experiences in the past from blasting activities at neighbouring mine sites (n=1).

‘We have a rural ambient background and sounds travel enormous distances through the valleys.’

‘Today the main noise I’ve heard was the honey eaters, the birds, the crows were a bit noisy… and it’s going to change.’

‘Blasts from coal mines reverberate out a long distance.’

Impacts to social amenity as a result of noise associated with the operation of turbines was also a key issue noted in Stage 1 submissions (SSD=55/ IPC=13). The submissions noted that this was particularly an issue given the proximity of WTGs to neighbouring residences and also the potential for noise impacts to amplified by the landscape’s natural features creating noise levels that would be significantly higher for those residing within the valley.

‘Sitting on our front verandah we will be subjected to 220-metre-high metal turbines aligning the skyline and humming background noise.’ (SSD)

‘I am very concerned about the noise the wind turbines will make.’ (SSD)

‘I'm also very concerned about the noise impact as the noise will travel even into properties in town let alone the significant impact that that it will have on farming properties.’ (SSD)

‘Sound travels for many kilometres in that valley and in ways that you wouldn’t expect.’ (SSD)

A reduced attachment to place was also documented in Stage 1 submissions in relation to noise disruptions (SSD=38/ IPC=8)[10] with submissions recalling the peaceful tranquilities of the area and the value attached to the natural sounds of the landscape.

‘Our home is our sanctuary, we have an array of bird populations out here, the type of quietness that is only disturbed by the sounds of birds, frogs, cows and the occasional car that is travelling to and from their homes down the dead-end road that is Muscle Creek Road.’ (SSD)

‘The sounds of the Wedgetail Eagles flying over our home and the trees moving from the wind passing down the valley. These are the noises my son uses to put an image in his brain of what it is.’ (SSD)

‘Hearing the nature noises of the beautiful environment of Muscle Creek I believe is great for his mental health. Our son will most likely grow old with us…I do not want my son growing up in Muscle Creek having to live with noises coming from the proposed wind farm.’ (SSD)

4.3.1.3 Air Quality

The potential for impacts on amenity due to **changes to air quality** and an **increase in dust** associated with Project construction activities was also noted during scope phase consultation activities (n=2) with participants referring to:

‘Dust from traffic and road works – a major corner needs to be upgraded.’

Again, the above is consistent with Stage 1 submissions with a number of these also referring to a concern regarding cumulative air pollution during maintenance activities during the operational phase of Stage 1.

’I object to the project because…it will increase dust and air pollution particularly during the construction stage.’ (SSD)

[10] This includes reduced attachment to place due to noise and visual landscape disruptions.

4.3.2 Impacts on the Natural Environmental Values

Throughout engagement the importance and value of the environment in and surrounding the Project Area was highlighted by landholders. During the scoping phase, landholders reported concerns with regards to the **loss of habitat and other ecological values** (n=4) associated with the Project**.** Significant concerns were also held for the **loss of birds** due to possible strike with WTGs given the large wedge-tailed eagle populations in the area along with hawks, black cockatoos, king parrots and bower birds.

It was also felt that the impacts to natural environmental values as a result of Stage 2 would be cumulative to those experienced as a result of Stage 1:

'Stage 2 has the same impacts as Stage 1, but Stage 2 just compounds the impacts – there will be more birds killed, more destruction of trees, etc.'

'I love the birds and we live here because we love the birds. There are wedge-tailed eagles in the area. Wind farms are not fined if a turbine kills a wedge-tailed eagle, but if a farmer shoots one then they get fined. Without the wedge-tails and other birds of prey; kookaburras, hawks, crows etc, then you will have increased mice, snakes, mice and rabbit.'

'Decimation of wedge-tailed eagle population by blade strike…this was acknowledged by developers with Stage 1.'

'The wind farm will impact on our wildlife – we have to look after the wildlife I am not a conservationist but I do care for these critters.'

'Destruction of local Koala population… this aspect was deliberately ignored with Stage 1.'

One landholder also referred to the susceptibility of the local area to landslip and that blasting activities during construction of the Project may increase the likelihood of this happening.

'Will there be rock falls and land slips…the area is very susceptible to landslips.'

During engagement, landholders also noted that the Project could provide a benefit to important environmental values. Benefits were largely associated with **increased opportunities for green energy production** from the existing Stage 1 project (n=1) and a **contribution to environmental sustainability** overall (n=3). It was also felt that the proximity of the Project to existing energy infrastructure enhanced these benefits (n=1).

'Greater energy production from the whole wind farm. Just educate the local population re how much extra energy Stage 2 will produce, and the greater efficiency of larger wind farm.'

'It completes the Project.'

'Provides a renewable source of energy for the Hunter region.'

'If we continue to turn of coal-fired power stations there must be an alternative.'

'I am open to renewable projects in the Hunter region as we can't rely on fossil fuels for very much longer and another source of energy needs to be integrated into our grid such as solar farms and wind farms.'

Concerns noted during scoping phase consultation activities were consistent with the outcomes of the Stage 1 submission review which revealed:

- Specific concerns raised with regards to the destruction of wildlife habitats that may occur during both construction and operational phases. While the potential loss of koala habitats was of particular concern, loss of those associated with spotted quolls, potoroos, birds, wallabies and bats were also highlighted. It was also felt that blasting activities during construction may also affect habitats and that the noise from the operation of WTGs may drive certain species out of the area. (SSD = 31; IPC = 13).
- Significant concerns for the loss of birds (SSD =37; IPC= 14).
- Concerns regarding erosion due to the loss of vegetation / vegetation clearing activities and how this may affect waterways and affecting safety (SSD = 7; IPC = 5).
- Concerns relating to changes to surface water quality and the potential for the destruction and disturbance to waterways, i.e. contamination of drinking water from toxic airborne turbine particles, oil spills and general water pollution (SSD = 4; IPC = 5).

'Wildlife habitats will be destroyed and animals killed from the construction and operation of turbines.' (SSD)

'Koala habitat …would ultimately be lost should the project go ahead.' (SSD)

'The very real chance that the population of wedge-tail eagles which inhabit the area will likely be among the first casualties of the turbine blades when in operation.'(SSD)

'Clearing this amount of vegetation will increase the risk for severe erosion in the area, creating a safety risk for residents, their stock and their livelihoods in the process.' (SSD)

'My six-year-old son asked me why they will put up turbines if they need to clear trees to do it, and I find I cannot adequately answer the question. If you are proposing to install a development that will deliver environmental benefits to the community then surely you should be looking at the impacts holistically.' (SSD)

'Knowing that the blade composite is that of toxic base, Blade failure with the fragment and toxic air borne practicals impacting on our property and our drinking water.' (SSD)

4.3.3 Public Safety

There were a number of concerns also noted with regards to impacts on **public safety** (n=5) due to the possibility of increased bushfire risk due to reduced access for fire flighting planes / aerial spraying and general aviation safety (n=1) and **road traffic accidents** due to increased vehicle movements and possible interactions with school buses and livestock (n=2).

'Stage 2 will impact us in terms of fire immensely. They cannot fight fires that get into inaccessible steep gulleys around tall turbines. Can't use aircraft to fight fire. Not enough rural volunteers or appropriate amounts of equipment to fight fires in accessible steep gulleys and peaks from the ground successfully.'

'Safety for us, son and grandchildren – using the road. There needs to be more warning to slow traffic near the driveways. Also the school bus – extra traffic safety needed.'

One participant consulted also expressed the concern that the presence of the broader Bowmans Creek Wind Farm may result in increased visitation to the area which ultimately may lead to a decline in resident community safety and security.

'As more people coming through and looking at the project, security becomes a problem. Motor bike groups and 4wd groups, most people do the right thing but the more people [travelling through the area the more likely an incident will be]…'

The **increase of traffic incidents** associated with increased construction traffic and destruction to the roads were raised in 10 SSD and three IPC submissions at Stage 1 with concerns held regarding the inability for the roads to accommodate to heavy vehicles and increased traffic volumes. Submissions also questioned the validity of the Traffic and Transport Assessment prepared at that time and considered that insufficient measures had been included to mitigate crash risk.

'The local roads will not withstand this type of vehicle movement and increase traffic movement, therefore being a risk to human life.' (SSD)

'The project has not identified how it will maintain and manage the infrastructure in order to cope with a 75% traffic increase, or any reasonable steps to mitigate crash risk at the New England Highway/Hebden Road and Hebden Road/Scrumlo Road intersections.' (SSD)

Concerns for an increase in **risk of bush fires** were also frequently raised in the submissions for Stage 1 (SSD=27/ IPC=14), due to both the ability for fire flighting planes to access and suppress the fires but also the possibility of increased fire risks due to wind turbine malfunctions.

'Added to our fears will be the ongoing threat of fires emanating from this windfarm in the fire season, due to its upwind location from our area.' (SSD)

'Fire safety is of great importance and especially after having the most severe drought of many years surely building a Wind Turbine project with a potential fire risk hazard on a road that is one way in one way out would be a major concern.' (SSD)

4.4 Livelihoods

As outlined in the SIA Guideline (DPE, 2023), livelihood impacts refer to the Project's effect on people's capacity to sustain themselves through employment or business activities, and the economic contribution that a Project may contribute to local communities and the broader region.

4.4.1 Local Employment and Procurement

Engagement with landholders during the scoping phase revealed mixed views with regards to the **local procurement and employment opportunities** that may result from the Project.

Three (3) landholders noted the opportunity for increased employment as a result of the Project and considered this to be important due to the transition away from coal mining resulting in a decline in employment in that sector.

'Would be great to have local jobs. With mining declining, would be great to have a job. Would be great to have that opportunity to have someone who knows the area.'

‘Families who will lose their breadwinner with the end of the mining industry & therefore may have to leave the district.’

Conversely it was noted by one participant that the ongoing opportunities for employment would not be that significant.

‘Apart from construction jobs, there will be very few ongoing jobs.’

The Project was also identified as having a livelihood benefit through providing landholder agreements and payment which offer a **diversified income stream** for some households.

‘Farmers are sick of struggling with droughts and floods, and fires, and that’s why they are signing up.’

Submissions for Stage 1 also noted similar views with a conflict between those that felt that employment and procurement opportunities arising from the Project would be limited (SSD=14; IPC=1) as compared to those that noted increased opportunities for local employment and procurement and hence an overall positive economic contribution to the community and regional economy. A further two SSD and two IPC submissions felt the project increased the economic diversification of the region away from coal, particularly with the closure of the Lidell Power Station in April 2023.

4.4.2 Changing and Conflicting Land Use, and Impact to Land Values

Land use change and conflict was raised by a small number of participants in scoping phase consultation activities with changes to land use seen to conflict with existing uses, and could potentially impact on farming practices and livelihoods of local farmers.

One consulted landholder was concerned the presence of Bowmans Creek Wind Farm (including Stage 1 and Stage 2) was already impacting the value of their land, and would in turn impact their ability to sell and their livelihoods. It was noted that this was particularly impactful due to the financial impacts that fires and droughts had already had on their property.

‘After the drought, etc. [the wind farm] is the straw that is breaking us.’

‘[The presence of the Project] has already affected the price of the property. Where do we go?’

‘They say that it doesn’t affect the price of neighbouring properties or the ability to sell but [I’ve had conversations with]real estate agents [that] says it does.’

‘It causes damage to the environment and productive farming land.’

Despite this view, one landholder did acknowledge the benefits of wind energy over solar and the fact there was less of an impact on land use.

‘Very happy with wind generated energy cause we are still able to use the farm but not so much if it was solar – which has more impedance on farming.’

Submissions from Stage 1 expressed similar concerns regarding the impact of Bowmans Creek Wind Farm on **property values** (SSD= 38/ IPC=9) due to the proximal location of the WTGs and resulting visual and noise impacts with submissions linking their concerns to other areas where wind farms have been developed and property values had decreased.

'We have done the research and have the proof. Your property value will decline by a significant amount. That's if you can even sell…there are now numerous properties for sale around Nundle and the proposed Hills of Gold Wind Farm. They are not selling.' (SSD)

Similarly Stage 1 submissions also highlighted siting concerns due to the **impact on existing agricultural land use** with land no longer able to be used for agricultural purposes or to be destroyed due to construction activities (SSD = 5/IPC=2) and potential impacts on the cattle breeding businesses due to turbine noise, **financially impact farming operations** (SSD=27/ IPC=6).

'The noise of the wind turbines will disrupt our angus breeding program as cattle don't like constant noise. We feel that our breeding numbers will significantly decrease which will reduce our annual income.' (SSD)

Increased land care costs were also raised by SSD submissions amongst impacts to framing operations with these noting a reliance on aerial crop dusters for spraying, fertiliser and seeding.

'Those land users that have relied in the past on aerial crop dusters for aerial spraying, seeding etc would see costs increase as they seek alternative application methods.' (SSD)

4.5 Health and Wellbeing

Health and wellbeing impacts include impacts to both physical and mental health and may include psychological stress resulting from financial and/or other pressures, as well as changes to individual and public health.

4.5.1 Physical Health and Wellbeing

Concerns raised with regards to related to **physical health and wellbeing** during consultation activities during the scoping phase were in relation to the effects of potential exposure to electromagnetic fields (EMF) (n=1) and also to impacts arising from disturbances to sleep associated with the Project' operation and also the use of safety lighting at night.

'Ark Energy say the EMF do not effect people, but there needs to be proper independent research into health impacts. Long term research. Health concerns from the noise that you can't hear are a big concern for me…Reports on the internet say that people within 10 km of turbines can be affected by this noise/EMF.'

'If we are having trouble sleeping, or have issues with the lights. It's a real concern about the unknown.'

'[The idea that] wind farm will have minimal visual impact and health concerns have been discredited by reputable studies.'

Impacts on physical health associated with noise related sleep disturbance and its flow on impacts were also raised at Stage 1 ((SSD=12/ IPC=8) and (SSD=4/ IPC=5) respectively):

'Wind turbines are never silent, they make a constant noise which will disturb sleep, especially with large windfarms.' (SSD)

'The sound pollution caused from the turbines would cause unwarranted anxiety and loss of sleep from their son, impacting on the whole family.' (SSD)

4.5.2 Mental Health and Wellbeing Impacts

While not specifically raised as an impact of the Project during engagement, landholders noted that the Bowmans Creek Wind Farm as a whole was contributing to increases in stress and anxiety. Experience with similar projects suggest it is possible that the Project could cause increased stress and anxiety in near neighbours and local community members due to a fear of the unknown, feelings of uncertainty, and of losing control over one's future and local surroundings.

'The amount of stress and energy, the days I've spent on my computer, looking at maps, researching, having meetings, it's just a lot.'

Increases stress and anxiety has occurred in similar project circumstances and similar impacts have been raised during Stage 1 with submissions at that time specifically mentioning the **decline of mental health and an increase in stress and anxiety** (SSD= 20/ IPC= 13) due to the intrusion of the development into their lives, disrupting their usual activities and the landscape. Submissions mentioned the direct correlation between their mental wellbeing and the restorative nature of the natural landscape (also highlighted in **Section 4.3**). Further, submissions raised concerns regarding turbine noise and the resulting impact to their mental health.

'On top of this there has been the necessity to receive formal medical treatment for mental…health conditions caused by the intrusion of this proposed development into our lives.' (SSD)

Further mentions of impacts to mental health were related to the lack of communication and perceptions regarding the deception by the previous Project proponent.

'My mental health has also suffered considerably since finding out some of the truth about the location of the wind turbines, the size of the wind farm and how many we will see from our home.' (SSD)

'The nature of the development proposal and the manner in which it was communicated (or lack thereof) has already directly led to adverse health conditions for my family and I.' (SSD)

A decline of mental health due to the **increased stress and anxiety** relating to the Project were mentioned in relation to the uncertainty around their properties and their communities.

'The wind farm will ruin this for everyone now and in the future. People that live here are very stressed.' (SSD)

4.6 Way of Life and Community

Impacts in relation to way of life refers to the potential impacts on how people live, work, play and interact with one another; with community impacts referring to changes in the composition, cohesion, and character of the population, as well as how the community functions and impacts on sense of community and sense of place.

4.6.1 Changed Community Cohesion

During engagement two landholders raised concerns that the Project was already impacting community cohesion and creating community division due to differing opinions regarding the merit of the Project. In addition, as discussed further in **Section 4.8**, references to a lack of transparency intimated that there was

also potential division of community due the perceived unequal distribution of monetary benefits between landholders and neighbours.

'Unrest in community created by the local state politician - local politicians should aim to work together to facilitate the project and calm community.'

'The Project is dividing the community, there are those that benefit and there are others that will suffer the effects.'

'We all worked together [at Stage 1] and we all had total transparency....We had a strong group for stage 1 and all on the same group same page. All the involved landholders – united we stand, divided we fall.'

'Why should we lose out on value when our neighbour profits - it shouldn't happen.'

'It's been very divisive. There are those who will benefit and those who won't.'

As highlighted at **Section 3.8**, participants also noted generally throughout discussions the closeness of the community and the high value that was attached to this. Similarly when asked to identify what they value about the local area, landholders frequently raised local history and community as something they value (refer to **Figure 4.4**).

The review of Stage 1 submissions revealed similar concerns **community cohesion** and **community division** regarding unequal distribution of monetary benefits (SSD = 7/ IPC=2).

'All this talk about wind farms around our small community has made some people to have falling out with one and other we use to be there for each other through thick and thin and we are a small net of people and now we are all divided, and all this comes back to your company wanting to put these wind farms on land.' (SSD)

'What used to be a close community, where friendships were life-long has been broken by the underhanded tactics of the proponent's causing division and misinformation.' (SSD)

Submissions at Stage 1 also referred to the potential **outmigration of community members** as a result of the wind farm.

'I am afraid it's going to push families away.' (IPC)

'Landscape and visual amenity with regard to wind turbines, including shadow flicker, potential for damage to wildlife, and aviation lighting are going to be a real issue. It's going to force us to have to move from the area.' (IPC)

4.6.2 Sharing of Community Benefits

Community benefits and social investment opportunities were also identified as a potential positive impact of the Project for the local community, as a result of the development of a dedicated community fund or benefit sharing program.

Local benefit sharing programs can over time generate improvements in a community's sense of place, social cohesion, wellbeing, and in the capacity of local organisations and services. A participatory process of identifying local needs and opportunities can result in a greater understanding of community, and in turn,

the delivery of more targeted strategies to facilitate improved social/community outcomes. Strategies identified by those engaged during the scoping phase that may positively contribute to the local community include:

- Contribution to lawn mowing and maintenance for the Local Anglican Church and cemetery.
- Support to the Rural Fire Service (RFS) shed, e.g. contribution to monthly social functions and the annual Christmas party.
- Support for local Landcare group.
- Garbage collection and disposal at proposed viewing sites.
- Tours of other wind farms.
- Support to local schools (including Mount Pleasant School), hospitals and sport clubs.
- Cheaper electricity.
- Grading of the road between Rouchel Rd and Bowmans Creek Rd.
- A Community Hall for Muscle Creek.

4.7 Decision Making Systems

Impacts in relation to decision-making systems relate to people's ability to make meaningful contributions to decisions that affect their lives, including their ability to influence change.

In this regard, landholders emphasised the importance of open, transparent, and responsive engagement and information provision in relation to the Project. While those consulted were aware of Ark Energy and Stage 1, levels of awareness of Stage 2 were considerably lower (**Figure 4.5**) with a number of stakeholders noting a distinct difference in their level of involvement between the two stages and the belief that this was leading to increased division between participating landholders and a growing sense of distrust.

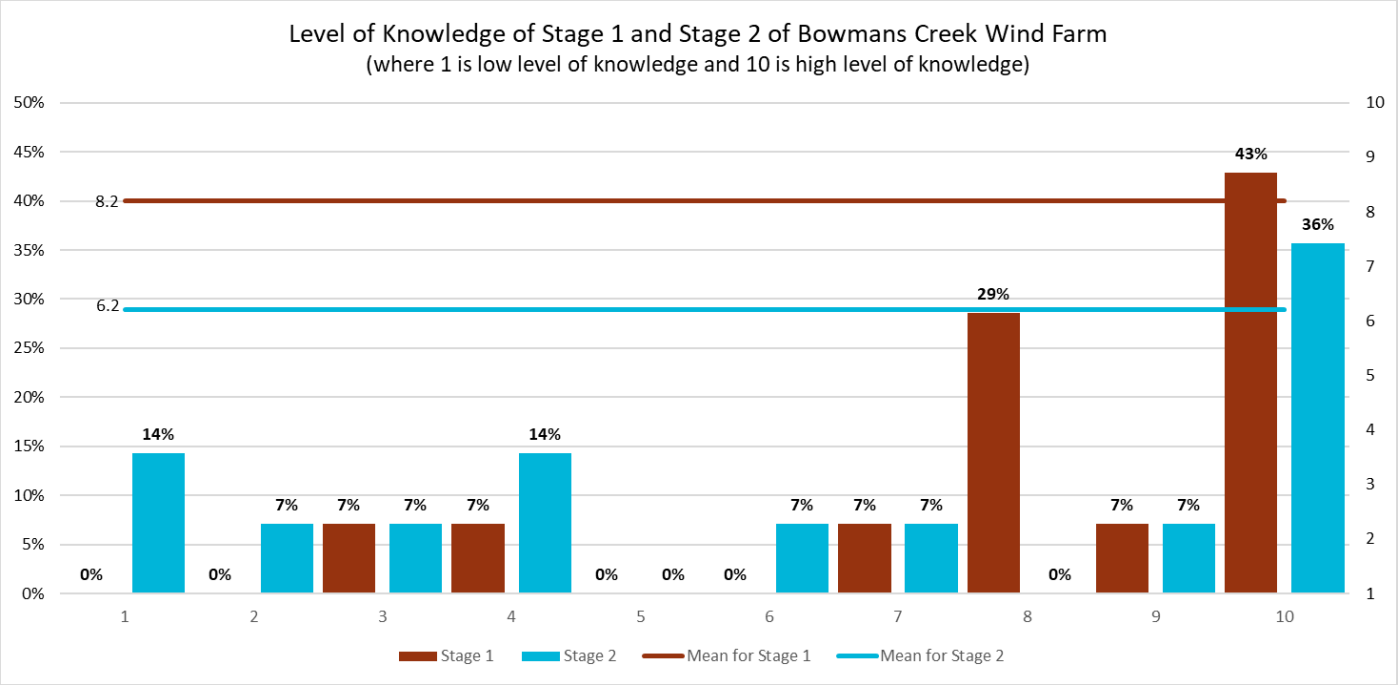


Figure 4.5 Levels of Awareness of Stage 1 vs Stage 2

Source: Umwelt, 2024, n=14.

'Limited communication from Ark Energy – only hosts are seen as important, not the rest of the neighbours.'

'Not given the same level of openness for stage 2 as stage 1'

'I support the project but transparently honestly and more openness would have been more beneficial….We deserved more honestly and transparency re stage 2…should have done this before we signed the contracts. We didn't know much about Stage 2…would have been nice if we were treated the same as we were in Stage 1'.

'It's not the first we had heard about it, but we didn't know a lot of detail about Stage 2. Closed booked, air of ill feeling that they could have done more consultation, especially with Stage 1 landholders. Only by accident that we found out about Stage 2… There hasn't been the same level transparency at Stage 2 – [it's] creating distrust.'

It was also felt that the recently held community information session, although at an early stage in the process, had not shared a lot of details regarding what was proposed. This was also reflected by an additional stakeholder regarding informational provision of the Project generally.

'Traffic – how many vehicles, traffic flow, how many heavy vehicles. It was mentioned in EIS but what will change for Stage 2?'

"How will the construction affect us?"

One stakeholder also noted that a positive of Stage 2 was that there would be a finalisation the overall Project design process.

Submissions reviewed from Stage 1 reflected similar views with references to a lack of trust in the planning process (SSD = 12; IPC =7); poor quality engagement and community involvement (SSD=21; IPC=17) and a view that project impacts and concerns had been downplayed. However, it is also noted that many of these comments were largely with reference to the previous project proponent – Epuron.

'The wider community is not aware of this project. There has been minimal communication in the media and very little effort made.' (SSD)

'They have not contacted either of us since and there has been no "ongoing dialogue" or "transparency" on their part.' (SSD)

4.8 Accessibility

Impacts to community accessibility refers to people's ability to access and use infrastructure, services, and facilities and how the Project may result in access issues.

4.8.1 Increased Traffic and Changed Road Conditions

Two landholders during scoping phase consultation noted a concern regarding the potential for an increase in traffic volumes as a result of the Project. While this was also noted as a concern for Stage 1, the cause of the concern now was that the timeframes of exposure to this impact would extend.

'Will give us more traffic passed our home…know it will be short term but will be extended with Stage 2.'

'I really don't know the full impacts to [my property] – there will more traffic and noise [as a result of Stage 2], can't say I am over the moon about it.'

'Construction traffic on some local roads …will be impossible to prevent.'

Stage 1 submissions also raised concerns relating to the impact the Project would have **increases to local traffic** (SSD =23/ IPC= 3) with this being of particular concern for New England Highway, despite upgrades expected to be completed for the Singleton Bypass. Other concerns were held for the road between McDougall's Hill and Ravensworth and the Hebden, Goorangoola and Bowmans Creek Roads with particular reference made to the cumulative increase of traffic volumes due to neighbouring mines and quarries.

'With a number of neighbouring quarries and mines already contributing to an overcrowded road we do not need to include more trucks on our country roads during construction and afterwards.' (SSD)

However, it is important to note that support was also expressed at the Stage 1 submission phase as it was felt that Project related road upgrades could directly have a positive contribution to the accessibility and quality of roads with the greatest impact on Hebden Road, Scrum lo Road, Albano Road and Bowmans Creek Road.

4.8.2 Strain on Local Services

In relation to the Project, while no concerns were specifically raised during scoping phase consultation activities, additional pressure on local accommodation provision is an issue that has arisen in similar project contexts and can affect access and affordability for other user groups, including workers from other sectors, visitors, and tourists, who may also experience an increase in housing and accommodation prices

during the construction period. It is therefore possible this may also be an issue during construction phase of the current Project.

Concerns regarding Stage 1 Project's workforce requirements during the construction of that project were noted in IPC submissions (n=2) and as a result an Accommodation and Employment Strategy has been included as a condition of consent for the Stage 1 project and will need to be prepared prior to construction of that project commencing.

'There are already accommodation difficulties being experienced in the Upper Hunter region and… further project approvals of all types will exacerbate this issue.' (IPC)

4.9 Culture

Impacts on culture include changes that may occur because of a Project to values, shared beliefs, customs, and connections of those who reside within a social locality. Local Aboriginal organisations have not been consulted to inform this SISR. However, an Aboriginal Cultural Heritage Assessment Report (ACHAR) will be conducted for the EIS in consultation with the registered Aboriginal Parties for the Project in determining and assessing impacts, developing and selecting options and mitigation measures. Consultation with these groups will also seek to understand issues of concern and / or opportunities from a social impact assessment perspective.

Concerns regarding impacts to both **Aboriginal cultural heritage and local European heritage** were noted in a number of Stage 1 submissions with these regarding:

- The potential disturbance and destruction of Country and a disruption of other local heritage (SSD=5) with sites of cultural importance potentially lost during the development of the windfarm.
- Disruption to local heritage with two submissions recalled the long European heritage of the area and the potential of a loss of local heritage resulting from the Project.

'Loss of local heritage in the Bowmans Creek area; it is a unique historical place of European heritage from 1870's. The area is dotted with wool sheds, dance hall, Blacksmith's shop, Local land Heritage Church as well as federation homesteads; the architecture provides many examples of a long history and settlement for over 150 years.' (SSD).

4.10 Cumulative Impacts

The rate of change across the region, due to the growing number of proposed and active renewable energy projects was noted during consultation activities with reference made to cumulative impacts both in the context of the Stage 1 project and also in light of the Hunter Central Coast and New England REZS.

'Our rural areas being industrialised - the sheer number of wind farms needed in these REZs to reach "net zero" will destroy the quiet, rural and scenic amenity in a massive way in rural NSW.'

'It would appear that rural residents are to shoulder the negative impacts of renewables to fulfill the wishes of those in the cities.'

'[The property] will be looking at many of the turbines. It will change significantly from stage 1 – closer and will see more.'

‘We are besieged with Santos gas pipeline, wind farms, solar, poles and wires (incl pumped hydro) ruining our way of life.’

Additionally, while not specifically mentioned during current scoping consultation activities, Stage 1 submissions referred to a range of other related concerns that have the potential to be of relevance to Stage 2 when considered cumulatively and will be further explored during the SIA phase including:

- Changes to local roads, in particularly in relation to a need for increased maintenance of local roads following necessary upgrades to allow for heavy vehicles.
- Potential obstructions to aircraft flight paths with submissions noting that the wind farm was underneath flight paths used for commercial, light planes, rescue helicopters, and private aircrafts and as such would cause access and safety issues.
- Potential for impacts on interference with TV, telecommunications and internet given that internet and phone reception is already limited in the area.

‘Many other aviation crafts use the flight path. How will property owners be able to continue the need of flight fertiliser drops to ensure noxious weeds are kept in control?’

5.0 Potential Enhancement and Mitigation Measures

The development consent for Stage 1 noted a range of conditions attached to the consent of that project which are of direct relevance to the consideration of social impacts that have been reported in the preceding sections. These have been summarised in **Table 5.1**.

Table 5.1 Stage 1 Consent Conditions and Current Commitments

Theme	Examples of Existing Commitments
Surroundings Social Amenity	• Development and implementation of a Traffic Management Plan. • Implementation of specified road upgrades. • Repair and / or make good development-related damage on roads. • Visual impact mitigation measures with 5 years of construction if requested by landholders within the 4.4 km of a turbine. • Noise monitoring within the first 6 months of the commencement of operations to ensure compliance. • Maximum permitted height of turbines of 220 metres. • Establish and operate a Community Consultative Committee (CCC). • Minimise off-site lighting impacts of the development and reduce incidence of shadow flicker.
Community Livelihoods	• Prepare an Accommodation and Employment Strategy in consultation with Council that is informed by consultation with local accommodation and employment service providers.
Surroundings Environment	• Development and implementation of a Biodiversity Management Plan. • Turbine locations restricted to reduce risks to breeding habitats of threatened or at risk fauna species. • No land clearing permitted outside the development corridor. • Prepare a Decommissioning and Rehabilitation Plan. • Site rehabilitation must be completed in accordance with a number of robust rehabilitation objectives. • Sufficient funds must be held for decommissioning in accordance with the Proponent's stated commitments.

Community identified strategies to mitigate or respond to issues and impacts, as well as opportunities to enhance the positive impacts of the Project, as well as contribute positively to the local community have been presented below at **Table 5.2** along with selection of quotes. This knowledge provides a basis to further consider and explore community benefit sharing options during subsequent phases of the Project.

Table 5.2 Examples of Stakeholder Identified Mitigation Measures

Mitigation Measure	Quotes
Improved engagement and information provision	*'Transparent, clear communication, face to face communication – one on one.'* *'Communication: The system is flawed. They tell you what they want to keep you quiet – they don't get the stuff you ask for. We have had no contact prior to the contact with Epuron. Limited communication from Ark Energy – only hosts are seen as important, not the rest of the neighbours.'* *'Educate the local population (all impacted LGAs) re how much extra energy stage 2 will produce, and 79efficiency of larger wind farm.'*
Restriction of night works	*'Obviously no night work.'*
Traffic controls	*'School bus – grandchildren, extra traffic safety…restricted speed zone, policed? Flashing lights or concealed driveway sign. Traffic control.'*
Speed limits on access tracks	*'Safety for us, son and grandchildren – using the road. Need warning / slowing traffic near the driveways for more traffics.'*
Dust suppression	*'Dust suppression.'*
Alternative screening methods	*'Screening won't work for visual (take time to grow).'*
Reduce number of turbines	*'Visual impact on existing Stage 1 participants. Reduce number of turbines near homes.'*
Purchase of properties within buffer zone	*'They shouldn't be allowed to impact on other neighbours. And if they are going to impact neighbours they should have buy into a buffer zone, at market value. If you are near a coal mine they need to buy you out. It should be the same for wind farms. They should be looking to purchase landholders who want to get out.'*

Source: Umwelt, 2024 (n=6).

Alignment of Project-led strategies to support local communities, and collaborate with host communities, through a participatory identification process of local needs and opportunities can result in greater social outcomes. Therefore, during subsequent engagement with the local community and key stakeholders, participants will be asked to identify any additional strategies they would like to see Ark Energy consider.

6.0 Preliminary Impact Evaluation

Table 6.1 and **Table 6.2** outline the preliminary impact evaluation undertaken using the DPE Social Scoping Worksheet (DPE, 2023). Notably, it considers a range of social impacts relating to the Project and determines the level of assessment to be undertaken for each identified impact in subsequent phases of the SIA process.

The significance ratings identified are based on preliminary investigation and current understanding of the potential social impacts, prior to any mitigation measures being applied. It should be noted that these impact rating will be further evaluated in the assessment phase of the SIA with consideration of mitigation measures, including landholder agreements.

Table 6.1 Preliminary Negative Social Impact Evaluation

Social Impact Category	Project Aspect/ Activity	Potential Social Impact on People	Potential for cumulative impacts? (i.e. Stage 1 or other Projects)	Timing/ Duration[11]	Affected Stakeholder Group	Stakeholder Perceived Significance*	Potential Impact Significance (based on preliminary investigation)	Existing and Potential Mitigation Measures	Phase 2 Assessment Level
Way of Life – Livelihoods	Establishment, operation, and decommissioning of Project infrastructure including ancillary infrastructure.	Limiting of existing agricultural operations and increased land care costs.	Yes	C, O & D	Host Landholders Neighbouring Landholders	High	**Medium (possible, moderate)**	Landholder agreements. Ongoing farming. Continue to consider landholder needs and activities in project design. Ongoing stakeholder engagement.	Standard assessment
Way of Life – Community Livelihoods	Payments to landholders.	Reduced community cohesion and lack of distributional equity.	Yes	P	Neighbouring Landholders Broader Community	Medium	**High (likely, moderate)**	Further engagement and ongoing open, transparent, and accessible communication.	Detailed Assessment

[11] P = Planning Phase, C = Construction Phase, O = Operational Phase, D = Decommissioning Phase; * Based on outcomes of review of Stage 1 submissions and Stage 2 scoping phase engagement activities.

Social Impact Category	Project Aspect/ Activity	Potential Social Impact on People	Potential for cumulative impacts? (i.e. Stage 1 or other Projects)	Timing/ Duration[11]	Affected Stakeholder Group	Stakeholder Perceived Significance*	Potential Impact Significance (based on preliminary investigation)	Existing and Potential Mitigation Measures	Phase 2 Assessment Level
								Ongoing Community Sponsorship Program. Host and neighbour agreements.	
Way of Life – Livelihoods	Public release of Project plans and documentation. Establishment of Project infrastructure, including ancillary infrastructure.	Decline in property values.	Yes	P, C, O & D	Neighbouring Landholders	High	**Medium (Possible, moderate)**	Early engagement with local community including potential hosts and neighbours to understand feedback on the Project. Further engagement and ongoing open, transparent, and accessible communication. Ongoing Community Sponsorship Program. Host and neighbour agreements.	Detailed Assessment

Social Impact Category	Project Aspect/ Activity	Potential Social Impact on People	Potential for cumulative impacts? (i.e. Stage 1 or other Projects)	Timing/ Duration[11]	Affected Stakeholder Group	Stakeholder Perceived Significance*	Potential Impact Significance (based on preliminary investigation)	Existing and Potential Mitigation Measures	Phase 2 Assessment Level
Way of Life – Social Amenity Surroundings	Establishment of Project infrastructure, particularly WTG installation and operation.	Altered landscape affecting people's sense of place (rural character, visual amenity, and impacts on community values).	Yes	C & O	Host Landholders Neighbouring Landholders	High	**High (likely, moderate)**	Ongoing consideration of property impacts and mechanisms to address personal issues on a case-by-case basis.	Detailed Assessment
Health and Wellbeing	Public release of Project plans and documentation	Increase in anxiety and stress	Yes	P & C	Host Landholders Neighbouring Landholders Broader Community	High	**Medium (Possible, moderate)**	Continue to ensure appropriate mechanisms to enable open, transparent, and accessible communication of Project information to key stakeholders. Continue to ensure community feedback is considered and acknowledged in Project planning and development. Develop and implementation a Construction Environmental Management Plan (CEMP), including	Standard Assessment

Social Impact Category	Project Aspect/ Activity	Potential Social Impact on People	Potential for cumulative impacts? (i.e. Stage 1 or other Projects)	Timing/ Duration[11]	Affected Stakeholder Group	Stakeholder Perceived Significance*	Potential Impact Significance (based on preliminary investigation)	Existing and Potential Mitigation Measures	Phase 2 Assessment Level
								traffic management measures. Complete road upgrade works as identified by Project traffic assessment.	
Decision making systems	Project planning, approval, construction and operations.	Increased distrust/ outrage given the perceived lack of distributive equity in Project benefits (Project developers Vs community; Landholders Vs Neighbours/ Broader community/Region).	Yes	C & O	Host Landholders Neighbouring Landholders Broader Community	High	**Medium (possible, moderate)**	Develop and implement the Ark Energy Community Benefit Fund (CBF) with council reflective of the community needs and aspiration and aligned to the NSW Government Draft Benefit Sharing Guideline. If other funds are to be disbursed or investments made in key areas such as training and education, a clear governance structure should be developed and communicated with benefit directed	Detailed Assessment

Social Impact Category	Project Aspect/ Activity	Potential Social Impact on People	Potential for cumulative impacts? (i.e. Stage 1 or other Projects)	Timing/ Duration[11]	Affected Stakeholder Group	Stakeholder Perceived Significance*	Potential Impact Significance (based on preliminary investigation)	Existing and Potential Mitigation Measures	Phase 2 Assessment Level
								towards those most likely impacted by the Project.	
Health and Wellbeing, Accessibility, Surroundings	Establishment and construction of Project infrastructure.	Increased traffic and change in road conditions affect road safety, increase disruption and/or increase commuter travel times.	Yes	C	Broader Community Road Users	Medium	**High (almost certain, moderate)**	Commission detailed Traffic Impact Assessment (TIA). Preparation of a Traffic Management Plan which will include notification to the local community regarding development-related traffic impacts and details for ongoing consultation with landowners impacted by the road upgrade roads and the haulage route. Avoid transport of material along local bus routes Develop detailed planning transport routes with public	Standard Assessment

Social Impact Category	Project Aspect/ Activity	Potential Social Impact on People	Potential for cumulative impacts? (i.e. Stage 1 or other Projects)	Timing/ Duration[11]	Affected Stakeholder Group	Stakeholder Perceived Significance*	Potential Impact Significance (based on preliminary investigation)	Existing and Potential Mitigation Measures	Phase 2 Assessment Level
								safety considerations and information disclosure, notifying residents, considering any sensitive user groups. Consult with landowners and other stakeholder on the results of the TIA and develop appropriate mitigation measures.	
Surroundings, Health and Wellbeing	Establishment and construction of Project infrastructure.	Social amenity and way of life impacts due to noise, lighting and dust.	Yes	C & O	Host Landholders Neighbouring Landholders Broader Community	High	**High (likely, moderate)**	Regular noise monitoring. Development and implementation of a CEMP to identify controls to be implemented during the construction phase. Construction and operational management controls to be	Standard Assessment

Social Impact Category	Project Aspect/ Activity	Potential Social Impact on People	Potential for cumulative impacts? (i.e. Stage 1 or other Projects)	Timing/ Duration[11]	Affected Stakeholder Group	Stakeholder Perceived Significance*	Potential Impact Significance (based on preliminary investigation)	Existing and Potential Mitigation Measures	Phase 2 Assessment Level
								developed in consultation with key stakeholders. Ensure appropriate mechanisms to enable open, transparent, and accessible communication of Project information to key stakeholders. Communication of key Ark Energy contacts from the Construction Team for the community to liaise with as required. Ongoing engagement with local community and key stakeholders	

Social Impact Category	Project Aspect/ Activity	Potential Social Impact on People	Potential for cumulative impacts? (i.e. Stage 1 or other Projects)	Timing/ Duration[11]	Affected Stakeholder Group	Stakeholder Perceived Significance*	Potential Impact Significance (based on preliminary investigation)	Existing and Potential Mitigation Measures	Phase 2 Assessment Level
Decision-Making Systems	Community and stakeholder engagement activities.	Perceived inadequate community consultation affecting people's ability to contribute to Project design, planning and decision-making and therefore affecting the level of social acceptance of the project and a lack of trust.	Yes	P	Broader Community	High	**High (almost certain, moderate)**	Ongoing community engagement and community information sessions during EIS preparation. Proactive personal engagement with community members and proximal residents. Build and maintain effective community relationships and implement a range of engagement mechanisms which respond to individual needs as required, prioritising personal and face-to-face consultation	Detailed Assessment
Surroundings, Way of Life	Project construction and operations.	Changes in visual amenity and enjoyment of the natural environment given perceived industrialisation of the landscape.	Yes	C & O	Host Landholders Neighbouring Landholders Broader Community	High	**High (Almost certain, moderate)**	Use of vegetation screening.	Standard Assessment

Social Impact Category	Project Aspect/ Activity	Potential Social Impact on People	Potential for cumulative impacts? (i.e. Stage 1 or other Projects)	Timing/ Duration[11]	Affected Stakeholder Group	Stakeholder Perceived Significance*	Potential Impact Significance (based on preliminary investigation)	Existing and Potential Mitigation Measures	Phase 2 Assessment Level
Surroundings	Project construction and operations.	Degradation of assets with environmental value, including flora and fauna and water quality.	Yes	C, O & D	Neighbouring Landholders Broader Community Special Interest Groups (Environmental)	High	**Medium (possible, moderate)**	Preparation of a Decommissioning and Rehabilitation Plan. Rehabilitation of the site in accordance with rehabilitation objectives. Ensure ley stakeholders are proactively informed about any planned or unplanned changes to environmental assets as a result of the Project.	Standard Assessment

Social Impact Category	Project Aspect/ Activity	Potential Social Impact on People	Potential for cumulative impacts? (i.e. Stage 1 or other Projects)	Timing/ Duration[11]	Affected Stakeholder Group	Stakeholder Perceived Significance*	Potential Impact Significance (based on preliminary investigation)	Existing and Potential Mitigation Measures	Phase 2 Assessment Level
Surroundings	Project construction.	Concerns regarding reduced access to water due to possible need for water supply for Project construction activities.	Yes	C	Broader Community	Medium	**Medium (Possible, minor)**	Continue to ensure appropriate mechanisms to enable open, transparent, and accessible communication of Project information to key stakeholders. Continue to ensure community feedback is considered and acknowledged in Project planning and development.	Standard Assessment
Community	Project planning, approval, construction and operations.	Reduced community cohesion due to differing attitudes and feelings towards renewable energy development in the local community and region. i.e. good/bad/like/dislike.	Yes	C & O	Host Landholders Neighbouring Landholders Broader Community Special Interest Groups Local Government	High	**High (almost certain, moderate)**	Continue to ensure appropriate mechanisms to enable open, transparent, and accessible communication of Project information to key stakeholders to reduce the risk of misinformation.	Detailed Assessment

Social Impact Category	Project Aspect/ Activity	Potential Social Impact on People	Potential for cumulative impacts? (i.e. Stage 1 or other Projects)	Timing/ Duration[11]	Affected Stakeholder Group	Stakeholder Perceived Significance*	Potential Impact Significance (based on preliminary investigation)	Existing and Potential Mitigation Measures	Phase 2 Assessment Level
Accessibility Surroundings	Heavy truck movements.	Reduced public safety due to deterioration of local roads and increased volume of traffic.	Yes	C	Road users around the Project area School bus route users Local Government State Government Federal Government	High	**Medium (Likely, minor)**	Preparation and implementation of a Traffic Management Plan. Notification to the local community regarding development-related traffic impacts. Ongoing consultation with landowners impacted by the road upgrades and the haulage route.	Standard Assessment
Way of Life Accessibility	Obstruction of WTGs.	Concerns regarding further degradation of existing poor TV, telecommunications and internet reception due to interference from WTGs.	Yes	O	Host Landholders Neighbouring Landholders	Medium	**Low (possible, minimal)**		Standard Assessment

Social Impact Category	Project Aspect/ Activity	Potential Social Impact on People	Potential for cumulative impacts? (i.e. Stage 1 or other Projects)	Timing/ Duration[11]	Affected Stakeholder Group	Stakeholder Perceived Significance*	Potential Impact Significance (based on preliminary investigation)	Existing and Potential Mitigation Measures	Phase 2 Assessment Level
Community Way of Life Accessibility	Construction workforce influx.	Temporary increase in population, increasing pressure on local services and infrastructure, particularly housing and accommodation (affordability and availability).	Yes	C	Neighbouring Landholders Broader Community Local Businesses Service Providers	Medium	**Medium (possible, moderate)**	Development and implementation of an Accommodation and Employment Strategy Coordinate efforts and liaise with key stakeholders to coordinate provision of accommodation and other services and suppliers	Detailed Assessment
Surroundings	Decomissioning.	Rehabilitation and production of waste during the decommissioning phase leading to environmental degradation.	Yes	C, O & D	Special Interest Groups Neighbouring Landholder Host Landholders Broader Community	Medium	**Medium (possible, moderate)**	Development of a waste management and recycling plan for the Project. Development of environmental management plans for decommissioning. Preparation of a Decommissioning and Rehabilitation Plan.	Standard Assessment

Social Impact Category	Project Aspect/ Activity	Potential Social Impact on People	Potential for cumulative impacts? (i.e. Stage 1 or other Projects)	Timing/ Duration[11]	Affected Stakeholder Group	Stakeholder Perceived Significance*	Potential Impact Significance (based on preliminary investigation)	Existing and Potential Mitigation Measures	Phase 2 Assessment Level
Way of Life **Accessibility** **Health and Wellbeing**	Construction of WTGs.	Obstructions to aircraft flight paths due to height, quantity and presence of WTGs.	Yes	C & O	Special Interest Groups Neighbouring Landholder Host Landholders Broader Community	High	**Medium (possible, moderate)**	Further consultation to characterise and assess specific circumstances, risk and extent.	Standard Assessment
Culture	Project establishment.	Impacts to Aboriginal Cultural Heritage values, including artefacts, cultural sites, and connection to Country.	Yes	C	Aboriginal Stakeholders	Low	**Medium (possible, minor)**	Inclusion of Indigenous groups and Registered Aboriginal Parties in decision-making processes. Active community engagement with Indigenous groups providing clear information of next steps of project development. Delivery of an Aboriginal Cultural Heritage Assessment.	Standard Assessment

Social Impact Category	Project Aspect/ Activity	Potential Social Impact on People	Potential for cumulative impacts? (i.e. Stage 1 or other Projects)	Timing/ Duration[11]	Affected Stakeholder Group	Stakeholder Perceived Significance*	Potential Impact Significance (based on preliminary investigation)	Existing and Potential Mitigation Measures	Phase 2 Assessment Level
Culture	Project construction and establishment.	Impacts to local heritage, including local heritage sites and family historical values.	Yes	C, O	Host landholders Neighbouring Landholders	Low	**Low (possible, minimal)**	Active engagement with affected stakeholders providing clear information of next steps of project development.	Standard Assessment
Surroundings **Safety, Health and Wellbeing**	Construction of WTGs.	Safety risks for aircraft due to height and quantity of turbines.	Yes	C & O	Broader Community Businesses and Service Providers Neighbouring Landholders Host landholders	Medium	**Medium (possible, minor)**	Further consultation to characterise and assess specific circumstances, risk and extent.	Standard Assessment
Health and Wellbeing, **Accessibility &** **Surroundings**	Project construction and operations.	Reduced public safety due to increased bushfire risk.	Yes	C & O	Neighbouring Landholders Host Landholders Broader Community	High	**Medium (possible, moderate)**	Further consultation to characterise and assess specific circumstances, risk and extent.	Standard Assessment
Health and Wellbeing & Way of Life	Project construction and operations.	Decline of physical health due to noise causing disruptions to sleep.	Yes	C & O	Neighbouring Landholders Host Landholders	Medium	**Medium (possible, moderate)**	Further consultation to characterise and assess specific circumstances, risk and extent.	Standard Assessment

Social Impact Category	Project Aspect/ Activity	Potential Social Impact on People	Potential for cumulative impacts? (i.e. Stage 1 or other Projects)	Timing/ Duration[11]	Affected Stakeholder Group	Stakeholder Perceived Significance*	Potential Impact Significance (based on preliminary investigation)	Existing and Potential Mitigation Measures	Phase 2 Assessment Level
								Regular noise monitoring Development and implementation of a CEMP and OEMP to identify controls to be implemented	
Health and Wellbeing & Way of Life	Project construction, operations and decommissioning.	Perceived reduced physical health and wellbeing due to potential for project components to leach chemicals into the ground/ ground water and dust.	Yes	C, O & D	Neighbouring Landholders Host Landholders	Low	**(Low) unlikely, minor**	Further consultation to characterise and assess specific circumstances, risk and extent. Open, transparent, and accessible communication of Project information nt.	Standard Assessment
Health and Wellbeing & Way of Life	Project construction and operations.	Decline of mental health due to noise and light flicker.	Yes	C & O	Neighbouring Landholders Host Landholders	Medium	**Medium (possible, minor)**	Further consultation to characterise and assess specific circumstances, risk and extent.	Standard Assessment
Community	Project construction and operations.	Outmigration of local residents altering the fabric of the community.	Yes	C & O	Neighbouring Landholders Host Landholders	Low	**Medium (unlikely, moderate)**	Open, transparent, and accessible communication of Project information.	Standard Assessment

Social Impact Category	Project Aspect/ Activity	Potential Social Impact on People	Potential for cumulative impacts? (i.e. Stage 1 or other Projects)	Timing/ Duration[11]	Affected Stakeholder Group	Stakeholder Perceived Significance*	Potential Impact Significance (based on preliminary investigation)	Existing and Potential Mitigation Measures	Phase 2 Assessment Level
Livelihoods	Project construction and operations.	Perceived lack of limited economic opportunities, including jobs.	Yes	C & O	Broader Community	Medium	**Medium (possible, minor)**	Development and implementation of an Accommodation and Employment Strategy.	Detailed Assessment

Table 6.2 Preliminary Positive Social Impact Evaluation

Social Impact Category	Project Aspect/ Activity	Potential Social Impact on People	Potential for cumulative impacts? (i.e. Stage 1 or other Projects)	Timing/ Duration	Affected Stakeholder Group	Stakeholder Perceived Significance*	Potential Impact Significance (based on preliminary investigation)	Existing and Potential Mitigation Measures	Phase 2 Assessment Level
Livelihoods	Construction workforce	Training and education opportunities through sourcing of local employment.	Yes	C & O	Broader Community Local Businesses and Service Providers	Low	**Medium (possible, minor)**	Development and implementation of an Accommodation and Employment Strategy. Proactive support for the establishment of programs that encourage and incentivise re-skilling and upskilling of local workers to remain in the region. Social procurement and employment opportunities for women, Indigenous people and people with disabilities.	Standard Assessment
Livelihoods	Project establishment and operations	Provision of additional sources of income for landholders, enhancing local livelihoods.	Yes	C & O	Host Landholders Neighbouring Landholders	High	**High (almost certain, moderate)**	Open, transparent, and accessible communication of Project information. Development of participatory local benefits scheme or good neighbour programs including financial compensation.	Detailed Assessment

Social Impact Category	Project Aspect/ Activity	Potential Social Impact on People	Potential for cumulative impacts? (i.e. Stage 1 or other Projects)	Timing/ Duration	Affected Stakeholder Group	Stakeholder Perceived Significance*	Potential Impact Significance (based on preliminary investigation)	Existing and Potential Mitigation Measures	Phase 2 Assessment Level
Community Livelihoods	Project establishment and operations	Community investment initiatives and funds allocated to improve social outcomes for local communities.	Yes	O	Neighbouring Landholders and Residents Aboriginal Stakeholders Environmental Groups Broader Community Businesses Service Providers Local Government	High	**Medium (likely, minor)**	Development and implementation of an Accommodation and Employment Strategy. Proactive support for the establishment of programs that encourage and incentivise re-skilling and upskilling of local workers to remain in the region. Active involvement with the community to provide opportunities to improve social outcomes.	Detailed Assessment
Community	Construction workforce influx	Increase in human capital for local communities (expertise) due to the provision of training and skills development resulting labour pool growth.	Yes	C & O	Broader Community Business and Service Providers	High	**Medium (possible, minor)**	Proactive support for the establishment of programs that encourage and incentivise re-skilling and upskilling of local workers to remain in the region.	Detailed Assessment

Social Impact Category	Project Aspect/ Activity	Potential Social Impact on People	Potential for cumulative impacts? (i.e. Stage 1 or other Projects)	Timing/ Duration	Affected Stakeholder Group	Stakeholder Perceived Significance*	Potential Impact Significance (based on preliminary investigation)	Existing and Potential Mitigation Measures	Phase 2 Assessment Level
Community Livelihoods	Construction workforce influx	Increased economic spend in local communities and townships due to the influx of construction workers.	Yes	C	Local Businesses and Service providers Broader Community	High	**Low (unlikely, minor)**	Coordinate efforts and liaise with key stakeholders to coordinate provision of accommodation and other services or suppliers. Develop a local participation plan.	Detailed Assessment
Decision Making Systems	Project operation	Positive role in the energy transition through provision of green energy.	Yes	C & O	Community Groups Broader Community	Medium	**High (almost certain, moderate)**	Actively engage and involve the community regarding the benefits of renewable energy and the natural environment. Open, transparent, and accessible communication of Project information.	Standard Assessment

7.0 Conclusion

This Report has documented the SIA process undertaken during the scoping phase of the Project and forms part of the Scoping Report to inform the issue of SEARs by the NSW DPHI.

This Report has included the compilation of a social baseline profile for the Project, early-stage community and stakeholder consultation to inform the scoping of Project-related social impacts and opportunities, and preliminary social impact prediction and evaluation.

Future engagement with the local community as the Project and the SIA continues will continue to be used to inform Project design, and the development of mitigation and enhancement strategies.

As part of the EIS, future stages of the SIA for this Project will include a comprehensive prediction and assessment of social impacts and development of relevant strategies to mitigate the negative and enhance the positive impacts associated with the Project. Further SIA and environmental impact studies will also address perceptions of impacts raised by key stakeholders during this phase.

Subsequent phases of the SIA program will involve the following key activities:

- An update of the baseline social profile to ensure that any further data relevant to the impacts identified is obtained.
- Further identification of, and consultation with, affected communities and vulnerable groups.
- Provision of feedback to scoping phase consultation participants on the outcomes of the issues raised in the scoping phase and communication of the Project's SEARs (once issued), including an outline of the next steps in the SIA and further opportunities for community input.
- Further consultation with neighbours, community members and other key stakeholders relating to key impact areas. This will involve feedback on the outcomes of the SIA and EIS and will provide opportunities for input to the development of appropriate mitigation and enhancement measures to address impacts to reduce residual effects and maximise Project benefits.
- A comprehensive assessment and evaluation of social impacts against existing baseline conditions.

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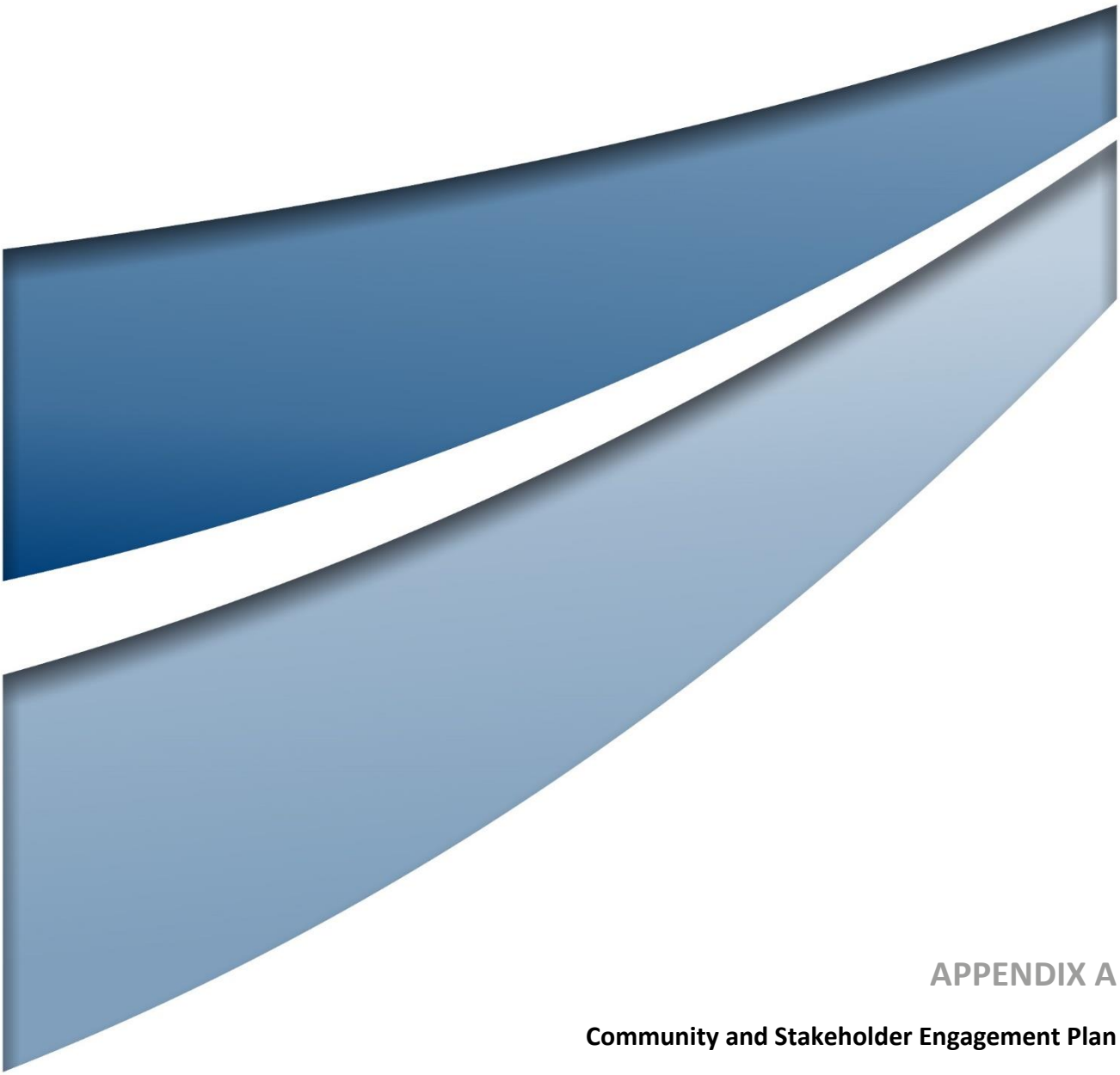
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APPENDIX A

Community and Stakeholder Engagement Plan

umwelt
Environmental & Social Consultants



ARK ENERGY

COMMUNITY AND STAKEHOLDER ENGAGEMENT PLAN

Bowmans Creek Wind Farm Stage 2

FINAL

June 2024

COMMUNITY AND STAKEHOLDER ENGAGEMENT PLAN

Bowmans Creek Wind Farm Stage 2

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Bowmans Creek Wind Farm Pty Ltd (on behalf of Ark Energy Corporation Pty Ltd)

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Report No. 23307/R02
Date: June 2024

This report was prepared using Umwelt's ISO 9001 certified Quality Management System.

Acknowledgement of Country

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Abbreviations

Abbreviation	Description
ABS	Australian Bureau of Statistics
CSEP	Community and Stakeholder Engagement Plan
DPE	Department of Planning and Environment
EIS	Environmental Impact Statement
IAP2	International Association for Public Participation
km	Kilometre
kV	Kilovolt
LGA	Local Government Area
MW	Megawatt
NSW	New South Wales
REZ	Renewable Energy Zone
SAL	Suburb and Locality
SEARs	Secretary's Environmental Assessment Requirements
SIA	Social Impact Assessment
SSD	State Significant Development
UCL	Urban Centre and Locality

1.0 Introduction

The Bowmans Creek Wind Farm Stage 2 Project (i.e. the Project) proposed by Bowmans Creek Wind Farm Pty Ltd (the proponent), a wholly owned subsidiary of Ark Energy, comprises the construction, operation and decommissioning of additional large-scale wind farm infrastructure in the Muswellbrook Shire Council and Singleton Council Local Government Area (LGAs) in the Upper Hunter region of New South Wales (NSW), Australia.

The additional wind farm infrastructure associated with the Project is proposed to increase capacity of the 'Bowmans Creek Wind Farm' (SSD-10315) (i.e., Stage 1) already progressed through the NSW planning and approvals pathway. Because of the scale of additional infrastructure, and other requirements under the NSW planning system, the Project is proposed as a separate State Significant Development (SSD) to that already advanced under "Stage 1".

Staging of the Bowmans Creek Wind Farm was not proposed within the SSD-10315 approvals documentation, however for simplicity and to assist differentiate between the two (2) projects, all wind turbines and ancillary infrastructure associated with SSD-10315 are referred as "Bowmans Creek Wind Farm Stage 1", or simply "Stage 1" throughout this CSEP.

1.1 Purpose and Objectives

This Community and Stakeholder Engagement Plan (CSEP) outlines the approach, strategy, and implementation program to inform and document the Project's Social Impact Assessment (SIA) and broader Environmental Impact Statement (EIS) for the State Significant Development (SSD) application, to be lodged with the NSW Department of Planning, Housing and Infrastructure (DPHI).

The purpose of this document is to outline the approach and strategy for community and stakeholder engagement across the Project's planning and assessment phase, to inform the preparation of relevant Scoping Reports (in the Request for SEARs) and completion of the Project's specialist studies. The CSEP will form part of the documentation for the proponents SSD application for the proposed Bowmans Creek Wind Farm Stage 2 Project.

As noted in the former NSW Department of Planning and Environment (DPE) SIA Guideline (DPE, 2023), respectful, inclusive, and meaningful engagement is a fundamental part of project planning and development. Engagement with affected communities and stakeholders provides first-hand insight into what people value and how they expect a project to affect them.

Community engagement is a key component of the EIS and SIA processes, with the DPE SIA Guideline (2023) outlining the following objectives to guide engagement activities:

- To ensure those potentially affected by a project understand the project and how it will affect them.
- To collect relevant data, evidence, and insights for scoping the SIA to maximise diversity and ensure representativeness of views.
- To understand the interests that people have and how impacts may be experienced (from their perspective).

- To consider the views of people in a meaningful way and use these insights to inform project planning and design.
- To provide opportunities for people to collaborate on project design matters and input to preferred solutions to address impacts.
- To confirm data, assumptions, findings, and recommendations.
- To ensure people know how their input has been considered, and what strategies will be put in place to address their concerns.
- To help understand how other specialist studies prepared for the EIS assist in addressing social impacts.
- To respect people's privacy, allowing them to communicate their views anonymously if requested.

Specifically, this CSEP aims to:

- Inform and consult with the community in relation to the proposed project.
- Develop an understanding of the social locality/social area of influence of the project, specifically the host community/communities in which the project is proposed.
- Scope and identify any impacts upon people associated with the project.
- Enable community and stakeholder input into the project design, planning and development.
- Collaboratively develop relevant strategies to respond to impacts in the form of mitigation or enhancement measures and community benefit sharing options.
- Identify future engagement preferences of stakeholders and potential partnerships between the proponent and the community.

1.2 Approach and Process

The former NSW DPE SIA Guideline (2023) makes SIA applicable to all SSD projects in NSW, with proponents required to commission standalone Social Impact Scoping Reports as part of the Request for SEARs. These studies are informed by, and rely on, the outcomes of early, and ongoing community and stakeholder engagement through the assessment phase.

The approach to stakeholder engagement for the Project will also be informed by the NSW Wind Energy Guideline (2016) for State Significant Wind Energy development and the Clean Energy Council's Community Engagement Guidelines (Clean Energy Council, 2018). Furthermore, best practice engagement design and delivery will also be guided by the International Association of Public Participation (IAP2) Public Participation Spectrum.

This CSEP outlines the engagement approach to be undertaken in the scoping phase of the Project with engagement for the EIS phases to be confirmed post issuance of SEARs.

This document has been developed in collaboration with the proponent through review and workshopping. It will be updated throughout the Project as required.

2.0 Project Overview

2.1 The Project

The Project is located in the locality of Bowmans Creek, NSW, approximately 21 km west of Muswellbrook in the Upper Hunter region of NSW.

The current Project design incorporates approximately 21 wind turbine generators (with a maximum blade-tip height of 250 m AGL) with an installed capacity of approximately 120 MW. The indicative Project Boundary encompasses an area of approximately 3,552 ha, however only a portion of this would be disturbed. The Project area (all land within and including the Project boundary) is at an elevation of 336 to 607 m (above sea level) and comprises a complex terrain, with steep hills in the northern portion of the Project Area flattening out to rolling ridge lines to the south that are dominated by improved pasture used for grazing.

There is currently one (1) landholder (comprised of three (3) residences) identified within the Project Boundary. There are additionally several landowners positioned proximally beyond the Project Boundary in all directions.

The Project will connect into Bowmans Creek Wind Farm Stage 1 (SSD-10315) infrastructure (refer **Section 2.2** below) near wind turbine #21 and #23 near the western extent of the Project boundary, with the grid connection occurring at a position within the boundary of the Bowmans Creek Wind Farm Stage 1 (SSD-10315) project area.

The Project is located approximately 120 km from the Port of Newcastle (via the Golden Highway) and transportation access to the wind farm would be provided via a proposed site access road off Scrumlo Road, as assessed under the Bowmans Creek Wind Farm Stage 1 (SSD-10315) project.

2.2 Bowmans Creek Wind Farm – Stage 1 Overview

Bowmans Creek Wind Farm Stage 1 (SSD-10315) involves the construction, operation and decommissioning of 54 wind turbines, a transmission line, grid connection and associated ancillary infrastructure. Stage 1 is located approximately 10 km east of Muswellbrook and is situated across three LGA boundaries: Muswellbrook, Singleton, and Upper Hunter Shire. The Stage 1 wind turbines will primarily be in Muswellbrook and Singleton LGA. The project site for Stage 1 is primarily used for farming and grazing.

The Environmental Impact Statement (EIS) and accompanying documents were exhibited between 31 March 2021 and 11 May 2021. Response to Submissions and Amendment Reports were submitted to DPE on 8 October 2021, which outlined numerous amendments to the project, including the removal and re-siting of wind turbines across the project. Additional information was requested by DPHI on 15 October 2021, 18 March 2022, 10 June 2022 whereby additional modifications to the project were made.

The Stage 1 Project (SSD-10315) was approved by the NSW Independent Planning Commission (IPC) on 6 February 2024.

2.3 Policy Context

The NSW Government's current energy security policy and approach to a clean energy transition is being delivered through the strategic development of the renewable energy sector, as outlined through the NSW Government's *Renewable Energy Action Plan* (2013), *Electricity Strategy* (2019) and the *Electricity Infrastructure Roadmap* (2020). This policy context is relevant to inform the public positioning and key messaging for the planning and development of the Project.

2.3.1 The Hunter-Central Coast Renewable Energy Zone (REZ)

The NSW Government's 'Electricity Strategy' and 'Electricity Infrastructure Roadmap' set out a plan to deliver the state's first five (5) Renewable Energy Zones (REZs) in the Central-West Orana, New England, South-West, Hunter-Central Coast and Illawarra regions. This builds on the 'NSW Transmission Infrastructure Strategy' and supports the implementation of the Australian Energy Market Operator's (AEMO) 'Integrated System Plan'.

As **Figure 2.1** illustrates, the Hunter-Central Coast REZ encompasses the townships of Muswellbrook, Singleton, Cessnock, Maitland and Newcastle. It crosses the borders of the Upper Hunter Shire LGA, Muswellbrook LGA, Singleton LGA, Maitland LGA, Cessnock LGA, Lake Macquarie LGA and Newcastle LGA. The Hunter and Central Coast region was selected due to its unique features, including excellent renewable energy sources, utilisation of existing power stations, a skilled workforce and rehabilitated mining land (EnergyCO, 2023). While the proposed Project is located in the Hunter-Central Coast REZ, it will not connect into the REZ and associated transmission infrastructure.

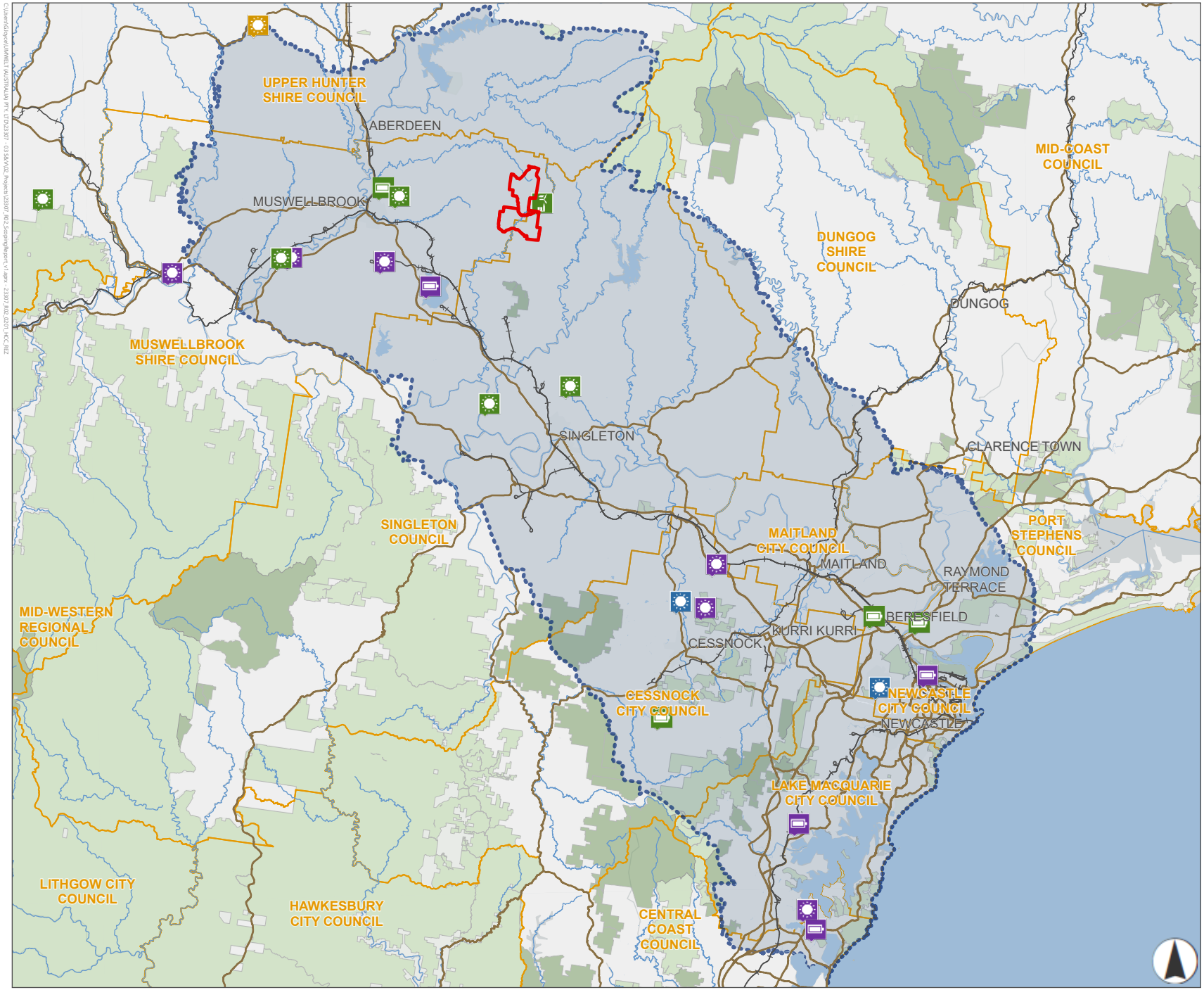


FIGURE 2.1

Project Context in Hunter-Central Coast REZ

Legend

- Project Boundary
- Hunter - Central Coast REZ Boundary
- Local Government Area Boundary
- National Park
- State Forest
- Major Waterbodies
- Major Watercourse
- Major Roads
- Railway

Renewable Projects

- Wind - In Planning
- Solar - Under Construction
- Solar - Operational
- Solar - In Planning
- Solar - Approved
- Battery - In Planning
- Battery - Approved

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Kilometres

Scale1:750,000 at A4
GDA2020 MGA Zone 56

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Image Source: ESRI Basemap (2023) | **Data Source:** NSW DFSI (2023), Energy Co. (2023)

3.0 Community Context and Relevant Considerations

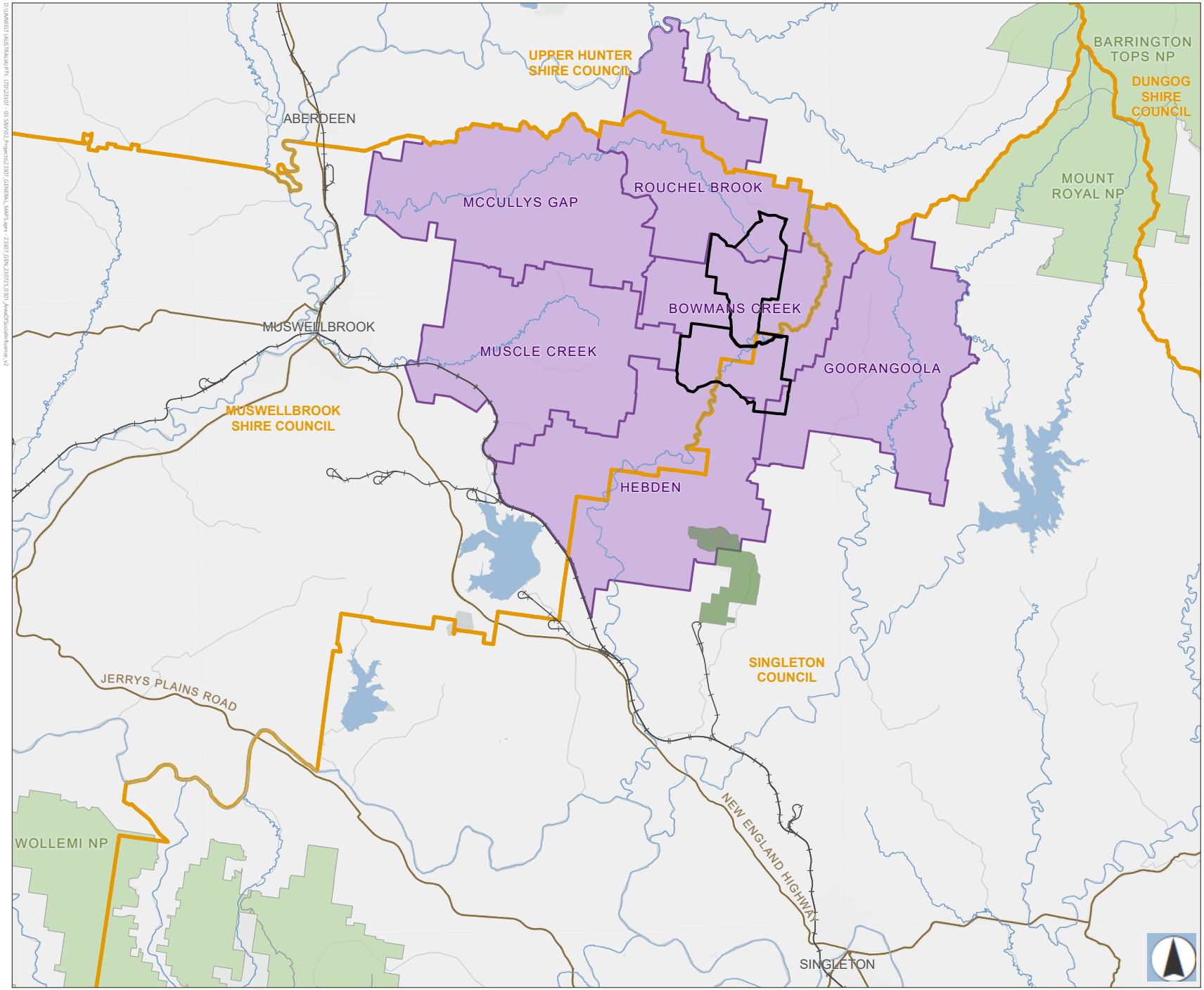
3.1 Community Profile

The social locality or social area of influence for the Project covers the Singleton, Upper Hunter and Muswellbrook Local Government Areas (LGAs), in addition to the Suburbs and Localities (SALs) of:

- McCullys Gap.
- Rouchel Brook.
- Bowmans Creek.
- Muscle Creek.
- Hebden.
- Goorangoola.

As Singleton and Muswellbrook represent areas of concentrated urban development and may be a source of service provision for the Project, these townships have also been considered at the Urban Centre and Locality (UCL) level. **Figure 3.1** outlines the area of social influence that will be considered as part of the Project.

FIGURE 3.1
Area of Social Influence



Legend

- Project Boundary
- Local Government Area Boundary
- Suburbs and Locations (SAL)
- National Park
- State Forest
- Major Waterbodies
- Major Watercourse
- Major Roads
- Railway



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Kilometres

Scale 1:275,000 at A4
GDA2020 MGA Zone 56

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Image Source: ESRI Basemap (2023) | **Data Source:** NSW DFSI (2023), ABS (2022)

Initial data has been gathered and summarised from publicly available secondary datasets, including the most recent Australia Census (2021) and Social Health Atlas of Australia (PHIDU, 2021), local strategies and media reports, on the LGAs and SALs to develop an understanding of the social and economic context in which the Project is located and to identify affected stakeholders and communities.

Table 3.1 outlines some key characteristics of these communities with considerations also noted as a basis to inform engagement planning.

Table 3.1 Community Characteristics and Considerations for Engagement

Characteristics of LGAs, SALS, UCLs[1]	Considerations for Engagement
Small proximal communities with high participation in volunteering (on average 20% of the social localities volunteered in the last 12 months compared to 10.6% in NSW).	Likely to be well connected, close-knit and communicate/share local news informally.
Higher proportion of certificate qualifications than tertiary or higher education (26% of the social localities compared to 15% in NSW).	Level of qualification may suit certain workforce requirements.
Key industries of employment include agriculture and mining.	Locally or regionally available skills may match Project requirements. Engagement tools used will need to provide opportunity for stakeholders to discuss concerns/opportunities regarding current industries of employment and the development of other potential industries in the region.
Established communities with predominantly family households (lower than average proportion with different addresses in last 5 years when compared to NSW).	Likely to be well-connected, place strong value on local area and features, and be a source of information about the area and its history.
Aboriginal and Torres Strait Islander population is proportionately higher in all localities besides Bowmans Creek SAL and Goorangoola SAL when compared to NSW.	Key population group to consider in any disproportionate socio-economic or cultural effects and need for tailored engagement mechanisms.
Low cultural, linguistic and ethnic diversity (proportion of residents born overseas) (all localities had low percentages of people born overseas with between 81% to 100% of people born in Australia compared to 65.4% on NSW).	Less consideration needed regarding culturally and linguistically diverse engagement mechanisms.
Primarily employed full-time with most localities recording percentages above or similar to the NSW average of 55.2%. A notable exception is Hebden SAL, with a substantially lower proportion of people who work full time (46.3%).	May be time poor, likely to be well-connected.
Generally high proportion of home ownership and low proportion of rental properties compared to NSW, which recorded rates of 31.5% and 32.6%. Notably, Bowmans Creek SAL recorded an outright home ownership of 100%, while Muscle Creek SAL recorded 26.5%. The proportion of people renting was highest in	Likely to have high interest in the Project given its direct impact on privately-owned land, personal assets and livelihoods.

[1] LGAs: Singleton, Muswellbrook and Upper Hunter; SALs: McCullys Gap, Rouchel Brook, Bowmans Creek, Muscle Creek, Hebden, Goorangoola; UCLs: Singleton and Muswellbrook

Characteristics of LGAs, SALS, UCLs[1]	Considerations for Engagement
Muswellbrook UCL (35.8%) and Muswellbrook LGA (34.2%).	
Below average internet access compared to NSW (82.5%). Overall, internet access is highest in Singleton LGA (81.4%), followed by Muswellbrook LGA (76.5%) and Upper Hunter Shire LGA (73.8%).	Consideration for engagement mechanisms and information provision methods.
The community has experience with past SSD projects.	They are likely to have been consulted or made submissions on Stage 1 or on other proximal projects, therefore have a greater understanding regarding the opportunity for participation while also feeling some consultation fatigue.

Source: ABS Community Profiles 2021, PHIDU 2021, & REMPLAN 2023

3.2 Identified Social and Community Concerns

Likely key issues of community concern in relation to the Project and understanding of potentially interested stakeholders, have been primarily identified through a review of submissions made during the public exhibition of the proposed Bowmans Creek Wind Farm Stage 1 (SSD-10315).

Along with submission content, an analysis of the type and locality of stakeholders has been useful in informing stakeholder identification, engagement methodology and future project messaging. A brief overview of the submissions is provided below.

A total of 168 submissions were provided during this period with 87% of these from community members. Of the total submissions, over 83% (139) were opposed to Stage 1, while 11 submissions (6.5%) expressed support. Moreover, 20 submissions lodged by different public authorities provided comment on Stage 1. A further break down of submission responses by stakeholder group is shown in **Figure 3.2.**

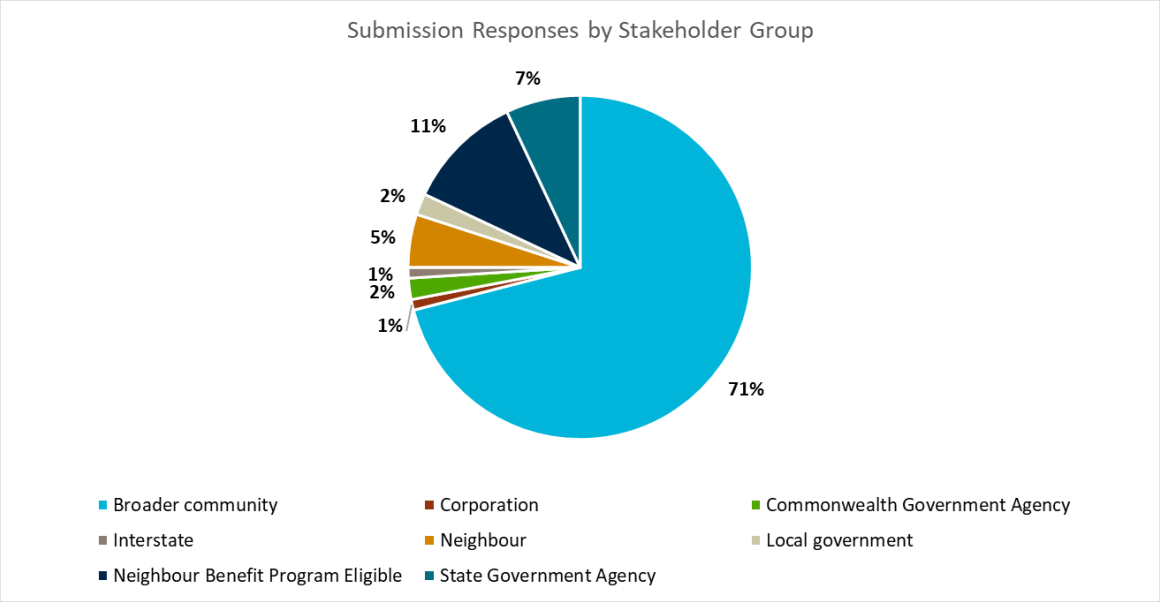


Figure 3.2 Submission Response by Stakeholder Group[2]

Source: Umwelt, 2023

[2] Neighbour refers to dwellings that are less than 3km of the closet WTG and are eligible for agreement, while Neighbour Benefit Program refers to people located within 3-5km of closest WTG.

Those who expressed opposition to the Project included landholders, local and broader community members, and members of the public residing outside of NSW while those indicating their support were primarily broader community members who did not reside within the area of social influence. A further breakdown of the stakeholder groups is provided in **Figure 3.3.**

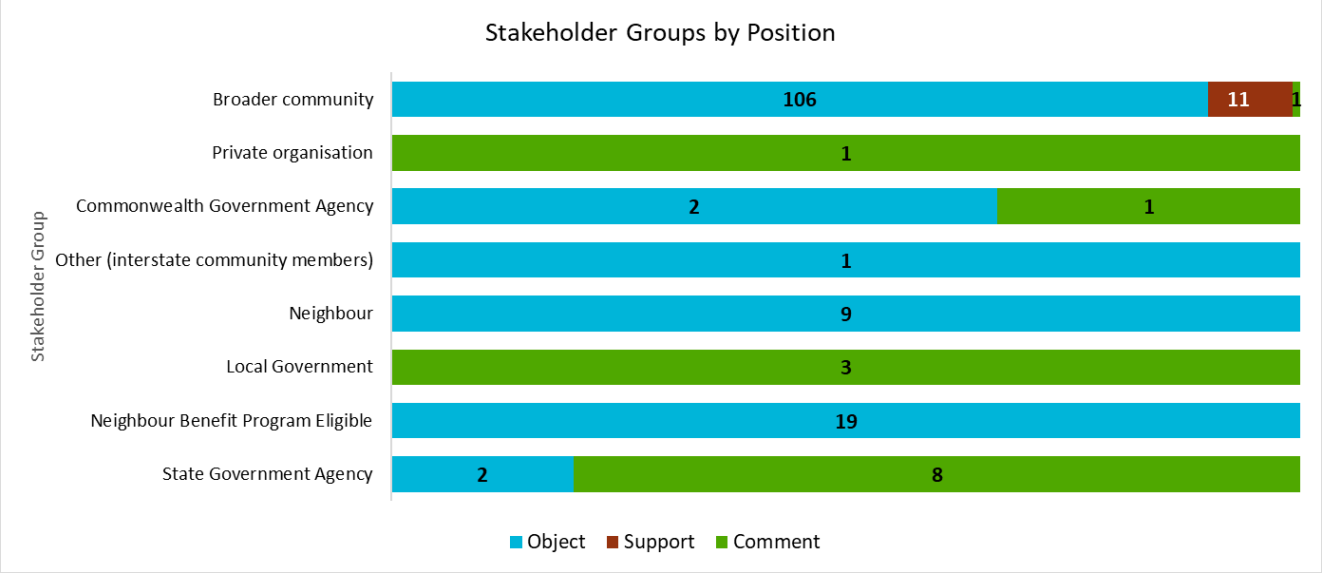


Figure 3.3 Stakeholder Group by Position[3]

Source: Umwelt, 2023

Community members who submitted responses for Bowmans Creek Wind Farm Stage 1 primarily reside in Muscle Creek (20.1%) and Muswellbrook (13.2%) followed by Hebden (8.2%), McCullys Gap (5.7%), Greenlands (4.4%) and Bowmans Creek (3.8%) (refer to **Figure 3.4**). Submissions were also received from an additional 59 locations, but as a total represented less than 2% of all submissions. These additional submissions were primarily from residents of NSW.

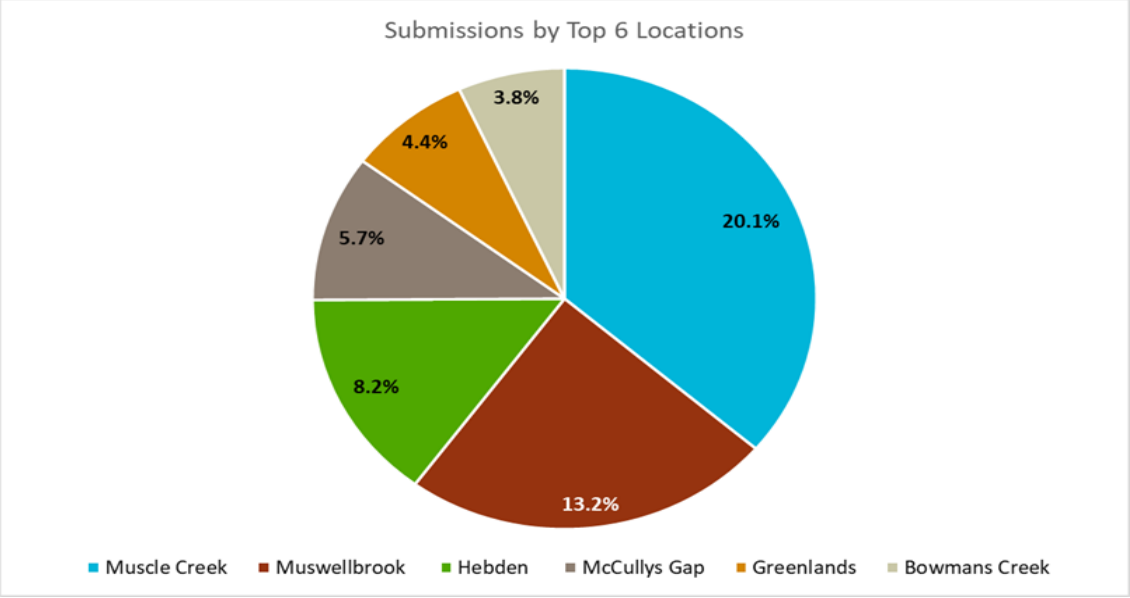


Figure 3.4 Submissions by Location

Source: Umwelt, 2023

[3] Data may differ slightly compared to the original analysis of submissions, as some submissions have been excluded due to being duplicates.

Submissions were analysed according to the social impact categories outlined in the SIA Guideline (DPE, 2023) which acknowledges that social impacts can be grouped according to several different categories and may involve impacts and changes to people's way of life, community, accessibility, culture, health and wellbeing, surroundings, livelihoods, and decision-making systems. A description of each of these impact categories is included in **Figure 3.5** with a summary of the submissions by social impact category type provided in **Table 3.2.**



Figure 3.5 Social Impact Categories

Source: (DPE, 2023)

Table 3.2 Summary of Submissions Received for Bowmans Creek Wind Farm Stage 1 by Social Impact Category

Social impact category	Summary of concern/opportunity
Surroundings	Impacts to surroundings were raised across a number of community and stakeholder submissions. The primary focus of these related to: • The perceived loss of visual and social amenity due to the industrialisation of the landscape, light flicker, noise and air pollution. • Reduced attachment to place due to the changing visual and aural landscape from natural to industrial. • Concerns about flora and fauna habitats that people value. • Changes to the water quality and accessibility. • The ability of Bowmans Creek Stage 1 to contribute to a sustainability agenda.
Decision Making Processes	Impacts relating to decision making processes addressed in the submissions commented on: • The perceived lack of consultation and opportunity to have their say about Bowmans Creek Wind Farm Stage 1. • Wanting more information on the planning and decommissioning processes associated with Bowmans Creek Wind Farm Stage 1. • Reinforcing the importance of early and effective engagement.
Community	Impacts relating to the proposed wind farm and its effect on community cohesion was raised in a small number of submissions, with an emphasis on: • Bowmans Creek Wind Farm Stage 1 dividing the community through a difference of opinions regarding the merit of the Project. • The unequal distribution of monetary benefits that favours landholders hosting turbines.
Way of Life	Submissions noted a variety of impacts that could impact on their way of life. This included: • Increased traffic volume at key locations. • The unreliability of renewable energy. • Obstruction to aircraft flight paths. • Interreference of wind turbines on TV, telecommunications, and internet signals.
Livelihoods	The submissions expressed a range of concerns related to livelihoods including: • Reduced property values due to proximity of the proposed wind turbines to their land. • Limited economic benefits, in terms of local business involvement and operational employment, for the local community. • Lack of procurement opportunities. • Reduction in viable agricultural land due to turbine infrastructure. • Concerns regarding how the presence of wind turbines would impact their stock and increase land care costs, and in turn reduce the financial viability of their operations. Six submissions did highlight economic opportunities for the local and regional community in terms of procurement of local services by the wind farm and the economic diversification of the region away from coal.

Social impact category	Summary of concern/opportunity
Health and Wellbeing	Submissions referencing health and wellbeing impacts included concerns regarding both mental and physical health. This included: • Psychological stress resulting from concerns regarding financial pressures relating to impact of the wind farm on livelihoods (as outlined above). • Anxiety relating to the unknowns of, or perceived miscommunication about, Bowmans Creek Wind Farm Stage 1. • Concerns regarding a decline in community cohesion due to differing opinions about Bowmans Creek Wind Farm Stage 1. • Physiological concerns pertained to sleep disturbance and an increase in physical health conditions.
Safety	Impacts to safety were raised across a number of submissions, with concerns primarily held for: • An increased risk of bush fires, and limited road/ aircraft access in the instance where a bush fire occurs. • Concerns for an increase of traffic incidents due to the increase in traffic volume associated with the construction period. One submission did highlight the potential for increased safety and accessibility due to potential road upgrades that may occur as a result of Bowmans Creek Wind Farm Stage 1.
Culture	Impacts to Aboriginal cultural heritage and local European heritage was expressed in a number of submissions. • Concerns included the potential disturbance and destruction of Country and sites of cultural importance to Aboriginal peoples and the need for further studies to be undertaken regarding Aboriginal cultural heritage. • Disruption to local heritage was also highlighted as a concern by two submissions. These submissions recalled the long European heritage of the area and the potential of a loss of local heritage resulting from the Project.

3.3 Social Risk and Mitigation Measures

A desktop analysis of identified local concerns, issues, and interests, with relevance to the Project were sourced from:

- Bowmans Creek Wind Farm Stage 1 (SSD-10315) submission reports (as outlined above).
- Publicly available documentation on nearby renewable energy projects within the region.
- Media articles.
- Insights from Ark Energy and Umwelt during previous consultation programs.

This material was considered to ensure that the engagement program addresses key risks, matters of concern, and interest to relevant stakeholder groups, and informs the Project's environmental and social assessment process. These risks are presented in **Table 3.3** below.

Table 3.3 Potential Social Risks and Proposed Control Measures

High level Summary of Potential Risks	Potential Consequences	Proposed Risk Control Measures
Conflation of engagement approach and information from Bowmans Creek Wind Farm Stage 1 to Bowmans Creek Wind Farm Stage 2	• Lack of awareness/understanding of Stage 2 of the Project leading to spread of misinformation. • Increased stakeholder, government, and media scrutiny. • Lack of trust in the proponents. • Project schedule extended and potential increase in costs as a result of extra effort required to address interests and concerns.	• Develop key messages and project information to explain Stage 1 and Stage 2 of the wind farm as distinct stages. • Complete ongoing monitoring of media, community issues, and local stakeholder sentiment to assist in identification of emerging stakeholder issues. • Continue to provide an opportunity for key stakeholders to provide feedback, raise issues, concerns and project opportunities.
Inadequate community engagement and consideration of engagement outcomes in project planning and assessment	• Increased stakeholder, government, and media scrutiny. • Project schedule extended and potential increase in costs as a result of extra effort required to establish relationships/undertake secondary engagement program to reach adequate level of engagement. • Lack of awareness/understanding of the project leading to spread of misinformation. • SIA unable to adequately identify and assess social impacts based on community engagement.	• Full implementation of CSEP. • Evaluation of engagement approach. • Complete ongoing monitoring of media, community issues, and local stakeholder sentiment to assist in identification of any emerging stakeholder issues. • Continue to provide opportunities for information provision and feedback from interested parties. • Continue to provide clear, transparent, and proactive communication to stakeholders regarding the project and the assessment process – stages, timing, opportunities for input.
Stakeholder engagement program does not adequately address stakeholders' key interests and concerns.	• Increased stakeholder, government, and media scrutiny. • Lack of trust in the proponents given all stakeholders not consulted. • Implications to the robustness of the project. • Project schedule extended and potential increase in costs as a result of extra effort required to establish relationship/ address interests and concerns.	• Continue to implement the CSEP to ensure stakeholder interests and issues are documented. • Continue to update the CSEP to ensure emerging issues are captured and stakeholder identification is refreshed as required. • Complete ongoing monitoring of media, community issues, and local stakeholder sentiment to assist in identification of emerging stakeholder issues. • Continue to provide an opportunity for key stakeholders to provide feedback, raise issues, concerns and project opportunities.

High level Summary of Potential Risks	Potential Consequences	Proposed Risk Control Measures
Consultation fatigue due to multiple concurrent projects.	• Implications to the robustness of the project. • Project schedule extended and potential increase in costs as a result of extra effort required to establish undertake secondary engagement program to reach adequate level of engagement.	• Integrate with other engagement activities planned for the EIA to avoid duplication and manage consultation fatigue. • Continue to provide opportunities for key stakeholders to provide feedback, raise issues, concerns and project opportunities in ways that reflect their needs. • Follow up with contributors to the engagement program and keep updated with key milestones and how they can contribute.

4.0 Engagement Strategy

In line with the SIA Guideline (DPE, 2023), community engagement will be used to identify community's values and aspirations in relation to the Project, and to focus the SIA and the broader EIA on key issues of concern for relevant stakeholders and local communities, including opportunities to consider stakeholder feedback in the final design to address and/or enhance Project outcomes.

The basic principles of effective public participation (IAIA, 2006) will also be applied, to ensure that engagement is:

- Relevant to the context.
- Informative and proactive.
- Adaptative and communicative.
- Inclusive and equitable.
- Educative.
- Cooperative.

The principles underpinning community engagement adopted by Ark Energy align with the '*Community Engagement Guidelines for the Australian Wind Industry'* developed by the Clean Energy Council. (Clean Energy Council, 2018).

In adopting the principles of the Guideline, Ark Energy commits to the following with respect to the development of the Project:

- **Openness:** Relevant information will be shared with the community in a format that is clear, accurate, timely and honest.
- **Inclusiveness:** Ark Energy will work with project stakeholders to ensure their perspectives are appropriately considered.
- **Responsiveness:** All community concerns will be listened and responded to.
- **Accountability:** The Project will continue to monitor, evaluate, and disclose information about project activities and identified positive and negative impacts of the Project.

4.1 Stakeholder Identification

Social impact assessment involves the participation and collaboration of people who have an interest in, or those that are affected by a project. As Burdge (2004) outlines, stakeholders may be affected groups or individuals that:

- Live, work, or recreate near the Project.
- Have an interest in the proposed action or change.
- Use or value a resource associated with the Project.
- Are affected by the Project e.g., may be required to relocate as a result of the project.

A stakeholder identification process was undertaken to support the planning and delivery of community and stakeholder consultation to inform the SIA/EIA. This process has involved identifying stakeholders with an interest in the Project, or those that may be directly or indirectly affected by the Project, including any potentially vulnerable or marginalised groups.

The stakeholder groups that are relevant to this Project are outlined in **Figure 4.1** below, with specific stakeholders within each of these identified in **Table 4.1.**

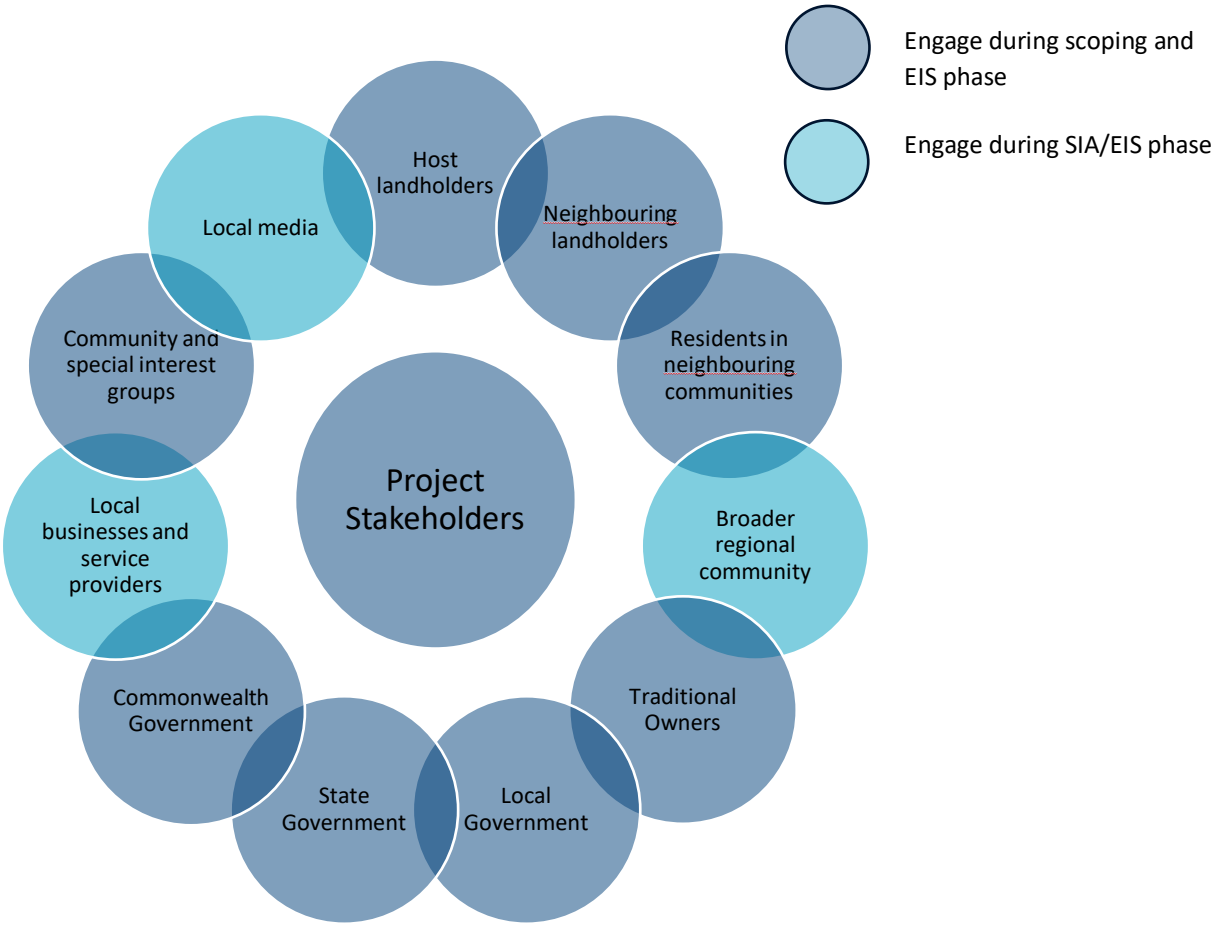


Figure 4.1 Stakeholder Groups

Source: Umwelt, 2023

Table 4.1 Summary of Stakeholders by Group, Objective and Interest

Stakeholder Group	Stakeholders	Level of Engagement	Potential Interest/ Concern
Host Landholders	• One (1) landholder, across three (3) separate residences.	Collaborate	• Social amenity impacts such as noise Visual changes to the landscape. • Accessibility impacts due to construction traffic. • Changes to way of life and livelihood. • Land use conflict.
Proximal Landholders	• 79 landholders within 8 km of a Project wind turbine.	Collaborate	• Social amenity impacts such as noise and visual changes to the landscape. • Accessibility impacts due to construction traffic. • Changes to way of life and livelihood. • Land use conflict.
Residents in Neighbouring Communities	• Study localities SALs - McCullys Gap, Rouchel Brook, Bowmans Creek, Muscle Creek, Hebden, Goorangoola. • Study localities UCLs: Singleton and Muswellbrook.	Involve	• Cumulative impacts from multiple projects. • Accessibility impacts from construction workforce. • Land use conflict. • Regional economic benefits. • Infrastructure and services provision.
Local Government	• Singleton Council. • Muswellbrook Shire Council. • Upper Hunter Shire Council. • Mayor, Councillors, Executive Team.	Collaborate	• Cumulative impacts from multiple projects. • Accessibility impacts on local and regional services and businesses. • Commercial stimulus for local economy. • Local infrastructure and services provision (e.g., road impacts). • Land use planning and/or conflict. • Concerns of community and local stakeholders.

Stakeholder Group	Stakeholders	Level of Engagement	Potential Interest/ Concern
Broader Regional Community	• Study localities LGAs – Singleton, Muswellbrook and Upper Hunter.	Consult	• Cumulative impacts from multiple projects. • Accessibility impacts from construction workforce. • Land use conflict. • Regional economic benefits. • Infrastructure and services provision.
Traditional Owners	• Wanaruah Local Aboriginal Land Council. • Wonnarua Nation Aboriginal Corporation. • Other Registered Aboriginal Parties.	Collaborate/Consult	• Impacts on cultural connection to Country or place, or on cultural values. • Inequity of impacts on Aboriginal community.
Community and Special Interest Groups	• McCullys Gap and Muscle Creek Community Association. • McCullys Gap Rehabilitation Sustainability Community Group Inc. • NSW Farmers – Hunter Branch. • Stop the Spin. • Hunter Region Landcare Network. • Hunter Bird Observers Club. • Local Hall Committees. • Muswellbrook Shire Local and Family History Society Inc. • Singleton Beef and Land Management Association. • Upper Hunter Thoroughbred Breeders Association. • Lions Club of Muswellbrook. • Rotary Club of Muswellbrook. • Country Women's Association (Muswellbrook and Singleton). • Rural Fire Service (Singleton and Aberdeen). Upper Hunter Community Services.	Consult	• Cumulative impacts from multiple projects. • Accessibility impacts from construction workforce. • Land use conflict. • Sense of community / sense of place. • Commercial stimulus for local economy. • Training opportunities for young people. • Local infrastructure and services provision. • Environmental impacts.

Stakeholder Group	Stakeholders	Level of Engagement	Potential Interest/ Concern
Local/Regional Businesses and Service Providers	• Muswellbrook Chamber of Commerce. • Business Singleton. • Superair. • Westpac Rescue helicopter. • Real estate agents/ social housing support.	Involve	• Cumulative impacts from multiple projects. • Regional and local economic benefits. • Infrastructure and services provision. • Opportunities for collaboration. • Demand and capacity. • Increased demand/use of local and regional services by construction workforce. • Livelihood impacts. • Public safety for other road users (e.g., children and school bus drop off locations). • Commercial stimulus for local economy.
State Government	• DPE Secretary. • DPE Director-Energy Infrastructure and Renewable Energy Zones. • NSW Environment Protection Authority (EPA). • Aboriginal Affairs NSW. • Transport for NSW. • Regional Development Australia. • Division of Resources and Geoscience. • Department of Industry. • TransGrid. • Local land services. • NSW Rural Fire Service. • Department of Defence (Richmond and Newcastle). • Civil Aviation Authority. • Airservices Australia. • National Park and Wildlife Services (NPWS).	Consult	• Cumulative impacts from multiple projects. • Alignment to NSW Government initiatives. • Compliance with relevant legislation and guidelines.

Stakeholder Group	Stakeholders	Level of Engagement	Potential Interest/ Concern
Commonwealth Government	• Department of Environment and Energy. • Federal Wind Commissioner.	Inform	• Alignment to Federal Government initiatives. • Compliance with relevant legislation and guidelines.
Local Media	• Muswellbrook Chronicle. • Singleton Argus. • 98.1 Power. • 2NM Radio Hunter Valley. • ABC Upper Hunter.	Inform	• Cumulative impacts from multiple projects. • Regional economic benefits.

4.2 Engagement Methods

The engagement of stakeholders and community groups will include a combination of information provision (inform) and engagement (consult, involve) (International Association for Public Participation, 2018) mechanisms to:

- Improve knowledge and awareness of the proponents and their activities, the project, and key issues/impacts as they arise.
- Facilitate stakeholder involvement in the identification of issues/impacts, areas of interest/concern and strategies to address the issues raised.
- Engagement mechanisms have been selected based on engagement objectives and previous knowledge of stakeholder engagement preferences. Mechanisms selected will build on previous mechanisms utilised by the proponents, as relevant.

Proposed engagement and communication mechanisms are identified in **Table 4.2.**

Table 4.2 Engagement and Communication Mechanisms

Mechanism	Engagement Objective	Description
Website	Inform	A dedicated project website page to provide project information and updates.
Project Hotline	Inform	A dedicated project community telephone number to enable the community to contact the project team for information or to provide feedback on the project.
Project Email	Inform	A dedicated project community email address to enable the community to contact the project team for information or to provide feedback on the project.
Project Information Sheets	Inform	Distribution of project updates and information on project technology throughout the proximal community.
Stakeholder Interviews	Involve	Telephone, online or in-person meetings with individual key stakeholders or small groups.
Online Survey	Consult	An online survey to gain feedback from key stakeholders and the broader community on the project and community needs and values, to be advertised and distributed through various mechanisms.
Drop-in Sessions	Consult	A drop-in information session to present information and updates on the project with invites distributed to the broader community through a number of mediums.

Table 4.3 outlines the mechanisms that are planned to be utilised to engage with each stakeholder group for the Project.

Table 4.3 Proposed Mechanism by Stakeholder Group

	Project Website	Project Hotline	Project Email	Information Sheet	Stakeholder Interviews	Online Survey	Drop-in Sessions
Host Landholders	✓	✓	✓	✓	✓	✓	✓
Proximal Landholders	✓	✓	✓	✓	✓	✓	✓
Residents in Neighbouring Communities	✓	✓	✓	✓		✓	✓
Broader Regional Community	✓	✓	✓			✓	✓
Traditional Owners	✓	✓	✓	✓	✓	✓	✓
Community and Special Interest Groups	✓	✓	✓	✓	✓	✓	✓
Local Businesses and Service Providers	✓	✓	✓		✓	✓	✓
Local Government	✓	✓	✓	✓	✓	✓	✓
State Government	✓	✓	✓				
Federal Government	✓	✓	✓				
Media	✓	✓	✓				

4.3 Engagement Materials and Topics

Umwelt will support Ark Energy in the drafting and preparation of instruments, materials, and tools to be used to support engagement in accordance with the CSEP. These materials, to guide engagement, will be prepared following Ark Energy's confirmation of the Implementation Plan (**Section 6.0**). Instruments to support engagement activities will include the following:

- **Interview discussion guides:** a suite of discussion guides including a standard discussion template/survey question set, as well as targeted guides for specific stakeholders or community groups covering perceived impacts of the project, community needs and values, and preferences for engagement. Each guide will likely include open ended questions.
- **Online survey:** survey instrument to be available to all interested community members and stakeholders, a mix of quantitative and qualitative questions relating to perceived impacts of the project, community needs and values, and preferences for engagement.
- **Project information sheets/Posters for drop-in sessions:** Provide an overview of the proposed Project, approvals pathway and information about being involved in the SIA.
- **Stakeholder engagement register:** set up of a stakeholder engagement register template in Excel capturing key stakeholder details, interaction with the engagement process and preferred engagement mechanisms and information requirements.

5.0 Key Project Messages

Key messages (for external purposes) will be developed and refined throughout the EIS process for communication to targeted stakeholders and community members. They will be developed in line with the principles and commitments outlined within **Section 4.0** of this CSEP and will be used to share information related to the Project and its current activities, as well as to respond to stakeholder issues, concerns, interests through relevant Project phases.

Key messages will be developed to:

- Provide clear and consistent information relating to the Project.
- Clearly articulate project aspects and components.
- Outline the environmental and social impact assessment process and opportunities for engagement.

Key messages have been developed and refined around four message categories as outlined below. These will be used to inform engagement and associated material development.

- **The Project** – What is the Bowmans Creek Wind Farm Stage 2 project? Including details on the Project, quick facts, and Project description.
- **The Proponent** – Who is Ark Energy? The company, its background and development, activities in NSW, Australia and internationally.
- **The Process** – the development planning and assessment process, including key milestones and opportunities for engagement and the broader SIA process.
- **Issues and Benefits** – key issues in relation to the Project i.e., social and environmental impacts, stakeholder issues/concerns, opportunities and benefits, engagement preferences and information requirements.

Preliminary key messages are provided in the sections below.

5.1 What is the Bowmans Creek Wind Farm Stage 2 Project?

Question / Topic	Message
Where is the Project?	The Project is located in the town of Bowmans Creek, NSW, approximately 14 km northeast of the New England Highway in the Upper Hunter region of NSW. Other major regional centres of Muswellbrook and Singleton are situated 19 km to the west, and 28 km to the south, respectively. It is in both the Muswellbrook Shire Council and Singleton Council Local Government Areas (LGAs).
How many turbines will the Project have?	The current design incorporates approximately 21 wind turbine generators.
What will the Project produce?	An installed capacity of approximately 120 MW is proposed.

Question / Topic	Message
Will the transmission line be underground or above ground?	Power infrastructure proposed to provide connection to the National Energy Market NEM will include (1) on-site collector substation and an overhead transmission line to connect the proposed wind turbines in the south of the Project Area to the Stage 1 project electrical reticulation network. The internal electrical reticulation network would consist of low voltage (33 kV) above ground transmission network connecting the northern turbines to the Stage 1 project electrical reticulation network.
What are the reasons for site selection?	The Project location was selected due to: • A reliable wind resource and access to this wind resource consistently across the Project Area. • Its location, being adjacent to the approved Bowmans Creek Stage 1 project, which allows for the beneficial re-use of approved construction facilities and grid connection. • Relatively low density of housing within the closest towns to the Project, including Bowmans Creek, Goorangoola, and Hebden.
How much land will it take up?	The Project Area is proposed to encompass covers an area of approximately 3,552 ha.
How does this Project relate to Bowmans Creek Wind Farm Stage 1?	The additional wind farm infrastructure associated with the Project is proposed to increase capacity of the 'Bowmans Creek Wind Farm' (SSD-10315) (i.e., Stage 1) approved in February 2024. Because of the scale of additional infrastructure, and other requirements under the NSW planning system, the Project is proposed as a separate State Significant Development (SSD) to that already approved under "Stage 1.
What is the Hunter Central Coast Renewable Energy Zone and how does it relate to the Project?	The Hunter-Central Coast REZ is an area declared by the NSW Government to be targeted for renewable energy development. The REZs form a critical component of the NSW Government's Electricity Infrastructure Roadmap. The purpose of each REZ is to group new wind and solar power generation projects in areas where it can be efficiently stored and transmitted across NSW. The REZs will help to ensure reliable electricity supply and deliver lower wholesale electricity costs. Based on the current mapping, the Project is wholly located within the current Hunter-Central Coast REZ. While the proposed Project is located in the Hunter-Central Coast REZ, it will not connect into the REZ and associated transmission infrastructure.
How many people will the Project employ?	The Project is anticipated to support 160 jobs during the construction phase activities, and 15 jobs during operational phase activities.
How will the Project benefit the community?	Ark Energy is committed to the development of community benefit sharing programs (e.g., neighbourhood benefit programs, the development of community grant funds and community co-investment/co-ownership programs) in line with the Clean Energy Council's Guidelines for Benefit Sharing (2019).
How long will it take to construct? Will an outside workforce be required? If so, where will the construction workers live?	The construction of the Project is expected to take approximately 1.5 to 2 years. The Project is anticipated to support 160 jobs during the construction phase activities. A local workforce will be prioritised and where possible, construction workers would be accommodated in towns within one (1) hour of the site. The findings of the EIS, SIA and other studies will assist Ark Energy in further assessing potential workforce accommodation options to reduce any project related impacts.
How long will the Project be operational?	The Project is anticipated to have a lifespan of 30 years.

5.2 Who is Ark Energy?

Question/Topic	Message
Who is developing the Project?	The Project is being proposed as a joint venture between Bowmans Creek Wind Farm Pty Ltd (on behalf of Ark Energy) and AGL.
Who is Ark Energy?	Ark Energy is a leading Australian renewable energy company specialising in wind, solar and hydrogen. Our growing operational portfolio includes wind and solar energy projects in Queensland, New South Wales and Tasmania, amounting to 7 gigawatts of wind and solar energy experience across 15 Australian projects. We are a signatory to the Australian Clean Energy Council's Best Practice Charter for Renewable Energy Projects, a voluntary commitment to engage respectfully with communities, be sensitive to environmental and cultural values, and make a positive contribution to the regions in which we operate.
How long have Ark Energy been operating in Australia/NSW?	Ark Energy is a subsidiary of Korea Zinc Co. Ltd., the world's largest producer of zinc, lead and silver and a company with a proud 25-year history in Australia through its Sun Metals Corporation Pty Ltd zinc refinery in Townsville. Established in January 2021, Ark Energy's mandate is to decarbonise the energy supply of the Korea Zinc group.
Where is Ark Energy based?	Ark Energy is an Australian renewable energy company that is a subsidiary of Korea Zinc Co. Ltd. Ark Energy has two offices located within Australia. The first is located within the Brisbane CBD, while the second office is located in the Sydney CBD.
Where do they have project interests and what is their track record?	Ark Energy is developing large scale wind, solar and hydrogen projects in the states of Queensland, New South Wales, and Tasmania. Ark Energy's Hydrogen Hub is situated in Townsville.
Change of ownership	In May 2022, Ark Energy finalised the friendly acquisition of Australian wind and solar developer Epuron, and in October 2022 Epuron retired.
How do their projects benefit communities?	Ark Energy is guided by the principles outlined in the Best Charter for Renewable Energy Projects which states that Ark Energy will ensure that the local community will share in the benefits of their projects. It also ensures that Ark Energy will support the local economy and any potential educational and tourism opportunities. Overall, projects developed by Ark Energy contribute to the regional economies. For the proposed Bowmans Creek Project, it is estimated that Ark Energy will generate at least $114 million into the local economy and create up to 150 jobs during construction.

5.3 What is the Assessment Process?

Question / Topic	Message
Why am I being contacted?	As part of the approval process for the Project, a SIA, including a community engagement program, will be prepared that addresses relevant guidelines. The engagement program includes consultation with interested parties, affected communities and local representative groups. The outcomes of the engagement program will inform the development of the SIA and EIS.
What are the likely impacts – should I be concerned?	Comprehensive assessments will be completed to identify the potential positive and negative impacts of the project and how best to manage these potential impacts. The detailed design of the Project will be informed by these studies to ensure that negative impacts are mitigated to the greatest extent possible, and positive impacts enhanced.
What assessment process is required?	The Bowmans Creek Wind Farm Stage 2 project is in the early stage of planning works. It will be assessed as a State Significant Development (SSD) under Part 4 of the NSW Environmental Planning and Assessment Act 1979 (the EP&A Act).
Who will approve the project?	The former NSW Department of Planning and Environment (DPE) now the Department of Planning Housing and Infrastructure (DPHI) is the State planning authority for the project. The EP&A Act requires a preliminary scoping report to be prepared and submitted to the DPHI. DPHI will then prepare and issue the Secretary's Environmental Assessment Requirements (SEARs), which will be used to guide preparation of an Environmental Impact Statement (EIS) required to support the development application. Once complete, DPHI will assess the EIS, considering all project impacts, and provide the community and other stakeholders the opportunity to comment on the Project. Once commentary on the Project has been reviewed and assessed in the form of a Response to Submissions Report and Amendment Report (if required), DPHI will make a decision to approve or reject the Project. The Project may get referred to the NSW Independent Planning Commission by DPHI should over 50 community submissions be received and/or Council object to the Project, in this case, the Commissioners will assess the Project and make a determination on whether or not to approve the project.
How will the determination consider my concerns?	The feedback received through the engagement program will inform the SIA for the project, and the broader EIS, to be lodged with DPHI for assessment.
How long will the approvals process take?	The Project Scoping Report and SIA Scoping Report is expected to be submitted to DPHI in May 2024. The EIS and SIA for the Project are expected to be lodged between late 2024 and early 2025.

Question / Topic	Message
How can I have my say?	The SIA assesses the impact of the project on people and communities. To inform the SIA, Ark Energy will consult with the community to understand their concerns, interests, issues, or the benefits that people perceive the Project may deliver. Ark Energy will endeavour to undertake regular, open, and transparent engagement that is helpful and constructive and to ensure feedback is addressed in project design and planning. Ark Energy will work closely with host landholders, neighbouring landholders and property owners, Aboriginal community representatives, and the wider community, in addition to the Singleton, Muswellbrook and Upper Hunter Shire Councils and NSW Government agencies, to gain a detailed understanding of the views, issues, and interests on the proposed project. Engagement relating to Bowmans Creek Wind Farm Stage 2 will acknowledge the outcomes of Stage 1 consultation and will focus on opportunities for the community and stakeholders to provide feedback and express their concerns and aspirations in regard to Bowmans Creek Wind Farm Stage 2. Engagement for Bowmans Creek Wind Farm Stage 1 included correspondence with landowners, face to face meetings, community information sessions, newsletters, and a project website. Submissions received as part of the public exhibition of Stage 1 indicated some concern with the ability to participate in these mechanisms and obtain relevant and timely information regarding the Project. It is recognised that this engagement was undertaken during the peak of COVID-19 public health orders and restrictions which limited engagement opportunities. Engagement to inform the Bowmans Creek Wind Farm Stage 2 Scoping Report was undertaken in Q2 2024, with a subsequent round of engagement expected to take place during the preparation of the EIS later in 2024. Prior to the determination from the DPHI, the EIS will be made public, allowing for submissions to be made by any member of the community or interested party. This gives the public and the wider community the opportunity to further contribute to the Project's assessment and determination. The engagement program for the Project includes consultation with interested parties, affected communities and local representative groups through a range of personal meetings, community forums and other mechanisms. People can also learn about the Project through the project website, including links to recent newsletters and the option to sign up to the mailing list. Further, people can raise queries, provide feedback, and generally express an interest in being informed via the dedicated hotline, email and feedback form that is featured on the Project website.

5.4 Project Impacts and Opportunities Messages

Question / Topic	Message
How will I be affected?	Ark Energy recognises that the siting of the Project may still result in some community impacts (both positive and negative) and that impacts may be experienced differently across stakeholder groups. They are committed to working with the community and key stakeholders to identify potential environmental and social impacts associated with their proposed project and to explore relevant strategies to mitigate any negative impacts and enhance positive impacts. Ark Energy will work to ensure that through the EIS, SIA and associated community engagement process, that community issues are well understood and are addressed, where possible, in project design and planning.
What is the project going to do for residents and the community? How will we benefit?	Ark Energy is committed to building strong local relationships with key stakeholders and communities as part of their planning and understands the importance of ensuring local participation and community input, to achieve positive local and regional community benefits.

Question / Topic	Message
Will the Project take up agricultural land?	Ark Energy has been consulting with all host landholders throughout the design and planning phase to ensure the Project layout would result in minimal impacts to their properties and land uses. Ark Energy hopes to work with host landholders to allow for the ongoing use of the land for grazing or other existing agricultural activities. Ark Energy is interested in exploring and promoting new partnerships, and models for complementary wind energy land uses, with food production and agriculture, working with local farmers to support co-existence.
Will the Project make energy cheaper or easier to access in our local area?	Wind energy is one of the cheapest sources for electricity generation in Australia. As we invest increasingly in renewable energy infrastructure this will assist in putting downward pressure on energy prices for local households and businesses.
Will the Project reduce the amount of coal mining in the area?	The Project will contribute to Australia achieving net zero by 2050 by helping replace the need for coal by providing clean energy such as wind power.
How will the project influence climate change?	The Project is aligned with the Australian Government's energy policy, through its key objectives of supporting the National Energy Market to provide reliable electricity, developing energy infrastructure that is efficient, and contributing to net reductions in greenhouse gas emissions through replacement of existing diesel-powered electricity back up system. The Project will ensure a greater usage of renewable electricity generates from existing wind and solar projects, whilst also stimulating the development of new Projects. Greenhouse gas emissions associated with the construction of the project will be investigated during the EIS process.
What will happen when the Project is no longer used?	The infrastructure would be decommissioned and removed should the facility no longer be required. A decommissioning and rehabilitation management plan would be developed and implemented prior to closure to manage this process.
Is the Project going to be visible from houses?	Potential visual impacts of the Project will be assessed early on during the planning process. A detailed Landscape and Visual Impact Assessment will be developed for the Project which will assess the characteristics and values of the existing landscape, the extent to which the existing landscape is changed by the Project and how these changes are perceived by individuals and the broader community.

What are the health and safety risks associated with the Project?	The Project will be subject to detailed design and assessment to provide for safe construction and operation including:
	• Detailed civil design to ensure safe constructability of the Project.
	• Detailed drainage design to ensure mitigation of any potential increased run off in the Project area.
	• Traffic and Transport management plans specific to the local area, which will take into account, but is not limited to the following:
	  ◦ Shift change over times in the local mines.
	  ◦ School bus routes and times.
	  ◦ High traffic times, based on detailed traffic and transport studies.
	• Ongoing noise monitoring of the Project.

Question / Topic	Message
What is the impact on flora and fauna?	Impacts to fauna and flora may occur as a result of ground disturbance associated with the construction of the proposed infrastructure. A detailed biodiversity development assessment report will be developed for the Project which will assess the impact to flora and fauna and determine appropriate offset requirements applicable to the Project.

6.0 Engagement Planning and Implementation Across the SSD Phases

6.1 Scoping Phase

6.1.1 Planning

It is expected by DPHI in the SIA Guideline (2023) that the scoping phase will include community engagement activities to understand likely stakeholder issues and concerns early in the project, and to ultimately inform the social impact evaluation phase of the SIA.

Engagement in the scoping phase provides an opportunity to gauge and understand stakeholder issues/concerns/interests in relation to the project; to identify preliminary strategies/solutions to address topics raised; and to inform project design and planning. This phase will also draw on submissions to Bowmans Creek Wind Farm Stage 1 (SSD-10315) to develop an understanding of potential stakeholder issues and concerns.

In this regard, the SIA process calls for likely social impacts to be appropriately scoped and identified through consultation with potentially affected people and mitigation and enhancement options preliminarily explored.

To satisfy the SIA requirements, proposed engagement activities to be undertaken in this phase need to be targeted at identifying perceived issues of concern and/or positive impacts in relation to the proposed project to be further considered in the subsequent EIS phase.

Questions to include in interview discussion guides appropriate to this phase will include topics relating to:

- Awareness and attitudes towards wind farm development (and other renewables or industry development in the local or regional area).
- Awareness and public perceptions of Ark Energy.
- Relationship between Bowmans Creek Wind Farm Stage 1 and Stage 2.
- Potential issues, concerns or interests related to the proposed project.
- Community values, identity, local needs, and aspirations.
- Areas of value and use within and near the project area.
- Sense of community and place attachment in the area.
- Preferred engagement mechanisms, frequency, and content.

6.1.2 Implementation

Table 6.1 presents the Scoping Phase Implementation Plan. Specifically, in this phase, the CSEP aims to:

- Include learnings from engagement undertaken as part of Bowmans Creek Wind Farm Stage 1 (SSD-10315).
- Inform and consult with the community in relation to the Project i.e., the proposed Bowmans Creek Wind Farm Stage 2.
- Develop an understanding of the social locality/social area of influence of the Project, specifically the host community/communities in which the Project is proposed.
- Scope and identify any impacts upon people associated with the Project.
- Afford community and stakeholder input into the preliminary Project design, planning and development.
- Identify preliminary strategies that may be further explored to respond to impacts in the form of mitigation or enhancement measures or community benefit strategies.
- Identify engagement preferences of stakeholders and potential partnerships between the proponent and the community.

Table 6.1 Scoping Phase

Mechanism	Detail	Target Stakeholder Groups
Project Information Sheet/ Newsletter #1 **Project Overview**	• Provide an overview of the proposed Project, approvals pathway and information about being involved in the SIA.	• Host and proximal landholders. • Community and Special Interest Groups. • Local business and service providers. • Residents in neighbouring communities. • Traditional Owners. • Local Government.
Targeted SIA Scoping Interviews with Key Stakeholders and Community Members	• To better understand community values and to identify community perspectives on impacts (positive and negative) associated with the Project.	Sample from: • Host and neighbouring landholders. • Community and Special Interest Groups. • Traditional Owners. • Local Government. Survey based on interview guide will be available for all community via the Project website.
Community Information Sessions	• To provide an overview of the Project and the assessment and approvals process. Supported by poster material. • Up to four sessions will take place (minimum of three) in separate locations. • It is proposed that the sessions are run on different days and in different locations, to enable the wider community to access opportunities to learn about the project and provide feedback.	• Host and neighbouring landholders. • Community and Special Interest Groups. • Traditional Owners. • Local Government. • Broader community. • Residents in neighbouring communities. • Other industry.

6.2 EIS / SIA Preparation Phase

6.2.1 Planning

Proposed engagement activities undertaken during this phase will be focused on exploring and validating the issues/interests/concerns that have been identified during the Scoping Phase. The EIS program and preliminary insights or findings gathered through the various technical studies will also be further communicated during this phase, to assist in gathering feedback from key stakeholders and the wider community, on predicted project impacts.

Depending on the outcomes of the Scoping Phase, engagement in this phase to inform the EIS and SIA is likely to focus on:

- Assessment and evaluation of perceived issues, impacts and opportunities associated with the Project.
- Existing capacity of local service provision and projected future demand.
- Perceived cumulative impact of Bowmans Creek Wind Farm Stage One 1 and Stage Two2, and with other proposed renewable energy and/ or infrastructure development in the social localities.
- Potential strategies to address and respond to issues, impacts and opportunities.
- Enhancement measures to improve collaboration between Ark Energy and community or stakeholders, including potential community investment and benefit-sharing opportunities.

6.2.2 Implementation

Table 6.2 below contains the tasks that are proposed to be undertaken in the EIS / SIA preparation phase, however, this will be revised as required following the outcomes of Scoping Phase and subsequent to the issuance of Project SEARs.

Table 6.2 Proposed Engagement Mechanism for the EIS-Preparation Phase (to be confirmed post SEARs)

Mechanism	Detail	Target Stakeholder Groups
Project Information Sheet / Newsletter #2 **Project Overview**	• Distribution of an information sheet that outlines the outcomes of the scoping phase engagement program to confirm the correct interpretation and understanding of the community's perceived impacts and to provide an update on the Project planning process. This content can be included in regular newsletters if already developed or can form a stand-alone project newsletter.	• Host and proximal landholders. • Community and Special Interest Groups. • Local business and service providers. • Traditional Owners. • Local Government. • Residents in neighbouring communities. • Broader community.
Targeted SIA Interviews with Key Stakeholders and Community Members	• This round of interviews would focus on validating social impacts identified in the scoping phase and identifying and developing mitigation and enhancement measures. • Interview guides and survey instruments – to guide discussions with key stakeholders and community members, including discussion points such as top of mind associations with wind farms, level of knowledge and awareness of the Project, perceived impacts of the proposed Project, mitigation and enhancement measures to address these impacts, community values, needs and aspirations, and preferences for engagement and information provision.	• Sample from: • Host and neighbouring landholders. • Community and Special Interest Groups. • Traditional Owners. • Local Government. • Local businesses and service providers. • Survey based on interview guide will be available for all community via the Project website.
Community Information Sessions	• To provide an update on the Project and the assessment and approvals process, and an overview of results and outputs of the EIS and technical studies.	• Host and neighbouring landholders. • Community and Special Interest Groups. • Traditional Owners. • Local Government.

Mechanism	Detail	Target Stakeholder Groups
		• Residents in neighbouring communities. • Broader community. • Other industry.

6.3 Response to Submissions and Amended Project

Proposed engagement activities undertaken during this phase will be focused on clarifying and responding to issues raised during the submission process and considering any Project refinements that may need to be considered as a result of these.

Mechanisms for engagement will depend on the nature of the issues raised in submissions to the EIS but are likely to include further community information sessions and follow up targeted interviews with relevant key stakeholders.

7.0 Reporting and Evaluation

7.1 Recording, Monitoring and Record-keeping

Outcomes and records of each engagement activity will be documented by the team member(s) in attendance.

A Stakeholder and Engagement Register in Excel format will also be maintained throughout the delivery of the Implementation Plan to ensure consistent tracking and recording of all community or stakeholder engagement activities and outcomes. Information to be recorded includes:

- Activity details (including stakeholder engaged, attendees, time and place, mechanism used).
- Discussion points.
- Summary of key outcomes or any actions.
- Stakeholder contact details.
- Preferences for future engagement.

Following completion of engagement for each phase, outcomes and data obtained will be collated and analysed to identify key impact themes and impact prioritisation. Identified issues or impacts may also be mapped to identify any patterns.

Communications and stakeholder engagement will be monitored throughout the project and this plan may be adapted to adjust engagement mechanisms, stakeholders, timing, or content in response to feedback or changing circumstances.

Outcomes of engagement undertaken will then be summarised in the Social Impact Scoping Report and Social Impact Assessment Report, respectively.

7.2 Evaluation

The implementation of the CSEP will be monitored and evaluated on an ongoing basis to ensure the effectiveness of the CSEP in achieving the objectives outlined in **Section 1.1**. The evaluation will be based on ensuring that:

- All key stakeholders and communities relevant to the project have been identified, in particular, vulnerable and at-risk groups.
- All identified and interested stakeholders are provided the opportunity to participate in the engagement program.
- Relevant project information will be provided to all stakeholders and all questions and queries received will be followed up in a timely manner by Umwelt and/or the proponents.
- Regular project team meetings will be held between Umwelt and the proponents to provide required updates and ensure a collaborative and consistent approach to engagement across the project.

- Engagement outcomes and community feedback is meaningfully and adequately considered in the development of the SIA and EIS, and where possible, is used to inform project design and refinements, including the development of local community benefit sharing programs.
- All regulatory requirements relating to community engagement are met.
- Engagement is timely, open/transparent, inclusive, and meaningful.

Mechanisms/methods such as those outlined below, will be used to ensure that the engagement program is on track and is responsive to any changing project issues:

- Proactive contact made with stakeholders identified in **Section 4.0.**
- Prompt project team response and inclusion of stakeholders interested in being involved in the project.
- Fortnightly project meetings to discuss outcomes of engagement progress.
- Fortnightly media monitoring to identify any emerging community issues and concerns.
- Evaluation items utilised in relevant survey instruments and discussion guides to facilitate process improvement.
- Outcomes of the engagement program communicated to project team members.
- Transparent summary of community issues and impacts associated with the project reported in the SIA and used to inform the Project EIS.

Revisions and updates to the CSEP will be made as required, to address any issues raised or ideas for improvement, in collaboration with the proponents.

8.0 Summary and Next Steps

This CSEP has provided the approach, strategy, and implementation program to inform and document the Project's SIA and broader EIS for the SSD application, to be lodged with the NSW DPHI (formerly DPE).

A brief overview of the Project has been provided along with an identification and summary of key characteristics of affected stakeholders and communities to inform engagement planning. The plan has also been informed by an analysis of submissions to the public exhibition of the approved Bowmans Creek Wind Farm Stage 1 (SSD-10315) and an analysis of local and regional policy.

Engagement methods and materials have been proposed across the Scoping and EIS/SIA preparation phases that capture the proposed engagement mechanisms, stakeholders, tasks, responsibilities and timings. The materials utilised in these engagement phases stages will be centred on agreed messaging reflective of the principles and requirements outlined in the SIA Guideline (2023).

Finally, diligent record keeping, monitoring and evaluation will occur during the Scoping and EIS/SIA preparation phases, with relevant updates to this CSEP occurring at key milestones. This will ensure consistent tracking and recording of all community or stakeholder engagement activities and that critical reflection occurs to promote the effectiveness of the CSEP in achieving the agreed objectives.

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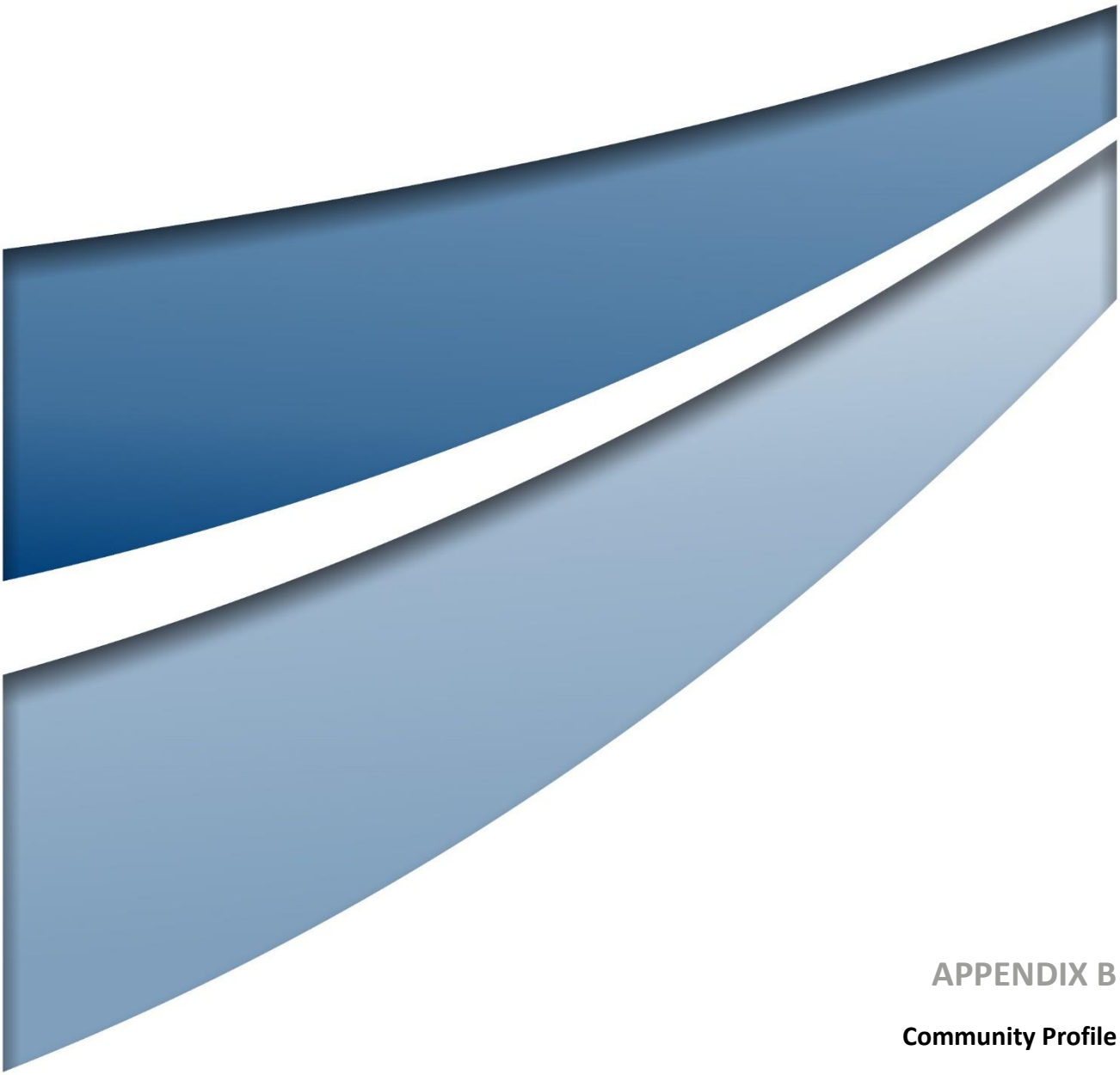
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APPENDIX B

Community Profile

Appendix B – Community Profile

Table 1 Community Profile

	Bowmans Creek SAL	Gooran-goola SAL	Hebden SAL	Muscle Creek SAL	Singleton UCL	McCullys Gap SAL	Rouchel Brook SAL	Muswellbrook UCL	Scone UCL	Upper Hunter Shire LGA	Singleton LGA	Muswellbrook LGA	NSW
Human Capital													
Population Size	17	52	67	313	14,229	262	22	10,901	5,013	14,229	24,577	16,357	8,072,163
Proportion Indigenous Population (%)	0.0%	0.0%	13.4%	3.5%	8.7%	3.8%	0.0%	2.7%	7.3%	6.7%	7.9%	11.3%	3.4%
Median Age	39	55	38	38	35	41	56	36	39	42	37	37	39
Year 10 highest year of schooling (%)	75%	41%	48%	59%	35%	47%	30%	36%	32%	36%	35%	36%	20%
Year 12 highest year of schooling (%)	33%	28%	24%	22%	36%	24%	50%	30%	36%	33%	35%	29%	58%
Bachelor degree (%)	0%	6%	10%	5%	5%	5%	18%	4%	7%	6%	5%	4%	11%
Post graduate degree (%)	0%	0%	0%	1%	2%	0%	0%	1%	2%	1%	1%	1%	6%
Graduate diploma and graduate certificate level	0%	0%	0%	1.3%	0.8%	1.9%	0%	0.9%	0.9%	0.8%	0.9%	0.8%	1.7%
Advanced diploma and diploma level	0%	5.8%	4.5%	7.3%	5.8%	6.5%	27.3%	5.0%	6%	5.8%	6.1%	5.3%	7.6%
Certificate (%)	18%	23%	19%	26%	25%	29%	0%	23%	21%	22%	25%	23%	15%

	Bowmans Creek SAL	Gooran-goola SAL	Hebden SAL	Muscle Creek SAL	Singleton UCL	McCullys Gap SAL	Rouchel Brook SAL	Muswellbrook UCL	Scone UCL	Upper Hunter Shire LGA	Singleton LGA	Muswellbrook LGA	NSW
Highest Occupation	Managers (44.4%)	Managers (30.3%)	Machinery operators and drivers (29.4%)	Machinery operators and drivers (19.1%)	Technicians and trades workers (18.2%)	Technicians and trades workers (19.2%)	Managers (46.2%)	Technicians and trades workers (20.6%)	Labourer (19.3%)	Technicians and trades workers (17%)	Technicians and trades workers (18%)	Technicians and trades workers (19.4%	Professionals (25.8%)
Social Capital													
Proportion of population with a different address 1 year ago (%)	17.6%	0.0%	14.9%	11.8%	16.0%	11.8%	0.0%	15.7%	16.7%	13.4%	14.7%	14.8%	14.7%
Proportion of population with a different address 5 year ago (%)	17.6%	28.8%	38.8%	29.7%	41.6%	27.9%	31.8%	38.8%	40.2%	33.3%	38.4%	37.7%	37.8%
Proportion of population aged 15+ who volunteer (%)	29.4%	30.8%	16.4%	14.7%	10.8%	21.8%	13.6%	8.2%	11.1%	13.4%	11.7%	9.5%	10.6%
Proportion of population born overseas (%)	0.0%	9.6%	0.0%	4.5%	9.5%	3.4%	0.0%	8.3%	12.1%	9.2%	8.4%	8.5%	29.3%
Proportion of one parent families with children	0%	23%	0%	6%	13%	4%	0%	14%	12%	9%	11%	13%	11%
Couple families with children (%)	67%	36%	37%	48%	31%	40%	0%	27%	26%	27%	36%	28%	32%
Proportion of family households (%)	100%	68%	100%	93%	70%	88%	63%	67%	66%	68%	75%	69%	71%
Proportion of group households (%)	0%	0%	0%	0%	3%	0%	0%	3%	4%	3%	2%	3%	4%

	Bowmans Creek SAL	Gooran-goola SAL	Hebden SAL	Muscle Creek SAL	Singleton UCL	McCullys Gap SAL	Rouchel Brook SAL	Muswellbrook UCL	Scone UCL	Upper Hunter Shire LGA	Singleton LGA	Muswellbrook LGA	NSW
Proportion of lone person households (%)	50%	14%	0%	10%	27%	8%	31%	30%	31%	29%	23%	29%	25%
Economic Capital													
Proportion of the labour force employed full-time (%)	88.9%	60.6%	46.3%	66.1%	59.5%	59.6%	61.5%	59.3%	62.9%	62.6%	59.9%	60.3%	55.2%
Proportion of the labour force employed part-time (%)	0.0%	27.3%	31.7%	25.0%	28.9%	28.2%	46.2%	28.1%	28.4%	27.9%	28.6%	27.9%	29.7%
Proportion of the labour force who are unemployed (%)	0.0%	0.0%	0.0%	1.6%	4.7%	3.2%	0.0%	6.1%	3.5%	3.2%	3.7%	5.1%	4.9%
Median household income ($/week)	$1,249	$2,583	$3,416	$3,083	$1,864	$2,299	$1,583	$1,547	$1,435	$1,429	$2,016	$1,628	$1,829
Median mortgage repayment ($/month)	$1,270	$2,700	$1,517	$2,383	$1,733	$2,167	$3,734	$1,517	$1,517	$1,560	$1,917	$1,517	$2,167
Median rent ($/weekly)	$0	$400	$350	$243	$400	$300	$243	$300	$290	$270	$338	$300	$420
SALM Unemployment Rate (March 2023)	-	-	-	-	-	-	-	-	-	2.8%	3.0%	5.3%	-
Physical Capital													
Proportion of occupied private dwellings that are fully owned (%)	100.0%	50.0%	31.6%	26.5%	28.1%	32.6%	25.0%	27.4%	31.7%	36.7%	31.6%	28.6%	31.5%

	Bowmans Creek SAL	Gooran-goola SAL	Hebden SAL	Muscle Creek SAL	Singleton UCL	McCullys Gap SAL	Rouchel Brook SAL	Muswellbrook UCL	Scone UCL	Upper Hunter Shire LGA	Singleton LGA	Muswellbrook LGA	NSW
Proportion of occupied private dwellings that are being purchased/ owned by a mortgage (%)	0.0%	13.6%	68.4%	66.3%	38.5%	41.3%	25.0%	34.1%	31.6%	32.0%	40.8%	33.1%	32.5%
Proportion of occupied private dwellings that are being rented (%)	0.0%	0.0%	0.0%	7.1%	31.1%	12.0%	31.3%	35.8%	32.9%	24.2%	24.8%	34.2%	32.6%
Unoccupied dwellings (%)	0%	23%	14%	7%	7%	7%	0%	11%	9%	13%	9%	12%	9%
Average number of vehicles per dwelling	2.0	2.7	2.7	2.5	1.8	2.5	1.6	1.7	1.7	1.9	2.1	1.8	1.7
Rental Vacancy Rate (April 2024)	-	-	-	-	-	-	-	-	-	0.62%	0.96%	0.90%	-

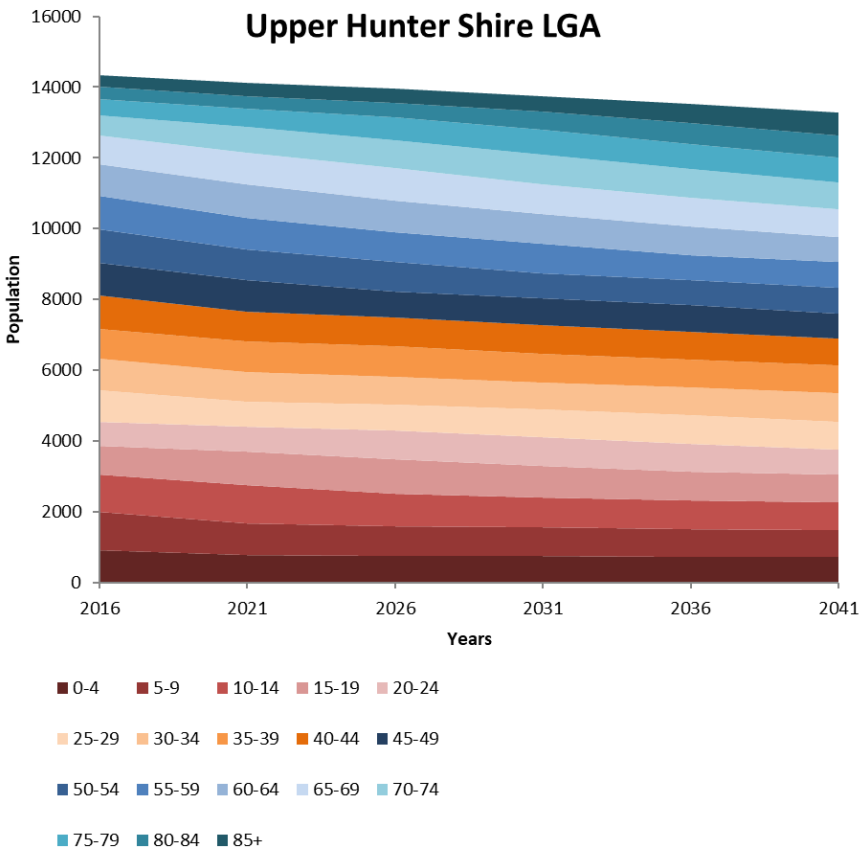


Figure 1 Upper Hunter Shire LGA Population Projection

Source: NSW Government, 2024

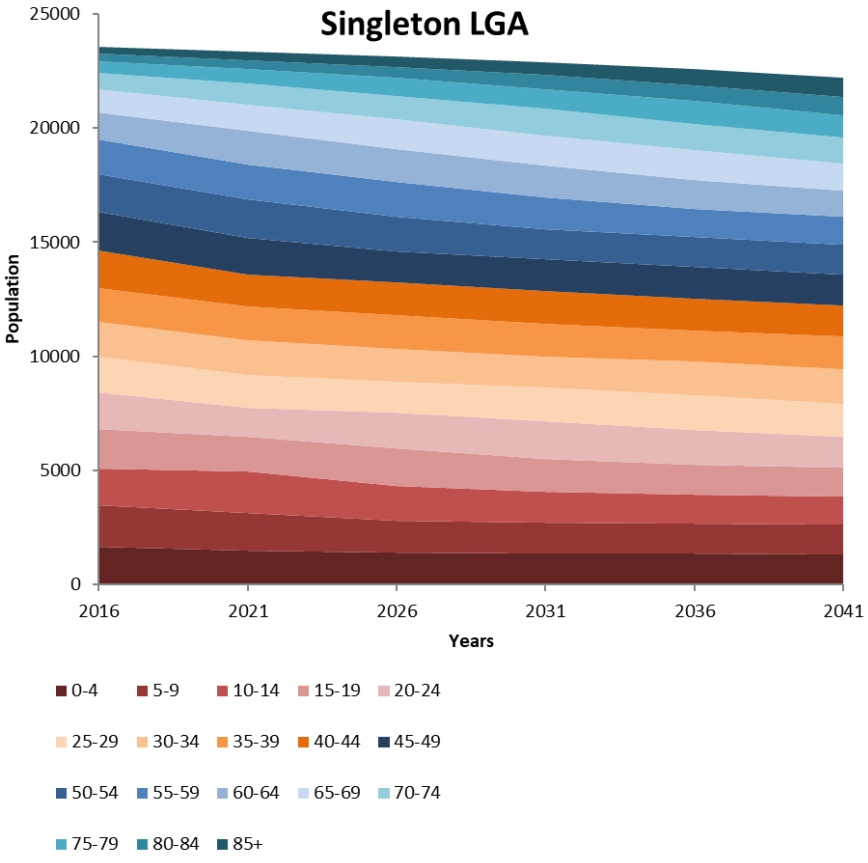


Figure 2 Singleton LGA Population Projection

Source: NSW Government, 2024

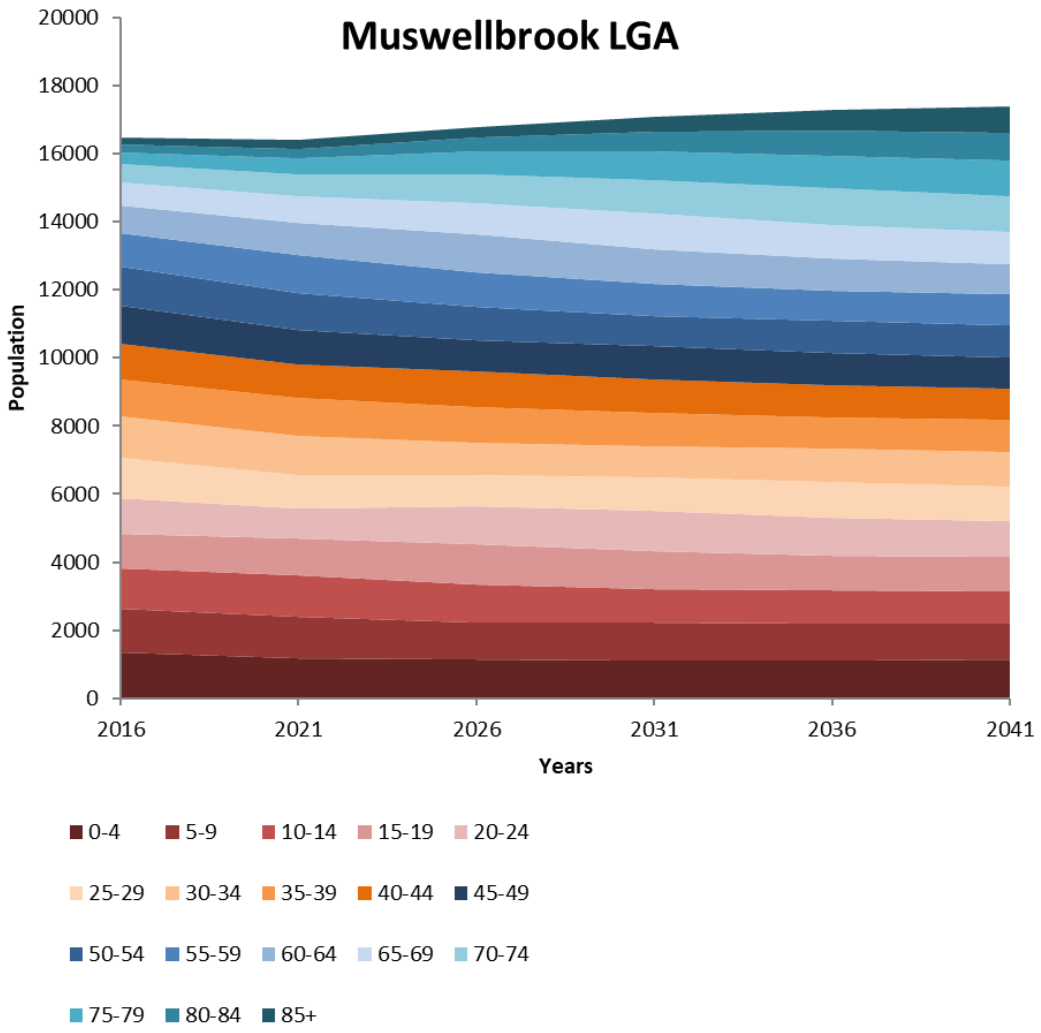


Figure 3 Muswellbrook LGA Population Projection

Source: NSW Government, 2024

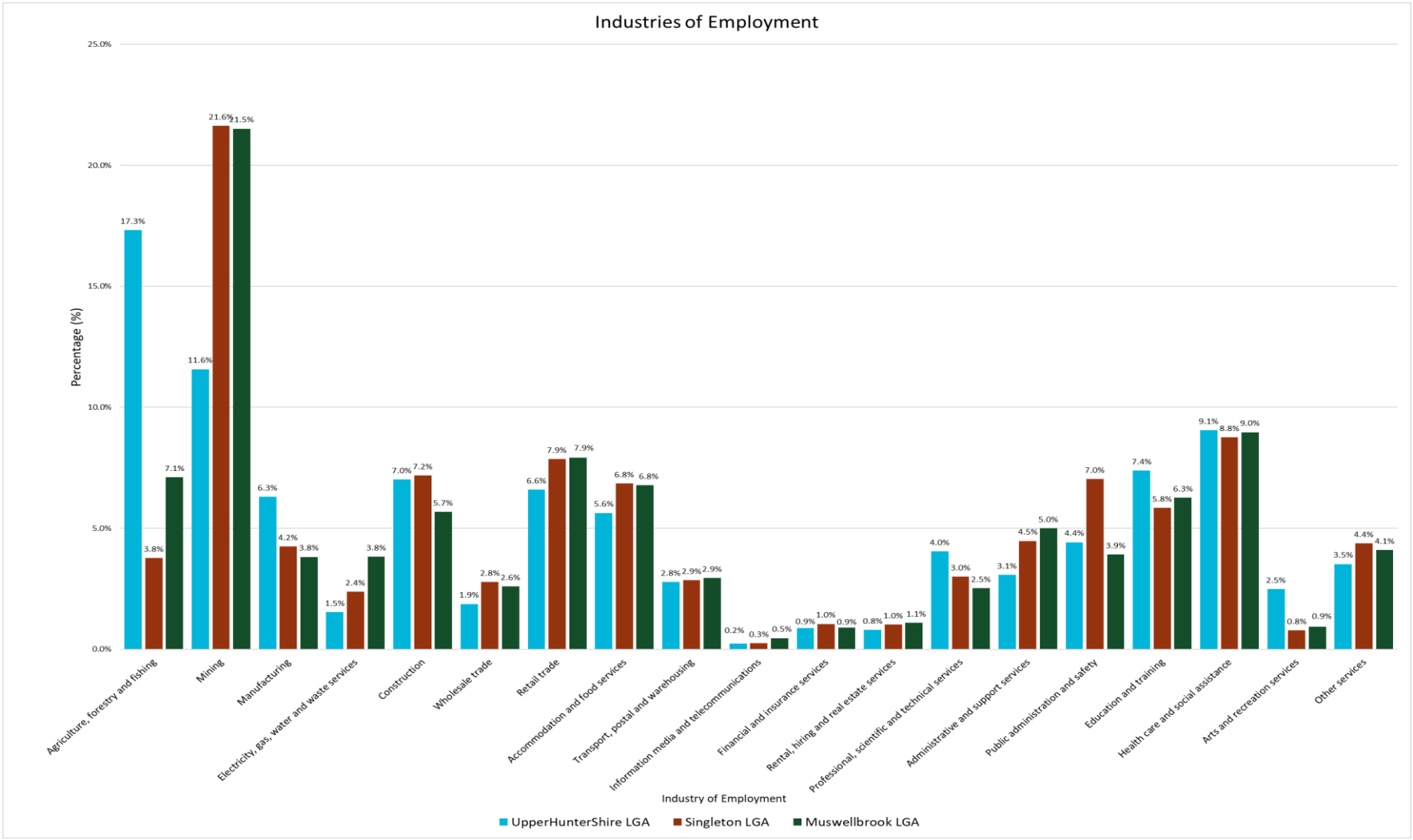
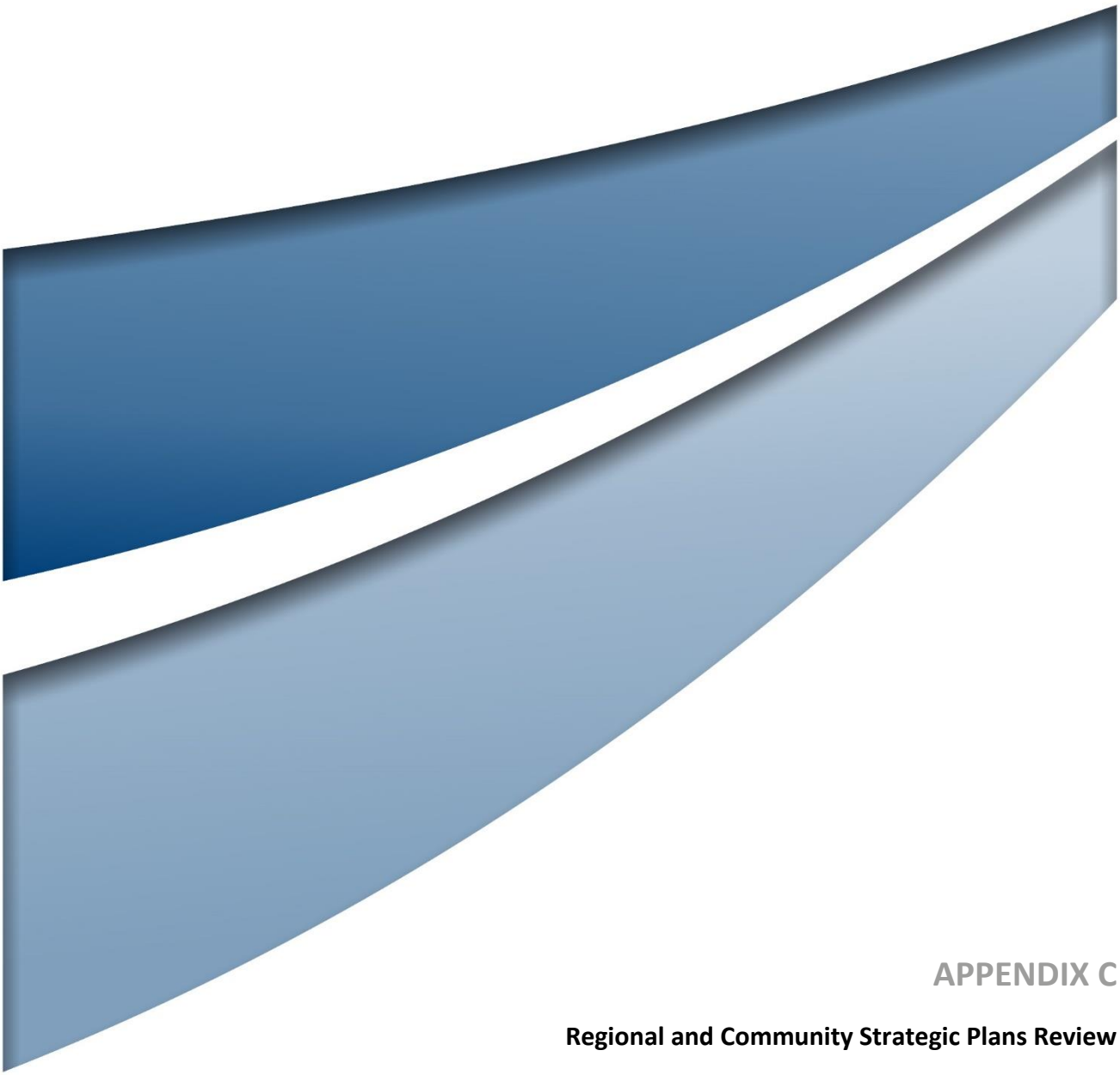


Figure 4 Industries of Employment

Source: REMPLAN, 2024.

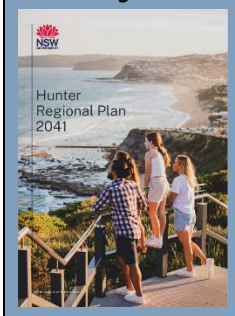


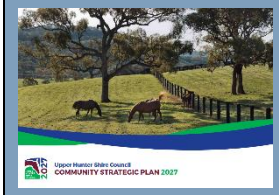
APPENDIX C

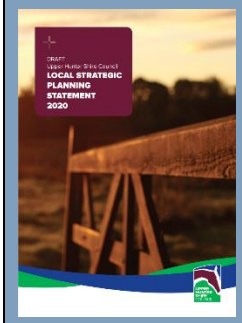
Regional and Community Strategic Plans Review

Appendix C – Regional and Community Strategic Plans Review

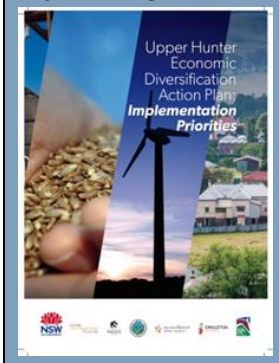
Plan	Overview and Relevance to the Project

Hunter Regional Plan 2041
 
	Outlines the goals and actions for the Hunter Region to achieve a sustainable future; the plan applies to 10 local government areas including the Upper Hunter and Muswellbrook Shires. The Plan establishes the following objectives:
	• Diversify the Hunter's mining, energy and industrial capacity.
	• Ensure economic self-determination for Aboriginal communities.
	• Create a 15-minute region made up of mixed, multi-modal, inclusive and vibrant local community.
	• Plan for "Nimble neighbourhoods", diverse housing and sequenced development.
	• Increase green infrastructure and quality public spaces and improve the natural environment. Reach net zero and increase resilience and sustainable infrastructure.
	• Plan for business and services at the heart of healthy, prosperous and innovative communities.
	• Build an inter-connected and globally focused Hunter. The economy is expected to further diversify and cater to demand for renewable energy:
	  ○ This plan outlines renewable energy developments, using materials with low embodied emissions and the circular economy as a key opportunity in the region.
	  ○ Increased infrastructure assets and skilled workforce to support more renewable energy generation.
	  ○ Rehabilitated mines and decommissioned power stations could become renewable energy and storage hubs that cover wind, solar, pumped hydro and batteries.
	The Upper Hunter is recognised as undergoing a transition with major transformation occurring in power generation and emerging technologies. The high voltage transmission lines and transport infrastructure mean the Hunter plays an important role in powering NSW.

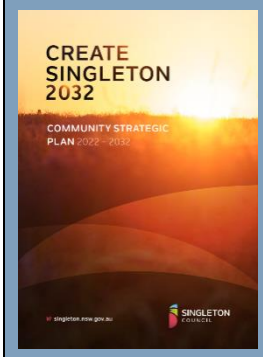
Upper Hunter Council Community Strategic Plan 2027
 
	The Upper Hunter Community Strategic Plan provides a road map for the development of the community over a shared 10-year vision to 2027. The vision for the CSP is:
	• A Quality Rural Lifestyle – in a vibrant, caring, and sustainable community. The Plan identifies the following key community priorities:
	  ○ Increased and innovative tourism and visitor opportunities.
	  ○ Rural lifestyle and country feel are valued and protected.
	  ○ Well-maintained, safe, reliable, and additional infrastructure.
	  ○ A stronger economic base to attract and retain residents, particularly youth.
	  ○ Upper Hunter has improved and well-maintained roads and bridges.

Upper Hunter Shire Council Local Strategic Planning Statement 2020
 
	The Local Strategic Planning Statement (LSPS) is the Upper Hunter Shire Council's plan for the community's social, environmental, and economic land use needs over the next 20 years. The following themes and planning priorities of relevance are identified in the LSPS:
	• Sustainable Development:
	  ○ Avoid long-term degradation of natural ecosystems.
	  ○ Planning for climate change.
	  ○ Facilitate the use of renewable energy.
	• Caring Community:
	  ○ Planning anticipates and responds to the rapidly ageing nature of the population. Rural Economy. o Promote sustainable primary industry.
	  ○ Protect agricultural land.
	  ○ Agriculture is the largest most visible land use.
	  ○ Provide a sufficient supply of land to accommodate employment generating activities.
	• Vibrant Towns:
	  ○ Encourage economic diversification.
	  ○ The town of Merriwa is identified as a key area for the diversification of the NSW energy resources sector. Managing the growth and change of the town over the long-term is a priority.
	The LSPS also highlights the following actions to facilitate the use of renewable energy:
	• Facilitate wind farm development in the Upper Hunter and Liverpool Range areas, and any other potential new renewable energy ventures by developing a public position supporting renewable energy development.
	• Support the investigation of renewable energy opportunities throughout the region and infrastructure requirements.

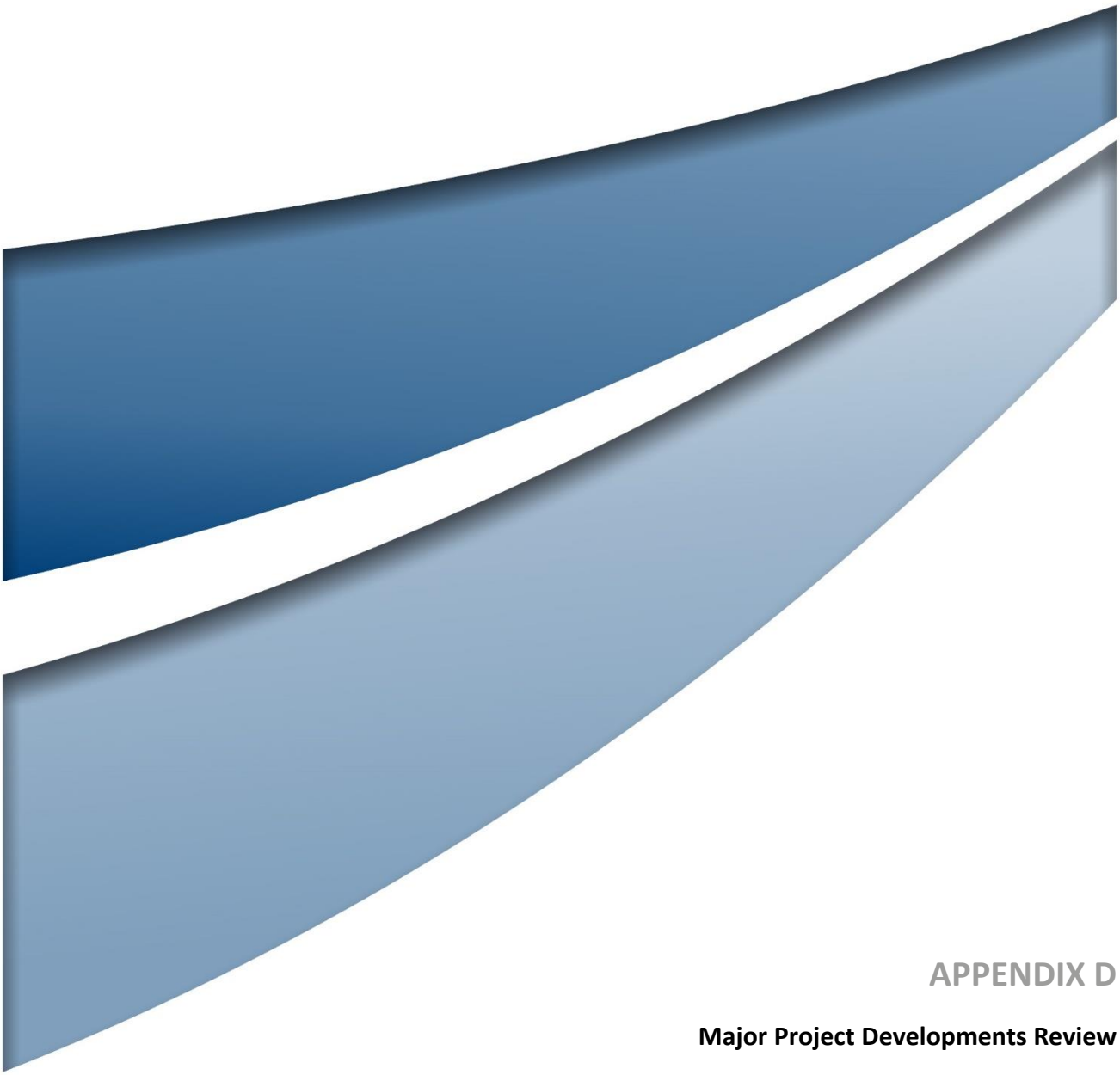
Plan	Overview and Relevance to the Project

Upper Hunter Economic Diversification Action Plan: Implementing Priorities
 
	The Upper Hunter Economic Diversification Action Plan sets priorities for business growth and sustainable economic transitions in the region. This Plan is driven by the need to plan for global and regional economic shocks, and to support new emerging industries. One key opportunity identified is:
	• Working with power asset owners, industry and research partners to foster growing renewable energy capacities and support agribusiness development.
	The following items are identified in the Plan to achieve a successful transition for the power and energy sector:
	• Business
	  ○ Transitions: generation capacity; existing workforces; future site use; dispatchable renewable power; and circular bioeconomy.
	  ○ Investment: existing capacity; new facilities; renewables; R&D/innovation.
	• Industry
	  ○ Maintain required generation capacity across regional, state, and national grids. o Invest in renewable and smart technologies.
	  ○ R&S support for Hunter Research Centres.

Hunter Regional Economic Development Strategy 	The Hunter Regional Economic Development Strategy articulates a framework for identifying actions crucial to achieving the following vision for the Hunter region: • A leading region in innovation, resilience, and diversity of opportunity, with world class infrastructure and direct access to interstate and international markets, boasting an enviable lifestyle. The following core strategies are identified: • Improve inter and intra-connectivity in the Region to boost business opportunities in the 'engine' industries of agriculture, mining, and manufacturing. • Manage transitions and risks to the coal mining and electricity generation sectors. • Improve infrastructure, services, and amenities. The Strategy recognises 'Energy Generation' (comprising existing power stations, high voltage transmission, and grid and gas infrastructure) as an industry cluster. It also acknowledges the transition taking place in the region, and is planning for other opportunities (including wind, solar, biofuels, and hydro), following the scheduled closure of Liddell Power Station in 2022 and Bayswater Power Station in 2035. Managing the transitions and risks to the coal mining and electricity generation sectors is therefore a key focus area in diversifying the Region's economy. A number of key infrastructure priorities are identified to support this, including: • Manage potential land-use conflicts arising from mining expansions. • Develop land-use plans for the Region (specially to provide investment certainty to the wine and equine industry). • Support transition to power generation. • Support transitioning and expansion of the workforce.
Climate Change Strategy and Action Plan	This strategy provides a framework that will support Upper Hunter Shire Council to reduce the impacts of climate change. It seeks to reduce the Upper Hunter Shire Council's impact in the environment and provide support to the wider community to reduce theirs. It also aims to improve resilience to climate change impacts. The Upper Hunter Shire Council has committed to: • Establish a series of mitigation and adaptation actions. • Collaborate with other public, private and not-for-profit enterprises. • Benchmark activities against other organisations. • Seek support, either financial or otherwise, through grant mechanisms and the like. • Participate in appropriate industry and government associations. • Support the community and local business through targeted educational activities, funding and other resource sharing activities. • Carry out all activities in an open and transparent manner. • Monitor and track progress towards meeting climate change targets including Council's target of becoming carbon neutral by 2030. The strategy seeks to reduce GHG emissions by switching to renewable energy. A project to facilitate this is currently underway.

Plan	Overview and Relevance to the Project
Singleton Community Strategic Plan 2022-2032 	The Singleton Community Strategic Plan provides a framework to fulfill the community needs over the next 10 years. The goals of the CSP are to: • To create a community that is creative, vibrant, inclusive, safe, health and sustainable. • To create a community that is resilient, educated, inclusive, connected and engaged. • Ensure their places are sustainable, adaptable, inclusive, vibrant, connected, innovative and safe. • Ensure that the environment is valued, preserved, respected and enhanced in a sustainable way. • The economy is diversified, innovative and resilient. • The economy will embrace growth and produce security. • The council is trusted, accountable, responsible and community focused. A number of challenges and opportunities were identified through this plan. These include: • Affordable Housing. • Changing Environment. • Economic evolution and diversification. • Promote tourism.
Singleton Community Development Strategy 2022/2026 	This strategy provides a framework to achieve the Singleton Council's vision to empower the community to be healthy, inclusive, connected, resilient and prosperous through the facilitation of partnerships aimed at delivering community programs and services. The strategy identified 4 key gaps in current services and within the community more broadly: • Direct youth and mental health support outside of business hours. • Housing availability including emergency housing. • Services for young people. • Mental health services particularly for chronic or severe mental health.
Singleton Sustainability Strategy 2019-2027 	This strategy provides an overview of the directions that will be taken by the Council to promote, facilitate and support the community to achieve social, economic, and environmental sustainability. Further, it provides a framework to advance sustainability efforts within the region. Further, this strategy highlights the Council's goals for renewable energy. It highlights the importance of increasing the use of renewable energy in increasing sustainable and inclusive communities. The strategy outlines 5 key deliverables in relation to affordable and clean energy: • Council will lead by example through clean energy practices. • Increased take up of renewable energy sources for businesses and households. • More efficient use of energy by Council, households and businesses • Encourage sustainable design. • Promote affordable and clean energy
Muswellbrook Shire 2022-2032 Community Strategic Plan 	This plan outlines the community's main priorities and aspirations for the next 10 years. The goals of the CSP include: • Establish a dynamic local economy which seeks to fully employ current and future residents in a diverse range of high value industries. • Create an inclusive and interconnected community. • An environmentally sensitive and sustainable community. • A culturally rich and diverse community with strong identities, history and sense of belonging. • Establish effective and efficient infrastructure that is appropriate to the needs to the community. • Ensure collaborative and responsive leadership that meets the expectations and anticipates the needs of the community. Further, the plan outlines the key challenges and opportunities identified by the community. Those relevant to the Project include: • Uncertainty of the coal and energy industry, associated direct and indirect job losses, and impact more broadly upon the Shire's economic base. • Housing affordability and accessibility. • Land use conflict.

Plan	Overview and Relevance to the Project
	• Liveability and amenity - the extent to which the general well-being, health and quality of life of residents is supported physically, aesthetically, and in terms of accessibility. • Loss of native vegetation and vegetation connectivity. • Impacts of increasing human activity upon the local environment. Community Strategic Plan recognises the Shire's long association with mining and working closely with company's such as AGL Macquarie to "minimise the challenges and maximise the opportunities that will arise from a transition to renewable energy generation in the Shire."



APPENDIX D

Major Project Developments Review

Appendix D Major Project Developments

State Significant Development / Project Name	Location	Workforce and Timeframes	Notes on Projects Acceptance	Social Impact Considerations
Prepare EIS				
Muswellbrook Pumped Hydro Energy Storage Project	Sandy Creek, Muswellbrook LGA (18 km northwest)	Construction would occur over 4-yr period in 2026, expected completion by 2030	Received SEARs December 2023	Cumulative impacts may occur due to overlapping construction timeframes. Cumulative impacts will include a strain on local services, housing and accommodation. Given the proximity of the project to Bowmans Creek Wind Farm Stage 2, there also may be cumulative impact to visual amenity and further industrialisation of the landscape.
Maison Dieu Solar Farm	Maison Dieu, Singleton LGA (30 km south)	Construction expected to begin 2025, operational in 2026; at peak construction will provide employment and specialist training for up to 150 jobs	Issued SEARs October 2022	Cumulative impacts may occur due to overlapping construction timeframes. Cumulative impacts will include a strain on local services, housing and accommodation.
Hunter River Solar Farm	Muswellbrook, Muswellbrook LGA (32 km west)	Construction to take approx. 18 months	Issued SEARs April 2022	Cumulative impacts may occur due to potential overlapping construction timeframes. Cumulative impacts will include a strain on local services, housing and accommodation.

State Significant Development / Project Name	Location	Workforce and Timeframes	Notes on Projects Acceptance	Social Impact Considerations
Assessment				
Dalswinton Sand and Gravel Quarry	Dalswinton, Muswellbrook LGA (45 km west)	Seeking to extend extraction operation for additional 25 years post 2022, until 2047; direct employment to 12 people	A total of 7 submissions, with 4 supporting and 3 providing comment on the project. Support related to job opportunities. Comments raised concerns dust and noise.	It is unlikely that there will be any cumulative impact as the project has an existing workforce.
HVO North Open Cut Coal Continuation Project	Lemington, Muswellbrook LGA (30 km southwest)	Extend operation beyond 2025 to 2050; 1500 ongoing jobs and 600 temporary jobs across north and south	Of a total of 897 submissions, only 50 have objected to the project. 833 submissions support the project. Job security and employment opportunities were raised often in relation to the benefits of the project.	It is unlikely that there will be any cumulative impact as the project has an existing workforce.
Muswellbrook Solar Farm	Muscle Creek, Muswellbrook LGA (15km west)	Construction expected to commence Q4 2023, be commissioned by 2025; operational life >35 years	A total of 62 submissions. Of these 52 submissions opposed the project. Key concerns included impacts to biodiversity and threatened species, impacts to agricultural land, visual amenity, fire risk and the justification for renewable energy (EMM, 2024).	Cumulative impacts may occur due to overlapping construction timeframes in 2025. Cumulative impacts will include a strain on local services, housing and accommodation. Given the proximity of the project to Bowmans Creek Wind Farm Stage 2, there also may be cumulative impact to visual amenity and further industrialisation of the landscape.
Liddell Future Land Use and Enabling Works	Liddell, Muswellbrook LGA (20 km southwest)	-	A total of 24 submissions, with 18 opposing the project. Concerns relating to demolition and rehabilitation of Liddell Power Station to enable future land uses include impacts to biodiversity, water quality, soils and contamination and impacts to Aboriginal heritage	Cumulative impacts are unlikely as demolition timeframe will not overlap with the construction timeframe for the Project.

State Significant Development / Project Name	Location	Workforce and Timeframes	Notes on Projects Acceptance	Social Impact Considerations
Determination / Operation				
Muswellbrook Battery Energy Storage System	Muswellbrook, Muswellbrook LGA (27 km west)	Under construction, estimated completion late 2023; 20 year lifespan	A total of 14 submissions, with none opposing the project.	Unlikely cumulative impact as construction timeframes will not overlap
Mangoola Coal Continued Operations Project	Wybong, Muswellbrook LGA (50 km west)	Approved 2021; existing mine; continue operations until 2030; create 100 jobs; ongoing employment for 400 employees	A total of 334 submissions, with 88 opposing and 231 supporting. Support for the project was based on jobs, economic benefits, social benefits, and effective rehabilitation. Primary concerns were raised for air quality, property value, noise and social.	It is unlikely that there will be any cumulative impact as the project has an existing workforce.
Mount Pleasant Optimisation Project	Muswellbrook, Muswellbrook LGA (30 km west)	Approved 2022; increase in operational workforce to approx. 600 people; operations until 2048	A total of 268 submissions, with 106 supporting and 140 opposing. Support for the project was based on socio-economic benefits, effective rehabilitation, and good environmental management. Primary concerns were raised for air quality, human health, climate change GHG, and cumulative impacts.	It is unlikely that there will be any cumulative impact as the project has an existing workforce.
Maxwell Solar Farm	Muswellbrook, Muswellbrook LGA (25 km west)	Approved 2020; creation of approx. 50 new jobs; 30 year lifespan	Total of 14 submissions received, with three supporting and zero opposing. Support for the project was based on the solar farm addressing climate change.	Unlikely cumulative impact as construction timeframes will not overlap. Given the proximity of the project to Bowmans Creek Wind Farm Stage 2, there also may be cumulative impact to visual amenity and further industrialisation of the landscape.

State Significant Development / Project Name	Location	Workforce and Timeframes	Notes on Projects Acceptance	Social Impact Considerations
Kyoto Wind Farm	Scone, Upper Hunter Shire LGA (45 km northwest)	Energy Park approx. 466 construction jobs, 10-15 FTE operational jobs; expected to be operational by 2029	Total of 136 responses received, with 26 supporting and 73 opposing. Support was based on the project addressing climate change and creating jobs. Main concerns raised around inefficiency of wind compared to solar, rehabilitation of the area, lack of transparency and consultation, negative economic effects from reduced tourism and property values, and biodiversity.	Cumulative impacts may occur due to overlapping construction timeframes. Cumulative impacts will include a strain on local services, housing and accommodation.
Liddell Battery and Bayswater Ancillary Works	Lidell, Singleton LGA (20 km southwest)	Construction approx. 2022-2028; approx. 250 construction jobs	A total of 17 submissions, with only 1 opposing the project and 16 providing comment. Comments primarily related to procedural matters, with only four project impacts identified. This includes visual amenity, waste management and hazards,	Cumulative impacts may occur due to overlapping construction timeframes. Cumulative impacts will include a strain on local services, housing and accommodation.
Muswellbrook Battery Energy Storage System	Sandy Creek, Muswellbrook LGA(25 km northwest)	Obtained development approval July 2023, expected completion July 2024	Two submissions, with one providing comment and one opposing. Concerns related to rural amenity and the impact on future land developments.	Unlikely cumulative impact as construction timeframes will not overlap. Given the proximity of the project to Bowmans Creek Wind Farm Stage 2, there also may be cumulative impact to visual amenity and further industrialisation of the landscape.
Operational				
Dolwendee Quarry	Muswellbrook, Muswellbrook LGA (20 km west)	-	Total of 18 submission received, with seven opposing. Main concerns raised were around traffic and road safety, noise and dust, and Aboriginal cultural heritage.	Unlikely to have a cumulative impact as project is already operational.

State Significant Development / Project Name	Location	Workforce and Timeframes	Notes on Projects Acceptance	Social Impact Considerations
Bengalla Coal Mine	Bengalla, Muswellbrook LGA (32 km west)	Employs approximately 400 people. Project extended to 2039	Total of 119 submissions received, with 97 private submissions supporting. Support was based on positive employment effects, community participation and contribution, economy growth, land use and rehabilitation.	Unlikely to have a cumulative impact as project is already operational.
Mount Arthur Mine	Muswellbrook, Muswellbrook LGA (28 km west)	Employs approximately 2000 people	Underground mine: Total nine submissions, with none opposing, but all having comments. Comments were mainly made around water management, traffic, heritage conservation, and subsidence. Open cut: Total 18 submissions. Most objected to the project or had concerns, mainly relating to air quality, noise, blasting, visual and water impacts. Extension: Total 11 submissions, with three opposing. Main concerns were around noise, dust, GHG, flora and fauna, water resources, and traffic.	Unlikely to have a cumulative impact as project is already operational.
Mount Pleasant Coal Mine	Muswellbrook, Muswellbrook LGA (32 km west)	Employs approximately 600 people	Modification: Total 22 submissions received. Main concerns were around noise, vibration, and visual impacts.	Unlikely to have a cumulative impact as project is already operational.
Rix Creek Coal Mine	Singleton, Singleton LGA (42 km south)	Employs approximately 300 people	Extension: Total 140 submissions made, with 85 supporting and 46 opposing. Main concerns were raised around air quality, noise, water, and climate change.	Unlikely to have a cumulative impact as project is already operational.
Camberwell Coal Mine	Singleton, Singleton LGA (30 km south)	Employs approximately 150 people	Open Cut Part3A: Total 31 submission received. Main concerns around air quality, noise, topsoil recovery, blasting, dust, and traffic.	Unlikely to have a cumulative impact as project is already operational.

State Significant Development / Project Name	Location	Workforce and Timeframes	Notes on Projects Acceptance	Social Impact Considerations
Warkworth Coal Mine	Singleton, Singleton LGA (40 km south)	-	Continuation: Total 1974 submissions received. Of these, 1967 were individual or from special interest groups, with 1670 supporting and 297 opposing. Support was based on environmental management, social impacts, economic contributions, and employment. Concerns were mainly raised around social matters, ecology impacts, air quality, and noise.	Unlikely to have a cumulative impact as project is already operational.
Integra Underground	Glennies Creek, Singleton LGA (21 km south)	Employs approximately 230 people	Total ten submissions received, with five opposing the development. Main concerns were around subsidence, socioeconomic concerns, cumulative impacts, water, and traffic.	Unlikely to have a cumulative impact as project is already operational.
Mount Owen Mine	Muswellbrook, Muswellbrook LGA (10 km south)	Employs approximately 800 people	Continued operations: Total 233 submissions, including 221 community submissions, of which 188 were in support of the project and 29 were opposing. Support was based on future economic benefits and good environmental management. Concerns were around ecology, offsets, noise, air quality and surface water.	Unlikely to have a cumulative impact as project is already operational.
Liddell Coal Mine	Lidell, Singleton LGA (20 km southwest)	Employs approximately 340 people	Mod 8: Total 12 submission received, with three opposing. Main concerns were raised around rehabilitation, water, ecology, air quality, and climate change.	Unlikely to have a cumulative impact as project is already operational.

State Significant Development / Project Name	Location	Workforce and Timeframes	Notes on Projects Acceptance	Social Impact Considerations
Bulga Open Cut Mine	Broke, Singleton LGA (50 km south)	Employs approximately 1,020 people	Optimisation: Total 116 submission made, including 102 community and interest group submissions. Main concerns were around ecology, noise, blasting, air quality, and impacts on community.	Unlikely to have a cumulative impact as project is already operational.
Hunter Valley Operations	Lidell, Singleton LGA (26 km southwest)	Employs approximately 1,500 people	South: Total 20 submissions received, with most opposing and two providing conditional support. The main concerns included water, noise, dust, flora and fauna, community consultation processes, greenhouse gas, and Aboriginal heritage impacts.	Unlikely to have a cumulative impact as project is already operational.
Bayswater Power Station	Muswellbrook, Muswellbrook LGA (23 km southwest)	Employs approximately 600 people	Upgrade: Total 39 submissions received, including 22 from special interest groups and community, of which 16 were opposing and two were supporting. Main concerns were around ash reuse and water quality.	Unlikely to have a cumulative impact as project is already operational.



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APPENDIX D

Preliminary Visual Impact Assessment Report

Bowmans Creek Wind Farm Stage 2

Preliminary Visual Impact Assessment

moir
landscape architecture

Bowmans Creek Wind Farm Stage 2

Preliminary Visual Impact Assessment

Prepared for
Umwelt (Australia) Pty Ltd on behalf of Bowmans Creek Wind Farm Pty Ltd

Issue
D

Date
31/05/24

Project Number
2347

Revision	Date	Author	Checked	Comment
A	31/05/24	JR	AR	Draft PVIA Report for Initial Review
B	27/04/24	ES | JR	TB	For Submission
C	06/05/24	JR	TB	For Submission
D	31/02/24	JR	TB	Minor Amendments

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Glossary & Terminology

Associated Dwelling
A residences on privately owned land in respect of which the owner has reached an agreement with the Proponent with the Project and management of potential impacts.

Bioregion
An ecologically and geographically defined area characterised by its combination of geological features, climate, flora, and fauna.

Community Consultation
The process of engaging with the local community and stakeholders to gather feedback, address concerns, and involve the public in the decision-making process of the Project.

Cumulative Visual Impacts
The combined effects of multiple projects on the visual catchment in which the Project is proposed over time.

Department (DPHI)
The Department of Planning, Housing and Infrastructure

Development Application (DA)
A formal application made to seek development consent of the Project - submitted to the relevant approval authority.

Environmental Impact Statement (EIS)
An environmental impact statement prepared by or on behalf of the Proponent to accompany a development application. It involves a comprehensive assessment of the environmental, social and economic impacts of the Project.

Geographical Information Systems (GIS)
A system that captures, stores, analyses, manages and present data link to specific locations. It links this spatial data to a digital database.

Land Zoning
The classification of land for specific uses or activities - typically regulated by local environment planning documentation and/or relevant SEPP documentation.

Land Use
The way the existing land is utilised, including but not limited to residential, commercial, industrial, agricultural, or conservation purposes.

Landscape and Visual Impact Assessment (LVIA)
A technical assessment to identify and assess the potential visual effects resulting from the Project on the landscape, individual receivers and on the overall visual amenity of the region in which the Project is sited.

Landscape
All the visible features, including landform, vegetation, buildings and infrastructure, contained within a holistic area.

Landscape Character
Landscape character refers to the distinct and recognisable pattern of physical elements that occur consistently in a particular landscape. The landscape character of an area is generally defined by the most dominant landscape element or unique combination of elements that occur within that landscape. It reflects how particular combinations of geology, landforms, soils, vegetation, land use and human settlements create a particular sense of place for different areas within the landscape.

Landscape Character Units
An area of landscape with similar properties or strongly defined spatial qualities that are distinct from areas immediately nearby within the Study Area.

Local Government Area (LGA)
An administrative division of local governance and planning.

Mitigation Measures
Potential strategies or actions implemented to minimise or offset the adverse visual impacts of the Project.

Non-Associated Dwelling
A residences on privately-owned land in respect of which the owner has not reached an agreement with the applicant in relation to the development, where detailed visual assessments are required to determine if these residences are deemed as a sensitive receiver because of the Project.

Photographic Survey & Fieldwork
A systematic process of collecting visual data in the form of photographs and surveys taken from various viewpoints within the Study Area to document existing visual conditions.

Preliminary Visual Impact Assessment (PVIA)
An initial high level assessment for the purpose to inform the LVIA.

Proponent or Applicant
The individual, company, or organisation proposing the Project.

Project
The proposed development that is the subject of the PVIA, LVIA or VIA assessment.

Project Boundary
The Site where the Project is proposed.

Renewable Energy Zone (REZ)
A designated area to support renewable energy development as declared in the Electricity Infrastructure Investment Act 2020.

Secretary's Environmental Assessment Requirements (SEARs)
Secretary's Environmental Assessment Requirements (SEARs) outlines the environmental assessment requirements for State Significant Projects. The SEARs will normally include specific requirements for landscape character and visual impact assessments.

Study Area
The geographical region or area under consideration in PVIA, LVIA or VIA assessment.

Viewpoint
A specific location from which a view or landscape is observed. A viewpoint location is the geographic location or physical position (in GPS format) where the viewpoint was captured.

Visual Amenity
The overall visual quality of a landscape that considers factors including but not limited to views, natural features, and the built environment.

Visual Baseline
In the form of a desktop assessment and onsite photographic surveys/fieldwork to describe and capture the existing environmental conditions in which any future changes can be measured against.

Visual Catchment
The geographical area from which a particular view can be observed.

Visual Effects
Effects on specific views and on the general visual amenity experienced by receptors.

Visual Impact
The observable and measurable change in the visual catchment caused by the Project. This is determined by considering the visual sensitivity and magnitude.

Visual Magnitude
The degree of visual change resulting from the Project, including but not limited to the size, scale, compatibility and duration of effect.

Visual Receivers/Receptors
Individuals and/or defined groups of people who have the potential to be affected by the Project.

Glossary & Terminology

Visual Sensitivity

The susceptibility of a landscape or visual resource to absorb impacts from a Project, land use change or the introduction of a new element into the landscape.

Visual Impact Assessment (VIA)

This is the process for determining the day-to-day visual effects of a development project on people's views from the private and public domain.

Visualisation

A computer-generated simulation, photomontage or other technique illustrating the predicted appearance and/or massing of the Project within the existing landscape.

Zone of Visual Influence (ZVI)

The extent of landscape area from which the Project can potentially be theoretically viewed based on topography alone.

1.0 Introduction

1.1 Background

Moir Landscape Architecture (Moir LA) have been commissioned by Umwelt (Australia) Pty Ltd (Umwelt) on behalf of the Bowmans Creek Wind Farm Pty Ltd to prepare a Preliminary Visual Impact Assessment (PVIA) for Bowmans Creek Wind Farm Stage 2 (the Project).

The PVIA for the Project has been prepared in accordance with the *Wind Energy: Visual Assessment Bulletin* December 2016 (referred to hereafter as 'the Bulletin'). The PVIA will form part of the Scoping Report seeking the Secretary's Environmental Assessment Requirements (SEARs).

1.2 Relevant Experience

The Bulletin states: *the proponent is expected to engage professionals from relevant natural resource management and design professions (for example environmental planners, geographers, landscape architects, or other visual resource specialists), with demonstrated experience and capabilities in visual assessment to carry out a wind energy project visual assessment*.

Moir LA is a professional design practice and consultancy specialising in the areas of Landscape Architecture, Landscape Planning and Landscape and Visual Impact. Our team has extensive experience in undertaking Landscape and Visual Impact Assessments for large-scale infrastructure projects. In the context of our experience and with guidance from the Bulletin we have developed methodologies to ensure a comprehensive quantitative and qualitative assessment of the Project.

Relevant experience includes the preparation of PVIAs and Landscape Visual Impact Assessments (LVIAs) for the following Wind Energy Projects:

- Uungula Wind Farm LVIA (Wellington, NSW)
- Hills of Gold Wind Farm LVIA (Nundle, NSW)
- Thunderbolt Energy Hub Stage 1 (Kentucky, NSW)
- Valley of the Winds Wind Farm LVIA (Coolah, NSW)
- Jeremiah Wind Farm PVIA (Gundagai, NSW)
- Barneys Reef Wind Farm PVIA (Gulgong, NSW)
- Winterbourne Wind Farm LVIA (Walcha, NSW)
- Paling Yards Wind Farm PVIA (Paling Yards, NSW)
- Burrawong Wind Farm PVIA (Balranald, NSW)
- Keri Keri Wind Farm PVIA (Keri Keri, NSW)

1.3 Overview of Preliminary Visual Impact Assessment

The purpose of this PVIA is to provide a preliminary assessment of the potential visual impacts of the Project. The report has been prepared in accordance with the Bulletin.

The visual assessment process is broken into two main stages (see **Figure 01**):

Stage 1: Preliminary Environmental Assessment and
Stage 2: Environmental Impact Statement

This PVIA forms a part of Phase 1: Preliminary Environmental Assessment to be submitted to Department of Planning, Housing and Infrastructure (DPHI) together with the Scoping Report for the request for SEARs.

The requirements of Stage 1: Preliminary Environmental Assessment are as follows:

At the Preliminary Environmental Assessment stage, a process consisting of community consultation regarding key landscape values and application of preliminary assessment tools has been developed. The tools include consideration of the potential impact of the proposals on residences and key public viewpoints.

The preliminary assessment tools have been designed to assist proponents to drive better outcomes. They will assist in identifying, early in the process, the locations where wind turbines may have impacts that warrant further consideration. This in turn provides an opportunity to refine the proposed wind turbine layout to avoid or minimise impacts or justify the proposed design prior to lodgement of the application.

Proponents will be required to submit, with the request for SEARs, a Preliminary Environmental Assessment that includes a map with key information, results of community consultation and the application of the preliminary assessment tools. This will form the basis for the issue of the SEARs that will identify the matters that must be addressed in the EIS.

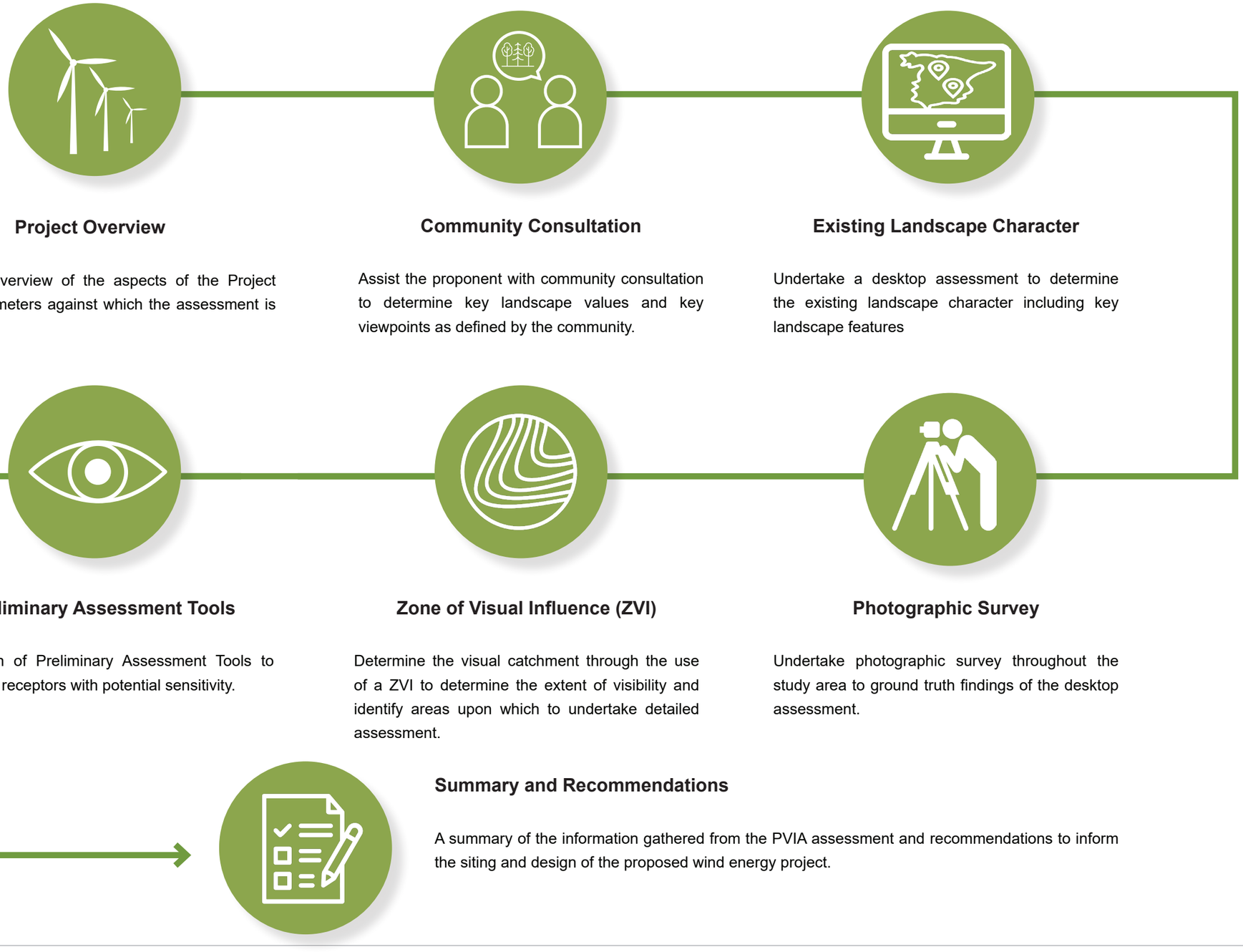


Figure 01 – Steps in Visual Impact Assessment
Source: DPHI, 2016

2.0 Study Method

2.1 Study Method

The following steps have been undertaken to develop the PVIA:



Desktop Assessment:

- Application of Preliminary Assessment Tools to determine receptors requiring further assessment.
- Preparation of a preliminary Zone of Visual Influence (ZVI) to establish a theoretical zone of visibility of the Project.
- Identification of key viewpoints and landscape features using available mapping and background documents.

Field Work:

Photographic survey work for the assessment was undertaken in **October 2023** to carry out a preliminary assessment of the existing landscape character from publicly accessible land within the Study Area (as defined in **Section 3.3**). The findings of the field work have been included in the PVIA and will form the basis for discussion with the community in the EIS Phase of the Project.

Community Consultation:

Community consultation has been undertaken through the Scoping Phase of the Project. Results of the community consultation have also been utilised to gain perspective on the landscape values held by the community to inform the PVIA. Community consultation will be continued through the EIS phase of the Project.

2.2 Report Structure

The following table provides an overview of the requirements of the Bulletin and where these have been addressed in the PVIA:

Preliminary Visual Impact Assessment Report Structure:	
PVIA Report:	**Bulletin Requirements:**
Refer to Section 3.0: Project Overview	
Refer to Section 4.0: Community Consultation	*Undertake community consultation to establish key landscape features valued by the community, key viewpoints in the area (both public and private) along with information about the relative scenic quality of the area.*
Section 5.0 : Existing Landscape Character	*Production of a map detailing key landscape features (informed by community consultation and any ground-truthing undertaken), the preliminary wind turbine layout, the location of residences and key public viewpoints, and an overlay of the wind resource.*
Section 6.0: Preliminary Assessment Tools	*Results of the preliminary assessment tools for both the visual magnitude and multiple wind turbine parameters.*
Section 7.0: Preliminary Zone of Visual Influence	*The use of Geographic Information Systems (GIS) to facilitate the application of the tools will streamline the evaluation phase of a project during the pre-lodgement stage. Most GIS systems can establish the theoretical 'zone of visual influence' of the proposal (the area from which the proposal is theoretically visible or the 'visual catchment').*
Section 8.0: Preliminary Dwelling and Viewpoint Assessment	*The visual assessment will involve the combination of desktop and field evaluations of the proposed wind energy project and its various components, turbines and ancillary facilities. The visual performance objectives form the principal framework and guide for assessing the proposed wind energy project when applied to individual viewpoints. All key public viewpoints and individual residences within the visual catchment should be identified and assessed.*
Section 9.0: Cumulative Visual Impacts	*Address potential cumulative impacts of wind energy projects in the region (the proposed wind energy project, as well as existing and approved projects)*
Section 10.0: Summary and Recommendations	

Table 01 – Overview of Report Structure

3.0 Project Overview

3.1 Project Overview

Bowmans Creek Wind Farm Pty Ltd, on behalf of Ark Energy Pty Ltd (the Proponent) is seeking development consent for construction, operation and decommissioning of the Project. The Project is situated approximately 21 km from Muswellbrook in New South Wales (NSW), located in both the Muswellbrook and Singleton Shire Councils Local Government Areas (LGA). Refer to **Figure 02**.

The Project will comprise up to 21 wind turbines (WTGs) with an estimated combined capacity of approximately 120 megawatts (MW) and electrical transmission infrastructure that will connect the Project to the existing high-voltage network.

The additional wind farm infrastructure associated with the Project is proposed to increase capacity of the 'Bowmans Creek Wind Farm' (SSD-10315) (Stage 1) already progressed through the NSW planning and approvals pathway. Because of the scale of additional infrastructure, and other requirements under the NSW planning system, the Project is proposed as a separate State Significant Development (SSD) to that already advanced under Stage 1.

The Stage 1 project consists of the construction, operation, maintenance and decommissioning of up to 54 wind turbines generators (WTGs) with ancillary infrastructure, substations and transmission line infrastructure to connect to the existing TransGrid network. Stage 1 was approved by the NSW Independent Planning Commission (IPC) on 6 February 2024.

3.2 Project Boundary

The Project Boundary covers an approximate land area of 3,551 hectares. It is defined as the land enclosed by the Stage 2 Project Boundary shown in **Figure 03**.

The properties within the Project Boundary are primarily used for agricultural grazing activities.

3.3 Study Area

For the purpose of this report, the Study Area refers to the Project Boundary and the surrounding land up to approximately 8 km from the nearest turbine (Refer to **Figure 03**). The nearest points of interest within the Study Area include Mount Royal National Park, Lake St Clair, Lake Liddell, and the associated mining and energy production infrastructure in close proximity.

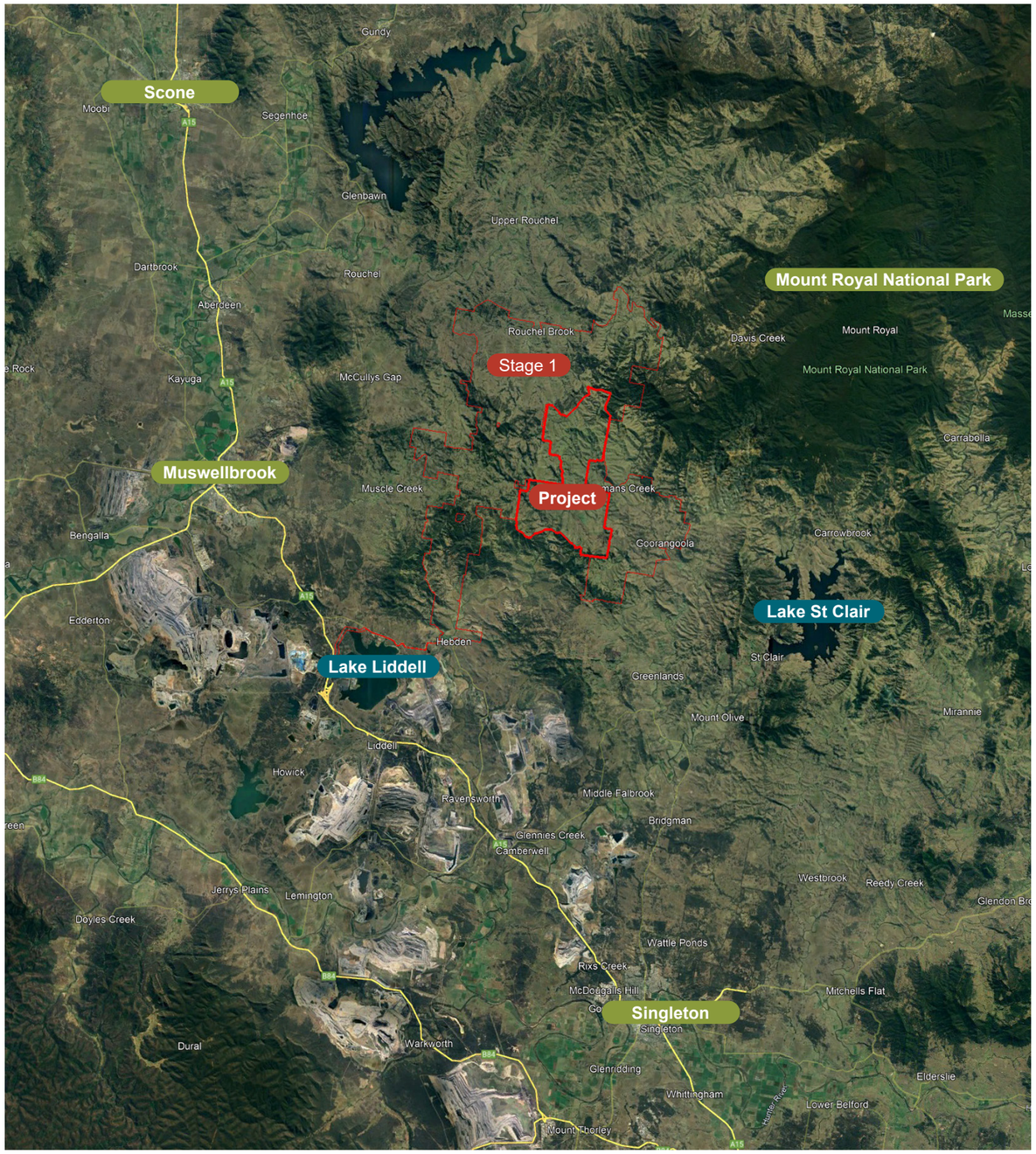


Figure 02 – Regional Context
Source: Google Earth, 2023

3.4 The Project

The Project would include the following key components:

- up to 21 (3 blade) WTGs, with a maximum blade-tip height of 250 m and a hub height of 160 m above ground level (AGL) power infrastructure providing connection to the National Electricity Market (NEM), including:
- one (1) on-site collector substation and associated medium voltage transmission line connecting the on-site substation to the Stage 1 project electrical reticulation network;
- one (1) overhead transmission line connecting the proposed wind turbines in the south of the Project Boundary to the Stage 1 project electrical reticulation network;
- an internal electrical reticulation network (i.e., underground 33 kV transmission lines) connecting all turbines to the Stage 1 project electrical reticulation network;
- other associated permanent infrastructure including hardstands, new access tracks, upgrades to existing access tracks, and access point/s from public roads
- permanent and temporary meteorological monitoring masts.

Temporary construction facilities proposed to facilitate the construction of the Stage 1 project will be utilised for the construction of this Project (i.e., Stage 2), including:

- construction compound/s and site office buildings and storage areas, including fencing and screen as required;
- on-site concrete batching plants for use during the construction phase;
- laydown areas used for wind turbine installation and storage of wind turbine components;
- potential construction material areas such as borrow pits, quarry and rock crushing facilities.

The operations and maintenance (O&M) facility proposed in Stage 1 would also be utilised for Stage 2.

Ongoing refinement of the proposed layout and technology would continue throughout the EIS process in response to engineering design refinements, landholder negotiations and outcomes of environmental and social assessments.

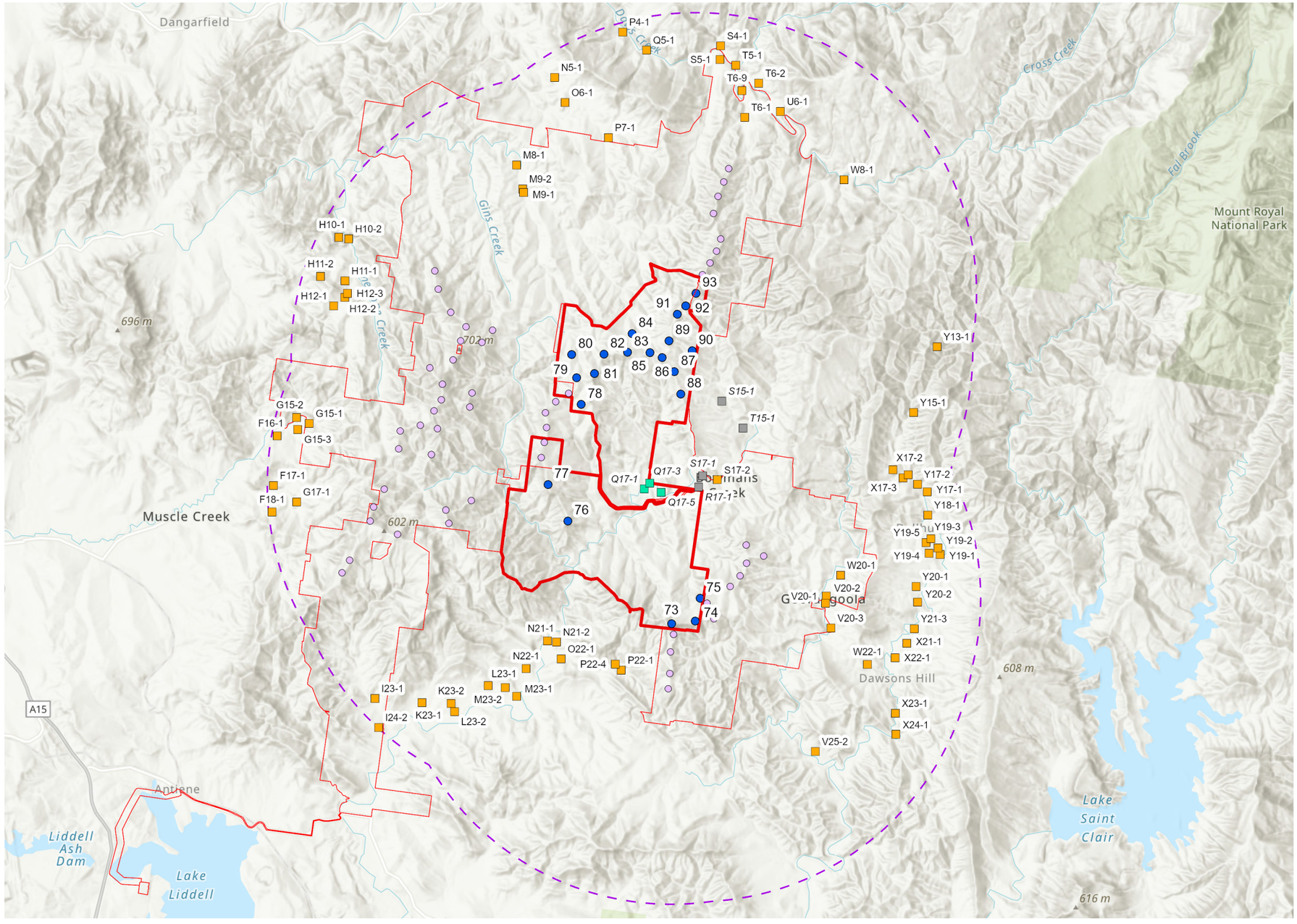
The operational lifespan of the Project will be approximately 30 years. Depending on the selected technology, components may be replaced and/or upgraded to extend this timeframe. The Project would be subject to additional environmental assessment if the timeframe were to extend.

3.5 Other Definitions

For this assessment, ‘associated residences’, are defined as residences on privately owned land in respect of which the owner has reached a private agreement with the Proponent in relation to the Project and management of impacts referred to as ‘associated residences’.

'Host residences' are defined as residences on privately owned land by those hosting the Project and in a private agreement with the Proponent.

‘Non-associated residences’ are defined as residences on privately owned land on which the owner has not reached an agreement with the applicant in relation to the Project.



Project Layout

Refer to Section 3.4

LEGEND

- Project Boundary (Stage 1)
- Project Boundary (Stage 2)
- Approved Turbine (Stage 1)
- Proposed Turbine (Stage 2)
- Host Residence
- Associated Residence
- Non-Associated Residence
- Study Area (8,000 m from nearest WTGs)

0 1 2 4 6 8 km

Figure 03 – Project Layout
Basemap Source: ESRI, 2023

4.0 Community Consultation

4.1 Overview of Community Consultation Process

In accordance with the Bulletin: *"Community consultation at this early stage may be broad, but should include discussions about the proposed Wind Farm Site, likely corridors of development, or preliminary turbine layouts and must involve people from the visual catchment."* (DPHI, 2016).

The purpose of community consultation undertaken in the preparation of the PVIA is to:

- Establish key landscape features
- Defined areas of scenic quality; and
- Identify key public viewpoints valued by that community.

Community consultation will continue through the EIS phase of the Project and this will further help inform the key landscape features and values prevalent in the region.

4.2 Results of Community Consultation

Understanding the community's perception towards the proposed development is an intrinsic component of the Landscape and Visual Impact Assessment process. A CSIRO study published in 2012: *Exploring community acceptance of rural wind farms in Australia* provides a snapshot of community acceptance levels regarding Australian wind farms from a variety of stakeholder perspectives. It found that levels of acceptance among the public are highly subjective and can differ depending on location, local context and place attachment (Hall, Ashworth, and Shaw, 2012).

In accordance with the Bulletin, ongoing community consultation was undertaken by the Proponent in Q1 2024. The Proponent conducted presentations and online surveys for the community.

Below are extracts from the community survey relating to visual and visual amenity, noting no key public viewpoints or defined areas of scenic quality were identified:

What do you see as the negative impact associated with the current Project (Stage 2) and why? What could Ark Energy do to reduce these impacts:

- *Decline of Visual Amenity (5 responses - 45.5%)*
- *Industrialisation of the Landscape (1 response - 9.1%)*
- *Navigation Lights (3 responses - 27.3%); and*
- *Light Flicker (1 response - 9.1%)*

Note decline to visual amenity was raised five times and therefore was the highest rated impact.

Below are the summary of quotes received as part of the survey relating to visual concerns:

- *"Visual impact on existing Stage 1 participants";*
- *"Landscape change, concern with Stage 1";*
- *"Visual; due to the enormous height of the turbines it will be impossible to remove them from the view just about anywhere";*
- *"Social amenity Navigation lights - seeing the night lights – current have excellent visual amenity – but will change their we can see the red lights / will it be a small clicker or more noticeable. Visual amenity";*
- *"Assume that lights will impact us – the red lights will light up the sky particularly in fog or cloud",*
- *"Screening won't work for visual (take time to grow)"; and*
- *"Light Flicker".*

5.0 Existing Landscape Character

5.1 Overview of Bioregion

The Project Boundary is located on the southern boundary of the North Coast Biogeographic Regionalisation of Australia (IBRA) Bioregion (refer to **Figure 04**), which extends along the east coast of NSW from just north of Newcastle to just inside the Queensland border. The boundary to the Sydney Basin Bioregion adjoins the Project to the south. This Bioregion covers approximately 7.11% of NSW.

The North Coast Bioregion is diverse due to the geological and topographical variations across the region. It spans northern NSW from the shoreline to the Great Escarpment, encompassing a range of topographical features, including coastal sand barriers, low foothills and ranges, to the steep slopes and gorges of the Great Escarpment. The Project straddles both the Upper Hunter and Tomalla IBRA sub-bioregions. **Images 01 & 02** illustrate the typical character of the landscape within the Study Area.



Image 01 – Gently Undulating Topography within Study Area

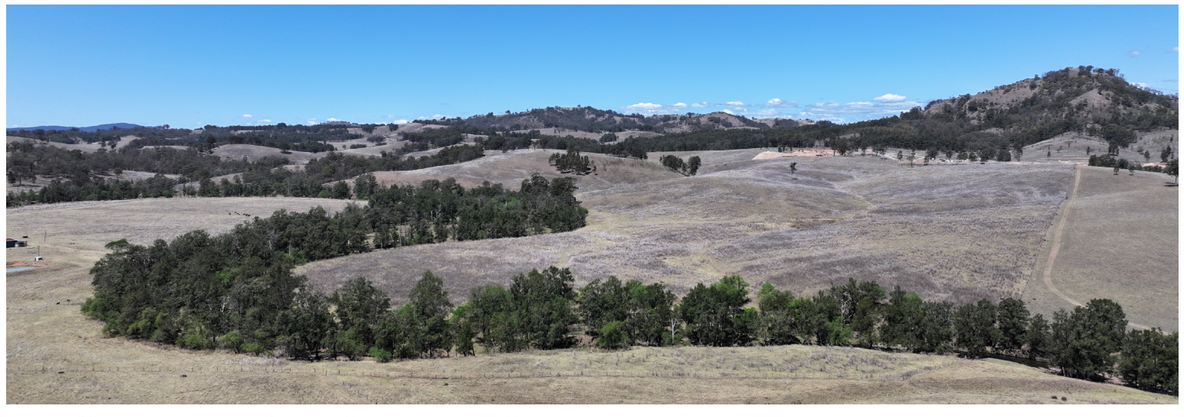


Image 02 – Vegetation & Pasture Character within Study Area

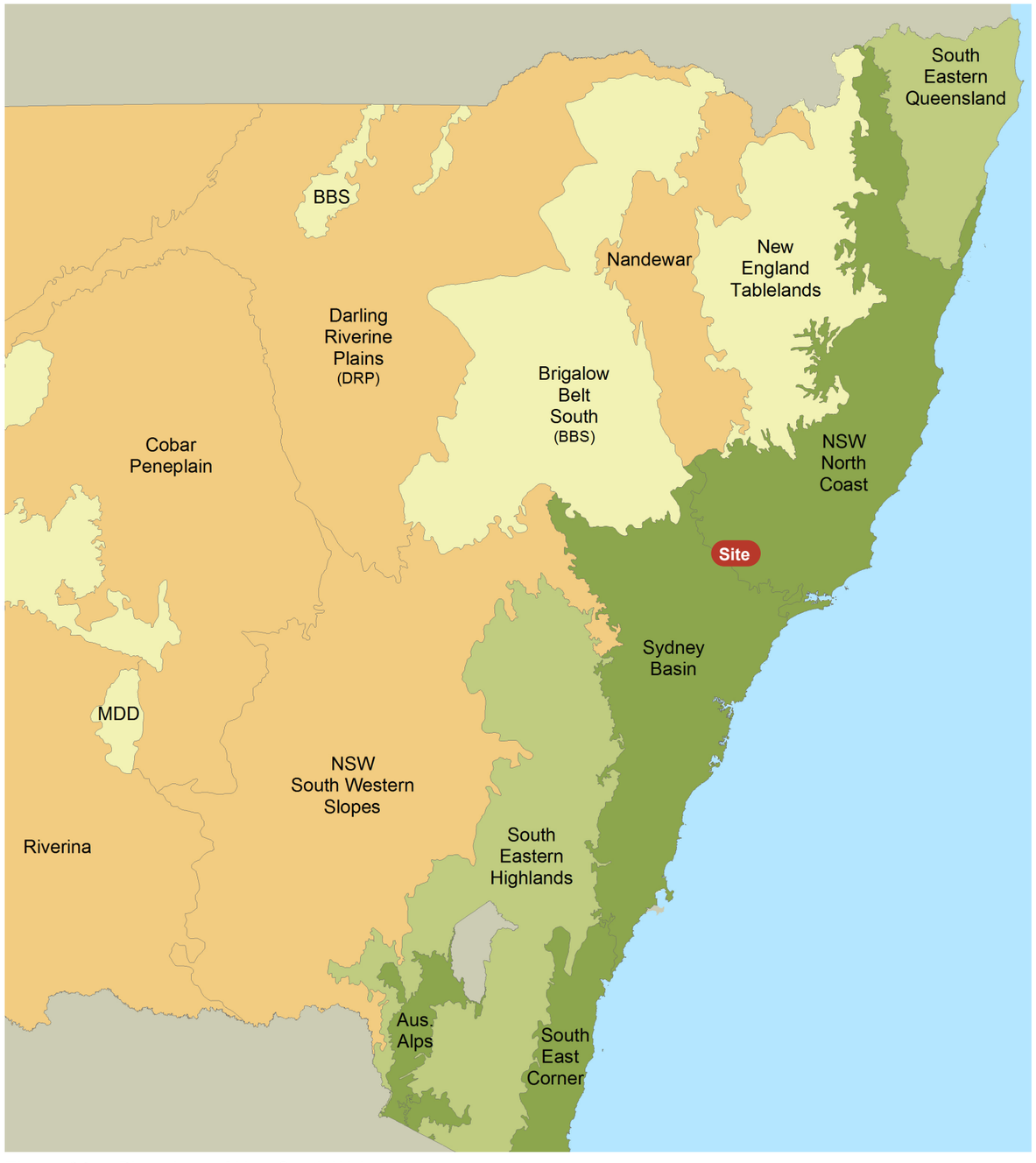


Figure 04 – Bioregions of New South Wales
Source: NPWS, 2018

5.2 Land Zoning

The Project is located within the extents of both the Singleton LGA and the Muswellbrook LGA. The following provides an overview of the main land use zoning within the Study Area (see **Figure 05**):

RU1 - Primary Production

The land within and surrounding the Project Boundary is predominantly zoned RU1 - Primary Production in both the Singleton and Muswellbrook LGAs' Local Environment Plans (LEP). The Muswellbrook LEP 2009 states the following objectives of the RU1 zoning relevant to the visual impact assessment.

- *To minimise the fragmentation and alienation of resource lands*
- *To minimise conflict between land uses within this zone and land uses within adjoining zones*
- *To maintain the rural landscape character of the land in the long term*
- *To protect or conserve (or both) trees and other vegetation*

The Singleton LEP 2013 states the following objectives of the RU1 zoning relevant to the visual impact assessment.

- *To minimise conflict between land uses within this zone and land uses within adjoining zones*

RU2 - Primary Production

The land approximately 5 km east of the Project Boundary below Mount Royal National Park is zoned RU2—Rural Landscape in the Singleton LEP. The Singleton LEP 2013 states the following objectives of the RU2 zoning relevant to the visual impact assessment.

- *To maintain the rural landscape character of the land.*

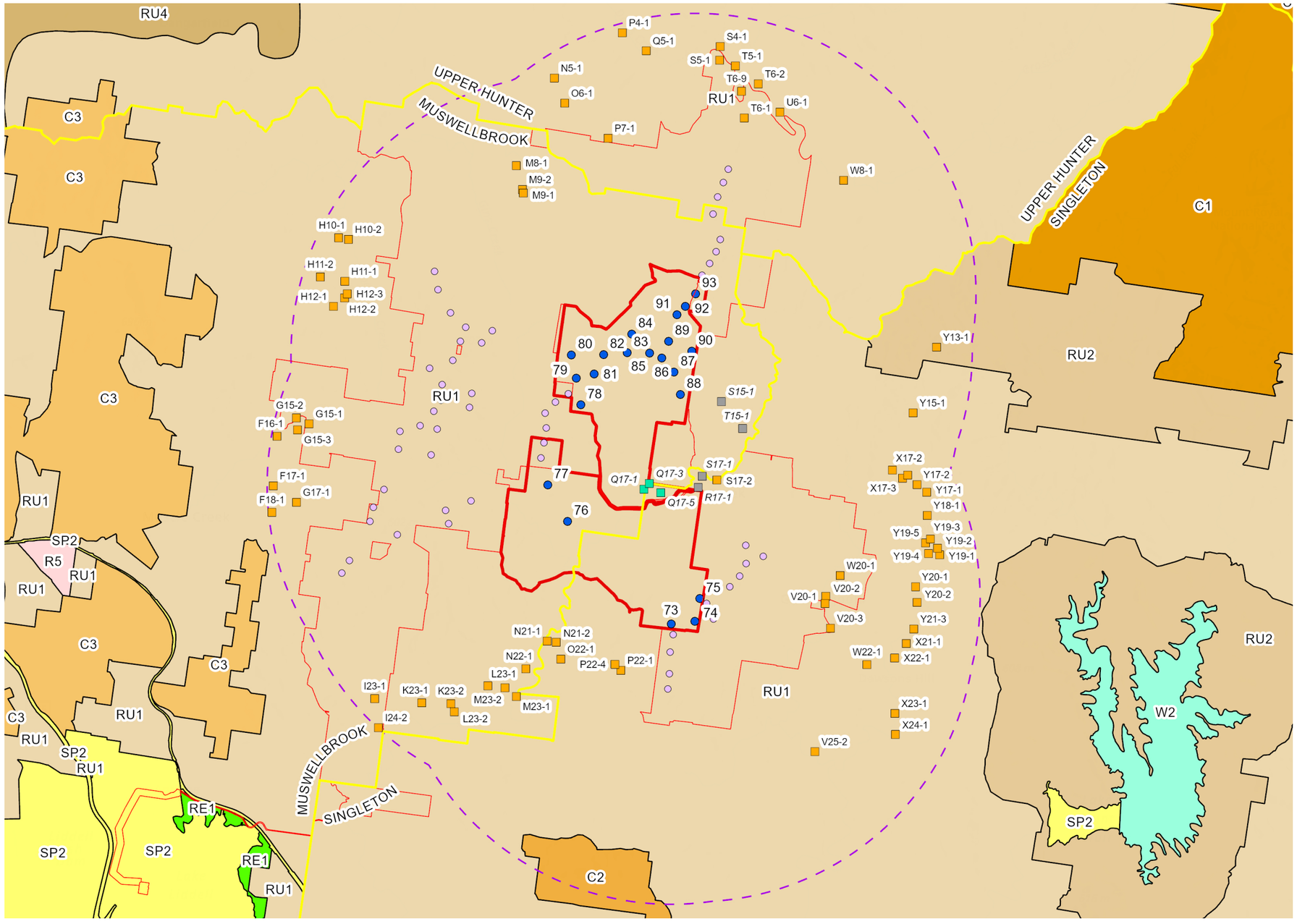
C2 - Environmental Conservation

The land approximately 6km south of the Project Boundary is zoned under the Singleton LEP 2013. This land, within the C2 zoning, is part of the Ravenworth State Forest. The objectives of the C2 zoning include:

- *To protect, manage and restore areas of high ecological, scientific, cultural or aesthetic values.*
- *To prevent development that could destroy, damage or otherwise have an adverse effect on those values.*

Land Zoning

Refer to Section 5.2



LEGEND

- Project Boundary (Stage 1)
- Project Boundary (Stage 2)
- Approved Turbine (Stage 1)
- Proposed Turbine (Stage 2)
- Host Residence
- Associated Residence
- Non-Associated Residence
- Study Area (8,000 m from nearest WTGs)
- Local Government Area
- C1 - National Parks and Nature Reserves
- C2 - Environmental Conservation
- C3 - Environmental Management
- R5 - Large Lot Residential
- RE1 - Public Recreation
- RU1 - Primary Production
- RU2 - Rural Landscape
- RU4 - Primary Production Small Lots
- SP2 - Infrastructure
- W2 - Recreational Waterways

0 1 2 4 6 8 km

Figure 05 – Land Zoning
Source: SEED, 2023

5.3 Land Use

Land use within and around the Project Boundary predominantly consists of agricultural production activities. The Project will be situated in areas currently dedicated largely to grazing on modified and native pastures (see **Figure 06**). These areas are mostly undulating, cleared to partially cleared, and open with agricultural associations.

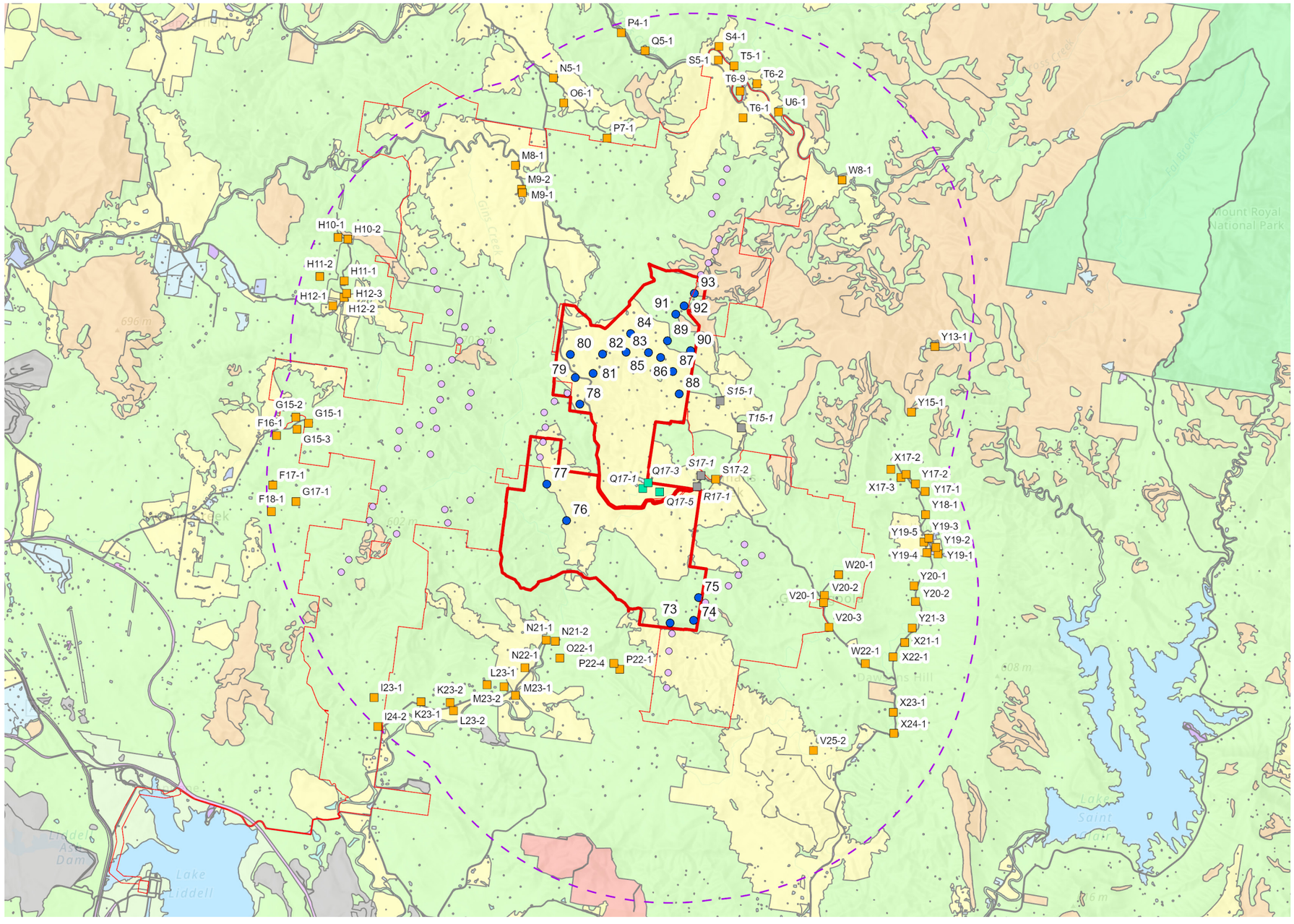
Mount Royal National Park is located approximately 8.5 km northeast of the Project. Land within the National Park is used for nature conservation. The undulating land northeast of the Project and adjoining Mount Royal National Park is generally subject to minimal use.

Pockets of land associated with Ravensworth State Forest, situated approximately 8.2 km south of the Project Boundary, are used for productive native forestry purposes.

It is noted that land to the southwest of the Project, just outside of the Study Area, is used for a variety of power and extractive industries associated with the Liddell and Baywater Power Stations and other mines in the area.

Land Use

Refer to Section 5.3



LEGEND

- Project Boundary (Stage 1)
- Project Boundary (Stage 2)
- Approved Turbine (Stage 1)
- Proposed Turbine (Stage 2)
- Host Residence
- Associated Residence
- Non-Associated Residence
- Study Area (8,000 m from nearest WTGs)
- 1.1.0 Nature conservation
- 1.2.0 Managed resource protection
- 1.3.0 Other minimal use
- 2.1.0 Grazing native vegetation
- 2.2.0 Production native forests
- 3.2.0 Grazing modified pastures
- 3.3.0 Cropping
- 3.4.0 Perennial horticulture
- 4.2.0 Grazing irrigated modified pastures
- 4.3.0 Irrigated cropping
- 5.1.0 Intensive horticulture
- 5.2.0 Intensive animal production
- 5.4.0 Residential and farm infrastructure
- 5.5.0 Services
- 5.6.0 Utilities
- 5.7.0 Transport and communication
- 5.8.0 Mining
- 6.1.0 Lake
- 6.2.0 Reservoir/dam

0 1 2 4 6 8 km

Figure 06 – Land Use
Source: SEED, 2019

5.4 Key Landscape Features and Viewpoints

The Bulletin states that *'proponents must identify key landscape features, dwelling locations, and key public viewpoints'*. The following section provides an overview of the key features identified within and around the Study Area (refer to **Figure 07**).

5.4.1 Geology and Landform

The Project Boundary is situated on the foothills and slopes associated with the Mount Royal Range, comprising shales, sandstones, conglomerates, volcanics, and coal measures (Environment NSW, 2019). Its surroundings are primarily characterized by undulating to rolling hills with narrow valleys transitioning to wide valleys adjoining creeks and rivers to the south of the Study Area. General elevations range from approximately 200m in the valley flats to 800m along the ridgelines associated with Mount Royal. Undulating to steep foothills and ridgelines associated with the Mount Royal Range National Park occur to the northeast of the Project Boundary.

5.4.2 Vegetation Character

Native vegetation is largely located along the undulating hills, ridgelines, and steep valleys associated with the foothills of Mount Royal. These areas are dominated by remnant native vegetation, including forest and open woodland of white box, forest red gum, narrow-leaved ironbark, grey box, grey gum, spotted gum, rough-barked apple, and extensive stands of swamp oak in upper reaches and foothills. Accessible areas used for agriculture are generally cleared grasslands and are primarily used to support grazing.

5.4.3 Rivers and Creeks

Bowmans Creek runs in a generally northeast/southeast direction through the centre of the Project Boundary. The headwaters of the creek start at Mount Royal National Park, eventually flowing into the Hunter River to the south of the Project Boundary.

A number of small creek lines traverse the Project Boundary and are tributaries, including Alexander Creek. There are also several dams that provide irrigation for livestock.

5.4.4 Roads and Highways

Albano Road runs in a generally north/south direction through the centre of the Project Boundary. Albano Road is a low-use unsealed road providing access between rural properties to the New England Highway.

5.4.5 Nature Reserves, State Conservation Area, and National Park

Mount Royal National Park is located approximately 8.5 km northeast of the Project Boundary. It is connected to the Barrington Tops National Park and State Conservation Park, forming part of the World Heritage Area representing the southern-most part of the Subtropical and Temperate Rainforest Parks of Eastern Australia (Adam, 1987). Notably, the portion of Mount Royal National Park closest to the Study Area does not form part of the world heritage listing. Mount Royal National Park contains various rainforest and eucalypt forest communities. There are two walking trails within the National Park: Pieries Peak Track and Carrow Brook Walking Track, both located more than 15 km from the Project Boundary. There are a limited number of fire trails running through the southwestern portion of the park, closest to the Study Area. Outside of this, due to the lack of access, there are limited publicly dedicated recreational opportunities.

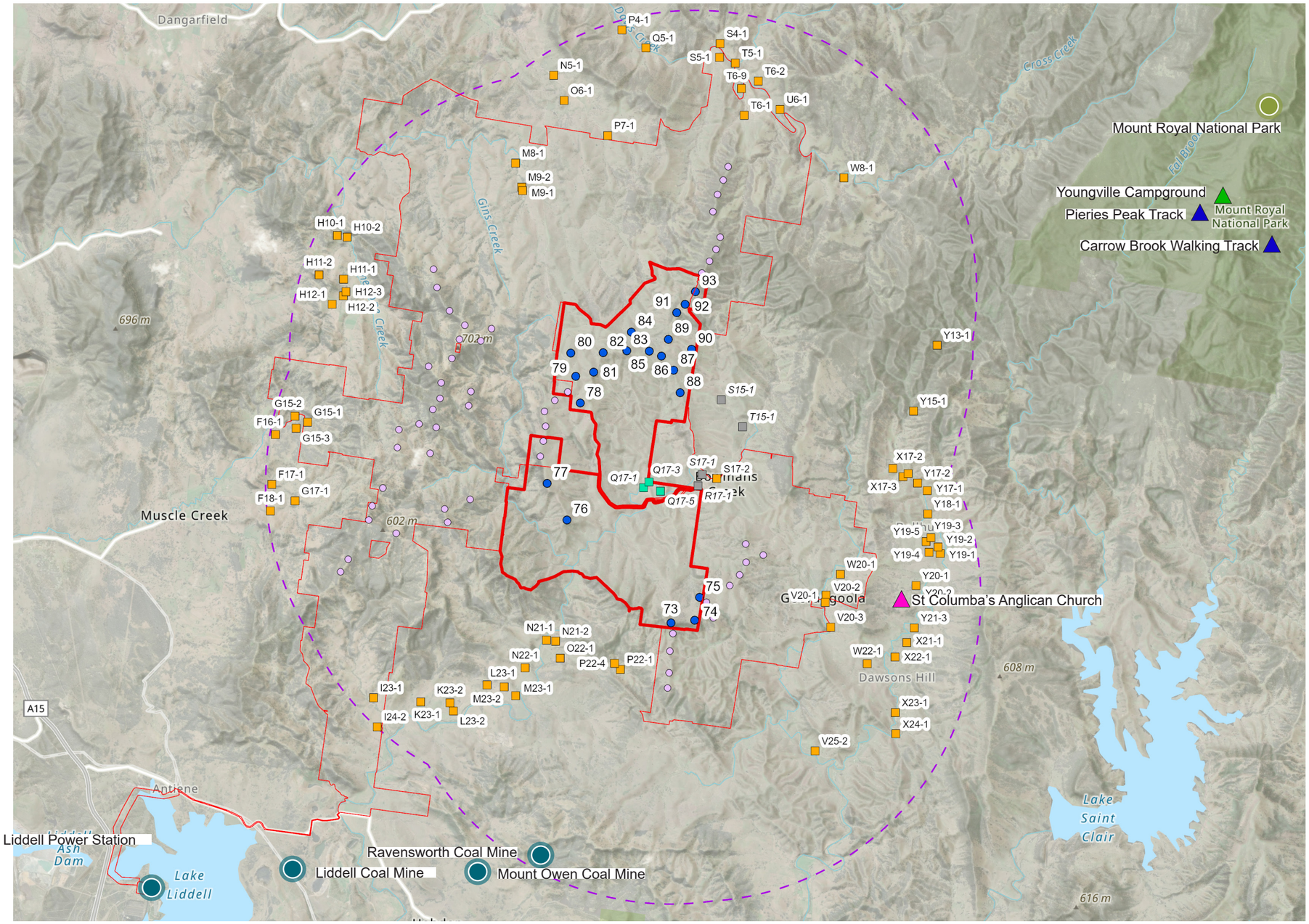
Ravensworth State Forest is located to the south of the Project. There are no noted public recreational amenities within the State Forest. However, the vegetated ridgeline provides an essential visual barrier between views to the north towards the Mt Owan Open Cut Coal Mine and Ravensworth Coal Mine to the south.

5.4.6 Campgrounds and Points of Interest

Recreational associations occur mostly within the extents of Taralga to the Mount Royal National Park, including the two walking trails mentioned above along with the Youngville Campground.

Existing Landscape Features

Refer to Section 5.4



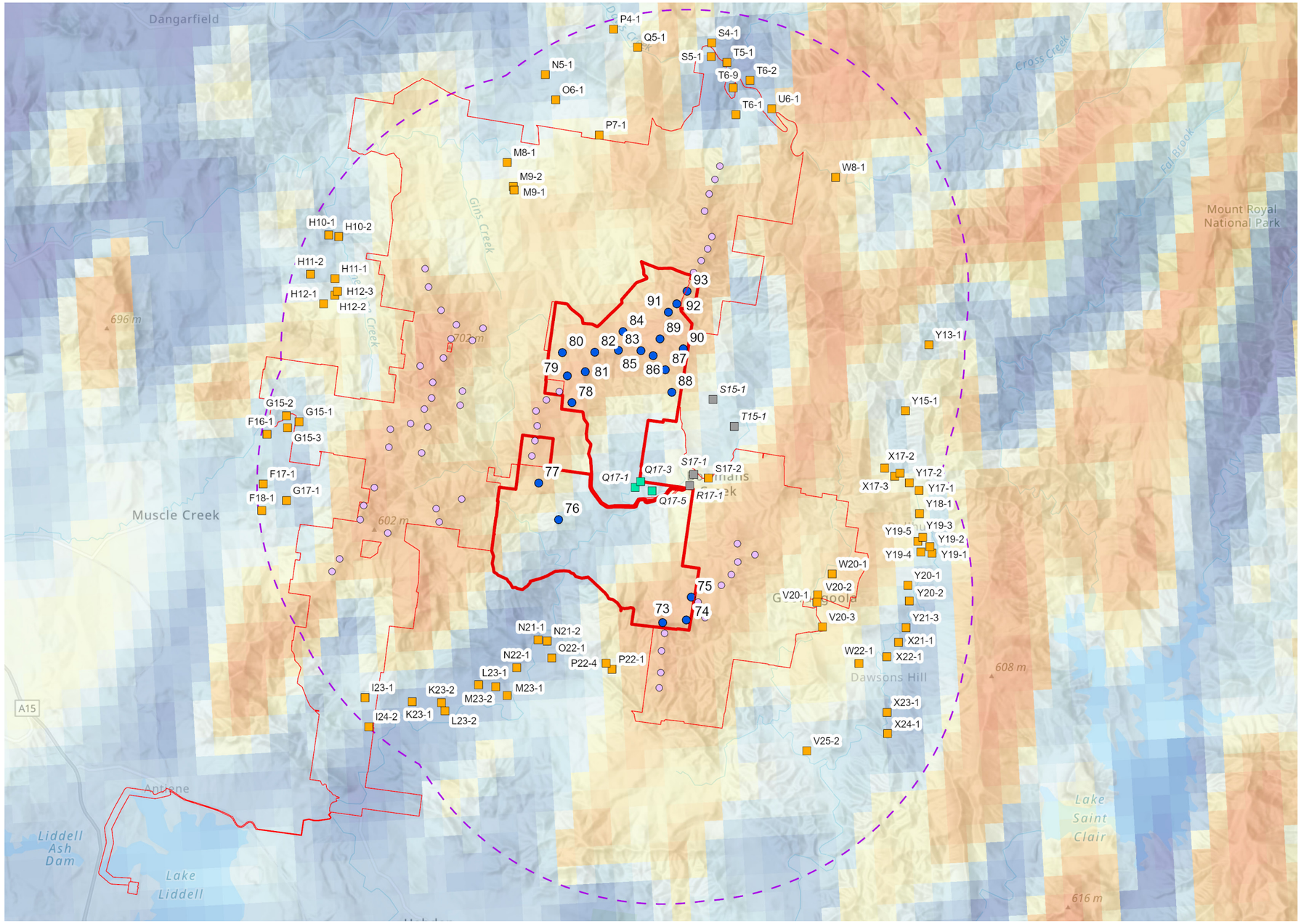
LEGEND

- Project Boundary (Stage 1)
- Project Boundary (Stage 2)
- Approved Turbine (Stage 1)
- Proposed Turbine (Stage 2)
- Host Residence
- Associated Residence
- Non-Associated Residence
- Study Area (8,000 m from nearest WTGs)
- Mining & Energy Infrastructure
- Highpoints / Peaks
- Lakes
- Campgrounds
- Church / Cemetery
- Walking Trails

0 1 2 4 6 8 km

Figure 07 – Existing Landscape Features
Basemap Source: ESRI, 2023

Wind Resource



LEGEND

- Project Boundary (Stage 1)
- Project Boundary (Stage 2)
- Approved Turbine (Stage 1)
- Proposed Turbine (Stage 2)
- Host Residence
- Associated Residence
- Non-Associated Residence
- Study Area (8,000 m from nearest WTGs)

WIND SPEED

Wind Speed **100 m** above ground level (**metres per second**)

- High (10.2 m/s)
- Mid (6.3 m/s)
- Low (2.4 m/s)

0 1 2 4 6 8 km

Figure 08 – Wind Resource & Existing Landscape Features
Basemap Source: ESRI, 2023

5.5 Preliminary Landscape Character Units & Scenic Quality

The Bulletin states: *"(...) the baseline study inputs, including key landscape features and sensitive land use designations, should lead to the identification of Scenic Quality Classes. Scenic quality refers to the relative scenic or aesthetic value of the landscape based on the relative presence or absence of key landscape features known to be associated with community perceptions of high, moderate or low scenic quality. It is both a subjective and complex process undertaken by experts in visual impact assessment, taking into account community values identified in early community consultation"* (DPHI, 2016).

Each category of the 'Frame of Reference' has been quantified for each Landscape Character Unit to determine a Scenic Quality Rating of **Low**, **Moderate** or **High**. The resulting Scenic Quality Rating is used during the EIS phase to assist in defining the Visual Influence Zones in accordance with the Bulletin.

Viewpoint Type	Low Scenic Quality	Moderate Scenic Quality	High Scenic Quality
Landform	• Large expanses of flat or gently undulating terrain. • Indistinct, dissected or unbroken landforms that provide little illusion of spatial definition or landmarks with which to orient	• Steep, hilly and undulating ranges that are not visually dominant • Broad shallow valleys • Moderately deep gorges or moderately steep valley walls • Minor rock outcrops	• Isolated peaks, steep rocky ridges, cones or escarpments with distinctive form and/or colour contrast that become focal points • Large areas of distinctive rock outcrops or boulders Well defined, steep sided valley gorges
Vegetation	• Extensively cleared and cropped areas with very limited variation in colour and texture • Pastoral areas, human created paddocks, pastures or grasslands and associated buildings typical of grazing lands	• Predominantly open forest or woodland combined with some natural openings in patterns that offer some visual relief • Vegetative stands that exhibit a range of size, form, colour, texture and spacing including human influenced vegetation such as vineyards, and orchards	• Strongly defined patterns with combinations of native forest, naturally appearing openings, streamside vegetation and/or scattered exotics • Distinctive stands of vegetation that may create unusual forms, colours or textures in comparison to surrounding vegetation
Waterbodies	• Absence of natural waterbody • Farm dams, irrigation canals or stormwater infrastructure	• Intermittent streams, lakes, rivers, swamps and reservoirs	• Visually prominent lakes, reservoirs, rivers, streams, wetlands and swamps • Presence of harbour, inlet, bay or open ocean
Social & Cultural	• Places of worship, cemeteries/memorial parks, private open spaces	• Local heritage sites • Distinguishable entry ways to a regional city identified in the Transport and Infrastructure SEPP	• Culturally important sites, world heritage areas, national parks/reserves, • Commonwealth and state heritage sites
Human Presence	• Dominating presence of infrastructure, human settlements, highly modified landscapes and higher density populations such as regional cities, industrial areas, agricultural transport or electricity infrastructure	• Dispersed yet evident presence of human settlement such as villages, small towns, isolated pockets of production and industry, lower scale and trafficked transport infrastructure	• Natural/undisturbed landscape • Minimal evidence of human presence and production

Table 02 – Scenic Quality Frame of Reference
Source: Adapted from the DPHI Technical Supplement - LVIA

5.6 Preliminary Landscape Character Units

Based on assessment of the existing character, most areas within and around the Project Boundary are used for grazing and cropping. A number of ephemeral creeks and rivers have also been identified in the Study Area.

A number of Landscape Character typologies exist within the Study Area (refer to **Figure 09**). As part of the Preliminary Landscape Character Assessment, a total of four (4) Landscape Character Units (hereafter referred to as 'LCUs') have been identified within the Study Area of the Project.

Table 03 provides an overview of the LCUs with preliminary Scenic Quality Ratings applied. These ratings have been developed using the Frame of Reference provided in **Table 02** and the Bulletin. The LCUs and Scenic Quality Ratings will be refined in the EIS Phase of the Project to reflect input provided by the community during ongoing consultation, and ongoing development of the Project design.

Landscape Character Units			
LCU	**Name**	**General Character**	
LCU01	**National Parks & Nature Reserves**	Lands within the extents of national parks and nature reserves with distinct topographic character, vegetation and unique landscape features.	**MODERATE**
LCU02	**Vegetated Hills**	Undulating hillsides with patchy to dense vegetation that is typical of the Upper Hunter subbioregion. Some areas aligning LCU03 are partially cleared areas are used for grazing.	**MODERATE**
LCU03	**Pastures & Rural Residential Properties**	Gentle undulations that have been cleared to support agricultural activities such as grazing and cropping. Remnant vegetation is patchy and scattered.	**LOW**
LCU04	**Mining & Electrical Production Infrastructure**	These areas consist of extensive mining activities with highly modified topography and electrical infrastructure present including transmission lines and substations. Some waterbodies including Lake Liddell are located near substation infrastructure.	**LOW**

Table 03 – Overview of Landscape Character Units

LCU01 - National Parks & Nature Reserves

Prominent vegetated hills and peaks are visually striking and an expansive landscape feature providing a backdrop to immediate region. These notable vegetated hills and mountains can be observed in both close proximity and from a distance. This includes Mount Royal National Park and Ravensworth Nature Reserve. Refer to **Image 03** and **Image 04**.



Image 03 – Mount Royal National Park



Image 04 – Prominent Vegetated Hills & Peaks

LCU02 - Vegetated Hills

Vegetated hills and ridgelines stand out as visually prominent in the midground of distant views. They bring a significant degree of topographical variety, maintaining visual uniformity in colour and texture to that of LCU01 because of the scattered remnant vegetation present. Refer to **Image 05** and **Image 06**.

LCU03 - Pastures & Rural Residential Properties

Modified pasture hills and ridges form a visually landform of a moderate scale, partially enclosed between vegetated ridgelines and distant prominent hills and mountains. These undulations typically create distinct backdrops to the immediate surrounds. Rural properties, dispersed across the landscape, constitute small-scale built elements integrated within surrounding landforms. Positioned on various terrains, from level ground to sloping hillsides, only a few properties in elevated locations. Refer to **Image 07** and **Image 08**

LCU04 - Mining & Electrical Production Infrastructure

Mining operations create visually prominent, medium to large-scale landscape features that are discernible at various distances. The presence of mining and electrical infrastructure introduces visual changes and, in some areas, contrasts, depending on the appearance of the excavated materials. Constructed bunds and overburden stockpiles are commonly used to contain excavated voids, influencing the overall visual character of the landscape. Refer to **iImage 09** and **Image 10**.



Image 05 – Vegetated Undulations



Image 06 – Changes in Topographic Character



Image 07 – Modified Pastures & Isolated Creeks



Image 08 – Modified Pastures & Rural Properties



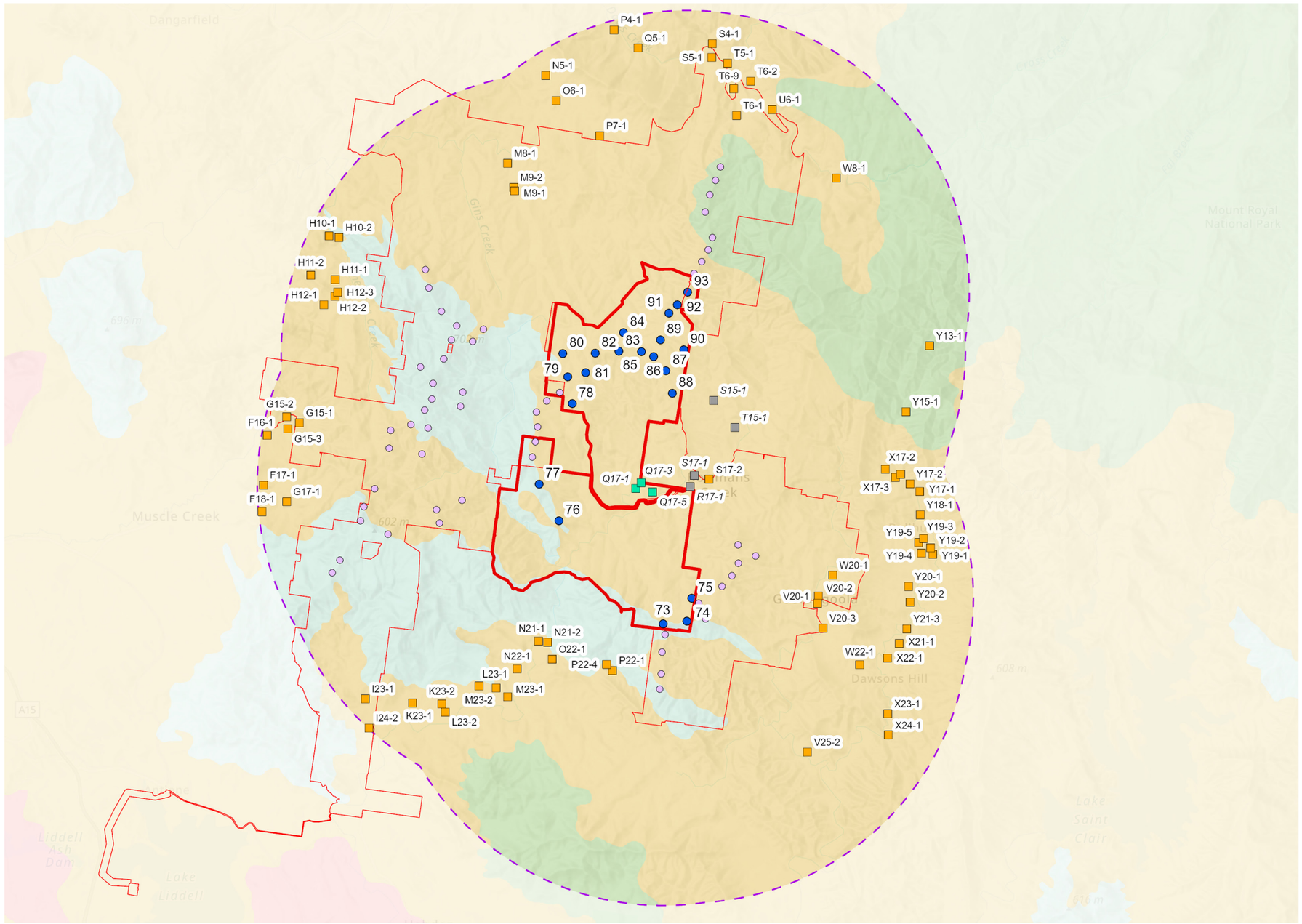
Image 09 – Large Scale Mining Practices



Image 10 – Lake Liddell Power Station

Preliminary Landscape Character Units

Refer to Section 5.5



LEGEND

- Project Boundary (Stage 1)
- Project Boundary (Stage 2)
- Approved Turbine (Stage 1)
- Proposed Turbine (Stage 2)
- Host Residence
- Associated Residence
- Non-Associated Residence
- Study Area (8,000 m from nearest WTGs)
- LCU01 - National Parks & Nature Reserves
- LCU02 - Vegetated Hills
- LCU03 - Pastures & Rural Residential Properties
- LCU04 - Mining & Electrical Production Infrastructure

0 1 2 4 6 8 km

Figure 09 – Preliminary Landscape Character Units (LCUs)
Source: SEED, 2019

6.0 Preliminary Assessment Tools

6.1 Overview of Preliminary Assessment Tools

To assist in defining the visual catchment, preliminary assessment tools have been developed in the Bulletin. In accordance with the Bulletin, the purpose of the preliminary assessment tools are: *"to provide an early indication of where turbines require careful consideration because of potential visual impacts. The tools apply to both residences and key public viewpoints in the study area. The tools provide an early indication of where placement of turbines will require further assessment and justification, and where consultation with potentially affected landowners needs to be focused – including discussions for landholder agreements"* (DPHI, 2016).

The Bulletin also states: *"Further assessment and justification for placement of turbines located in these sensitive areas in the EIS will be required, along with a description of mitigation and management measures being employed to reduce impacts. This assessment may identify that factors such as topography, relative distance and existing vegetation may minimise or eliminate the impacts of the project."* (DPHI, 2016).

The preliminary assessment tools involve analysis of two key visual parameters:

1. Visual Magnitude (Refer to **Section 6.2**)
2. Multiple Wind Turbine Tool (Refer to **Section 6.4**)

Residences identified through the application of the Preliminary Assessment tools have been assessed in detail in **Section 10.1** of this PVIA.

6.2 Visual Magnitude

The Visual Magnitude Threshold is based on the height of the proposed wind turbines to the tip of the blade and distance from residences or key public viewpoints as shown in **Figure 10**.

In accordance with the Bulletin: *'proposed turbines below the black line must be identified along with the residences or key public viewpoints as part of the request for SEARs'.*

The proposed wind turbines are based on a worst case scenario with a tip height of **250 m**.

The '**Black**' line intersects at a distance of **3,350 m.**
The '**Blue**' line intersects at **4,950 m.**
The **'Study Area'** is defined as **8,000 m.**

For the purpose of the Preliminary Assessment, the Visual Magnitude thresholds are based on a 2D assessment of the Project alone. Further assessment indicates factors such as topography, relative distance and existing vegetation may minimise or eliminate the impacts of the project from residences.

6.3 Results of the Visual Magnitude Tool

A total of **7** associated residences and **71** non-associated residences have been identified within the Study Area. In accordance with the Bulletin, associated residences do not require further assessment.

Application of the Preliminary Assessment Tools to the Project identified the following results for non-associated residences within the visual magnitude lines:

- Five (5) non-associated residences within the Black Line of Visual Magnitude (3,350 m from nearest turbine)
- Nine (9) non-associated residences between the Black and Blue Lines of Visual Magnitude (4,950 m from the nearest turbine)
- 57 non-associated residences have been identified between 4,950 m - 8,000 m of the proposed wind turbine locations (outside blue line of visual magnitude and within the Study Area).

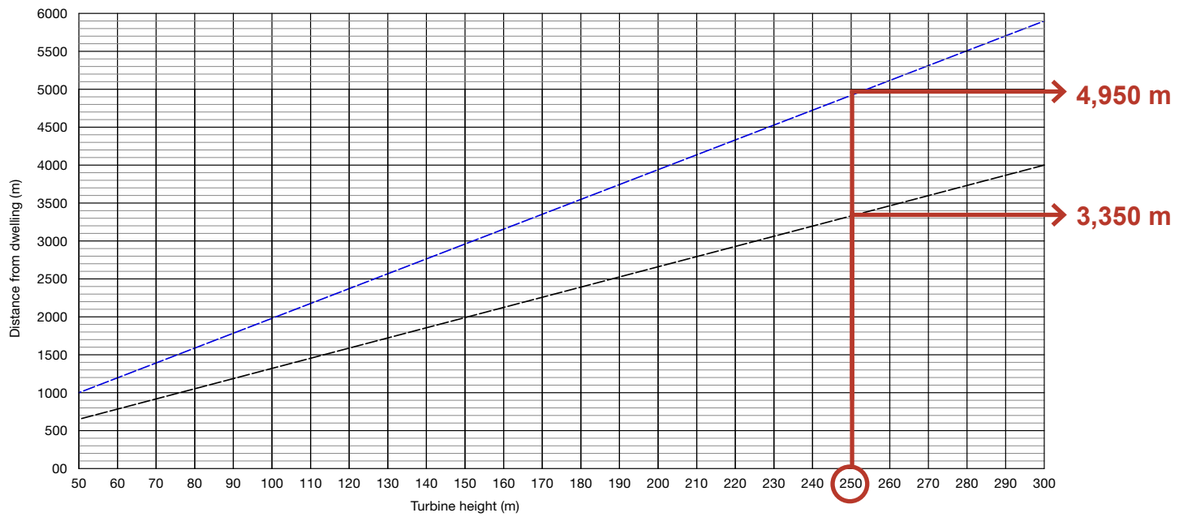
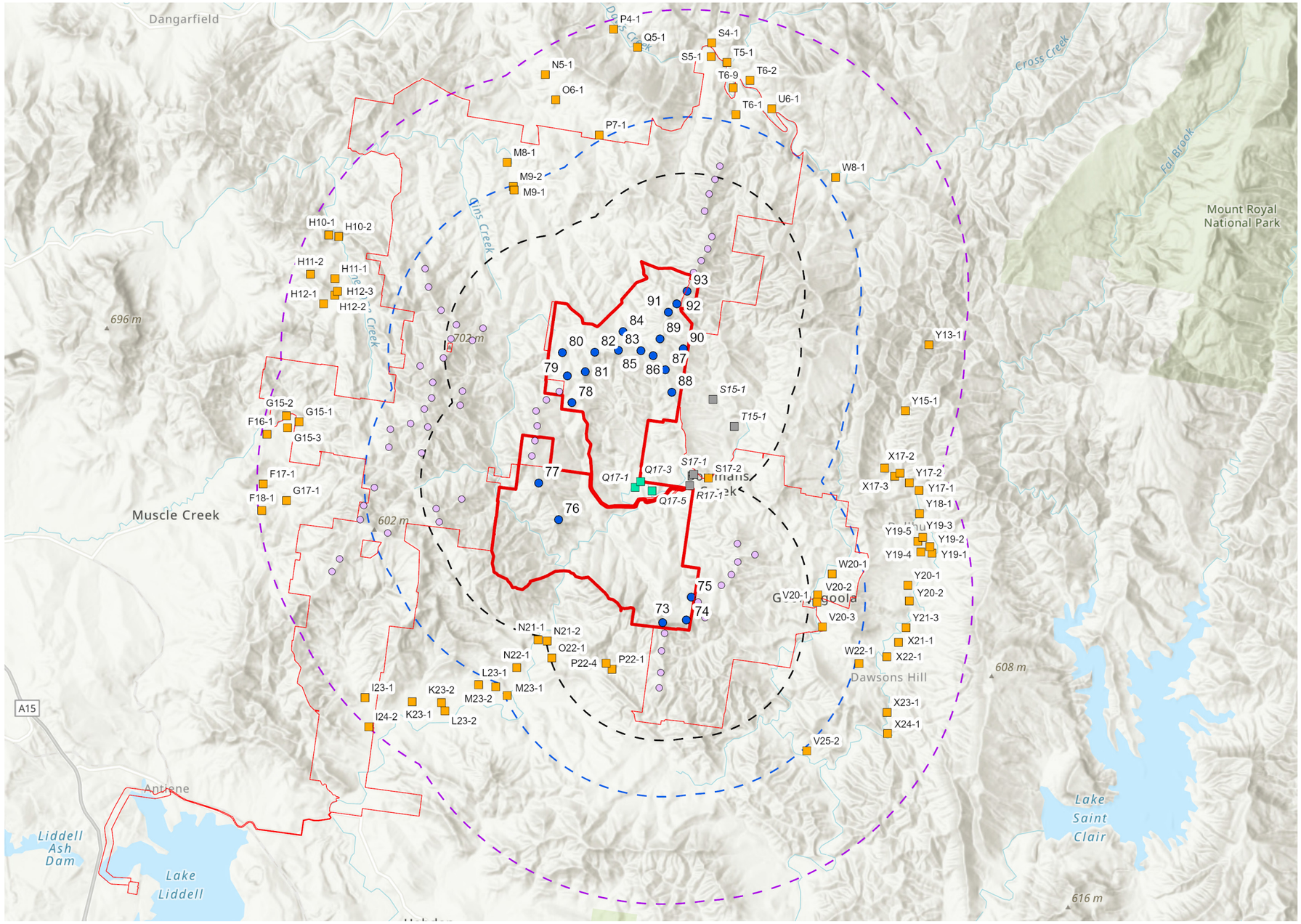


Figure 10 – Visual Magnitude
Source: Visual Assessment Bulletin, 2008

Visual Magnitude

Refer to Section 6.2



LEGEND

- Project Boundary (Stage 1)
- Project Boundary (Stage 2)
- Approved Turbine (Stage 1)
- Proposed Turbine (Stage 2)
- Host Residence
- Associated Residence
- Non-Associated Residence
- Black Line of Visual Magnitude (3,350 m)
- Blue Line of Visual Magnitude (4,950 m)
- Study Area (8,000 m from nearest WTGs)

0 1 2 4 6 8 km

Figure 11 – Visual Magnitude
Basemap Source: ESRI, 2023

6.4 Multiple Wind Turbine Tool

The Bulletin states: *"The Multiple Wind Turbine Tool provides a preliminary indication of potential cumulative impacts arising from the proposed Project. To establish whether the degree to which residences or key public viewpoints may be impacted by multiple wind turbines, the proponent must map into six sectors of 60° any proposed turbines, and any existing or approved turbines within eight (8) kilometres of each dwelling or key public viewpoint"* (DPHI, 2016).

The Multiple Wind Turbine Tool (MWTT) provides a preliminary indication of potential cumulative impacts arising from the proposed wind energy project. To establish whether the degree to which residences or key public viewpoints may be impacted by multiple wind turbines, the proponent must map into six sectors of 60° any proposed turbines, and any existing or approved turbines within eight kilometres of each dwelling or key public viewpoint. **Figure 12** below provides examples of where a dwelling or key public viewpoint may have views to turbines in multiple 60° sectors.

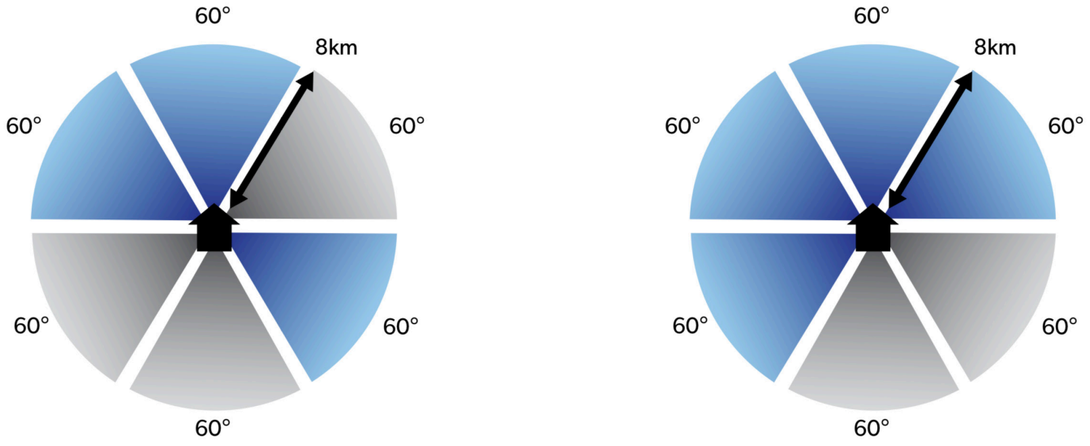


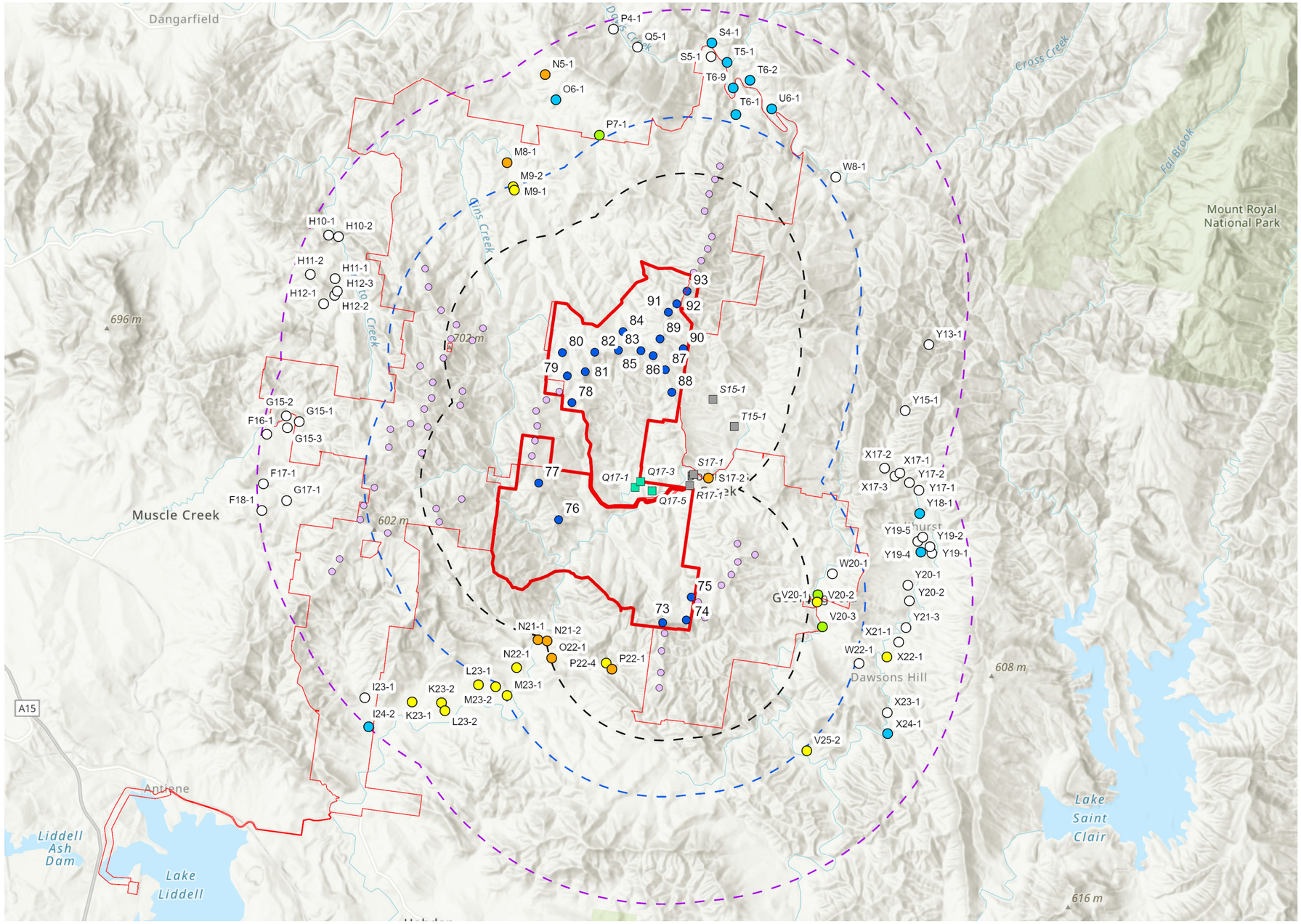
Figure 12 – Multiple Wind Turbine Tool
Source: Visual Assessment Bulletin, 2008

6.5 Result of the Multiple Wind Turbine Tool

This tool applies to all non-associated residences in the Study Area with potential visibility, with the results considering both Stage 1 and Stage 2 (the Project). The 2D MWTT identified residences with potential (see **Figure 13**):

- 20 non-associated residences identified having three (3) or more 60 degree sectors within the Study Area.
- Turbines are located in up to four (4) 60 degree sectors for seven (7) non-associated residences;
- Turbines are located in up to three (3) 60 degree sectors for 13 non-associated residences; and
- All the remaining non-associated residences within 8 km of the nearest turbine having two (2) 60 degree sectors or less. This is deemed an acceptable level in accordance with the Bulletin.

Existing screening factors (including vegetation and structures) may reduce visibility of the turbines. This will be discussed further in the EIS phase. Refer to **Appendix A** for the MWTT results for all preliminary public viewpoints.



Multiple Wind Turbine Tool

Stage 1 & Stage 2

Refer to Section 1.3

LEGEND

- Project Boundary (Stage 1)
- Project Boundary (Stage 2)
- Approved Turbine (Stage 1)
- Proposed Turbine (Stage 2)
- Host Residence
- Associated Residence
- Black Line of Visual Magnitude (3,350 m)
- Blue Line of Visual Magnitude (4,950 m)
- Study Area (8,000 m from nearest WTGs)
- No Visibility (as per Stage 2 ZVI)
- WTGs located within up to one (1) 60 degree sector
- WTGs located within up to two (2) 60 degree sector (up to 120 degrees)
- WTGs located within up to three (3) 60 degree sector (up to 180 degrees)
- WTGs located within up to four (4) 60 degree sector (up to 240 degrees)

Figure 13 – Multiple Wind Turbine Tool
Basemap Source: ESRI, 2023

7.0 Preliminary Zone of Visual Influence

7.1 Overview of Preliminary Zone of Visual Influence

The Bulletin states: *"The use of Geographic Information Systems (GIS) to facilitate the application of the tools will streamline the evaluation phase of a project during the pre-lodgement stage. This can also assist in refining the number of turbines and viewpoints that will ultimately need more detailed assessment"* (DPHI, 2016).

To address this requirement stated in the Bulletin, a Zone of Visual Influence (ZVI) diagram has been prepared for the Project to illustrate the theoretical visibility of the proposed turbines.

The ZVI (also known as a Zone of Theoretical Visibility (ZTV)) represents the area over which a development can theoretically be seen based on a Digital Terrain Model (DTM). The ZVI usually presents a bare-ground scenario, ie., a landscape without screening, structures or vegetation (Scottish Natural Heritage, 2017).

Figure 14 depicts the areas from which the proposed turbines may be visible. Colour coding on this figure provides an indication of the number of turbines visible, based on a tip height of 250 m. This diagram helps identify residences that are likely to have views towards the majority of the Project. These residences will be assessed further in the EIS.

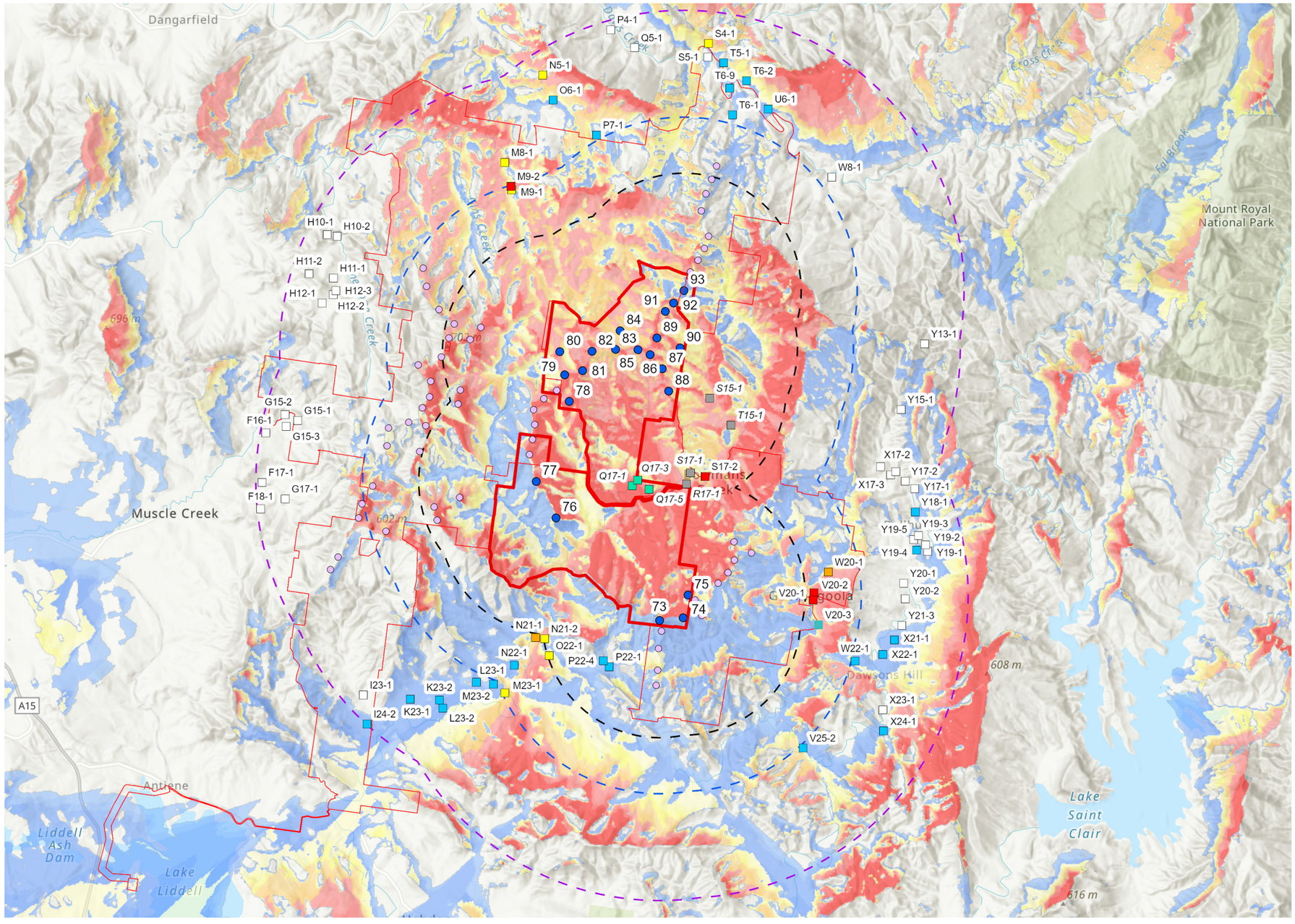
The ZVI has been determined through the use of digital topographic information and 3D modelling software WindPro.

7.2 Summary of Preliminary Zone of Visual Influence

The following provides a brief summary of the Preliminary Zone of Visual Influence (ZVI) figure prepared for the Project:

- The majority of the turbines associated with Stage 2 have the potential to be visible from most receptors to the immediate south and north within the black line of visual magnitude (up to 3,350 m from the nearest turbine). Selected turbines may be visible to the north, southeast, south and northwest within 8 km of the Project.
- Distant views may be experienced from Mount Royal National Park. Accessible lookouts and recreation location to be determined and assessed whilst onsite, however, it is likely if distant views are available that they will be heavily filtered due to intervening vegetation within the National Park.
- 38 non-associated residences have been identified as having potential views of the Project.
  - Five (5) non-associated residences have the potential to view up to 100% of turbines proposed in Stage 2;
  - Five (5) non-associated residences have the potential to view up to 75% of turbines proposed in Stage 2;
  - Eight (8) non-associated residences have the potential to view up to 50% of turbines proposed in Stage 2; and
  - 20 non-associated residences have the potential to view up to 25% of turbines proposed in Stage 2.
  - 33 of the 71 non-associated residences within 8 km of Stage 2 will have no visibility of the Project due to topography.

It is important to restate a preliminary ZVI is based on a worst case scenario where the assessment does not consider vegetation or structures. Ground truthing during field work will ascertain potential visibility from receptors taking into account structures and vegetation.



Zone of Visual Influence

Stage 2 - Blade Tip Height

Refer to Section 7.1

LEGEND

- Project Boundary (Stage 1)
- Project Boundary (Stage 2)
- Approved Turbine (Stage 1)
- Proposed Turbine (Stage 2)
- Host Residence
- Associated Residence
- Black Line of Visual Magnitude (3,350 m)
- Blue Line of Visual Magnitude (4,950 m)
- Study Area (8,000 m from nearest WTGs)
- Lakes
- National Parks

RESULT OF ZVI ON NON-ASSOCIATED RESIDENCES:

- no visibility (Stage 2)
- up to 25% visibility (Stage 2)
- up to 50% visibility (Stage 2)
- up to 75% visibility (Stage 2)
- up to 100% visibility (Stage 2)

- (1% - 25%) *1 - 5 turbines*
- (25% - 50%) *6 - 11 turbines*
- (50% - 75%) *12 - 16 turbines*
- (75% - 100%) *17 - 21 turbines*

NOTE

ZVI is a preliminary assessment tool that represents a bare ground scenario - ie. a landscape without screening, structures or vegetation. As accurate information on the height and coverage of vegetation and buildings is unavailable, it is important to note the map is based solely on topographic information. Therefore this form of mapping should be acknowledged as representing the worst case scenario.

0 1 2 4 6 8 km

Figure 14 – Zone of Visual Influence (Stage 2 - Blade Tip Height)
Basemap Source: ESRI, 2023

Cumulative Zone of Visual Influence

Stage 1 & 2 - Blade Tip Height

Refer to Section 7.2

LEGEND

- Project Boundary (Stage 1)
- Project Boundary (Stage 2)
- Approved Turbine (Stage 1)
- Proposed Turbine (Stage 2)
- Host Residence
- Associated Residence
- Black Line of Visual Magnitude (3,350 m)
- Blue Line of Visual Magnitude (4,950 m)
- Study Area (8,000 m from nearest WTGs)
- no visibility
- visibility of Stage 1 only
- visibility of both Stage 1 & Stage 2

- No Visibility
- Visibility of Stage 1 only
- Visibility of Stage 1 and Stage 2

NOTE

ZVI is a preliminary assessment tool that represents a bare ground scenario - ie. a landscape without screening, structures or vegetation. As accurate information on the height and coverage of vegetation and buildings is unavailable, it is important to note the map is based solely on topographic information. Therefore this form of mapping should be acknowledged as representing the worst case scenario.

0 1 2 4 6 8 km

Figure 15 – Cumulative Zone of Visual Influence (Stage 1 & 2 - Blade Tip Height)
Basemap Source: ESRI, 223

8.0 Preliminary Assessments

8.1 Preliminary Assessment of Public Viewpoints

Appendix A provides preliminary assessments from public viewpoints. A total of **32** preliminary public viewpoints have been selected to illustrate the different landscape character typologies and key public viewing locations throughout the Study Area (as shown on **Figure 16**).

8.2 Preliminary Assessment of Non-Associated Residences

Preliminary assessment tools were applied to all **71** non-associated residences within 8,000 m of the proposed turbines. Results provided below. Further detailed assessment and site inspections of sensitive receptors to ground-truth this analysis will be undertaken during the EIS phase.

Non-Associated Residences (with turbines within Black Line 3,350 m)														
		Stage 02							Stage 01 & 02					
Dwelling ID:	Elevation of Receptor: (m)	Distance to Nearest WTG: (m) *approx.*	Nearest WTG:	Number of 60º Sectors:	Number of WTGs within Black Line:	Number of WTGs within the Black & Blue Lines:	Number of WTGs within the Blue & Purple Lines:	ZVI Visibility	Number of 60º Sectors:	Number of WTGs within Black Line:	Number of WTGs within the Black & Blue Lines:	Number of WTGs within the Blue & Purple Lines:	ZVI Visibility	ZVI Visibility Cumulative
N21-2	201	3319	73	2	1	5	9	up to 50% visibility	4	0	11	38	up to 50% visibility	Both
O22-1	191	3304	73	2	1	5	6	up to 50% visibility	4	0	13	52	up to 50% visibility	Both
P22-1	237	1954	73	2	3	4	6	up to 25% visibility	4	6	18	37	up to 25% visibility	Both
P22-4	235	1970	73	2	3	1	3	up to 25% visibility	3	7	5	3	up to 25% visibility	Both
S17-2	260	2653	88	3	2	18	21	up to 100% visibility	4	13	19	32	up to 75% visibility	Both

Table 04 – Non-Associated Dwelling Assessment (Black Line 3,350 m)

Non-Associated Residences (with turbines within Blue Line 4,950 m)														
		Stage 02							Stage 01 & 02					
Dwelling ID:	Elevation of Receptor: (m)	Distance to Nearest WTG: (m) *approx.*	Nearest WTG:	Number of 60º Sectors:	Number of WTGs within Black Line:	Number of WTGs within theBlack & Blue Lines:	Number of WTGs within the Blue & Purple Lines:	ZVI Visibility	Number of 60º Sectors:	Number of WTGs within Black Line:	Number of WTGs within the Black & Blue Line:	Number of WTGs within the Blue & Purple Lines:	ZVI Visibility	ZVI Visibility Cumulative
M23-1	160	4877	73	1	0	1	5	up to 75% visibility	3	0	4	31	up to 50% visibility	Both
N21-1	174	3466	76	2	0	5	9	up to 75% visibility	4	0	11	39	up to 75% visibility	Both
N22-1	183	4339	73	2	0	2	6	up to 75% visibility	3	0	8	36	up to 50% visibility	Both
V20-1	241	3581	75	2	0	3	6	up to 100% visibility	3	11	14	25	up to 50% visibility	Both
V20-2	232	3828	75	1	0	3	3	up to 100% visibility	2	6	20	26	up to 75% visibility	Both
V20-3	230	3830	75	1	0	0	2	up to 100% visibility	2	0	0	10	up to 75% visibility	Both
W20-1	257	4050	75	2	0	2	5	up to 75% visibility	2	5	5	9	up to 50% visibility	Both
M9-1	339	4818	80	1	0	1	15	up to 50% visibility	3	0	9	25	up to 50% visibility	Both
M9-2	338	4919	80	1	0	1	15	up to 100% visibility	3	0	6	39	up to 50% visibility	Both

Table 05 – Non-Associated Dwelling Assessment (Blue Line 4,950 m)

Non-Associated Residences (with turbines between 4,950 m and the Study Area 8,000 m)

		Stage 02							Stage 01 & 02					
Dwelling ID:	**Elevation of Receptor: (m)**	**Distance to Nearest WTG: (m)** *approx.*	**Nearest WTG:**	**Number of 60º Sectors:**	**Number of WTGs within Black Line:**	**Number of WTGs within the Black & Blue Line:**	**Number of WTGs within the Blue & Purple Line:**	**ZVI Visibility**	**Number of 60º Sectors:**	**Number of WTGs within Black Line:**	**Number of WTGs within the Black & Blue Line:**	**Number of WTGs within the Blue & Purple Line:**	**ZVI Visibility**	**ZVI Visibility Cumulative**
F16-1	277	7841	77					Nil						
F17-1	238	7824	77					Nil						
F18-1	298	7903	77					Nil						
G15-1	287	7023	77					Nil						
G15-2	271	7417	77					Nil						
G15-3	280	7305	77					Nil						
G17-1	275	7180	77					Nil						
H10-1	318	7434	80					Nil						
H10-2	307	7161	80					Nil						
H11-1	349	6795	80					Nil						
H11-2	399	7498	80					Nil						
H12-1	362	6926	80					Nil						
H12-2	355	6671	80					Nil						
H12-3	350	6626	80					Nil						
I23-1	155	7471	76					Nil						
I24-2	155	7981	76	1	0	0	1	up to 25% visibility	1	4	0	19	up to 50% visibility	Both
K23-1	146	6639	76	1	0	0	3	up to 25% visibility	3	4	0	21	up to 25% visibility	Both
K23-2	164	6172	76	1	0	0	5	up to 25% visibility	3	3	0	25	up to 25% visibility	Both
L23-1	170	5212	76	1	0	0	5	up to 25% visibility	3	4	0	23	up to 25% visibility	Both
L23-2	146	6320	76	1	0	0	5	up to 50% visibility	3	0	4	24	up to 25% visibility	Both
M8-1	337	5624	80	1	0	0	15	up to 50% visibility	4	0	5	26	up to 50% visibility	Both
M23-1	161	4877	73	1	0	1	4	up to 75% visibility	3	0	8	29	up to 50% visibility	Both
M23-2	178	5071	76	1	0	0	5	up to 25% visibility	3	0	3	32	up to 25% visibility	Both
N5-1	363	7354	93	1	0	0	5	up to 50% visibility	4	2	2	9	up to 50% visibility	Both
O6-1	371	6597	93	1	0	0	12	up to 25% visibility	1	0	0	1	up to 50% visibility	Both
P4-1	291	7733	93					Nil						
P7-1	392	5090	93	1	0	0	16	up to 25% visibility	2	0	0	3	up to 50% visibility	Both
Q5-1	286	7074	93					Nil						
S4-1	307	7091	93	1	0	0	3	up to 50% visibility	1	0	0	0	up to 25% visibility	Both
T5-1	304	6601	93	1	0	0	3	up to 25% visibility	1	0	0	0	up to 25% visibility	Both

Table 06 – Non-Associated Dwelling Assessment (up to Study Area 8,000 m)

Non-Associated Residences (with turbines between 4,950 m and the Study Area 8,000 m)

		Stage 02							Stage 01 & 02					
Dwelling ID:	**Elevation of Receptor: (m)**	**Distance to Nearest WTG: (m)** *approx.*	**Nearest WTG:**	**Number of 60º Sectors:**	**Number of WTGs within Black Line:**	**Number of WTGs within the Black & Blue Lines:**	**Number of WTGs within the Blue & Purple Lines:**	**ZVI Visibility**	**Number of 60º Sectors:**	**Number of WTGs within Black Line:**	**Number of WTGs within the Black & Blue Lines:**	**Number of WTGs within the Blue & Purple Lines:**	**ZVI Visibility**	**ZVI Visibility Cumulative**
T6-1	322	5206	93	1	0	0	3	up to 25% visibility	1	5	3	7	up to 25% visibility	Both
T6-2	324	6252	93	1	0	0	6	up to 50% visibility	1	0	0	0	up to 25% visibility	Both
T6-9	318	5926	93	1	0	0	8	up to 25% visibility	1	0	0	0	up to 25% visibility	Both
U6-1	357	5715	93	1	0	0	6	up to 25% visibility	1	0	10	35	up to 25% visibility	Both
V25-2	162	5049	74	1	0	0	3	up to 25% visibility	3	2	10	27	up to 25% visibility	Both
W8-1	377	5323	93					Nil						
W22-1	223	5055	74	1	0	0	3	up to 25% visibility	2	0	12	26	up to 25% visibility	Both
X17-1	275	6884	88					Nil						
X17-2	324	6425	88					Nil						
X17-3	287	6733	75					Nil						
X21-1	206	6033	75	1	0	0	3	up to 25% visibility	2	0	3	24	up to 25% visibility	Both
X22-1	205	5789	74	1	0	0	3	up to 25% visibility	2	0	4	25	up to 25% visibility	Both
X23-1	179	6277	74					Nil						
X24-1	173	6562	74	1	0	0	3	up to 25% visibility	1	0	1	12	up to 25% visibility	Both
Y13-1	521	6983	90					Nil						
Y15-1	369	6553	90					Nil						
Y17-1	263	7154	75					Nil						
Y17-2	266	7004	75					Nil						
Y18-1	253	6914	75	2	0	0	5	up to 25% visibility	1	3	3	7	up to 25% visibility	Both
Y19-1	240	6961	75					Nil						
Y19-2	242	6936	75					Nil						
Y19-3	252	6800	75					Nil						
Y19-4	269	6654	75	1	0	0	3	up to 25% visibility	1	0	1	19	up to 25% visibility	Both
Y19-5	266	6638	75					Nil						
Y20-1	231	6169	75					Nil						
Y20-2	238	6203	75					Nil						
Y21-3	212	6170	75					Nil						

Table 07 – Non-Associated Dwelling Assessment (up to Study Area 8,000 m)

Preliminary Public Viewpoint Locations

Refer to Appendix A

LEGEND

- Project Boundary (Stage 1)
- Project Boundary (Stage 2)
- Approved Turbine (Stage 1)
- Proposed Turbine (Stage 2)
- Study Area (8,000 m from nearest WTGs)
- Public Viewpoint Locations

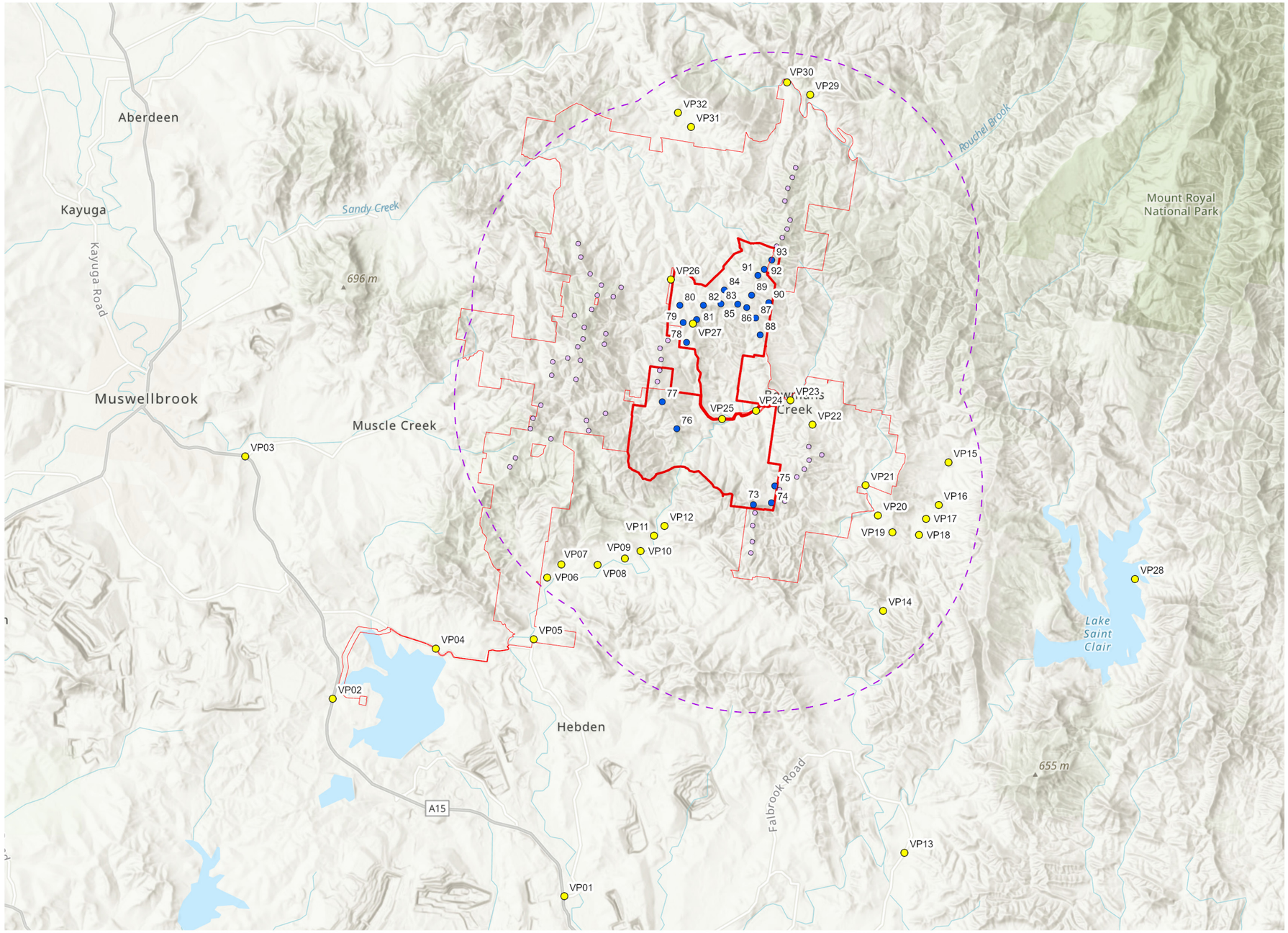


Figure 16 – Preliminary Public Viewpoint Locations
Basemap Source: ESRI, 2023

9.0 Cumulative Visual Impact Assessment

9.1 Overview of Cumulative Visual Impacts

The Project is in the Hunter Central Coast Renewable Energy Zone (HCC REZ). However, the Project does not anticipate using any HCC REZ infrastructure to support the connection to the grid.

Figure 17 shows the proposed renewable energy proposals within the extent of the Project. Most of these projects are in the northwestern parts of the REZ near Edderton, Denman and Muswellbrook.

9.2 Nearby Renewable Energy Projects

Currently, 10 renewable energy proposals have been proposed within the REZ (refer **Figure 17**). Of these, four (4) proposed renewable energy proposals are located close to the Project. Consideration of cumulative impacts for Bowman Creek Wind Farm (Stage 01), as previously discussed in this report, Muswellbrook Pumped Hydro Project, Muswellbrook Solar Farm and Liddell BESS are therefore critical for this Project as part of the EIS phase.

Located within close proximity to the Project -

- Muswellbrook Pumped Hydro (SEARs issued in December 2024) - 8.0 km from the nearest WTG
- Muswellbrook Solar Farm (Response to Submission SEP 2023) - 8.5 km from nearest WTG
- Liddell BESS (Approved March 2022) - 10.9 km from nearest WTG
- Maxwell Solar Farm (Approved August 2020) - 11.6 km from the nearest WTG
- Maison Dieu Solar Farm (SEARs ISSUED October 2022) - 20 km from nearest WTG
- Kayuga Solar Farm (SEARs ISSUED in May 2024) - 20.5 km from the nearest WTG
- Upper Hunter BESS (SEARs issued September 2023) - 18.1 km from nearest WTG
- Hunter River Solar Farm (Amended SEARs issued Feb 2023) - 26 km from nearest WTG
- Upper Hunter South Solar Farm (SEARS issued in January 2024) - 24.8 km from nearest WTG
- Edderton Solar Project (SEARS issued in May 2024) - 21.15 km from the nearest WTG

9.2.1 Muswellbrook Pumped Hydro (MPH)

The Pumped Hydro Facility proposed to the west of Bowman Creek Wind Farm (Stage 02) near the township of Muswellbrook has a proposed capacity of 500 MW / 4,000 MWh. The project involves constructing an upper reservoir at Bells Mountain, reconfiguring an existing mine void for the lower reservoir, and establishing two kilometres of waterway connecting the reservoir through tunnels and surface penstocks. Additionally, the project includes 1.5 kilometres of transmission infrastructure, a power station hall, and permanent access roads (IPA, 2024). The potential to view MPH and the Project simultaneously may exist and will need to be assessed during the EIS Phase of the assessment.

9.2.2 Muswellbrook Solar Farm (MSF)

ESCO Pacific plans to develop a renewable energy project at Muscle Creek Road, Muswellbrook NSW, about 2.5 kilometres east of Muswellbrook, west of Bowmans Creek Wind Farm (Stage 02). Spanning approximately 512 hectares, the site is adjacent to the Muswellbrook Coal Mine - the project will feature a large-scale solar farm generating around 135 MW alongside a utility-scale Battery Energy Storage System (BESS) with the same capacity. Additionally, the project includes necessary grid connection and electricity transmission line infrastructure (EMM, 2022). Potential to view the MSF, the MPH and the Project simultaneously may exist and will need to be assessed during the EIS Phase of the assessment.

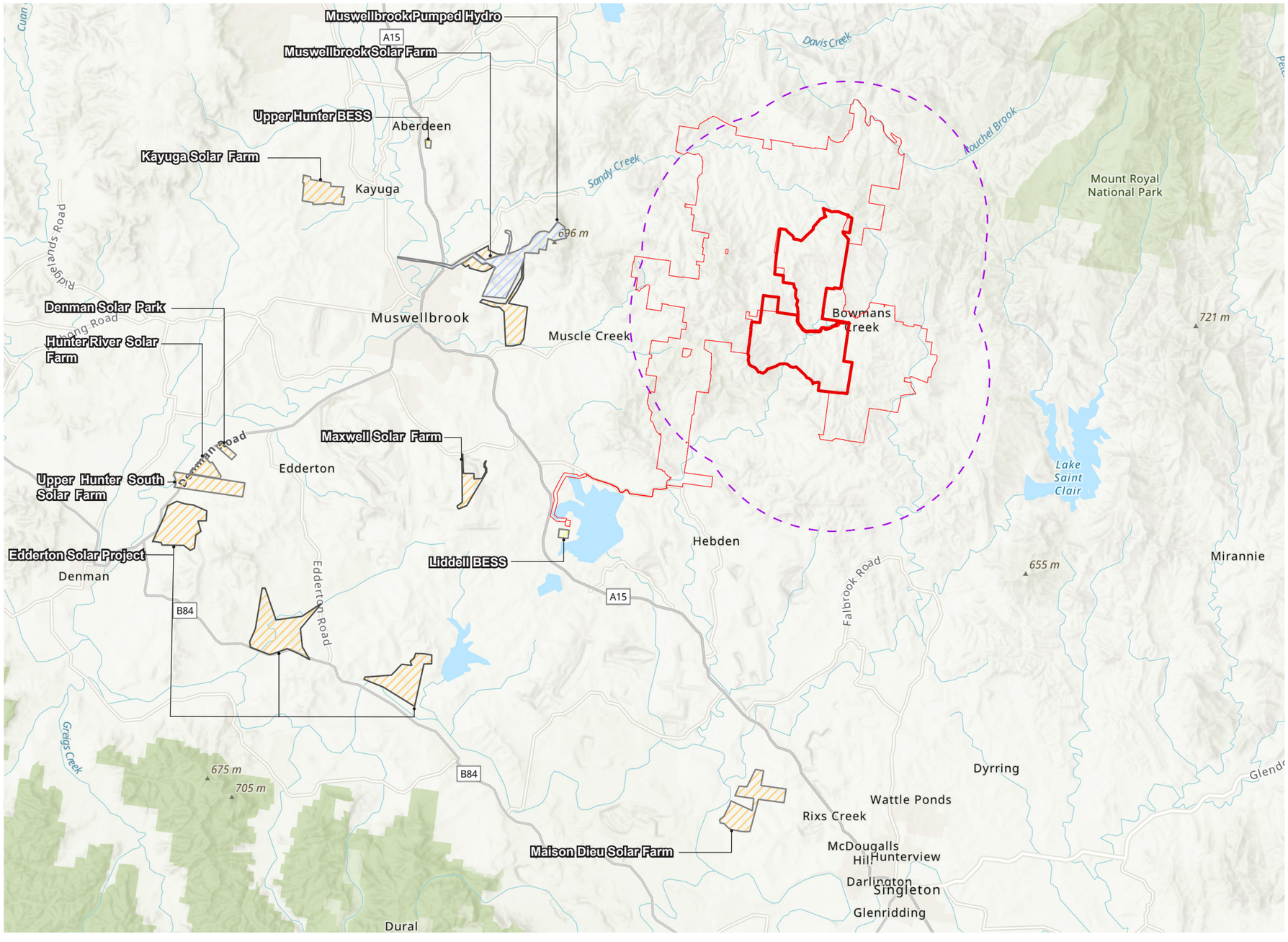
9.2.3 Liddell BESS

The proposal involves constructing, operating, and decommissioning of a Battery Energy Storage System (BESS) capable of discharging up to 500 MW for a maximum of four hours or up to 2 GWh. Situated near an existing solar array area - the BESS will connect to the existing TransGrid 330kV substation via a new 330kV high-voltage power line. The BESS will feature slab-mounted enclosures housing around 900 pre-assembled battery enclosures, 148 medium voltage skids and transformers, control rooms, electrical rooms, and storage facilities. Ancillary infrastructure such as a 33 kV reticulation system, collector switchrooms, and security measures, including fencing and closed-circuit television, will also be implemented (IPA, 2024). The potential to view Liddell BESS and the Project simultaneously may exist and will need to be assessed during the EIS Phase of the assessment.

9.3 Cumulative Impact on Broader Landscape Character

The occurrence of large-scale infrastructure and renewable energy projects within a region has the potential to alter the perception of the overall landscape character. It is important to determine whether the effect of multiple wind farms and other major infrastructure such as solar farms, hydro energy facilities and BESS projects within the region would combine to become the dominant visual element, thus altering the perception of the general landscape character.

The Project is located on gently undulating terrain and is surrounded by scattered rural residences. Due to the undulating character of the topography of this region and lack of continuous obtrusive elements, there will likely be areas within the Muswellbrook region from which multiple large-scale infrastructure projects will be visible simultaneously over time. Further assessment of the cumulative visual impact will be detailed in the EIS, along with a description of the mitigation and management measures employed to reduce the effects.



Nearby Renewable Energy Projects

Refer to Section 9.0

LEGEND

- Project Boundary (Stage 1)
- Project Boundary (Stage 2)
- Study Area (8,000m from nearest WTGs)
- BESS Project
- Pumped Hydro Project
- Solar Farm Project

Figure 17 – Nearby Renewable Energy Projects
Basemap Source: ESRI, 2023

0 2.5 5 10 15 20 km

10.0 Summary and Recommendations

10.1 Summary of the Preliminary Visual Impact Assessment

This PVIA report has been undertaken in accordance with the Bulletin, and will be submitted as part of the Scoping Report in the request for a SEARs. The following provides a brief summary of the PVIA and outlines the steps that will be undertaken in the EIS Phase of the assessment. The LVIA component of the EIS will be prepared in accordance to the proposed New South Wales Wind Guidelines (currently in draft format) once enforced.

10.1.1 Community Consultation

The report outlined the findings of community consultation to date which assisted in establishing the following visual baseline:

- Key landscape features;
- Defined areas of scenic quality; and
- Identify key public viewpoints valued by that community.

Next Steps -

Community consultation will be ongoing throughout the EIS phase in accordance with the Bulletin.

10.1.2 Existing Landscape Character

This PVIA provides a preliminary assessment of the existing landscape character within the Study Area . The following items have been addressed:

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

Next Steps -

- Utilise the landscape character assessment to prepare a detailed Visual Baseline Study;
- Identify any additional key features, key viewpoints valued by the community throughout the ongoing consultation process;
- Determine the scenic quality of the Landscape Character Units; and
- Determine the Visual Influence Zone of key viewpoints and assess the ratings against the objectives outlined in the Bulletin.

10.1.3 Application of the Preliminary Assessment Tools

The purpose of the Preliminary Assessment Tools in the PVIA phase is to identify ‘sensitive receivers’ for further assessment in the EIS Phase of the Project.

- Multiple Wind Turbine Tool (MWTT) was applied to all **71** non-associated residences within 8,000 m of the nearest proposed WTG;
- **20** non-associated residences were identified as having three (3) or more 60 degree sectors within the Study Area; and
- Key public viewpoints within the Study Area include the New England Highway, Ravensworth Junction Historic Site & Lake St Clair. An assessment of the potential visual impact on these representative viewpoints is discussed in **Appendix A**.

Next Steps -

- Ground-truthing of all non-associated residences identified as a sensitive receiver requiring further assessment in the EIS phase;
- Undertake individual site inspections and detailed dwelling assessments of these sensitive receivers;
- The LVIA will assess each ‘sensitive receiver’ in detail to take into account topography, vegetation and other screening factors; and
- Determine the potential visual impact of each sensitive receiver and provide mitigation methods to reduce potential visual impacts.

10.1.4 Zone of Visual Influence

A ZVI diagram has been prepared to illustrate the theoretical visibility of the Project to assist in defining the visual catchment when conducting onsite fieldwork.

Next Steps -

- The LVIA will provide further assessment from areas identified as having potential visibility in the ZVI provided; and
- Graphic representations of the Project in the form of wireframes and photomontages will be provided in the EIS phase using a combination of GIS and 3D Digital modelling technologies.

10.1.5 Cumulative Visual Impacts of Surrounding Renewable Energy Projects

The Project is in the Hunter Central Coast Renewable Energy Zone (REZ). Four (4) proposed renewable energy projects are located close to the Project. Consideration of cumulative impacts of Bowman Creek Wind Farm (Stage 01), Muswellbrook Pumped Hydro Project, Muswellbrook Solar Farm and Liddell BESS are therefore critical for this Project as part of the EIS phase. It is important that the Project considers the potential cumulative effects on the immediate and broader regional landscape character.

Next Steps -

- Further assessment and justification for the placement of WTGs in multiple sectors will need to be detailed in the EIS, along with a description of potential mitigation and management measures being employed if required to reduce impacts that are determined to be unacceptable as outlined in the relevant guideline.

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Appendix A

Viewpoint Analysis

VP01 Ravensworth Junction Historic Site

Approximate Extent of Project Area



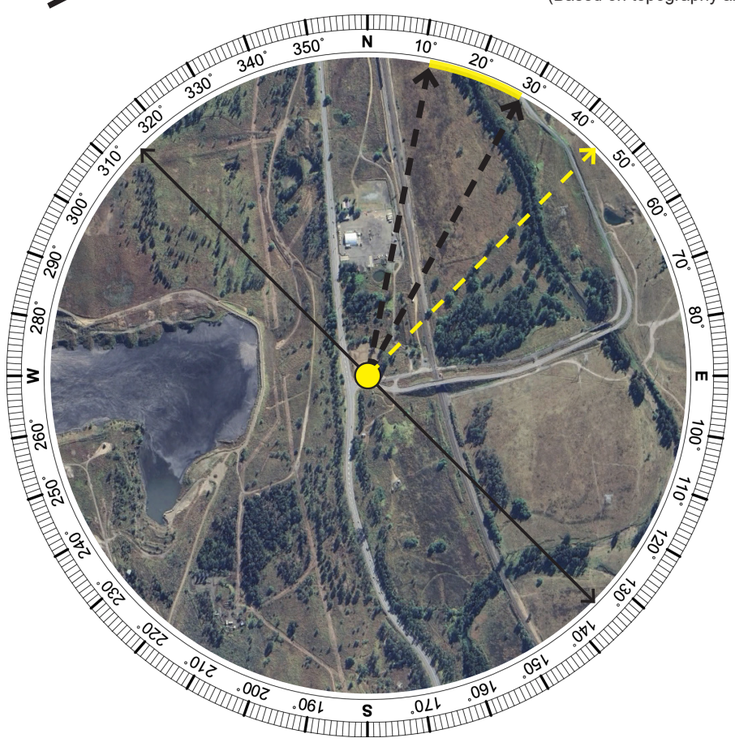
LEGEND

Viewing direction and centre of panorama

Extent of panorama

Direction of potentially visible turbines

Extent of visible turbines
(Based on topography alone)



VIEWPOINT VP01

Viewpoint Summary:	
Location:	Elevation:
Ravensworth Junction Historic Site, Ravensworth	83 m
Coordinates:	Viewing Direction:
32°26'26.68"S 151°03'19.94"E	Northeast
Distance to nearest WTG:	Visibility Distance Zone:
16.7 km	**Mid Background (MB)**
Land Use:	Viewer Sensitivity Level:
Historic Site	**Level 1 (High)**
LCU:	Scenic Quality Rating:
LCU04	**Low**

Multiple Wind Turbine Tool:

Zero (0) 60 degree sector based on 2D assessment (Stage 01 & 02)

Aerial Image Source: Google Earth (05/2023)

Existing Landscape Character Description:

This viewpoint was taken near Hebdren Road, specifically at the Ravensworth Junction Historic Site near the New England Highway.

The terrain predominantly consists of cleared areas for mining activities, with gently undulating topography with scattered vegetation in the northern foreground. An incline has been constructed to facilitate railway infrastructure, shaping the views towards the east from this location.

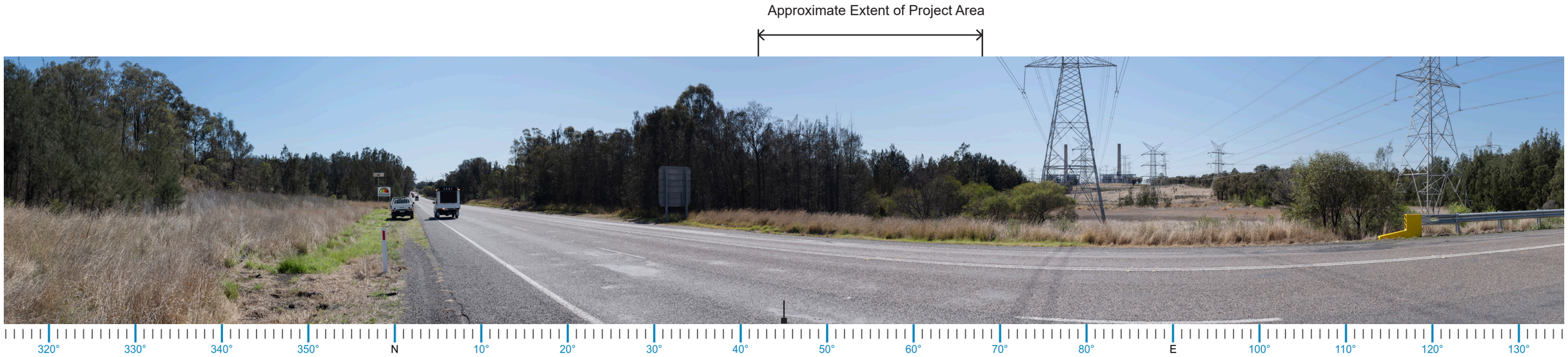
The land immediately to the east is characterised by a prevalence of road infrastructure and power lines, resulting in a notably modified landscape appearance.

Preliminary Potential Visual Impact:

A 3D assessment based on topography alone confirms that no turbines proposed as part of the Project (Stage 2) will be visible 8,000 m from this location.

Distant views beyond 8,000 m may be available. However, intervening vegetation will likely screen these distant views.

VP02 New England Highway, Muswellbrook



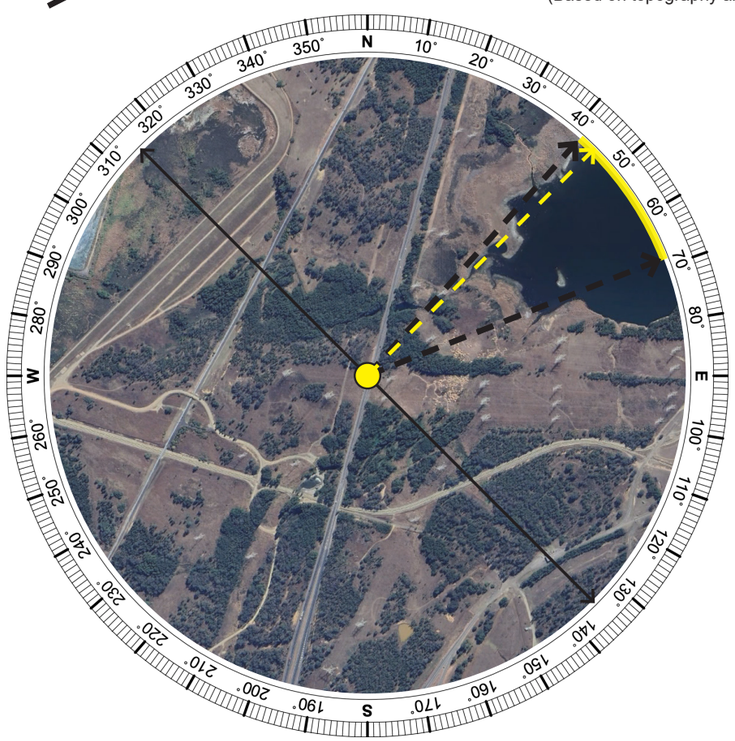
LEGEND

Viewing direction and centre of panorama

Extent of panorama

Direction of potentially visible turbines

Extent of visible turbines
(Based on topography alone)



VIEWPOINT VP02

Viewpoint Summary:	
Location:	Elevation:
New England Highway, Muswellbrook	139 m
Coordinates:	Viewing Direction:
32°22'14.49"S 150°57'44.44"E	Northeast
Distance to nearest WTG:	Visibility Distance Zone:
16.8 km	**Mid Background (MB)**
Land Use:	Viewer Sensitivity Level:
Main Road	**Level 3 (Low)**
LCU:	Scenic Quality Rating:
LCU03: Pastures & Rural Residential Properties	**Low**

Multiple Wind Turbine Tool:

Zero (0) 60 degree sector based on 2D assessment (Stage 01 & 02)

Aerial Image Source: Google Earth (08/2023)

Existing Landscape Character Description:

This viewpoint was captured along the New England Highway, near Liddell and Bayswater Power stations.

The land features a gentle undulating terrain with dense roadside vegetation along the highway.

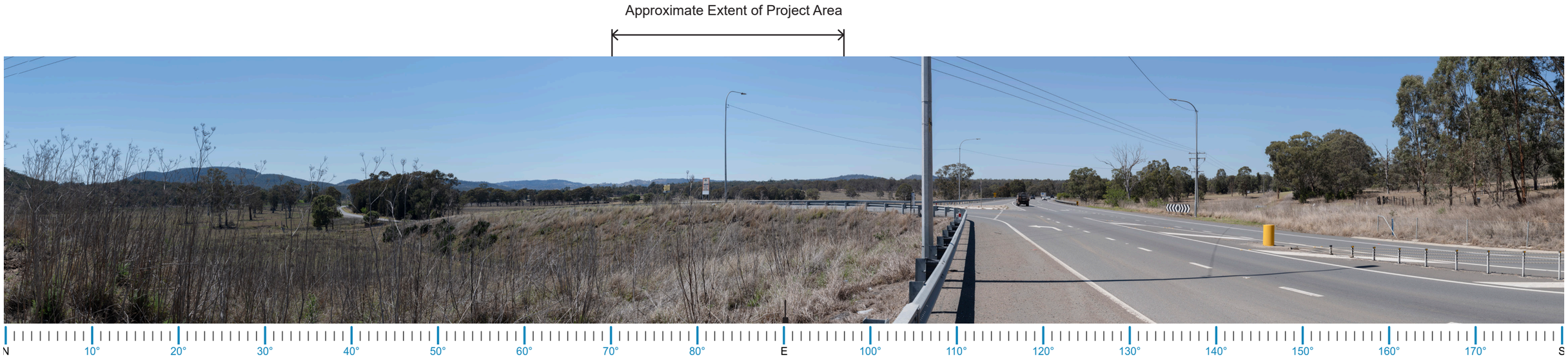
The view is characterised by prominent road and electrical infrastructure, including transmission lines and substations, particularly towards the east.

Preliminary Potential Visual Impact:

A 3D assessment based on topography alone confirms that no turbines proposed as part of the Project (Stage 2) will be visible 8,000 m from this location.

Distant views beyond 8,000 m may be available. However, intervening vegetation will likely screen the whole Project.

VP03 New England Highway, Muswellbrook



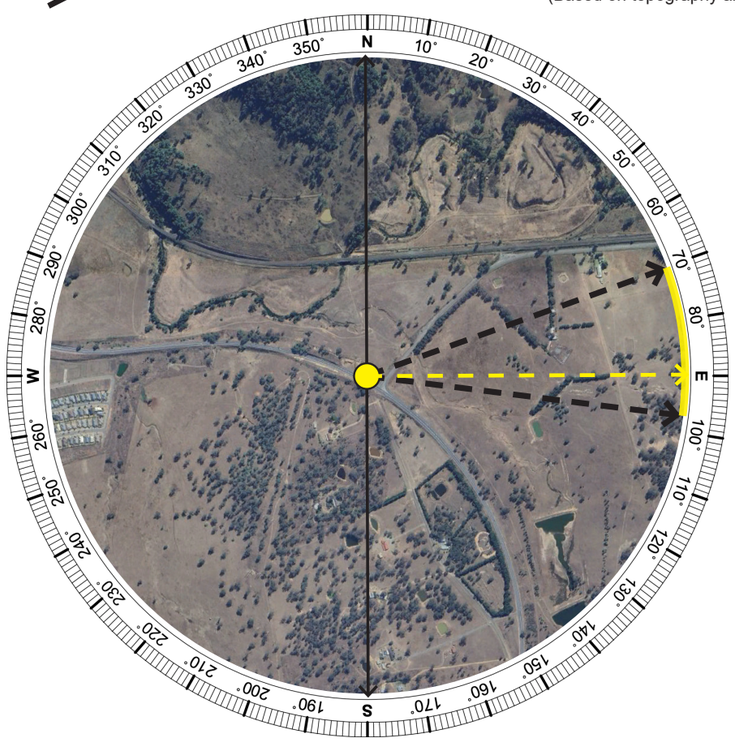
LEGEND

Viewing direction and centre of panorama

Extent of panorama

Direction of potentially visible turbines

Extent of visible turbines (Based on topography alone)



VIEWPOINT VP03

Viewpoint Summary:	
Location:	Elevation:
New England Highway, Muswellbrook	173 m
Coordinates:	Viewing Direction:
32°17'9.64"S 150°55'42.51"E	East
Distance to nearest WTG:	Visibility Distance Zone:
16.0 km	**Mid Background (MB)**
Land Use:	Viewer Sensitivity Level:
Main Road	**Level 3 (Low)**
LCU:	Scenic Quality Rating:
LCU03: Pastures & Residential Properties	**Low**

Multiple Wind Turbine Tool:

Zero (0) 60 degree sector based on 2D assessment (Stage 01 & 02)

Aerial Image Source: Google Earth (08/2023)

Existing Landscape Character Description:

This viewpoint was captured along the New England Highway.

The landscape features undulating cleared pastures, interrupted by significant road infrastructure and powerlines. The topography descends towards the northeast.

The surrounding land use is primarily agricultural, mainly for grazing purposes.

Scattered vegetation is observed, along with adjacent pastures. Some stretches of the highway exhibit dense roadside vegetation.

Distant vegetated ridgelines to the northeast contribute to the visual landform from this location.

Preliminary Potential Visual Impact:

A 3D assessment based on topography alone confirms that no turbines proposed as part of the Project (Stage 2) will be visible 8,000 m from this location.

Views are unlikely due to the receiver distance, and the Project is likely to be indiscernible from this location.

VP04 Hebden Road, Muswellbrook

Approximate Extent of Project Area



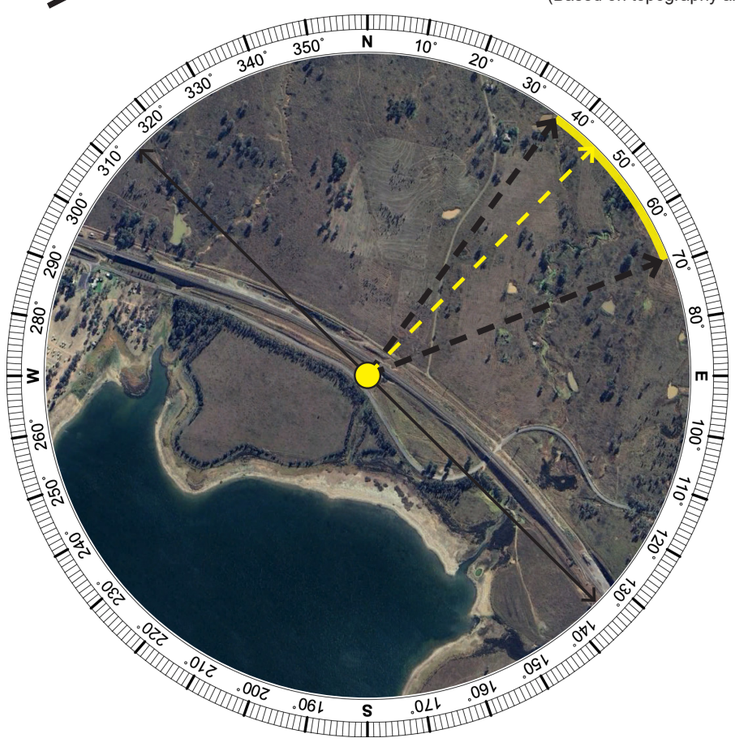
LEGEND

Viewing direction and centre of panorama

Extent of panorama

Direction of potentially visible turbines

Extent of visible turbines
(Based on topography alone)



VIEWPOINT VP04

Viewpoint Summary:	
Location:	Elevation:
Hebden Road, Muswellbrook	135 m
Coordinates:	Viewing Direction:
32°21’14.25”S 151°00’17.69”E	Northeast
Distance to nearest WTG:	Visibility Distance Zone:
12.5 km	**Mid Background (MB)**
Land Use:	Viewer Sensitivity Level:
Road	**Level 2 (Moderate)**
LCU:	Scenic Quality Rating:
LCU03: Pastures & Residential Properties	**Moderate**

Multiple Wind Turbine Tool:

One (1) 60 degree sector based on 2D assessment (Stage 01 & 02)

Aerial Image Source: Google Earth (05/2023)

Existing Landscape Character Description:

This viewpoint is located on Hebden Road near the edge of Lake Liddell.

The topography gently undulates, rising to a vegetated ridgeline visible in the background. In the middle ground, transmission lines and railway infrastructure are evident.

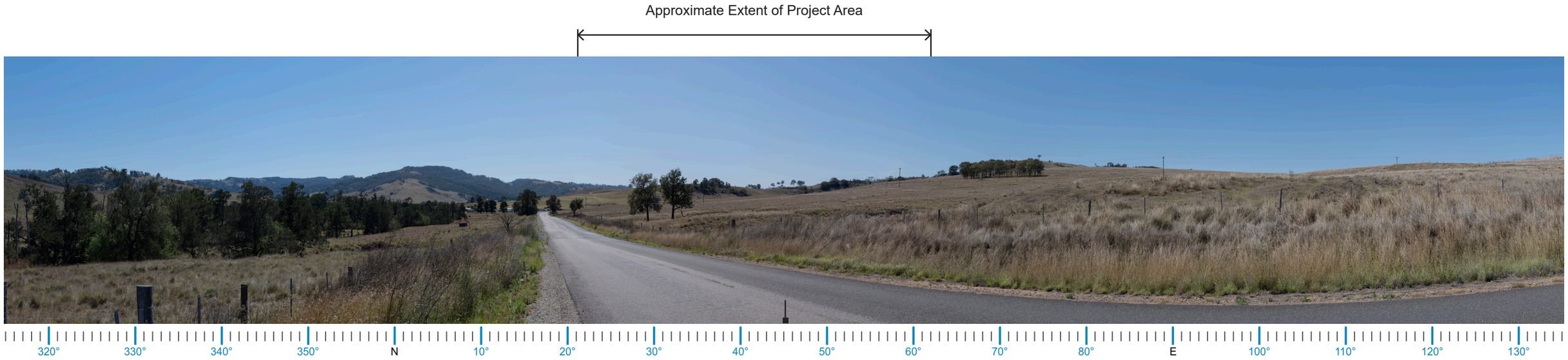
The foreground vegetation has been cleared to accommodate both infrastructure corridors and grazing.

Preliminary Potential Visual Impact:

A 3D assessment based on topography alone confirms that no turbines proposed as part of the Project (Stage 2) will be visible 8,000 m from this location.

Distant views beyond 8,000 m may be available. However, the Project will likely be indiscernible.

VP05 Scrumlo Road, Hebden



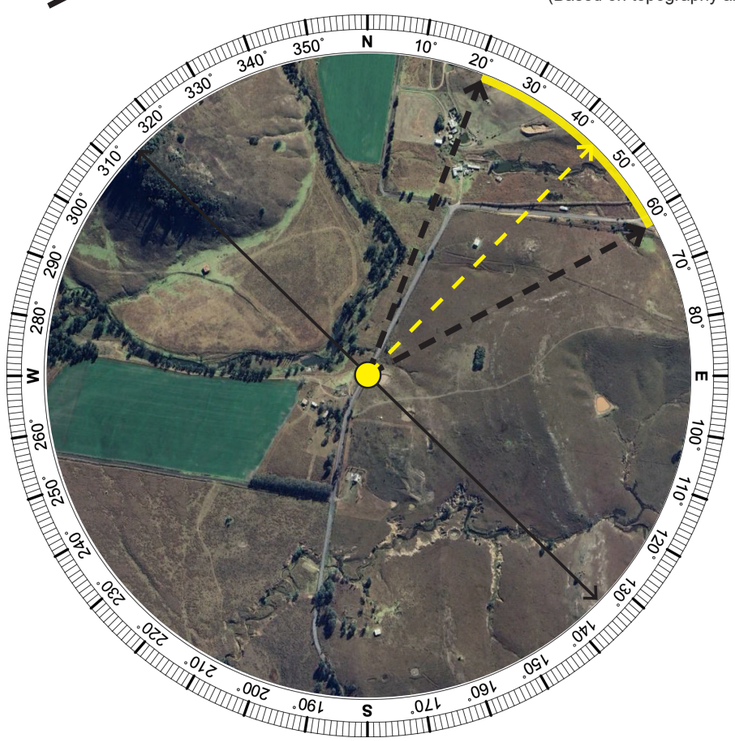
LEGEND

Viewing direction and centre of panorama

Extent of panorama

Direction of potentially visible turbines

Extent of visible turbines
(Based on topography alone)



VIEWPOINT VP05

Viewpoint Summary:	
Location:	Elevation:
Scrumlo Road, Hebden	131 m
Coordinates:	Viewing Direction:
32°21'4.77"S 151°02'41.76"E	Northeast
Distance to nearest WTG:	Visibility Distance Zone:
9.8 km	**Near Background (NB)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Level 3 (Low)**
LCU:	Scenic Quality Rating:
LCU03: Pastures & Residential Properties	**(Low)**

Multiple Wind Turbine Tool:

One (1) 60 degree sector based on 2D assessment (Stage 01 & 02)

Aerial Image Source: Google Earth (05/2023)

Existing Landscape Character Description:

This viewpoint was taken along Scrumlo Road, facing northeast towards the Project, near Hebden Community Hall.

The surrounding land is primarily altered for grazing, featuring scattered pastures of native vegetation.

The terrain is gently undulating with intermittent vegetation, especially along the riparian edge of Bowmans Creek to the north. Distant vegetated ridgelines in the north add to the visual landform from this location.

Preliminary Potential Visual Impact:

A 3D assessment based on topography alone confirms that no turbines proposed as part of the Project (Stage 2) will be visible 8,000 m from this location.

Distant views beyond 8,000 m may be available. However, the Project will likely be indiscernible and will not alter the major landscape features of this viewpoint.

VP06 Scrumlo Road, Hebden

Approximate Extent of Project Area



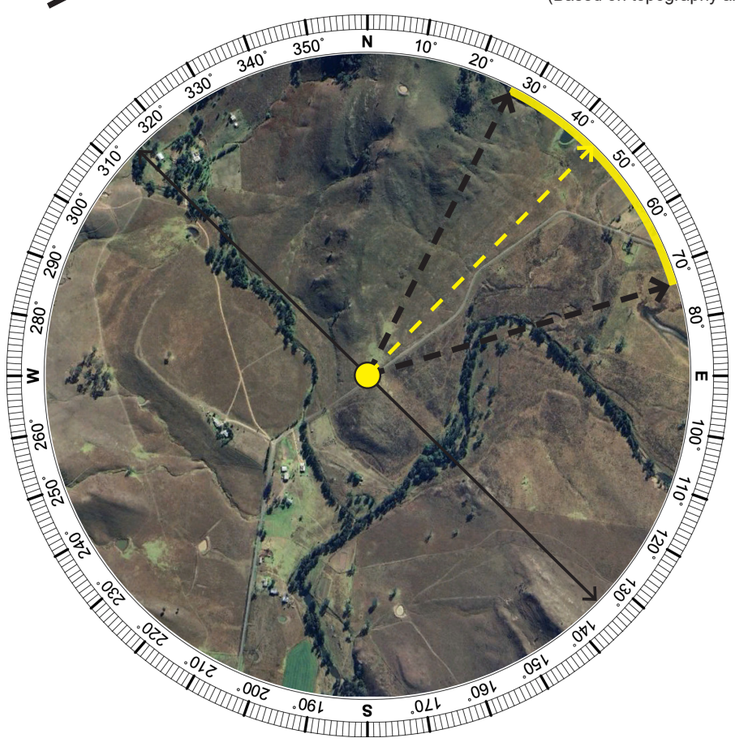
LEGEND

Viewing direction and centre of panorama

Extent of panorama

Direction of potentially visible turbines

Extent of visible turbines
(Based on topography alone)



VIEWPOINT VP06

Viewpoint Summary:	
Location:	Elevation:
Scrumlo Road, Hebden	144 m
Coordinates:	Viewing Direction:
32°19'47.85"S 151°03'03.55"E	Northeast
Distance to nearest WTG:	Visibility Distance Zone:
7.6 km	**Far Middleground (FM)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Level 3 (Low)**
LCU:	Scenic Quality Rating:
LCU03: Pastures & Residential Properties	**Low**

Multiple Wind Turbine Tool:

One (1) 60 degree sector based on 2D assessment (Stage 2)

Aerial Image Source: Google Earth (05/2023)

Existing Landscape Character Description:

This viewpoint is captured on Scrumlo Road near non-associated dwelling I24-2.

The surrounding land has been altered for agricultural practices, with minimal vegetation in the foreground.

Undulating hills in the midground are viewed as a prominent feature. Distant vegetated ridgelines to the northeast enhance the visual landform.

Existing powerlines and fencing are evident as introduced infrastructure in the landscape.

Preliminary Potential Visual Impact:

A 3D assessment based on topography alone confirms that one (1) turbine proposed as part of the Project (Stage 2) will be visible 8,000 m from this location.

Distant views may be available. However, the Project will likely be indiscernible and will not alter the major landscape features of this viewpoint.

VP07 Scrumlo Road, Hebden

Approximate Extent of Project Area



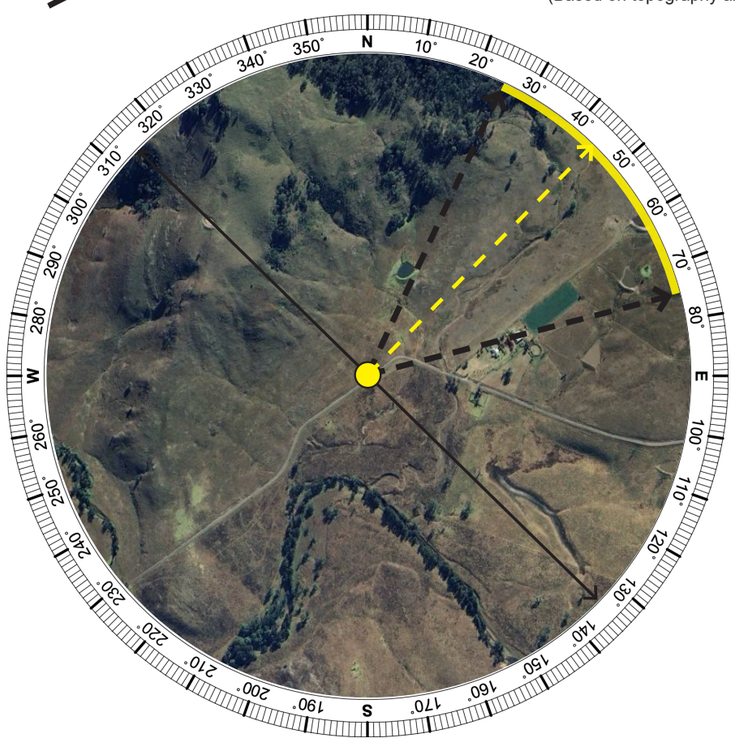
LEGEND

Viewing direction and centre of panorama

Extent of panorama

Direction of potentially visible turbines

Extent of visible turbines
(Based on topography alone)



VIEWPOINT VP07

Viewpoint Summary:	
Location:	Elevation:
Scrumlo Road, Hebden	145 m
Coordinates:	Viewing Direction:
32°19'32.14"S 151°03'24.49"E	Northeast
Distance to nearest WTG:	Visibility Distance Zone:
6.9 km	**Far Middleground (FM)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Level 3 (Low)**
LCU:	Scenic Quality Rating:
LCU03: Pastures & Residential Properties	**Low**

Multiple Wind Turbine Tool:

One (1) 60 degree sector based on 2D assessment (Stage 2)

Aerial Image Source: Google Earth (05/2023)

Existing Landscape Character Description:

This viewpoint is captured on Scrumlo Road near non-associated dwelling K23-1.

The surrounding land has been altered for agricultural practices, with minimal vegetation in the foreground. Dotted rural dwellings are dotted throughout the landscape.

Undulating hills in the midground are viewed as a prominent feature, with distant vegetated ridgelines enhancing the visual landform in the background.

Existing powerlines and fencing are evident as introduced infrastructure in the landscape.

Preliminary Potential Visual Impact:

A 3D assessment based on topography alone confirms that one (1) turbine proposed as part of the Project (Stage 2) will be visible 8,000 m from this location.

Due to the lack of intervening elements, the Project will likely be visible along the most distant ridgeline to the northeast. However, it is noted that they are likely to occupy a small portion of the view.

VP08 Scrumlo Road, Hebden

Approximate Extent of Project Area



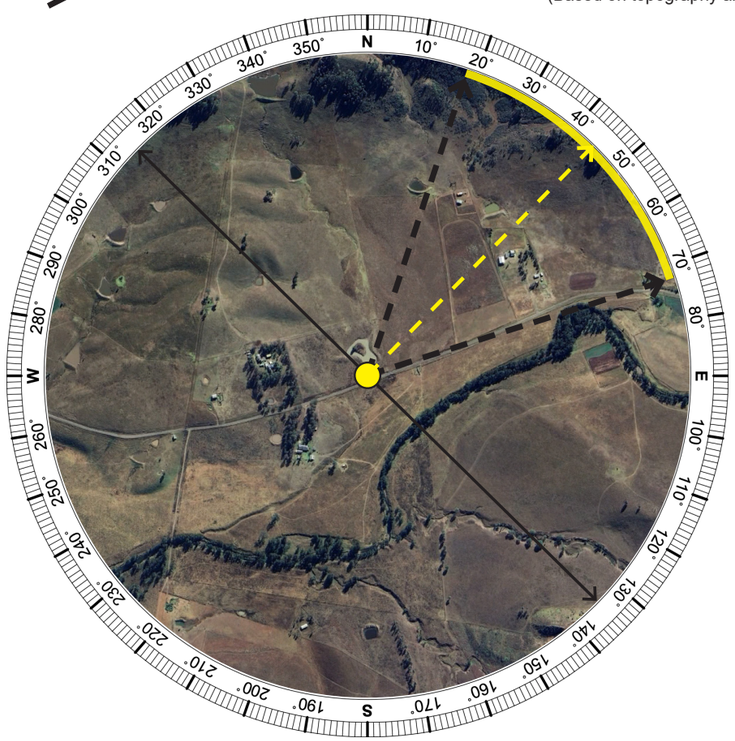
LEGEND

Viewing direction and centre of panorama

Extent of panorama

Direction of potentially visible turbines

Extent of visible turbines
(Based on topography alone)



VIEWPOINT VP08

Viewpoint Summary:	
Location:	Elevation:
Scrumlo Road, Hebden	143 m
Coordinates:	Viewing Direction:
32°19’33.30”S 151°04’18.05”E	Northeast
Distance to nearest WTG:	Visibility Distance Zone:
6.0 km	**Far Middleground (FM)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Level 3 (Low)**
LCU:	Scenic Quality Rating:
LCU03: Pastures & Residential Properties	**Low**

Multiple Wind Turbine Tool:

One (1) 60 degree sector based on 2D assessment (Stage 2)

Aerial Image Source: Google Earth (05/2023)

Existing Landscape Character Description:

This viewpoint is captured on Scrumlo Road near non-associated dwelling K23-2.

The surrounding land has been altered for agricultural practices, with minimal vegetation in the foreground. Dotted rural dwellings are dotted throughout the landscape.

Vegetated undulating hills in the midground are viewed as a prominent feature.

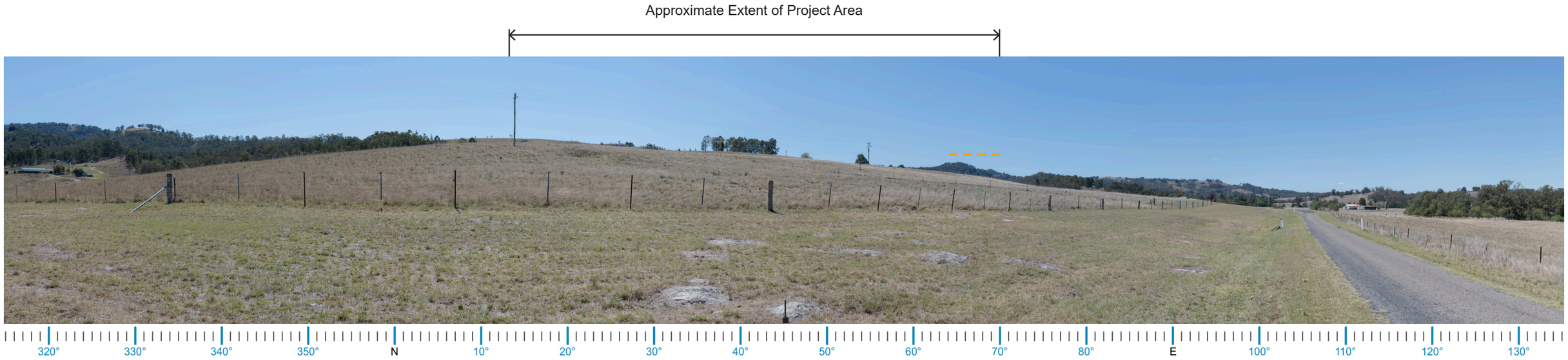
Existing powerlines and fencing are evident as introduced infrastructure in the landscape.

Preliminary Potential Visual Impact:

A 3D assessment based on topography alone confirms that four (4) turbines proposed as part of the Project (Stage 2) will be visible 8,000 m from this location.

Due to the lack of intervening elements, the Project will likely be visible along the most distant ridgeline to the northeast. However, it is noted that they are likely to occupy a small portion of the view.

VP09 Scrumlo Road, Hebden



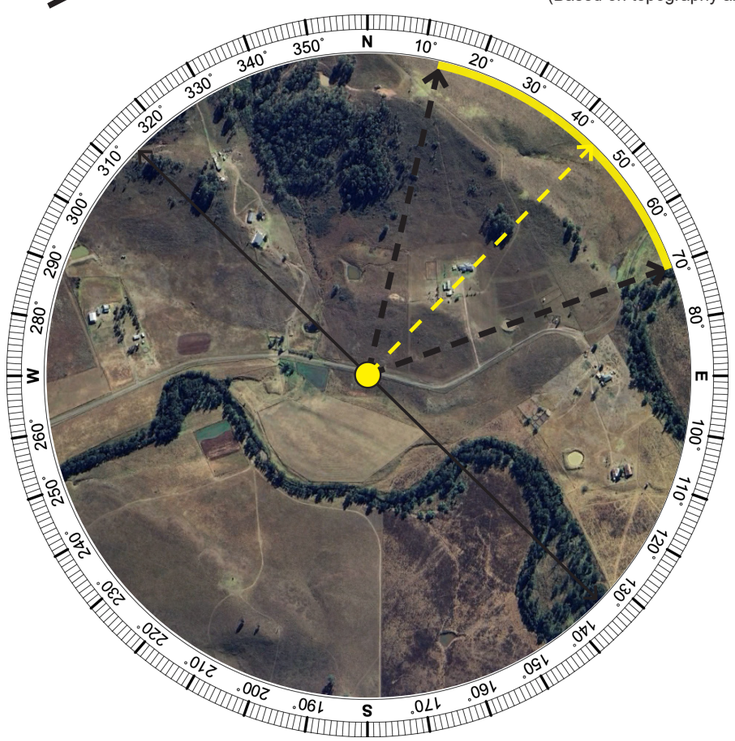
LEGEND

Viewing direction and centre of panorama

Extent of panorama

Direction of potentially visible turbines

Extent of visible turbines
(Based on topography alone)



VIEWPOINT VP09

Viewpoint Summary:	
Location:	Elevation:
Scrumlo Road, Hebden	151 m
Coordinates:	Viewing Direction:
32°19'25.99"S 151°04'58.19"E	Northeast
Distance to nearest WTG:	Visibility Distance Zone:
5.4 km	**Far Middleground (FM)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Level 3 (Low)**
LCU:	Scenic Quality Rating:
LCU03: Pastures & Residential Properties	**Low**

Multiple Wind Turbine Tool:

One (1) 60 degree sector based on 2D assessment (Stage 2)

Aerial Image Source: Google Earth (05/2023)

Existing Landscape Character Description:

This viewpoint is captured on Scrumlo Road near non-associated dwellings L23-1, M23-2 & M23-1.

The surrounding land has been modified for agricultural practices, featuring minimal vegetation in the foreground. Dotted rural dwellings are dispersed throughout the landscape.

In the midground, localised undulating hills provide views to the northeast, while distant vegetated ridgelines are visible to the east. Dense vegetation along Bowmans Creek to the southeast aligns the creek edge with adjoining pastures.

Existing powerlines and fencing serve as introduced infrastructure elements in the landscape.

Preliminary Potential Visual Impact:

A 3D assessment based on topography alone confirms that three (3) turbines proposed as part of the Project (Stage 2) will be visible 8,000 m from this location.

Due to the lack of intervening elements, the Project will likely be visible along the most distant ridgeline within this viewpoint. However, it is noted that they are likely to occupy a small portion of the view.

VP10 Scrumlo Road, Hebden

Approximate Extent of Project Area



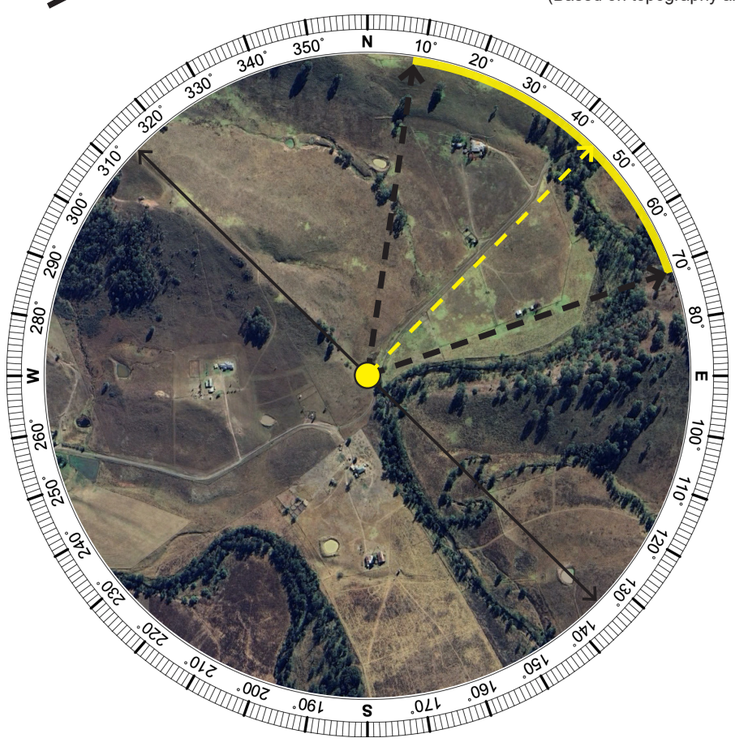
LEGEND

Viewing direction and centre of panorama

Extent of panorama

Direction of potentially visible turbines

Extent of visible turbines
(Based on topography alone)



VIEWPOINT VP10

Viewpoint Summary:	
Location:	Elevation:
Scrumlo Road, Hebden	161 m
Coordinates:	Viewing Direction:
32°19'17.16"S 151°05'21.53"E	Northeast
Distance to nearest WTG:	Visibility Distance Zone:
4.7 km	**Far Middleground (FM)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Level 3 (Low)**
LCU:	Scenic Quality Rating:
LCU03: Pastures & Residential Properties	**Low**

Multiple Wind Turbine Tool:

One (1) 60 degree sector based on 2D assessment (Stage 2)

Aerial Image Source: Google Earth (05/2023)

Existing Landscape Character Description:

This viewpoint is captured on Scrumlo Road near non-associated dwellings M23-1 & M23-2.

The surrounding land has been modified for agricultural practices, featuring scattered vegetation in the foreground within adjoining pastures. Dense vegetation aligns with Bowmans Creek to the east. Dotted rural dwellings are dispersed throughout the landscape.

Vegetated undulating hills in the midground are prominent features within this view, with distant vegetated ridgelines also visible.

Existing powerlines and fencing serve as introduced infrastructure elements in the landscape.

Preliminary Potential Visual Impact:

A 3D assessment based on topography alone confirms that three (3) turbines proposed as part of the Project (Stage 2) will be visible 8,000 m from this location.

Due to the lack of intervening elements, the Project will likely be visible along the most distant ridgeline within this viewpoint. However, it is noted that they are likely to occupy a small portion of the view, and as we move closer to the Project Site, the proposed turbines will be seen as a new element within the landscape.

VP11 Scrumlo Road, Hebden

Approximate Extent of Project Area



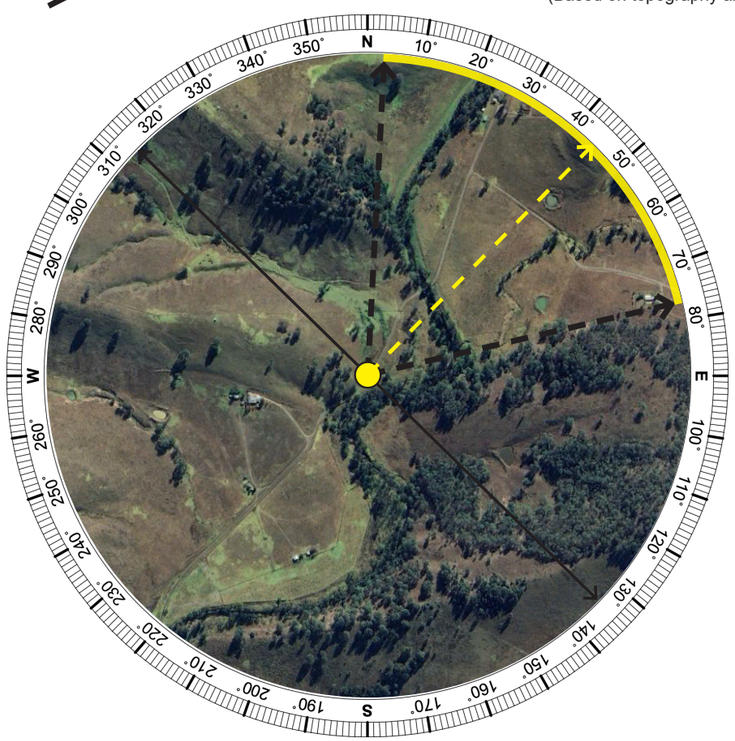
LEGEND

Viewing direction and centre of panorama

Extent of panorama

Direction of potentially visible turbines

Extent of visible turbines
(Based on topography alone)



VIEWPOINT VP11

Viewpoint Summary:	
Location:	Elevation:
Scrumlo Road, Hebden	167 m
Coordinates:	Viewing Direction:
32°18'57.93"S 151°05'41.97"E	Northeast
Distance to nearest WTG:	Visibility Distance Zone:
4.0 km	**Near Middleground (NM)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Level 3 (Low)**
LCU:	Scenic Quality Rating:
LCU03: Pastures & Residential Properties	**Low**

Multiple Wind Turbine Tool:

Two (2) 60 degree sector based on 2D assessment (Stage 2)

Aerial Image Source: Google Earth (05/2023)

Existing Landscape Character Description:

This viewpoint is captured on Scrumlo Road near non-associated dwellings N22-1.

The surrounding land has been modified for agricultural practices, featuring scattered vegetation in the foreground within adjoining pastures. Dense vegetation aligns with Bowmans Creek to the east.

Vegetated undulating hills in the midground are prominent features within this view, with distant vegetated ridgelines also present.

Existing powerlines and fencing serve as introduced infrastructure elements in the landscape.

Preliminary Potential Visual Impact:

A 3D assessment based on topography alone confirms that three (3) turbines proposed as part of the Project (Stage 2) will be visible 8,000 m from this location.

It will likely be visible along the ridgeline to the north within this viewpoint. However, it is noted that they are likely to occupy a small portion of the view, and as we move closer to the Project Site, the proposed turbines will be seen as a new element within the landscape.

Intervening vegetation in the midground will likely fragment views of distant turbines to the NNE.

VP12 Scrumlo Road, Hebden

Approximate Extent of Project Area



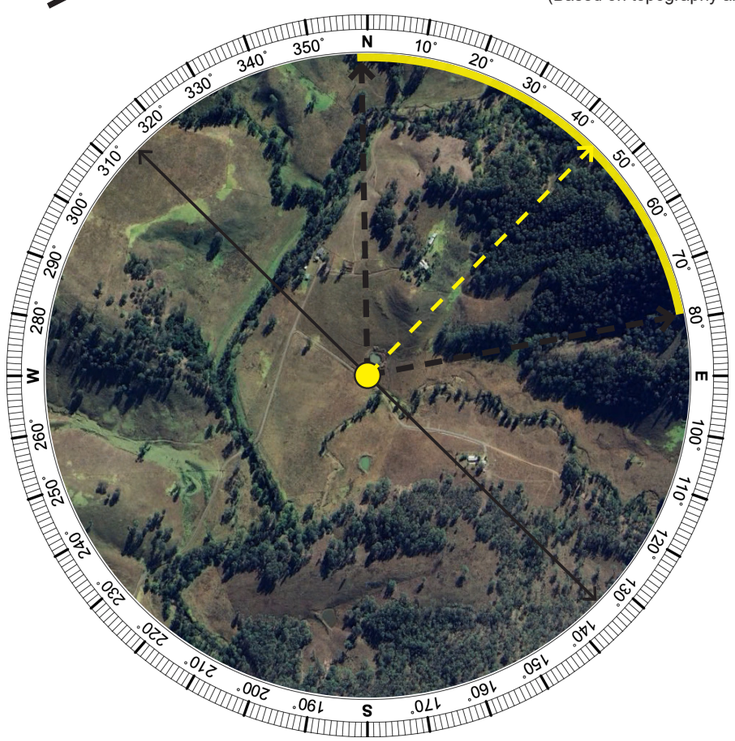
LEGEND

Viewing direction and centre of panorama

Extent of panorama

Direction of potentially visible turbines

Extent of visible turbines
(Based on topography alone)



VIEWPOINT VP12

Viewpoint Summary:	
Location:	Elevation:
Scrumlo Road, Hebden	171 m
Coordinates:	Viewing Direction:
32°18'45.96"S 151°05'57.76"E	Northeast
Distance to nearest WTG:	Visibility Distance Zone:
3.5 km	**Near Middleground (NM)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Level 3 (Low)**
LCU:	Scenic Quality Rating:
LCU03: Pastures & Residential Properties	**Low**

Multiple Wind Turbine Tool:

Two (2) 60 degree sector based on 2D assessment (Stage 2)

Aerial Image Source: Google Earth (05/2023)

Existing Landscape Character Description:

This viewpoint is captured on Scrumlo Road near non-associated O22-1, N21-1 & N21-2 dwellings.

The surrounding land has been modified for agricultural practices, featuring scattered vegetation in the foreground within adjoining pastures. Dotted rural dwellings are dispersed throughout the landscape.

Vegetated undulating hills in the midground are prominent features within this view, with localised undulating views to the northeast.

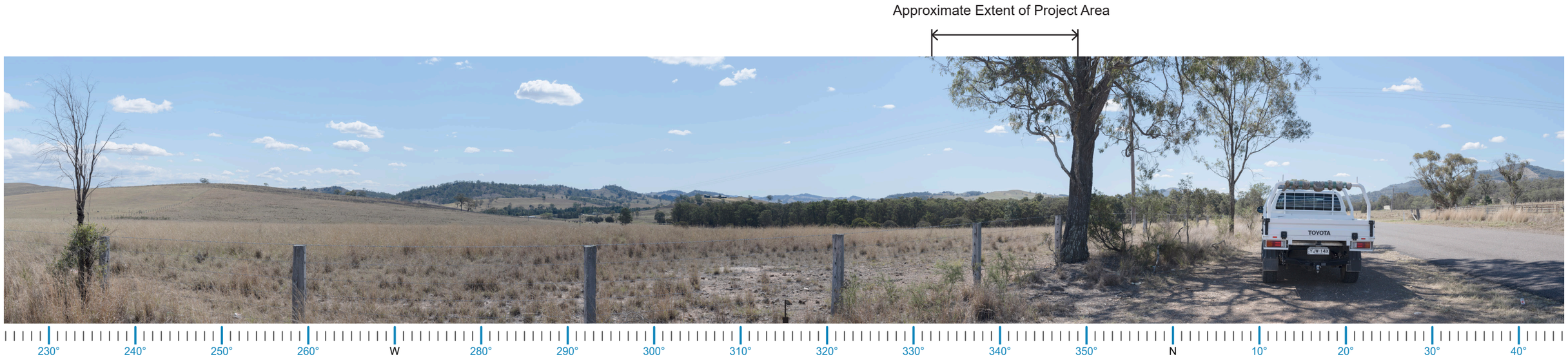
Existing powerlines are introduced infrastructure elements in the landscape.

Preliminary Potential Visual Impact:

A 3D assessment based on topography alone confirms that four (4) turbines proposed as part of the Project (Stage 2) will be visible 8,000 m from this location.

It will likely be visible along the distant ridgeline to the north within this viewpoint. However, it is noted that they are likely to occupy a small portion of the view, but the proposed turbines visible within this valley will be viewed as a new element within the landscape.

VP13 Bridgman Road, Bridgman


Approximate Extent of Project Area
TOYOTA
230°
240°
250°
260°
W
280°
290°
300°
310°
320°
330°
340°
350°
N
10°
20°
30°
40°
50°
60°
70°
80°
E
100°
110°
120°
130°
140°
150°
160°
170°
S
190°
200°
210°
220°
230°
240°
250°
260°
270°

VP14 Goorangoola Road, Greenlands

Approximate Extent of Project Area



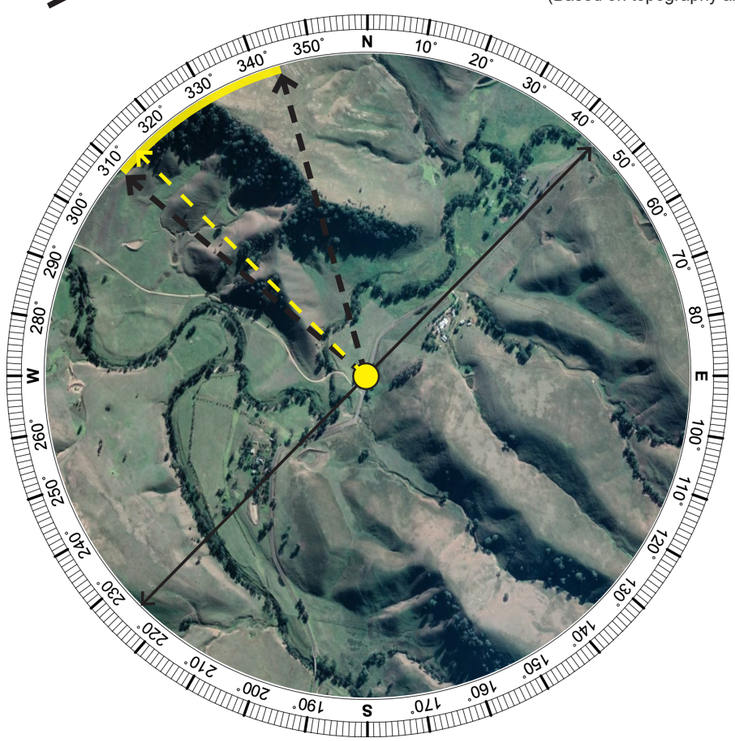
LEGEND

Viewing direction and centre of panorama

Extent of panorama

Direction of potentially visible turbines

Extent of visible turbines
(Based on topography alone)



VIEWPOINT VP14

Viewpoint Summary:	
Location:	Elevation:
Goorangoola Road, Greenlands	156 m
Coordinates:	Viewing Direction:
32°20'37.05"S 151°11'17.26"E	Northwest
Distance to nearest WTG:	Visibility Distance Zone:
5.9 km	**Far Background (FB)**
Land Use:	Viewer Sensitivity Level:
Road	**Level 3 (Low)**
LCU:	Scenic Quality Rating:
LCU03: Pastures & Residential Properties	**Moderate**

Multiple Wind Turbine Tool:

One (1) 60 degree sector based on 2D assessment (Stage 2)

Aerial Image Source: Google Earth (06/2019)

Existing Landscape Character Description:

This viewpoint was taken along Goorangoola Road near non-associated dwelling V25-2.

The surrounding land has been modified for agricultural practices, showcasing scattered vegetation in the foreground within adjoining pastures and dense vegetation aligning with Bowmans Creek to the west. Dotted rural dwellings are dispersed throughout the landscape.

Prominent vegetated undulating hills in the midground are notable features within this view, with distant vegetated ridgelines also visible..

Preliminary Potential Visual Impact:

A 3D assessment based on topography alone confirms that three (3) turbines proposed as part of the Project (Stage 2) will be visible 8,000 m from this location.

Intervening vegetation in the foreground will likely fragment proposed turbine views from this location.

VP15 Goorangoola Creek Road, Goorangoola

Approximate Extent of Project Area



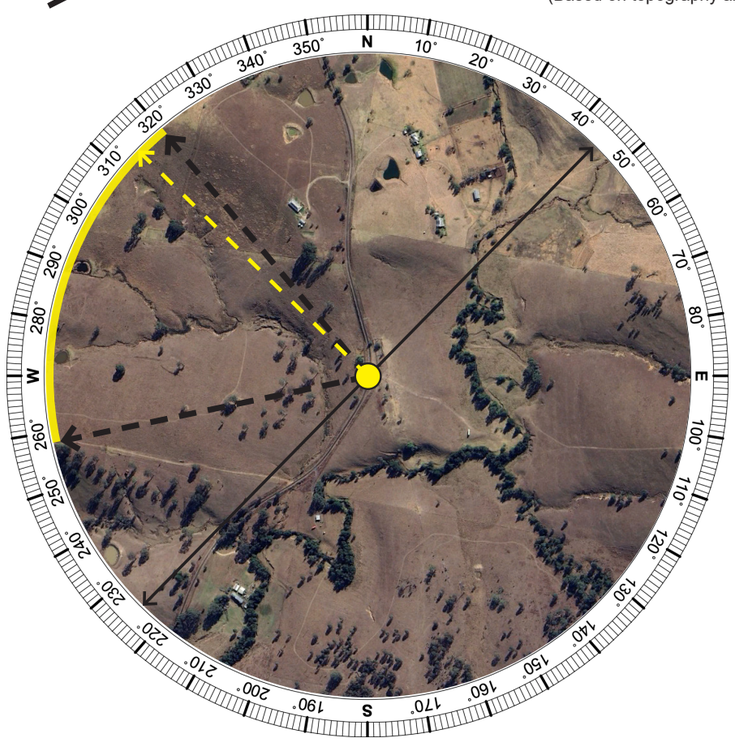
LEGEND

Viewing direction and centre of panorama

Extent of panorama

Direction of potentially visible turbines

Extent of visible turbines
(Based on topography alone)



VIEWPOINT VP15

Viewpoint Summary:	
Location:	Elevation:
Goorangoola Creek Road, Goorangoola	241m
Coordinates:	Viewing Direction:
32°17'32.96"S 151°12'56.97"E	Northwest
Distance to nearest WTG:	Visibility Distance Zone:
6.7 km	**Far Middleground (FM)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Level 3 (Low)**
LCU:	Scenic Quality Rating:
LCU03: Pastures & Residential Properties	**Moderate**

Multiple Wind Turbine Tool:

One (1) 60 degree sector based on 2D assessment (Stage 2)

Aerial Image Source: Google Earth (08/2023)

Existing Landscape Character Description:

This viewpoint was taken along Goorangoola Road near non-associated dwellings Y19-1, Y19-4 & Y19-2.

The surrounding land has been altered for agricultural practices with scattered vegetation within the foreground. Dotted rural dwellings are dotted throughout the landscape.

Undulating hills and localised valleys are prominent features with fragmented distant views of vegetated ridgelines.

Preliminary Potential Visual Impact:

A 3D assessment based on topography alone confirms that two (2) turbines proposed as part of the Project (Stage 2) will be visible 8,000 m from this location.

Intervening vegetation in the foreground will likely fragment views of proposed turbines in the distance from this location.

VP16 Goorangoola Creek Road, Goorangoola

Approximate Extent of Project Area



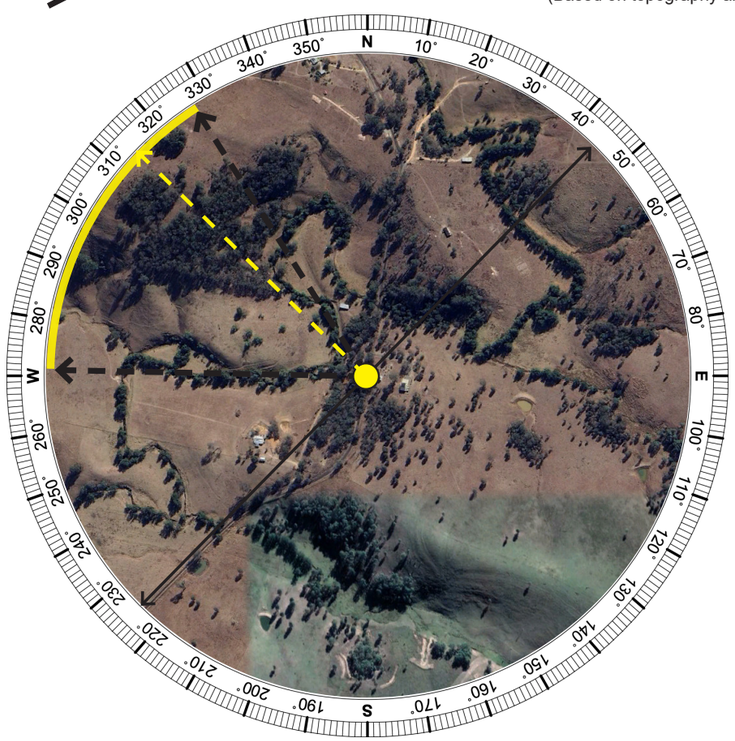
LEGEND

Viewing direction and centre of panorama

Extent of panorama

Direction of potentially visible turbines

Extent of visible turbines
(Based on topography alone)



VIEWPOINT VP16

Viewpoint Summary:	
Location:	Elevation:
Goorangoola Creek Road, Goorangoola	219m
Coordinates:	Viewing Direction:
32°18'25.94"S 151°12'41.69"E	Northwest
Distance to nearest WTG:	Visibility Distance Zone:
6.4 km	**Far Middleground (FM)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Level 3 (Low)**
LCU:	Scenic Quality Rating:
LCU03: Pastures & Residential Properties	**Moderate**

Multiple Wind Turbine Tool:

One (1) 60 degree sector based on 2D assessment (Stage 2)

Aerial Image Source: Google Earth (08/2023)

Existing Landscape Character Description:

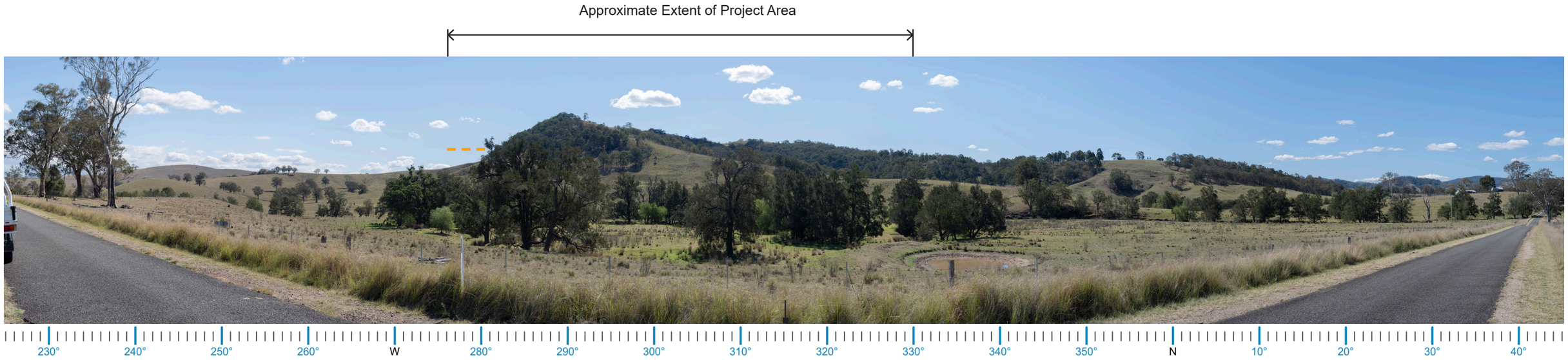
This viewpoint was captured at St Columba's Anglican Church on Goorangoola Road.

Dense vegetation lines the road corridor, a prominent landscape feature that filters clear views to undulating hills and cleared pastures in the midground. Filtered views of vegetated ridgelines are observed from this location.

Preliminary Potential Visual Impact:

A 3D assessment based on topography alone confirms that no turbines proposed as part of the Project (Stage 2) will be visible 8,000 m from this location.

VP17 Goorangoola Creek Road, Goorangoola



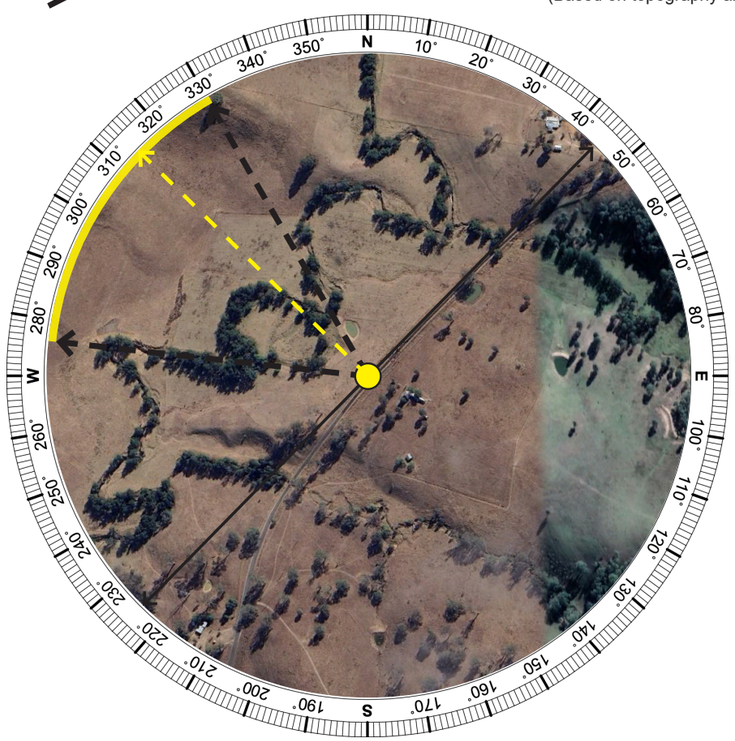
LEGEND

Viewing direction and centre of panorama

Extent of panorama

Direction of potentially visible turbines

Extent of visible turbines (Based on topography alone)



VIEWPOINT VP17

Viewpoint Summary:	
Location:	Elevation:
Goorangoola Creek Road, Goorangoola	203 m
Coordinates:	Viewing Direction:
32°18'42.89"S 151°12'22.74"E	Northwest
Distance to nearest WTG:	Visibility Distance Zone:
6.0 km	**Far Middleground (FM)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Level 3 (Low)**
LCU:	Scenic Quality Rating:
LCU03: Pastures & Residential Properties	**Moderate**

Multiple Wind Turbine Tool:

One (1) 60 degree sector based on 2D assessment (Stage 2)

Aerial Image Source: Google Earth (08/2023)

Existing Landscape Character Description:

This viewpoint is captured on Scrumlo Road near non-associated dwelling X21-1.

The surrounding land has been modified for agricultural practices, featuring scattered vegetation in the foreground and dense vegetation along the creek edge to the northwest. Dotted rural dwellings are dispersed throughout the landscape.

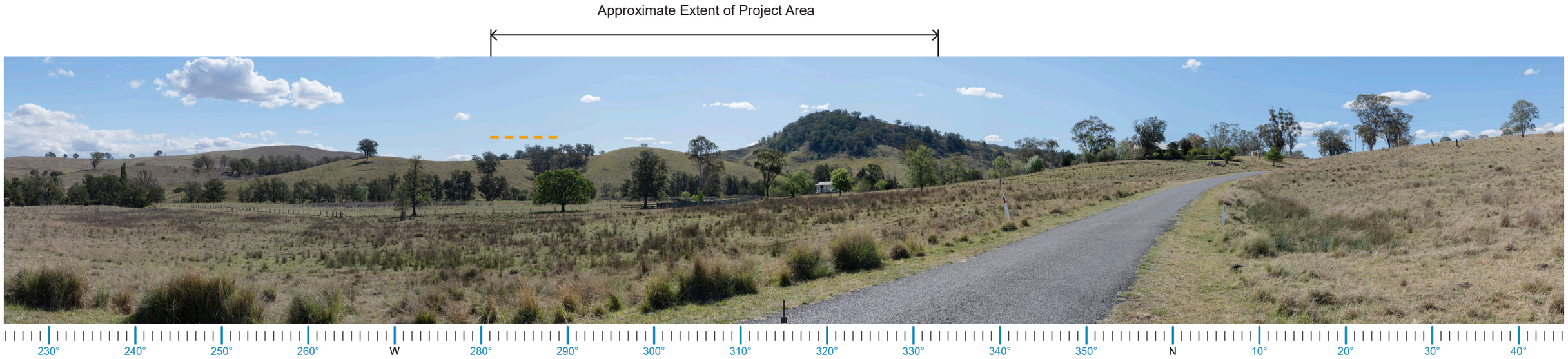
Prominent undulating hills in the midground stand out, with distant vegetated ridgelines contributing to the visual landform in the background.

Preliminary Potential Visual Impact:

A 3D assessment based on topography alone confirms that three (3) turbines proposed as part of the Project (Stage 2) will be visible 8,000 m from this location.

Due to the lack of intervening elements, select turbines will likely likely be visible along the most distant ridgeline in this viewpoint. However, it is noted that they are likely to occupy a small portion of the view to the west.

VP18 Goorangoola Creek Road, Goorangoola



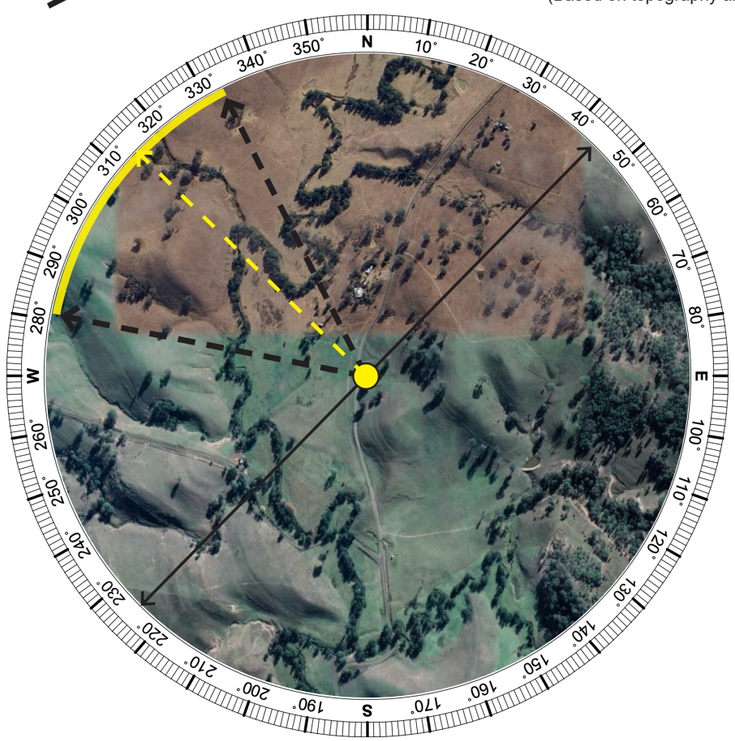
LEGEND

Viewing direction and centre of panorama

Extent of panorama

Direction of potentially visible turbines

Extent of visible turbines (Based on topography alone)



VIEWPOINT VP18

Viewpoint Summary:	
Location:	Elevation:
Goorangoola Creek Road, Goorangoola	194m
Coordinates:	Viewing Direction:
32°19'03.07"S 151°12'12.12"E	Northwest
Distance to nearest WTG:	Visibility Distance Zone:
5.8 km	**Far Middleground (FM)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Level 3 (Low)**
LCU:	Scenic Quality Rating:
LCU03: Pastures & Residential Properties	**Moderate**

Multiple Wind Turbine Tool:

One (1) 60 degree sector based on 2D assessment (Stage 2)

Aerial Image Source: Google Earth (06/2019)

Existing Landscape Character Description:

This viewpoint is captured on Scrumlo Road near non-associated dwelling X22-1.

The surrounding land has been modified for agricultural practices, with scattered vegetation in the foreground and dense vegetation along the creek edge to the northwest. Dotted rural dwellings are dispersed throughout the landscape.

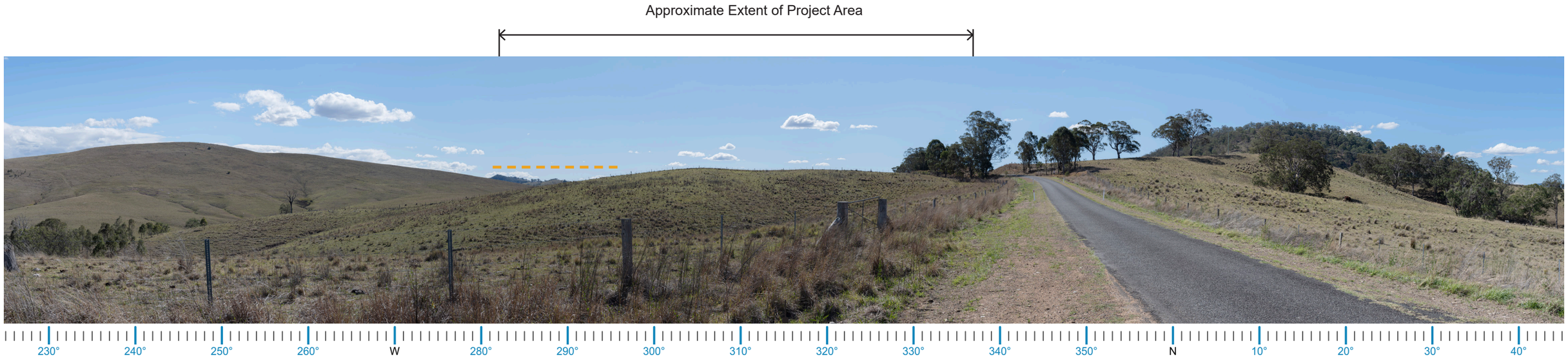
Prominent vegetated undulating hills in the midground add to the overall visual landscape character.

Preliminary Potential Visual Impact:

A 3D assessment based on topography alone confirms that three (3) turbines proposed as part of the Project (Stage 2) will be visible 8,000 m from this location.

Due to the lack of intervening elements, the Project will likely be visible along the most distant ridgeline within this viewpoint. However, it is noted that they are likely to occupy a small portion of the view, and as we move closer to the Project Site, the proposed turbines will be seen as a new element within the landscape.

VP19 Old Goorangoola Road, Goorangoola



LEGEND

Viewing direction and centre of panorama

Extent of panorama

Direction of potentially visible turbines

Extent of visible turbines
(Based on topography alone)

VIEWPOINT VP19

Viewpoint Summary:	
Location:	Elevation:
Old Goorangoola Road, Goorangoola	242m
Coordinates:	Viewing Direction:
32°18'59.24"S 151°11'32.89"E	Northwest
Distance to nearest WTG:	Visibility Distance Zone:
4.8 km	**Far Middleground (FM)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Level 3 (Low)**
LCU:	Scenic Quality Rating:
LCU03: Pastures & Residential Properties	**Low**

Multiple Wind Turbine Tool:

One (1) 60 degree sector based on 2D assessment (Stage 2)

Aerial Image Source: Google Earth (06/2019)

Existing Landscape Character Description:

This viewpoint is captured on Old Goorangoola Road near non-associated dwelling W22-1.

The surrounding land has been modified for agricultural practices, featuring scattered vegetation in the midground within adjoining pastures to the north. Dotted rural dwellings are dispersed throughout the landscape.

Vegetated undulating hills in the midground are prominent features within this view, with localised undulating containing distant views of vegetated ridgelines.

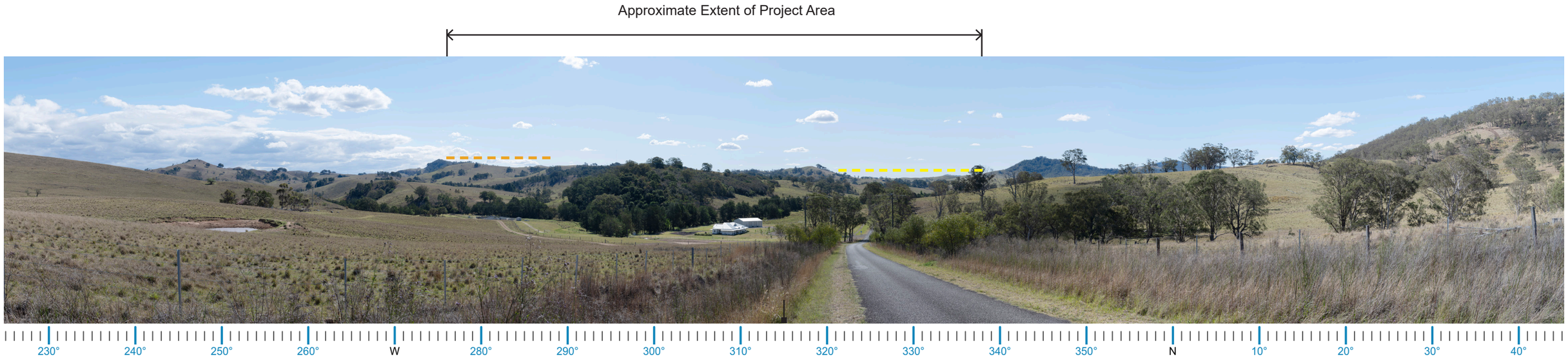
Existing powerlines are introduced infrastructure elements in the landscape.

Preliminary Potential Visual Impact:

A 3D assessment based on topography alone confirms that three (3) turbines proposed as part of the Project (Stage 2) will be visible 8,000 m from this location.

Due to the lack of intervening elements, select turbines will likely be visible along the most distant ridgeline within this viewpoint. However, it is noted that they are likely to occupy a small portion of the view, and as we move closer to the Project Site, the proposed turbines will be seen as a new element within the landscape.

VP20 Old Goorangoola Road, Goorangoola



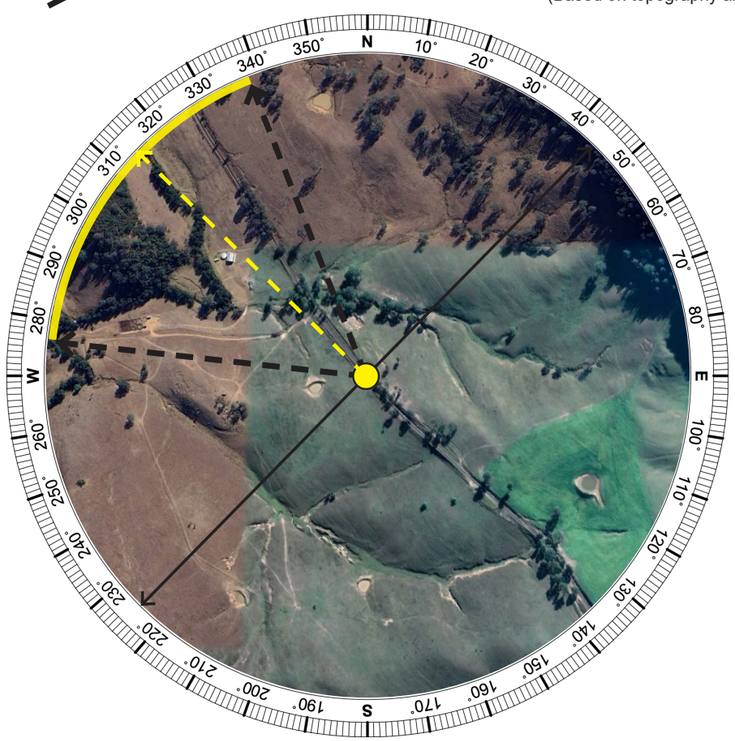
LEGEND

Viewing direction and centre of panorama

Extent of panorama

Direction of potentially visible turbines

Extent of visible turbines
(Based on topography alone)



VIEWPOINT VP20

Viewpoint Summary:	
Location:	Elevation:
Old Goorangoola Road, Goorangoola	248m
Coordinates:	Viewing Direction:
32°18'37.65"S 151°11'12.21"E	Northwest
Distance to nearest WTG:	Visibility Distance Zone:
4.1 km	**Far Middleground (FM)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Level 3 (Low)**
LCU:	Scenic Quality Rating:
LCU03: Pastures & Residential Properties	**Moderate**

Multiple Wind Turbine Tool:

One (1) 60 degree sector based on 2D assessment (Stage 2)

Aerial Image Source: Google Earth (06/2019)

Existing Landscape Character Description:

This viewpoint is captured on Old Goorangoola Road near non-associated dwelling V20-2.

The surrounding land has been modified for agricultural practices, featuring scattered vegetation in the midground within adjoining pastures. Dotted rural dwellings are dispersed throughout the landscape.

Undulating hills and distant vegetated ridgelines are prominent visual landscape features within this view.

Preliminary Potential Visual Impact:

A 3D assessment based on topography alone confirms that three (3) turbines proposed as part of the Project (Stage 2) will be visible 8,000 m from this location.

Due to insufficient intervening elements, select turbines will likely be visible along the most distant ridgeline to the west. However, it is noted that they are likely to occupy a small portion of the view, and as we move closer to the Project Site, the proposed turbines will be seen as a new element within the landscape.

Distant views beyond 8,000 m may be available towards the northwest. However, the Project will likely be indiscernible and not alter the major landscape features of this viewpoint.

VP21 Old Goorangoola Road, Goorangoola



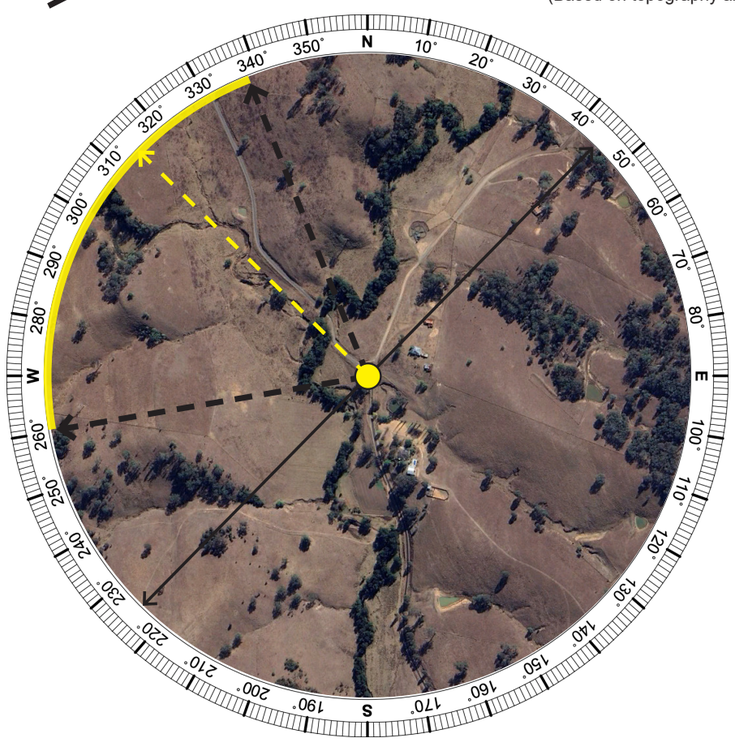
LEGEND

Viewing direction and centre of panorama

Extent of panorama

Direction of potentially visible turbines

Extent of visible turbines (Based on topography alone)



VIEWPOINT VP21

Viewpoint Summary:	
Location:	Elevation:
Old Goorangoola Road, Goorangoola	239m
Coordinates:	Viewing Direction:
32°17'59.85"S 151°10'54.75"E	Northwest
Distance to nearest WTG:	Visibility Distance Zone:
3.5 km	**Near Middleground (NM)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Level 3 (Low)**
LCU:	Scenic Quality Rating:
LCU03: Pastures & Residential Properties	**Low**

Multiple Wind Turbine Tool:

Two (2) 60 degree sector based on 2D assessment (Stage 2)

Aerial Image Source: Google Earth (08/2023)

Existing Landscape Character Description:

This viewpoint was taken along Old Goorangoola Road, facing Campbells Creek in the northwest near non-associated dwelling V20-1.

The surrounding land has been altered for agricultural practices, displaying scattered vegetation in the midground within adjoining pastures. Dotted rural dwellings are dispersed throughout the landscape.

Dense vegetation lines the riparian corridor of Campbells Creek - a prominent visual feature of the landscape.

Introduced elements in this view include road infrastructure and signage.

Preliminary Potential Visual Impact:

A 3D assessment based on topography alone confirms that six (6) turbines proposed as part of the Project (Stage 2) will be visible 8,000 m from this location.

Due to the lack of intervening elements, select turbines will likely be visible to the immediate west. However, it is noted that they are likely to occupy a small portion of the view, and as we move closer to the Project Site, the proposed turbines will be seen as a new element within the landscape.

Distant views beyond 8,000 m may be available towards the northwest. However, intervening vegetation aligning Campbells Creek will likely fragment these turbines.

VP22 Bowmans Creek Road, Bowmans Creek

Approximate Extent of Project Area



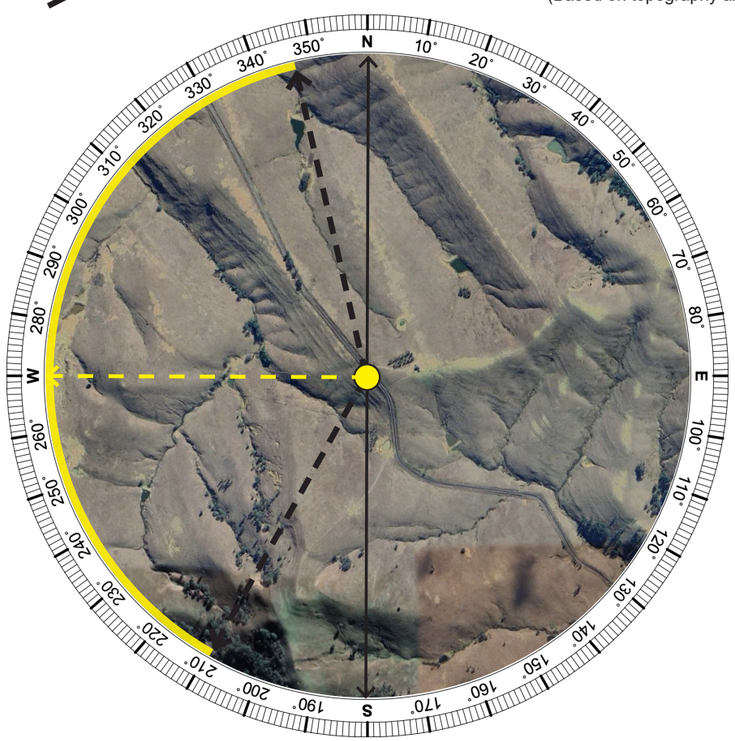
LEGEND

Viewing direction and centre of panorama

Extent of panorama

Direction of potentially visible turbines

Extent of visible turbines
(Based on topography alone)



VIEWPOINT VP22

Viewpoint Summary:	
Location:	Elevation:
Bowmans Creek Road, Bowmans Creek	356m
Coordinates:	Viewing Direction:
32°16'43.02"S 151°09'38.19"E	West
Distance to nearest WTG:	Visibility Distance Zone:
4.0 km	**Near Middleground (NM)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Level 3 (Low)**
LCU:	Scenic Quality Rating:
LCU03: Pastures & Residential Properties	**High**

Multiple Wind Turbine Tool:

Three (3) 60 degree sector based on 2D assessment (Stage 2)

Aerial Image Source: Google Earth (07/2023)

Existing Landscape Character Description:

This viewpoint is captured at a high point along Bowmans Creek Road.

The surrounding land has been modified for agricultural practices, featuring minimal vegetation in the foreground. Dotted rural dwellings are dispersed throughout the landscape.

Localised undulating hills and valleys are viewed as prominent features within the visual catchment, and distant views of vegetated ridgelines are in the background.

Preliminary Potential Visual Impact:

A 3D assessment based on topography alone confirms that 21 turbines proposed as part of Stage 2 of the Project will be visible within 8,000 meters from this location.

Due to a lack of intervening elements and open views towards the Project Site, the full extent of the Project will be visible from this location. The Project will likely be viewed as a new dominant character element within the visual catchment.

VP23 Bowmans Creek Road, Bowmans Creek

Approximate Extent of Project Area



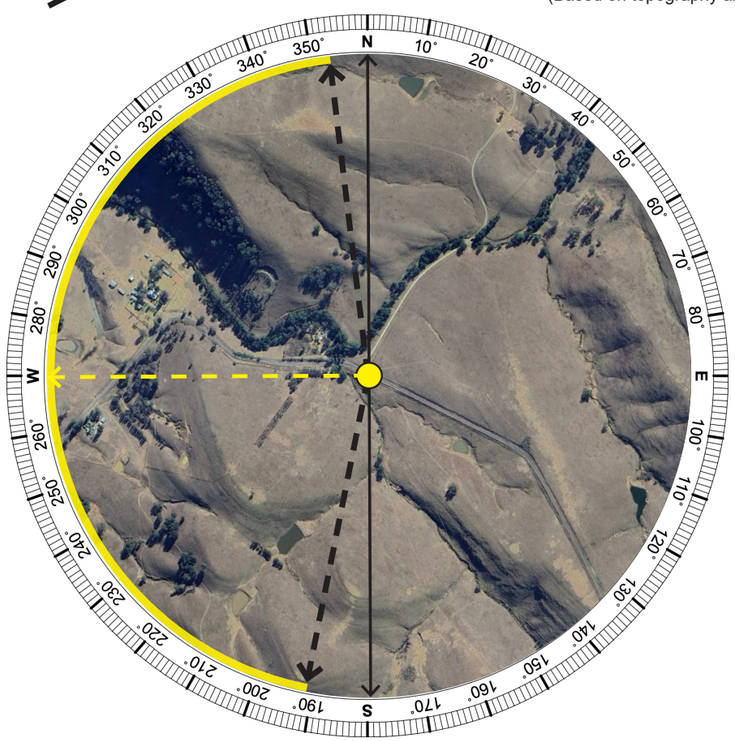
LEGEND

Viewing direction and centre of panorama

Extent of panorama

Direction of potentially visible turbines

Extent of visible turbines
(Based on topography alone)



VIEWPOINT VP23

Viewpoint Summary:	
Location:	Elevation:
Bowmans Creek Road, Bowmans Creek	265m
Coordinates:	Viewing Direction:
32°16'11.99"S' 151°09'06.28"E	West
Distance to nearest WTG:	Visibility Distance Zone:
2.78 km	**Near Middleground**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Level 3 (Low)**
LCU:	Scenic Quality Rating:
LCU03: Pastures & Residential Properties	**Moderate**

Multiple Wind Turbine Tool:

Three (3) 60 degree sector based on 2D assessment (Stage 2)

Aerial Image Source: Google Earth (07/2023)

Existing Landscape Character Description:

This viewpoint is captured along Bowmans Creek Road near non-associated dwelling S17-2.

The surrounding land has been modified for agricultural practices, featuring dense vegetation along the riparian corridor of Bowmans Creek to the northwest. Dotted rural dwellings are dispersed throughout the landscape.

Localised undulating hills and valleys are prominent features within the visual catchment.

Preliminary Potential Visual Impact:

A 3D assessment based on topography alone confirms that 18 turbines proposed as part of the Project (Stage 2) will be visible 8,000 m from this location.

The Project will be an apparent visual element from this location due to the proximity of the turbines.

Due to a lack of intervening elements and open views to the west, a large extent of the Project will be visible from this location.

The Project is likely to be viewed as a new dominant character element within the visual catchment, with select turbines to the northwest fragmented by intervening vegetation.

VP24a Bowmans Creek Road, Bowmans Creek

Approximate Extent of Project Area



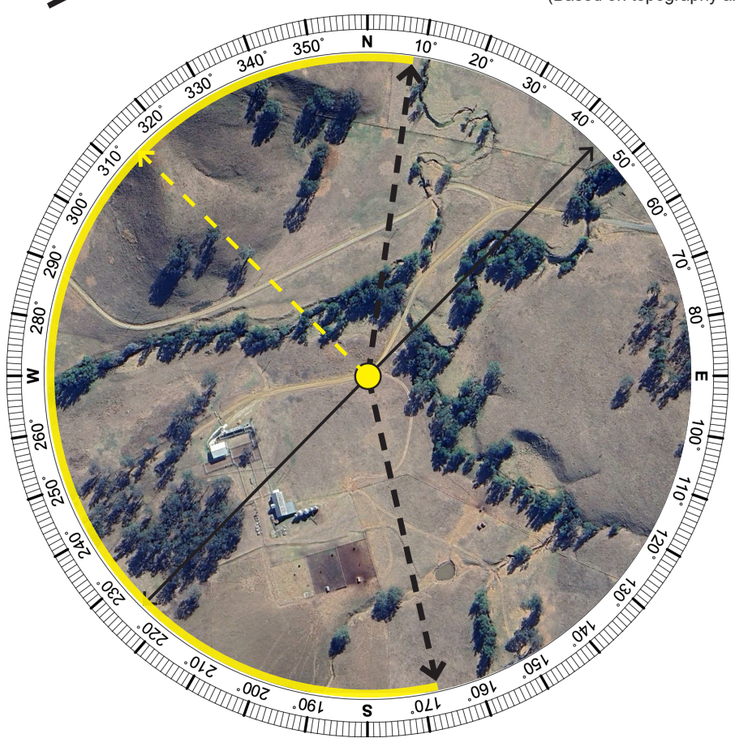
LEGEND

Viewing direction and centre of panorama

Extent of panorama

Direction of potentially visible turbines

Extent of visible turbines
(Based on topography alone)



VIEWPOINT VP24a

Viewpoint Summary:	
Location:	Elevation:
Bowmans Creek Road, Bowmans Creek	242m
Coordinates:	Viewing Direction:
32°16'24.28"S 151°08'15.44"E	Northwest
Distance to nearest WTG:	Visibility Distance Zone:
2.9 km	**Near Middleground (NM)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Level 3 (Low)**
LCU:	Scenic Quality Rating:
LCU03: Pastures & Residential Properties	**Moderate**

Multiple Wind Turbine Tool:

Four (4) 60 degree sector based on 2D assessment (Stage 2)

Aerial Image Source: Google Earth (07/2023)

Existing Landscape Character Description:

This viewpoint is captured along Bowmans Creek Road near non-associated dwelling Q17-5.

The surrounding land has been modified for agricultural practices, featuring dense vegetation along the riparian corridor of Bowmans Creek to the northwest. Dotted rural dwellings are dispersed throughout the landscape.

Localised undulating hills and valleys are prominent features within the visual catchment, with distant views of vegetated ridgelines available.

Preliminary Potential Visual Impact:

A 3D assessment based on topography alone confirms that 21 turbines proposed as part of the Project (Stage 2) will be visible 8,000 m from this location.

The Project will be an apparent visual element from this location due to the proximity of the turbines.

Due to a lack of intervening elements and open views of nearby ridgelines, the full extent of the Project will be visible from this location.

The Project is likely to be viewed as a new dominant character element within the visual catchment, with select turbines to the north fragmented by intervening vegetation along Bowmans Creek.

VP24b Bowmans Creek Road, Bowmans Creek

Approximate Extent of Project Area



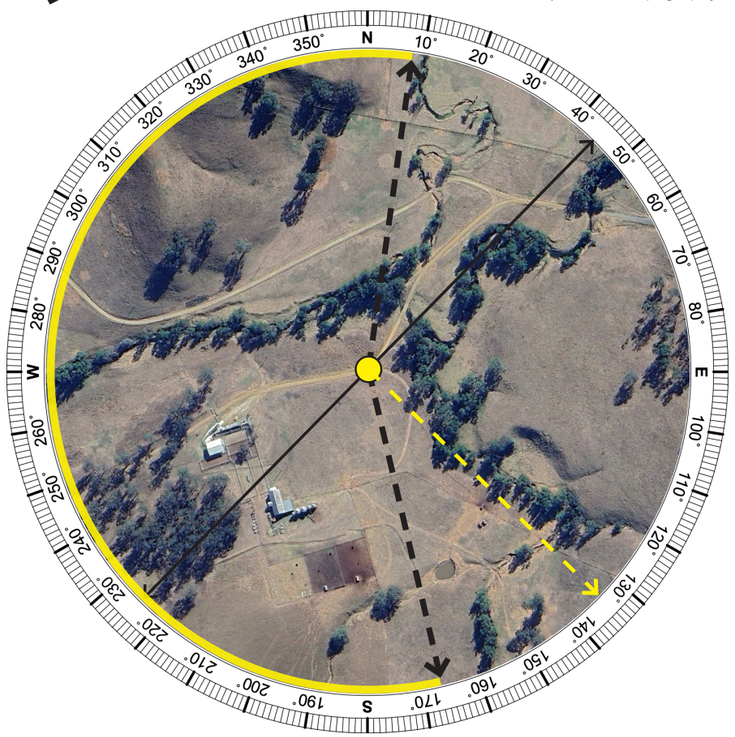
LEGEND

Viewing direction and centre of panorama

Extent of panorama

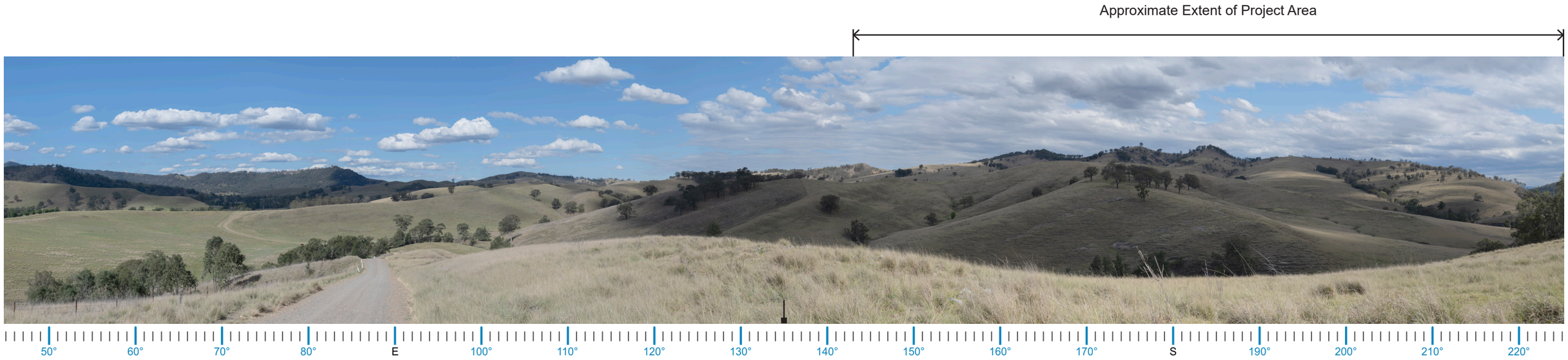
Direction of potentially visible turbines

Extent of visible turbines
(Based on topography alone)



Aerial Image Source: Google Earth (07/2023)

VP25a Bowmans Creek Road, Bowmans Creek



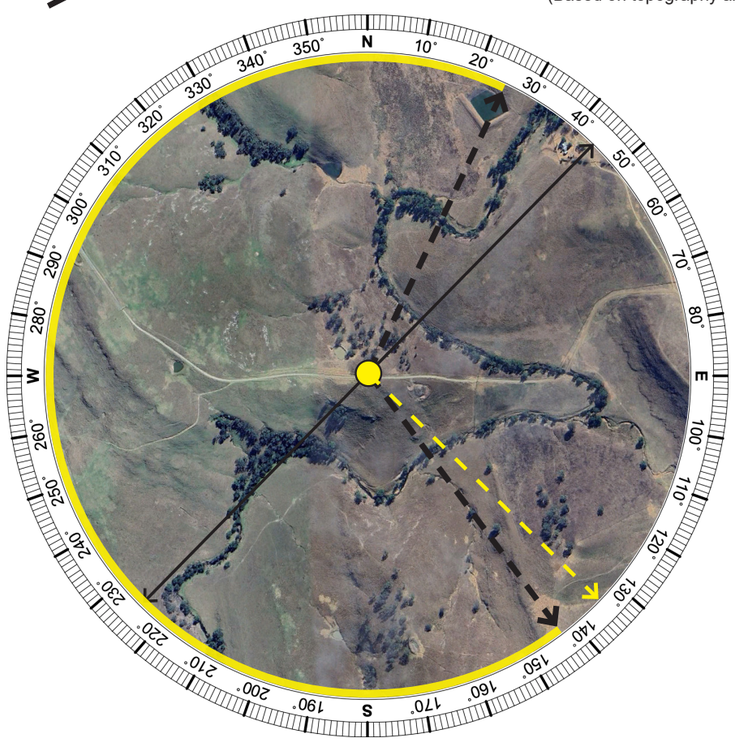
LEGEND

Viewing direction and centre of panorama

Extent of panorama

Direction of potentially visible turbines

Extent of visible turbines
(Based on topography alone)



VIEWPOINT VP25

Viewpoint Summary:	
Location:	Elevation:
Bowmans Creek Road, Bowmans Creek	258m
Coordinates:	Viewing Direction:
32°16'34.06"S 151°07'24.99"E	Southeast
Distance to nearest WTG:	Visibility Distance Zone:
1.8 km	**Far Foreground (FF)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Level 3 (Low)**
LCU:	Scenic Quality Rating:
LCU03: Pastures & Residential Properties	**Moderate**

Multiple Wind Turbine Tool:

Four (4) 60 degree sector based on 2D assessment (Stage 2)

Aerial Image Source: Google Earth (07/2023)

Existing Landscape Character Description:

This viewpoint is captured at a high point along Bowmans Creek Road.

The surrounding land has been modified for agricultural practices, featuring minimal vegetation in the foreground. Dotted rural dwellings are dispersed throughout the landscape.

Localised undulating hills and valleys are viewed as prominent features within the visual catchment, and distant views of vegetated ridgelines are in the background.

Preliminary Potential Visual Impact:

A 3D assessment based on topography alone confirms that 21 turbines proposed as part of the Project (Stage 2) will be visible 8,000 m from this location.

The Project will be an apparent visual element from this location due to the proximity of the turbines.

Due to a lack of intervening elements and open views of nearby ridgelines, the full extent of the Project will be visible from this location.

The Project will likely be viewed as a new dominant character element within the visual catchment, with select turbines to the north fragmented by intervening vegetation along Bowmans Creek (VP25b).

VP25b Bowmans Creek Road, Bowmans Creek

Approximate Extent of Project Area



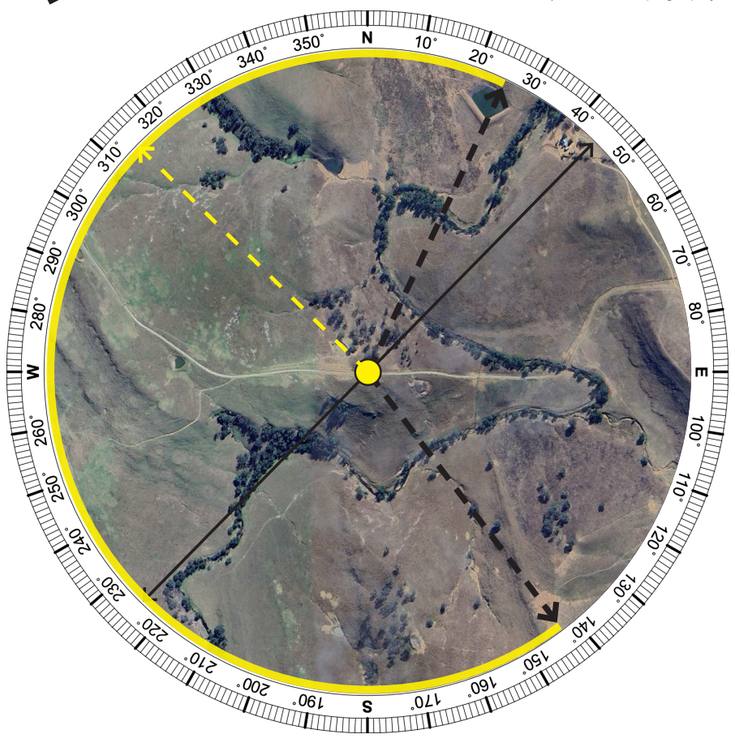
LEGEND

Viewing direction and centre of panorama

Extent of panorama

Direction of potentially visible turbines

Extent of visible turbines
(Based on topography alone)



Aerial Image Source: Google Earth (07/2023)

VP26 Albano Road, Bowmans Creek

Approximate Extent of Project Area



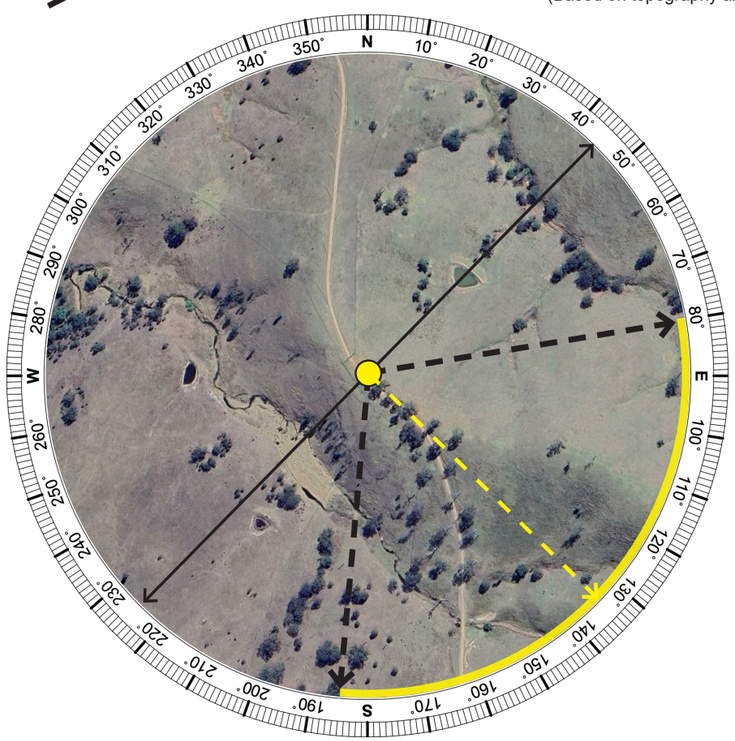
LEGEND

Viewing direction and centre of panorama

Extent of panorama

Direction of potentially visible turbines

Extent of visible turbines
(Based on topography alone)



VIEWPOINT VP26

Viewpoint Summary:	
Location:	Elevation:
Albano Road, Bowmans Creek	474m
Coordinates:	Viewing Direction:
32°13'38.59"S 151°06'13.24"E	Southeast
Distance to nearest WTG:	Visibility Distance Zone:
1.1 km	**Far Foreground (FF)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Level 3 (Low)**
LCU:	Scenic Quality Rating:
LCU03: Pastures & Residential Properties	**Moderate**

Multiple Wind Turbine Tool:

Two (2) 60 degree sector based on 2D assessment (Stage 2)

Aerial Image Source: Google Earth (09/2023)

Existing Landscape Character Description:

This viewpoint is captured along Albano Road along the northwest boundary of the Project Site.

The surrounding land has been modified for agricultural practices, featuring scattered vegetation in the midground along Albano Road and throughout adjoining pastures. Dotted rural dwellings are dispersed throughout the landscape.

Localised undulating hills and valleys are prominent features within the visual catchment. Distant vegetated ridgelines in the northeast add to the visual landform from this location.

Preliminary Potential Visual Impact:

A 3D assessment based on topography alone confirms that 18 turbines proposed as part of the Project (Stage 2) will be visible 8,000 m from this location.

The Project will be an apparent visual element from this location due to the proximity of the turbines.

Due to a lack of intervening elements and open views of nearby ridgelines, nearly the full extent of the Project will be visible from this location.

The Project will be viewed as a new dominant character element within the visual catchment.

VP27a Albano Road, Bowmans Creek

Approximate Extent of Project Area



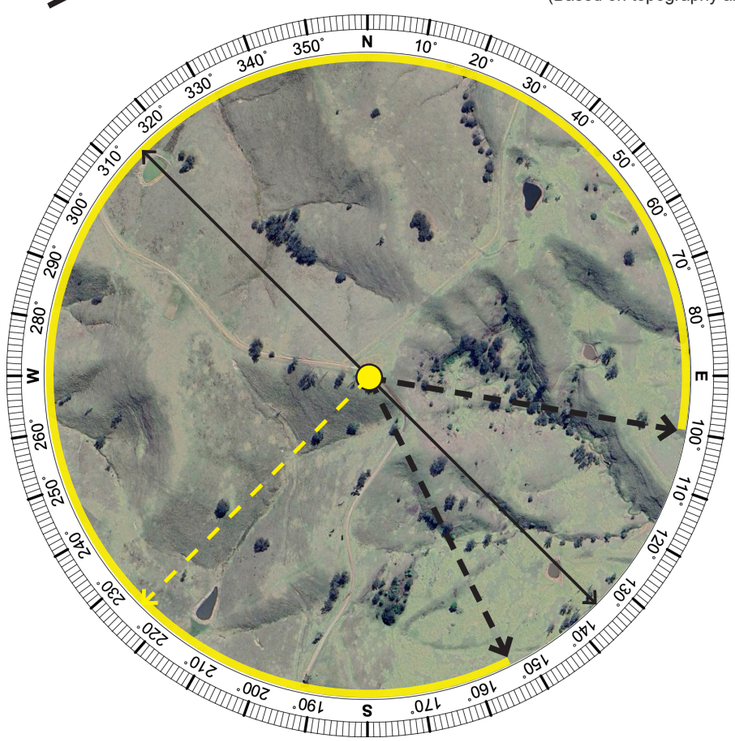
LEGEND

Viewing direction and centre of panorama

Extent of panorama

Direction of potentially visible turbines

Extent of visible turbines
(Based on topography alone)



VIEWPOINT VP27a

Viewpoint Summary:	
Location:	Elevation:
Albano Road, Bowmans Creek	522m
Coordinates:	Viewing Direction:
32°14'34.28"S 151°06'44.62"E	Southwest
Distance to nearest WTG:	Visibility Distance Zone:
0.2 km	**Near Foreground (NF)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Level 3 (Low)**
LCU:	Scenic Quality Rating:
LCU03: Pastures & Residential Properties	**Moderate**

Multiple Wind Turbine Tool:

Five (5) 60 degree sector based on 2D assessment (Stage 2)

Aerial Image Source: Google Earth (09/2023)

Existing Landscape Character Description:

This viewpoint is captured at a high point of Albano Road in the centre of the Project Site.

The surrounding land has been modified for agricultural practices, featuring scattered vegetation in the midground along Albano Road and throughout adjoining pastures. Dotted rural dwellings are dispersed throughout the landscape.

Localised undulating hills and valleys are prominent features within the visual catchment—distant undulating vegetated ridgelines add to the visual landform from this location.

Preliminary Potential Visual Impact:

A 3D assessment based on topography alone confirms that 21 turbines proposed as part of the Project (Stage 2) will be visible 8,000 m from this location.

The Project will be an apparent visual element from this location due to the extreme proximity of the turbines along the edge of Albano Road.

Due to a lack of intervening elements and open views of nearby undulations, the near full extent of the Project will be visible from this location.

The Project will be viewed as a new dominant character element within the visual catchment.

VP27b Albano Road, Bowmans Creek

Approximate Extent of Project Area



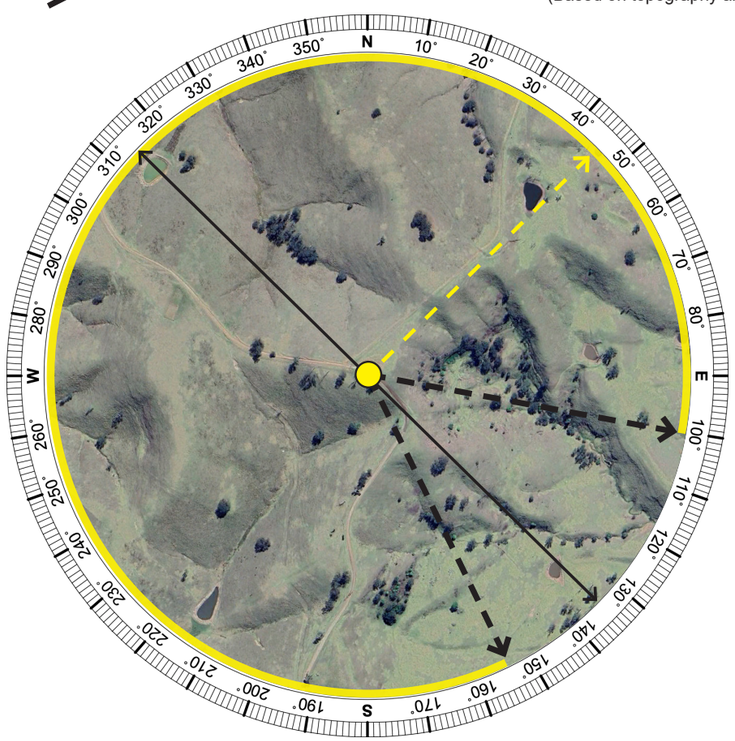
LEGEND

Viewing direction and centre of panorama

Extent of panorama

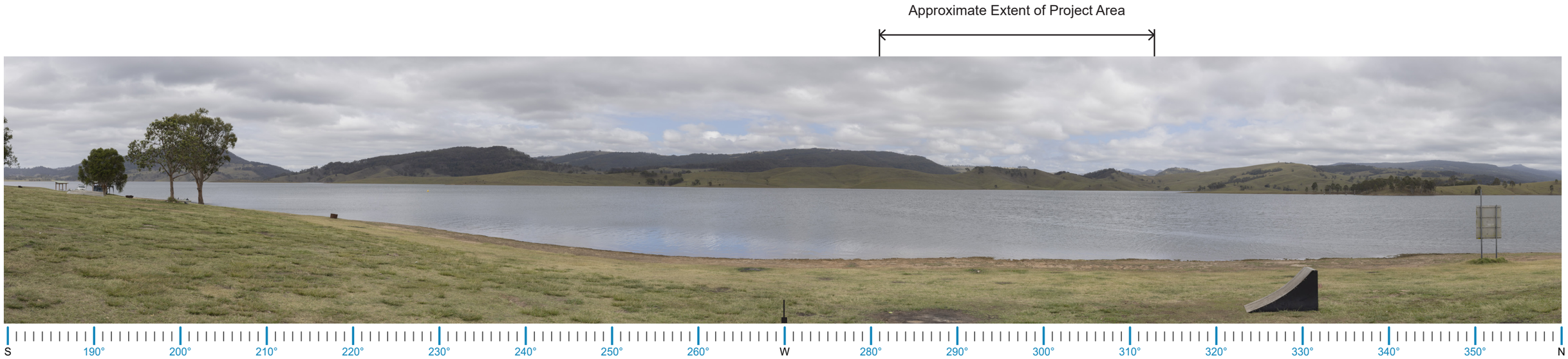
Direction of potentially visible turbines

Extent of visible turbines
(Based on topography alone)



Aerial Image Source: Google Earth (09/2023)

VP28 Lake St Clair Campground, St Clair



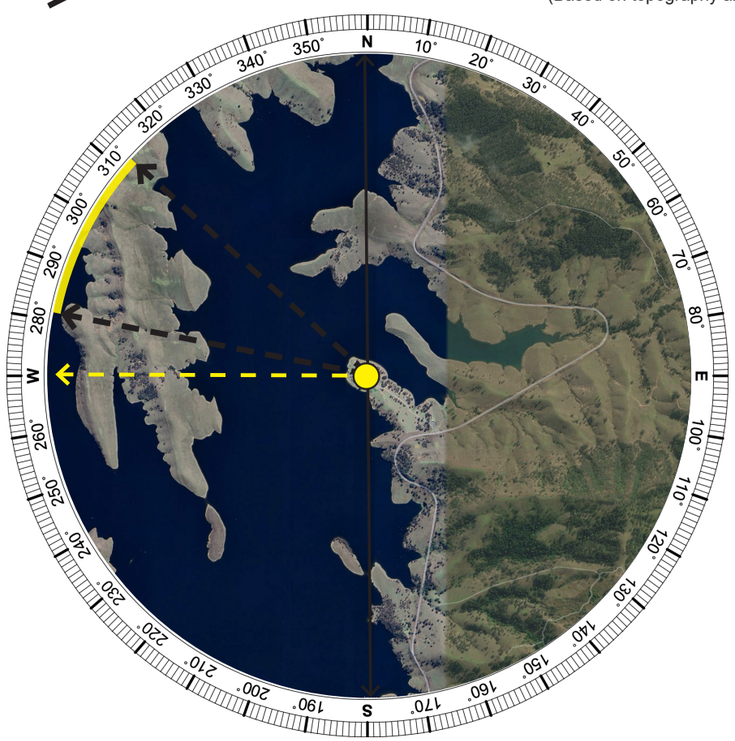
LEGEND

Viewing direction and centre of panorama

Extent of panorama

Direction of potentially visible turbines

Extent of visible turbines
(Based on topography alone)



VIEWPOINT VP28

Viewpoint Summary:	
Location:	Elevation:
Lake St Clair Campground, Lake St Clair	184 m
Coordinates:	Viewing Direction:
32°20'2.37"S 151°17'28.98"E	West
Distance to nearest WTG:	Visibility Distance Zone:
14.3 km	**Mid Background (MB)**
Land Use:	Viewer Sensitivity Level:
Recreation	**Level 1 (High)**
LCU:	Scenic Quality Rating:
LCU03: Pastures & Residential Properties	**High**

Multiple Wind Turbine Tool:

One (1) 60 degree sector based on 2D assessment (Stage 2)

Aerial Image Source: Google Earth (09/2023)

Existing Landscape Character Description:

This viewpoint was captured at Lake St Clair Campground, overlooking Lake St Clair towards undulating vegetated ridgelines, offering a prominent visual backdrop to the lake.

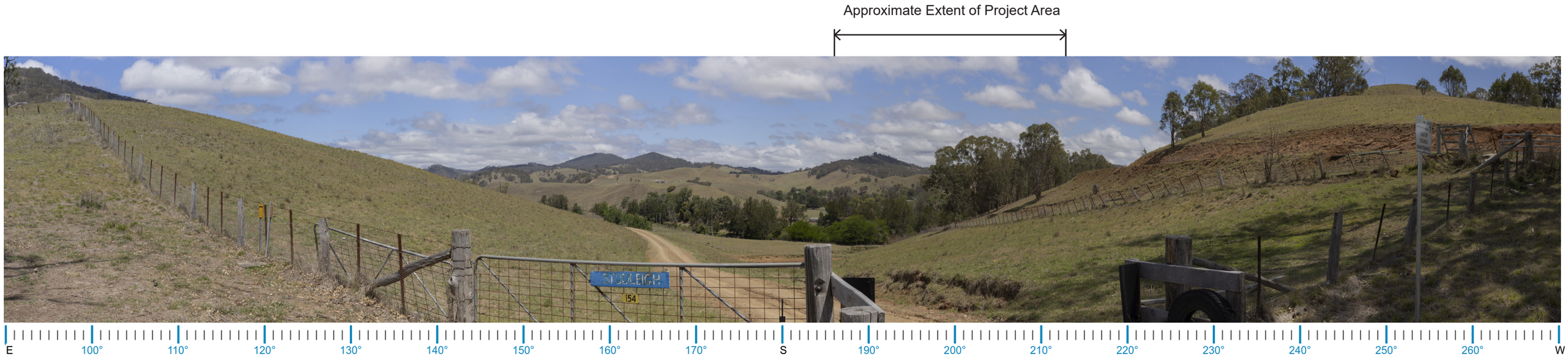
The surrounding area is used for recreational purposes.

Preliminary Potential Visual Impact:

A 3D assessment based on topography alone confirms that no turbines proposed as part of the Project (Stage 2) will be visible 8,000 m from this location.

Views are unlikely due to the receiver distance, and the Project will likely be indiscernible from this location.

VP29 Studleigh Road, Davis Creek



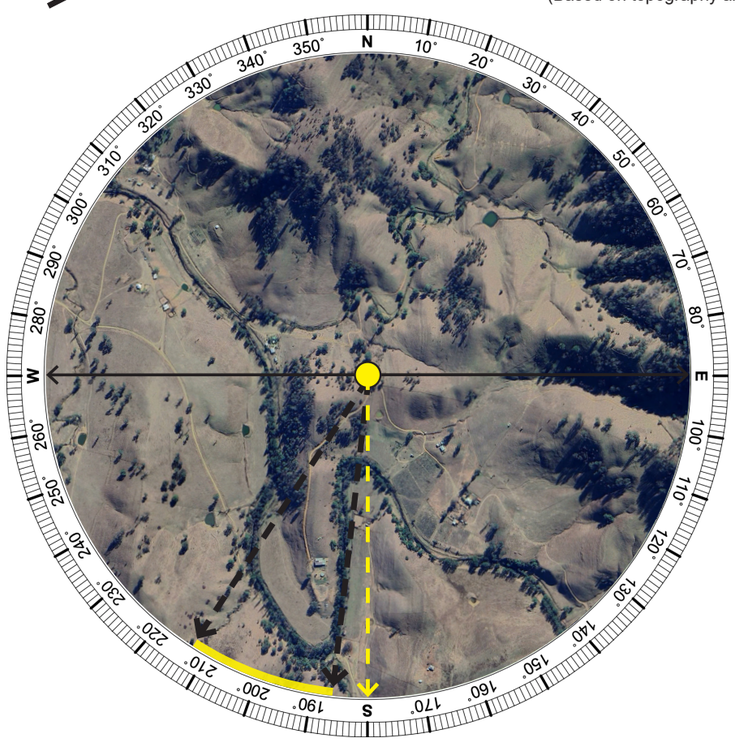
LEGEND

Viewing direction and centre of panorama

Extent of panorama

Direction of potentially visible turbines

Extent of visible turbines (Based on topography alone)



VIEWPOINT VP29

Viewpoint Summary:	
Location:	Elevation:
Studleigh Road, Davis Creek	340 m
Coordinates:	Viewing Direction:
32° 9'50.64"S 151° 9'42.79"E	South
Distance to nearest WTG:	Visibility Distance Zone:
6.5 km	**Far Middleground (FM)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Level 3 (Low)**
LCU:	Scenic Quality Rating:
LCU03: Pastures & Residential Properties	**Moderate**

Multiple Wind Turbine Tool:

One (1) 60 degree sector based on 2D assessment (Stage 2)

Aerial Image Source: Google Earth (09/2023)

Existing Landscape Character Description:

This viewpoint is captured on Studleigh Road near non-associated dwellings T6-9, T6-2 & T5-1.

The surrounding land has been altered for agricultural practices, with scattered vegetation in the midground. Dotted rural dwellings are dispersed throughout the landscape.

Undulating hills in the far midground are viewed as a prominent feature. Distant vegetated ridgelines to the south enhance the visual landform.

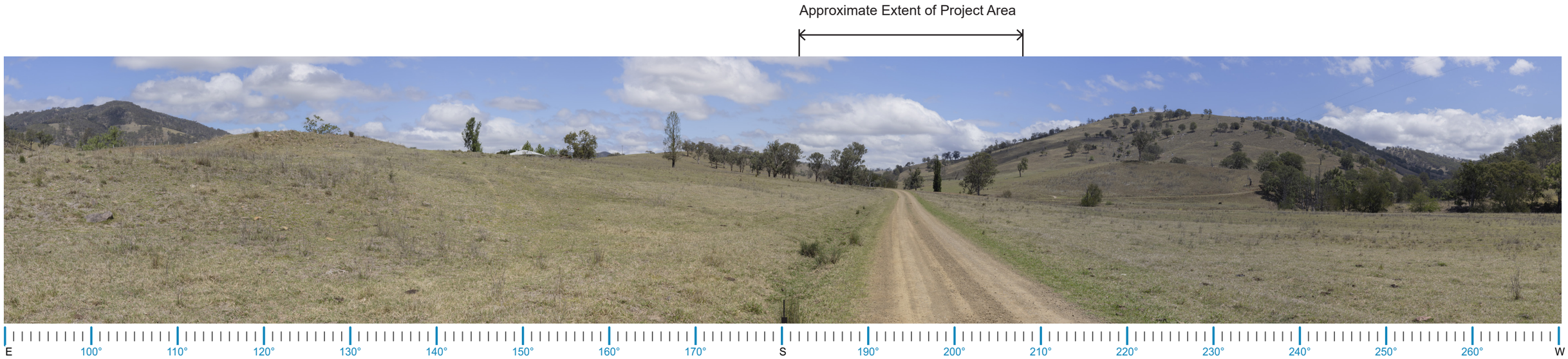
Existing fencing is evident as introduced elements in the landscape.

Preliminary Potential Visual Impact:

A 3D assessment based on topography alone confirms that three (3) turbines proposed as part of the Project (Stage 2) will be visible 8,000 m from this location.

Distant views may be available. However, intervening vegetation will likely make these turbines indiscernible or fragmented. These turbines are likely the major landscape features of this viewpoint will remain the same.

VP30 Studleigh Road, Davis Creek



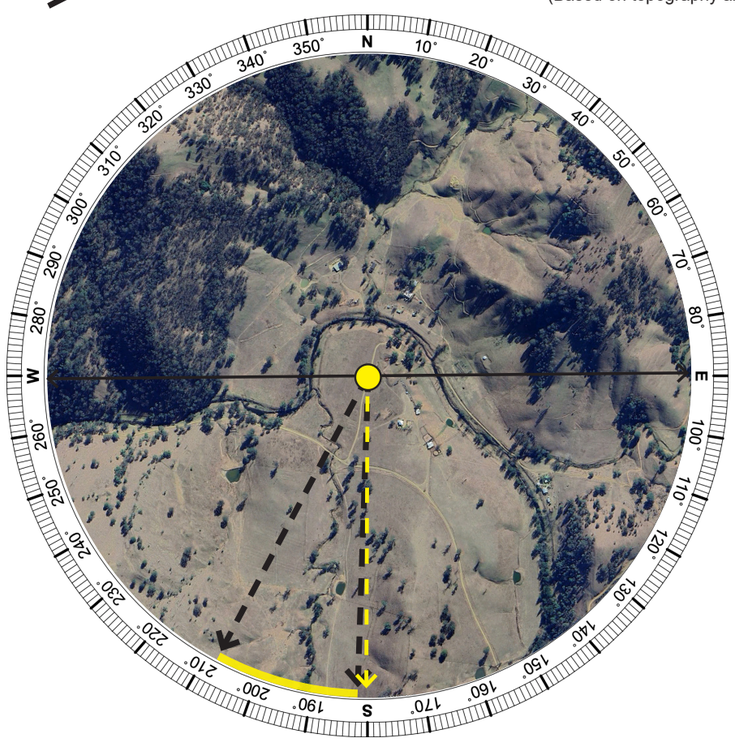
LEGEND

Viewing direction and centre of panorama

Extent of panorama

Direction of potentially visible turbines

Extent of visible turbines
(Based on topography alone)



VIEWPOINT VP30

Viewpoint Summary:	
Location:	Elevation:
Studleigh Road, Davis Creek	303m
Coordinates:	Viewing Direction:
32° 9’34.90”S 151° 9’9.21”E	South
Distance to nearest WTG:	Visibility Distance Zone:
6.8 km	**Far Middleground (FM)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Level 3 (Low)**
LCU:	Scenic Quality Rating:
LCU03: Pastures & Residential Properties	**Low**

Multiple Wind Turbine Tool:

One (1) 60 degree sector based on 2D assessment (Stage 2)

Aerial Image Source: Google Earth (09/2023)

Existing Landscape Character Description:

This viewpoint is captured on Studleigh Road near non-associated dwelling S4-1.

The surrounding land has been altered for agricultural practices, with scattered vegetation in the midground. Dotted rural dwellings are dispersed throughout the landscape.

Vegetated undulating hills are viewed as a prominent feature.

Preliminary Potential Visual Impact:

A 3D assessment based on topography alone confirms that three (3) turbines proposed as part of the Project (Stage 2) will be visible 8,000 m from this location.

Distant views may be available within the valley to the south. However, these turbines will be viewed as a small portion of the view. These turbines are likely the major landscape features of this viewpoint will remain the same.

VP31 Stoney Creek Road, Rouchel Brook



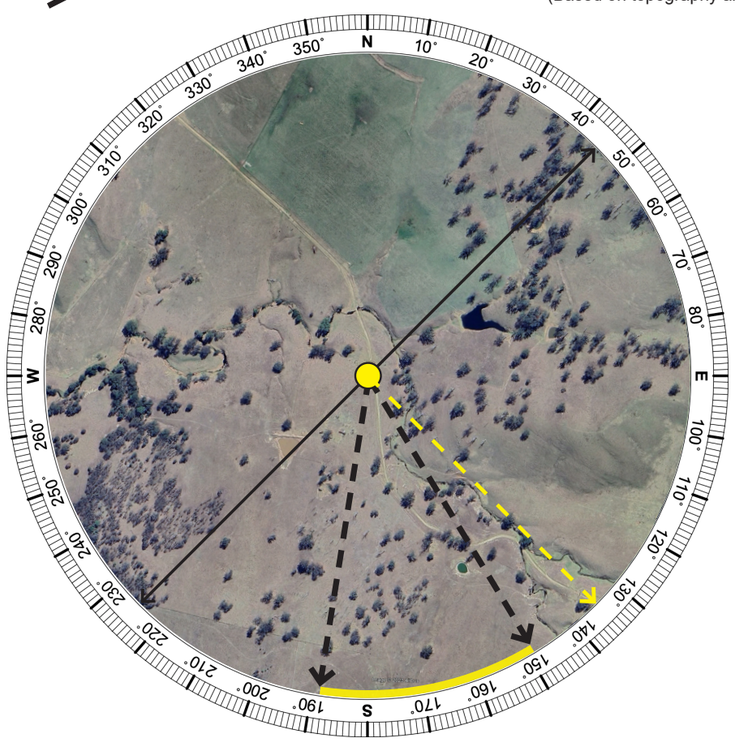
LEGEND

Viewing direction and centre of panorama

Extent of panorama

Direction of potentially visible turbines

Extent of visible turbines
(Based on topography alone)



VIEWPOINT VP31

Viewpoint Summary:	
Location:	Elevation:
Stoney Creek Road, Rouchel Brook	359 m
Coordinates:	Viewing Direction:
32°10’28.35”S 151° 6’46.87”E	Southeast
Distance to nearest WTG:	Visibility Distance Zone:
5.9 km	**Far Middleground (FM)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Level 3 (Low)**
LCU:	Scenic Quality Rating:
LCU03: Pastures & Residential Properties	**Low**

Multiple Wind Turbine Tool:

One (1) 60 degree sector based on 2D assessment (Stage 2)

Aerial Image Source: Google Earth (09/2023)

Existing Landscape Character Description:

This viewpoint is captured on Stoney Creek Road at the property entry to non-associated dwelling P7-1.

The surrounding land has been altered for agricultural practices, with scattered vegetation in the midground.

Localised, gently undulating vegetated hills are viewed as a prominent feature.

Preliminary Potential Visual Impact:

A 3D assessment based on topography alone confirms that five (5) turbines proposed as part of the Project (Stage 2) will be visible 8,000 m from this location.

Distant views may be available to the south. However, these turbines will be viewed as a small portion of the view and will likely be fragmented by intervening vegetation. It is unlikely that these turbines will alter the major landscape features of this viewpoint for this reason.

VP32 Stoney Creek Road, Rouchel Brook

Approximate Extent of Project Area



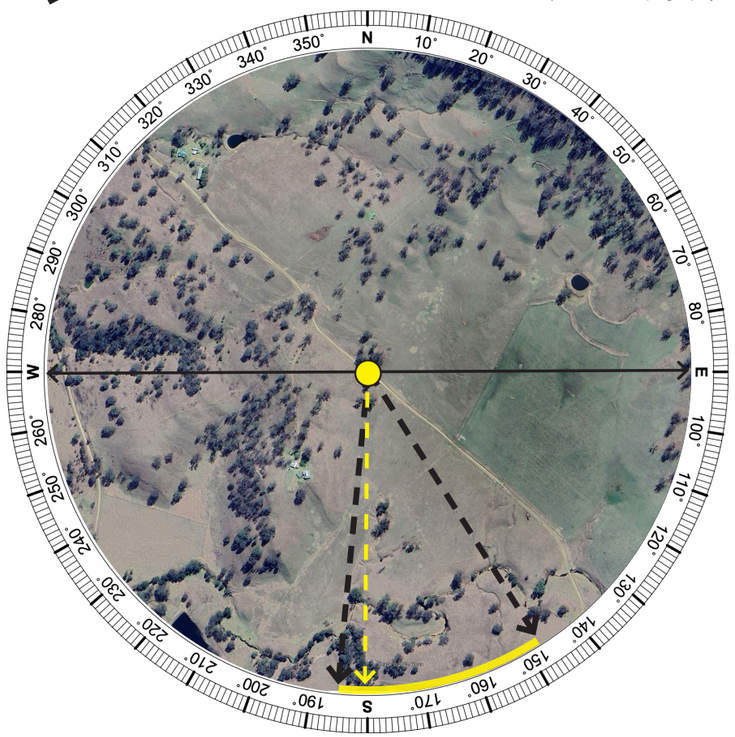
LEGEND

Viewing direction and centre of panorama

Extent of panorama

Direction of potentially visible turbines

Extent of visible turbines
(Based on topography alone)



VIEWPOINT VP32

Viewpoint Summary:	
Location:	Elevation:
Stoney Creek Road, Rouchel Brook	377m
Coordinates:	Viewing Direction:
32°10’10.44”S 151° 6’28.31”E	South
Distance to nearest WTG:	Visibility Distance Zone:
6.8 km	**Far Middleground (FM)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Level 3 (Low)**
LCU:	Scenic Quality Rating:
LCU03: Pastures & Residential Properties	**Moderate**

Multiple Wind Turbine Tool:

One (1) 60 degree sector based on 2D assessment (Stage 2)

Aerial Image Source: Google Earth (09/2023)

Existing Landscape Character Description:

This viewpoint is captured on Studleigh Road near non-associated dwellings O6-1 & N5-1.

The surrounding land has been altered for agricultural practices, with scattered vegetation in the midground. Dotted rural dwellings are dispersed throughout the landscape.

Undulating hills in the far midground are viewed as a prominent feature. Distant vegetated ridgelines to the south enhance the visual landform.

Existing fencing is evident as introduced elements in the landscape.

Preliminary Potential Visual Impact:

A 3D assessment based on topography alone confirms that 10 turbines proposed as part of the Project (Stage 2) will be visible 8,000 m from this location.

Due to the lack of intervening elements, select turbines will likely be visible along the most distant ridgeline within this viewpoint to the south.

The viewpoint is on a high point of Stoney Creek Road with open views towards the Project Site; the proposed turbines will likely be viewed as a new element within the landscape.

APPENDIX E

Preliminary Noise Impact Assessment Report



MARSHALL DAY Acoustics

BOWMANS CREEK WIND FARM STAGE 2
PRELIMINARY NOISE ASSESSMENT

Rp 001 20230224 | 30 May 2024

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Report No.: **Rp 001 20230224**

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Document Control

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

EXECUTIVE SUMMARY

The Bowmans Creek Wind Farm Stage 2 (the Project) is proposed to be developed by Bowmans Creek Wind Farm Pty Ltd (the Proponent) and comprises the construction, operation, and decommissioning of a wind farm located 21 km east of Muswellbrook and 15 km northeast of Liddell in the Hunter Valley region of New South Wales.

The Project is proposed to comprise twenty-one (21) wind turbines, with a maximum blade-tip height of 250 m above ground level. The Project will be an extension to fifty-four (54) wind turbines included in the Bowmans Creek Wind Farm Stage 1 development (Stage 1), which was approved by the NSW Independent Planning Commission (IPC) on 6 February 2024.

Stage 1 has already progressed through the NSW planning and approvals pathway under SSD-10315. Staging of the Bowmans Creek Wind Farm was not proposed within the SSD-10315 approvals documentation. For simplicity and to assist in differentiating between the two (2) projects, all wind turbines and ancillary infrastructure associated with SSD-10315 are referred as Stage 1 throughout this report.

Due to the scale of additional infrastructure, and other requirements under the NSW planning system, the Project is proposed as a separate State Significant Development (SSD) to that already advanced under Stage 1.

A preliminary assessment of operational noise for the Project has been carried out in accordance with the NSW Department of Planning and Environment's *Wind Energy: Noise Assessment Bulletin - For State significant wind energy development*, dated December 2016 (the NSW Noise Assessment Bulletin).

Noise modelling was carried out based on a candidate wind turbine model, as nominated by the Proponent, with a generation capacity of 6.2 MW and typical of the size and type of wind turbine which is being considered for the site.

Cumulative noise levels associated with the concurrent operation of the Project and Stage 1 wind turbines (situated to the north, south, and west of the Project) have also been considered in this assessment. The results of the preliminary assessment demonstrate that Stage 1 and the Project can be designed and operated to comply with the operational noise requirements of the NSW Noise Assessment Bulletin, both independently and cumulatively.

Once the Secretary's Environmental Assessment Requirements (SEARs) are released for this Project, further detailed assessment would be undertaken to support a subsequent State Significant Development Application (SSDA) 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 wind turbine noise modelling assessment, noise mitigation strategies (where required) and other noise considerations including special noise characteristics, construction, and ancillary infrastructure.

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1.0 INTRODUCTION

The proposed Bowmans Creek Wind Farm Stage 2 (the Project) by Bowmans Creek Wind Farm Pty Ltd (the Proponent) comprises the construction, operation, and decommissioning of a wind farm located 21 km east of Muswellbrook and 15 km northeast of Liddell in the Hunter Valley region of New South Wales (NSW).

The Project is proposed to comprise an extension to the current fifty-four (54) wind turbine Bowmans Creek Stage 1 development, which was approved by the NSW Independent Planning Commission (IPC) on 6 February 2024. The extension is proposed to comprise up to twenty-one (21) wind turbines and associated ancillary infrastructure, noting that shared infrastructure with Stage 1 will be utilised.

Stage 1 has already progressed through the NSW planning and approvals pathway under SSD-10315. Staging of the Bowmans Creek Wind Farm was not proposed within the SSD-10315 approvals documentation. For simplicity and to assist in differentiating between the two (2) projects, all wind turbines and ancillary infrastructure associated with SSD-10315 are referred as Stage 1 throughout this report.

Due to the scale of additional infrastructure, and other requirements under the NSW planning system, the Project is proposed as a separate State Significant Development (SSD) to that already advanced under Stage 1.

This report presents the results of a preliminary wind turbine noise assessment for the Project, prepared for submission with a Scoping Report and a request for Secretary's Environmental Assessment Requirements (SEARs).

The preliminary 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*, dated December 2016 (the NSW Noise Assessment Bulletin) 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 twenty-one (21) multi-megawatt wind turbines and a candidate wind turbine model representative of the size and type of wind turbine being considered for the Project; and
- A comparison of the predicted noise levels with the base noise limit.

A preliminary assessment of cumulative noise considering the Stage 1 development of fifty-four (54) wind turbines has also been undertaken.

Other noise considerations relating to the Project would be assessed during the State Significant Development Application (SSDA) stage of the Project. This would include the noise of construction and ancillary infrastructure associated with the Project, along with any other specific noise matters defined by the SEARs for the Project when issued.

Throughout this report, the term receiver is used to identify any dwelling identified by the Proponent in the vicinity of the Project. Receivers are grouped as *associated receivers* i.e. host properties or receivers where a noise agreement is in place between the landowners and the Proponent, or *non-associated receivers* which comprises the remaining receivers without an agreement with the Proponent. As the Project is an extension of Stage 1, there are situations where a receiver can be associated with either Stage 1 or the Project, both Stage 1 and the Project, or neither Stage 1 or the Project.

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

2.0 PROJECT DESCRIPTION

2.1 Overview

The Project is located 21 km east of Muswellbrook and 15 km northeast of Liddell in the Hunter Valley region of NSW. It is approximately 85 km northwest of the city of Newcastle.

The Project, if approved, would comprise twenty-one (21) wind turbines, with a maximum blade-tip height of 250 m above ground level, as an extension to the fifty-four (54) wind turbines included in Stage 1.

A total of one hundred and three (103) noise sensitive receivers are located within 5 km of a proposed wind turbine associated with either Stage 1 or the Project. This includes:

- Seven (7) associated receivers in relation to the Project (of which three (3) are also associated with Stage 1)
- Ninety-six (96) non-associated receivers in relation to the Project (of which twenty-three (23) are associated with Stage 1)

All associated status mentioned in this report refers to the associated status in relation to the Project i.e. Stage 2, unless otherwise noted.

The coordinates of the proposed wind turbines for Stage 1 and the Project have been tabulated in Appendix B.

The coordinates of the receivers are tabulated in Appendix C.

A site layout plan illustrating the wind turbine layout for Stage 1 and the Project, and receivers is provided in Appendix D.

2.2 Candidate wind turbine model

The wind turbine model to be assessed in detail as part of the SSDA would be determined from ongoing project design development. Further, if the Project were ultimately approved, the final wind turbine model would only be selected after a tender process to procure the supply of wind turbines. 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 consider a representative candidate wind turbine model for the size and type of wind turbines being considered. The purpose of using a candidate wind turbine 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 wind turbines being considered for the development. While a specific wind turbine manufacturer's data has been relied on for the assessment, the wind turbine make and model has not been specified at this stage for commercial reasons.

The candidate wind turbine is a variable speed wind turbine, with the speed of rotation and the amount of power generated by the wind turbines being regulated by control systems which vary the pitch of the wind turbine blades (the angular orientation of the blade relative to its axis).

Details of the candidate wind turbine models are provided in Table 1.

Table 1: Candidate wind turbine model details

Item	Specification
Rated power	6.2 MW
Rotor diameter	162 m
Modelled hub height	160 m
Modelled tip height	241 m
Operating mode	Standard
Serrated trailing edge	Yes

A maximum tip height of 250 m and a maximum hub height of 160 m is proposed for the Project. The tip height constitutes the hub height and blade length (half the rotor diameter) of a subject wind turbine. No commercially available wind turbine models are known that are specified to operate with the sought specifications and as a result, manufacturer's noise data for this operating configuration is not available.

In order to provide the most robust technical approximation of the sought operating configuration, manufacturer's noise data associated with a wind turbine model of known rotor diameter has been used, with the hub height of the wind turbine aligned with the maximum proposed hub height of 160 m. This results in a modelled tip height of 241 m. Further adjustments to apply manufacturer's noise data with a modelled wind turbine noise source having a rotor diameter other than that associated with the manufacturer's noise data would not be technically appropriate.

A candidate wind turbine model (or models) with specifications consistent with the Project design will be used in the Environmental Impact Statement (EIS), to reflect the candidate wind turbine models under consideration at the time. Accordingly, the noise assessment undertaken for the EIS would reflect those candidate wind turbine models.

2.3 Wind turbine noise emissions

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

Sound power level data for the candidate wind turbine model has been sourced from the manufacturer's specification document provided by the Proponent at the time of reporting. The sound power data provided in the manufacturer's documentation has been adjusted by the addition of +1.0 dB at each wind speed to provide a margin for typical values of test uncertainty, in line with recommendations from the UK Institute of Acoustics guidance.

The sound power levels referenced in this assessment, including the +1.0 dB adjustment, are illustrated in Figure 1. The overall level represents the total noise emission of the wind turbine, including the secondary contribution of ancillary plant associated with the wind turbine (e.g., cooling fans and internal transformer).

The sound power levels in Figure 1 are considered typical of the range of noise emissions associated with comparable multi-megawatt wind turbines. The data is therefore considered appropriate to reference in this preliminary assessment as a representation of the apparent sound power levels of the wind turbine when tested and rated in accordance with International Electrotechnical Commission publication IEC 61400-11:2012 *Wind turbines - Part 11: Acoustic noise measurement techniques* (IEC 61400-11).

The sound frequency characteristics of the wind turbine was sourced from the manufacturer's specification document provided by the Proponent at the time of reporting. The reference spectrum used as the basis for this assessment is illustrated Figure 2 and corresponds to the highest overall sound power level illustrated in Figure 1, occurring at a hub height wind speed of 11 m/s.

Figure 1: Wind turbine assessment sound power levels (including +1 dB for test uncertainty), dB L_{WA}

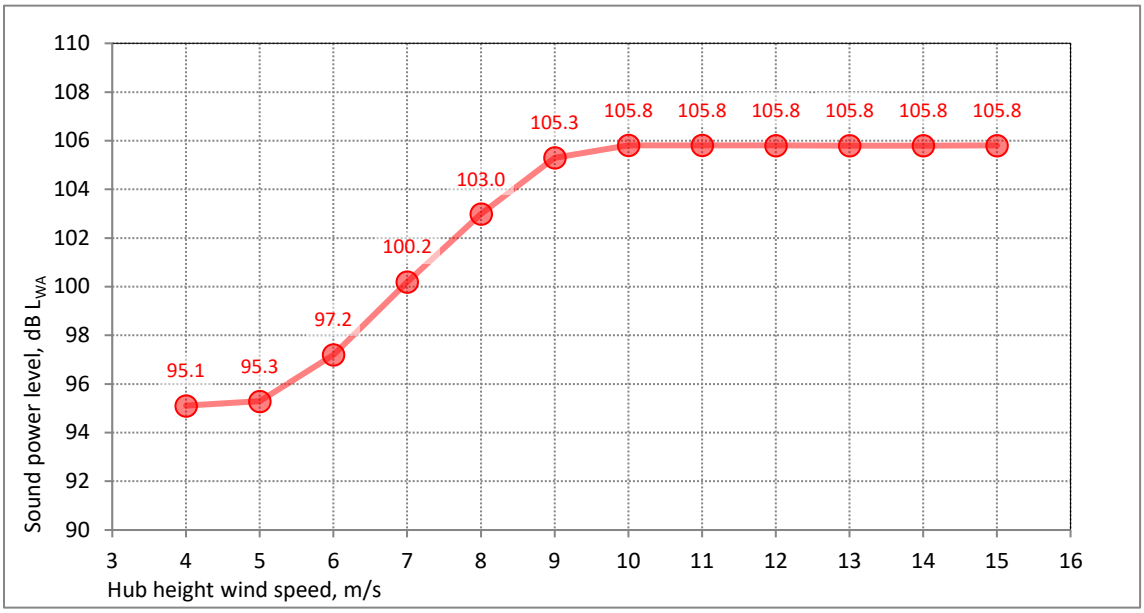
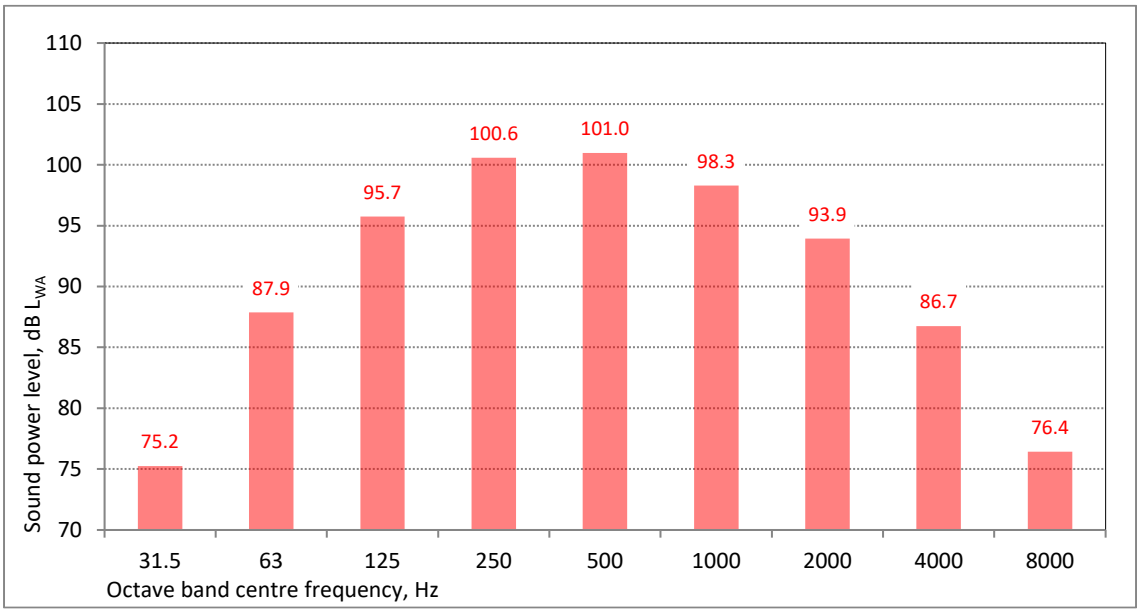


Figure 2: Wind turbine assessment sound power level spectrum (including +1 dB for test uncertainty), dB L_{WA}



The manufacturer specification for the candidate wind turbine model does not provide information about tonality.

The occurrence of tonality in the noise of contemporary multi-megawatt wind turbine designs is generally limited. This is supported by evidence of operational wind farms in Australia which indicates that the occurrence of tonality at receivers is atypical. On this basis, adjustments for tonality have not been applied to the predicted noise levels presented in this preliminary assessment. Notwithstanding this, the subject of tonality would be addressed in subsequent assessment stages for the Project. As part of this, further information will need to be obtained from the manufacturer concerning tonality.

The other special noise characteristic which is assessable in accordance with the NSW Noise Assessment Bulletin is low frequency noise. While there is a prescribed criterion for the application of low frequency noise penalty adjustments in the NSW Noise Assessment Bulletin (based on C-weighted noise levels), there is no established or verified engineering prediction method of C weighted noise levels associated with the operation of wind turbines.

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 H.

3.0 ASSESSMENT CRITERIA

3.1 Non-associated receivers

The NSW Noise Assessment Bulletin provides guidance on how noise impacts are to be assessed for large-scale wind energy development projects that are a State Significant Development.

The NSW Noise Assessment Bulletin states that the South Australian EPA publication *Wind farms environmental noise guidelines* dated July 2009 (the SA EPA Guideline) is to be used as the relevant assessment standard, subject to a set of variations that apply to the assessment of NSW projects. The variations are defined for:

- Noise limits;
- Special noise characteristics; and
- Noise monitoring.

In relation to noise limits, the variation defined in the NSW Noise Assessment Bulletin sets the base criterion at a value of 35 dB L_{Aeq} for all projects, in lieu of the 35 dB L_{Aeq} to 40 dB L_{Aeq} base criterion range defined in the SA EPA Guideline. 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.*

Variations are also defined in the NSW Noise Assessment Bulletin for the assessment of special noise characteristics. These procedures would be referenced in subsequent detailed assessment phases for the Project.

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.*

3.2 Associated receivers

The assessment criteria detailed in the previous section apply to all noise sensitive receivers that are not associated with the proposed Project (e.g. by way of land ownership or a negotiated agreement). However, in accordance with the requirements of the NSW Noise Assessment Bulletin, predicted noise levels are also presented for associated receivers, comprising host properties and receivers where a noise agreement is in place.

A reference level of 45 dB L_{Aeq} is presented as a base criterion for associated receivers in order to provide context to the predicted noise levels for these locations. This is consistent with the SA EPA Guideline which recommends a level of 45 dB for *financial stakeholders*. Comparisons between the predicted noise levels and the 45 dB reference level are provided for informative purposes only. Noise levels at these locations would ultimately need to be managed in accordance with the commercial agreements established between the Proponent and the landowners.

4.0 ASSESSMENT METHOD

Operational wind farm noise levels are predicted using:

- Noise emission data for the wind turbines
- A 3D digital model of the site and the surrounding environment
- International standards used for the calculation of environmental sound propagation.

At this preliminary stage of assessment, the primary consideration is potential A-weighted noise levels associated with operation of wind turbines associated with the Project.

The method selected to predict A-weighted 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). The prediction method is consistent with the guidance provided by the SA EPA Guideline and has been shown to provide a reliable method of predicting the typical upper A-weighted levels of the noise expected to occur in practice from wind farm developments.

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.

The noise prediction method is summarised in Table 2 with further discussion of the method and the calculation choices is provided in Appendix E.

Table 2: 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). 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 wind turbine noise* (the 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	Each wind turbine is modelled as a point source of sound. The total sound of the wind farm is then calculated based on simultaneous operation of all wind turbines and summing the contribution of each. Calculations of wind turbine to receiver distances and average sound propagation heights are made based on the point source being located at the position of the hub of the wind turbine. Calculations of terrain related screening are made based on the point source being located at the maximum tip height of each wind turbine. Further discussion of terrain screening effects is provided below.
Terrain data	Digital elevation model data with a resolution of 2 m as provided by the Proponent

Detail	Description
Terrain effects	Adjustments for the effect of terrain are determined and applied based on 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 wind turbine when a significant valley exists between the wind turbine and calculation point. A significant valley is determined to exist when the actual mean sound propagation height between the wind turbine 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 wind turbine 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 wind turbine and receiver locations are tabled in Appendix B and Appendix C respectively. The topography of the site is depicted in the elevation map provided Appendix F.
Ground conditions	Ground factor of G = 0.5 based on the UK good practice guide and research outlined in Appendix E. The ground around the site 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 based on the UK Institute of Acoustics guidance and the SA EPA Guideline. The calculations are based on sound speed profiles[1] which increase the propagation of sound from each wind turbine to each receiver, whether as a result of thermal inversions or wind directed toward each calculation point. The primary consideration for wind farm noise assessment is wind speed and direction. The noise level at each calculation point is assessed based on being simultaneously downwind of every wind turbine at the site. 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 wind turbine and the approach is therefore conservative in these instances.
Receiver heights	1.5 m above ground level This is a deviation from UK Institute of Acoustics guidance. However, the modelling also does not include the 2 dB subtraction recommended by the UK Institute of Acoustics guidance. 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).

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

5.0 WIND TURBINE NOISE ASSESSMENT

5.1 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 wind turbine 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.

5.1.1 Non-associated receivers

The receivers where operational wind farm noise levels are predicted to be higher than 25 dB L_{Aeq} are listed in Table 3 for non-associated receivers. The value of 25 dB is referenced here for informative purposes. The minimum noise limit applicable to the wind farm at non-associated receivers is 35 dB L_{Aeq}.

The predicted noise levels are for conditions when the candidate wind turbine's noise emissions have reached their highest level (corresponding to 11 m/s) and the wind is directed from the wind farm to each receiver. The predicted noise levels presented include the +1.0 dB allowance to account for wind turbine sound power level measurement uncertainty, as described in Section 2.3.

Table 3: Highest predicted noise level at non-associated receivers with predicted levels over 25 dB L_{Aeq}

Receiver	dB L_{Aeq}	Distance to the nearest wind turbine in the Project, m	Below the 35 dB base criterion
N21-1	25.4	3,470	Yes
N21-2	25.5	3,323	Yes
P22-1	27.7	1,960	Yes
P22-4	26.3	1,982	Yes
S17-2	27.9	2,658	Yes

Predicted noise levels for each integer wind speed are tabulated in Appendix G for all receivers within 5 km of the Project.

It can be seen from Table 3 that the predicted noise levels from the proposed Project are below the NSW Noise Assessment Bulletin base criterion of 35 dB L_{Aeq} at all of the assessed non-associated receivers.

The above findings support that the Project can be designed and operated to comply with the operational noise requirements of the NSW Noise Assessment Bulletin.

5.1.2 Associated receivers

Predicted noise levels at receivers associated with the Project are provided in Table 4, for information.

Table 4: Highest predicted noise level at associated receivers with predicted levels over 25 dB L_{Aeq}

Receiver	dB L_{Aeq}	Distance to the nearest wind turbine in the Project, m	Below the 45 dB reference level
Q17-1	31.9	2,370	Yes
Q17-3	31.5	2,578	Yes
Q17-5	31.2	2,789	Yes
R17-1	30.5	2,705	Yes
S15-1	35.0	1,203	Yes
S17-1	30.0	2,421	Yes
T15-1	32.0	2,035	Yes

It can be seen from Table 4 that the predicted noise levels from the proposed Project are below the 45 dB L_{Aeq} reference level for all associated receivers.

5.1.3 Predicted noise contours

The location of the total predicted 30 dB, 35 dB, 40 dB, and 45 dB L_{Aeq} noise contours is illustrated in Figure 3 with a zoomed view shown in Figure 4.

5.1.4 Low-frequency noise

A risk assessment provided in Appendix H indicates calculated low frequency noise levels below the applicable threshold at all receivers.

On the basis of the above, adjustments for special noise characteristics referred to in the NSW Noise Assessment Bulletin have not been applied to the predicted noise levels for non-associated receivers presented in this assessment. However, assessment of these special noise characteristics would need to be carried out at EIS stage and as part of the post-construction compliance assessment.

Figure 3: Highest predicted noise levels (corresponding to hub height wind speeds of 11 m/s)

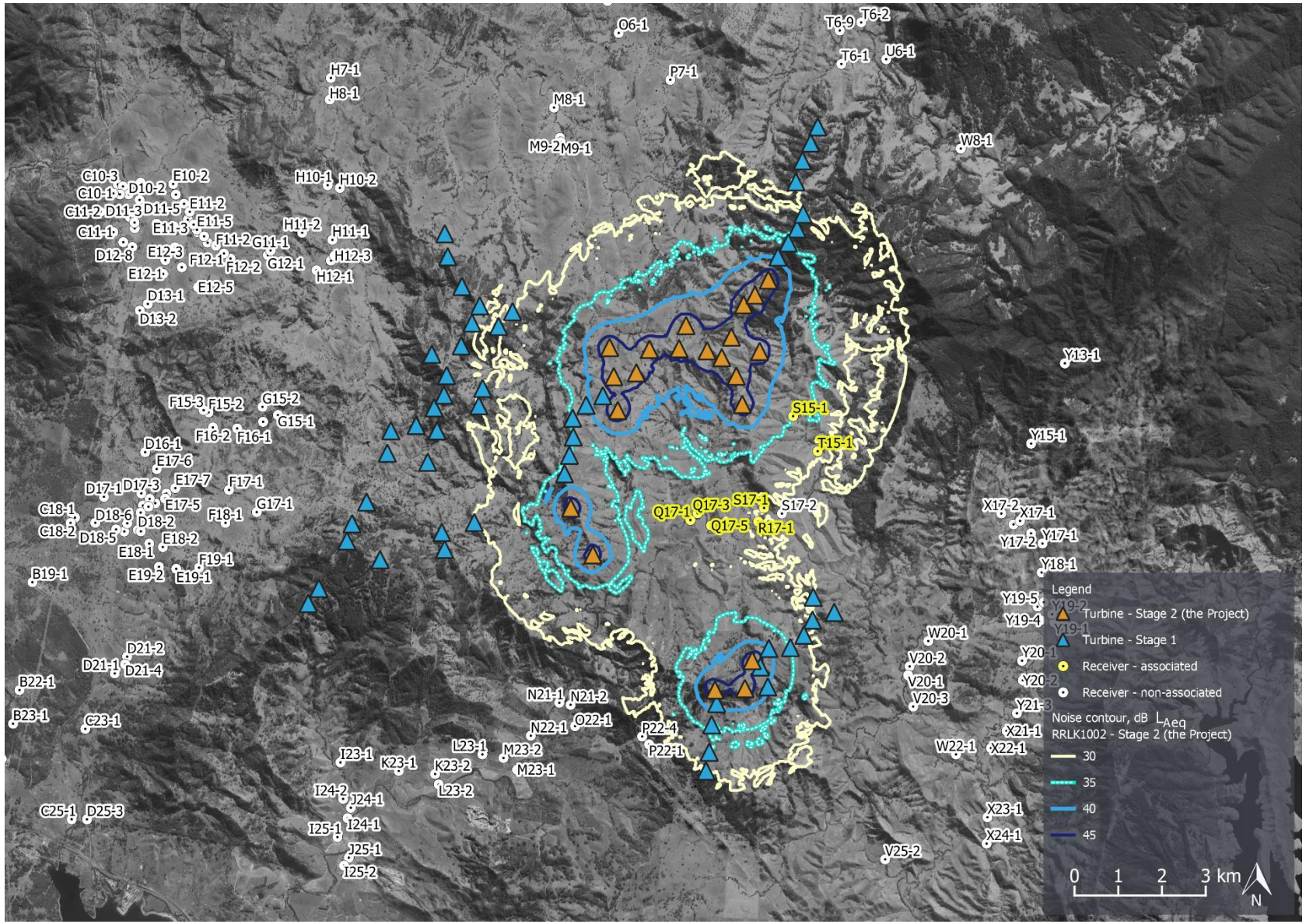
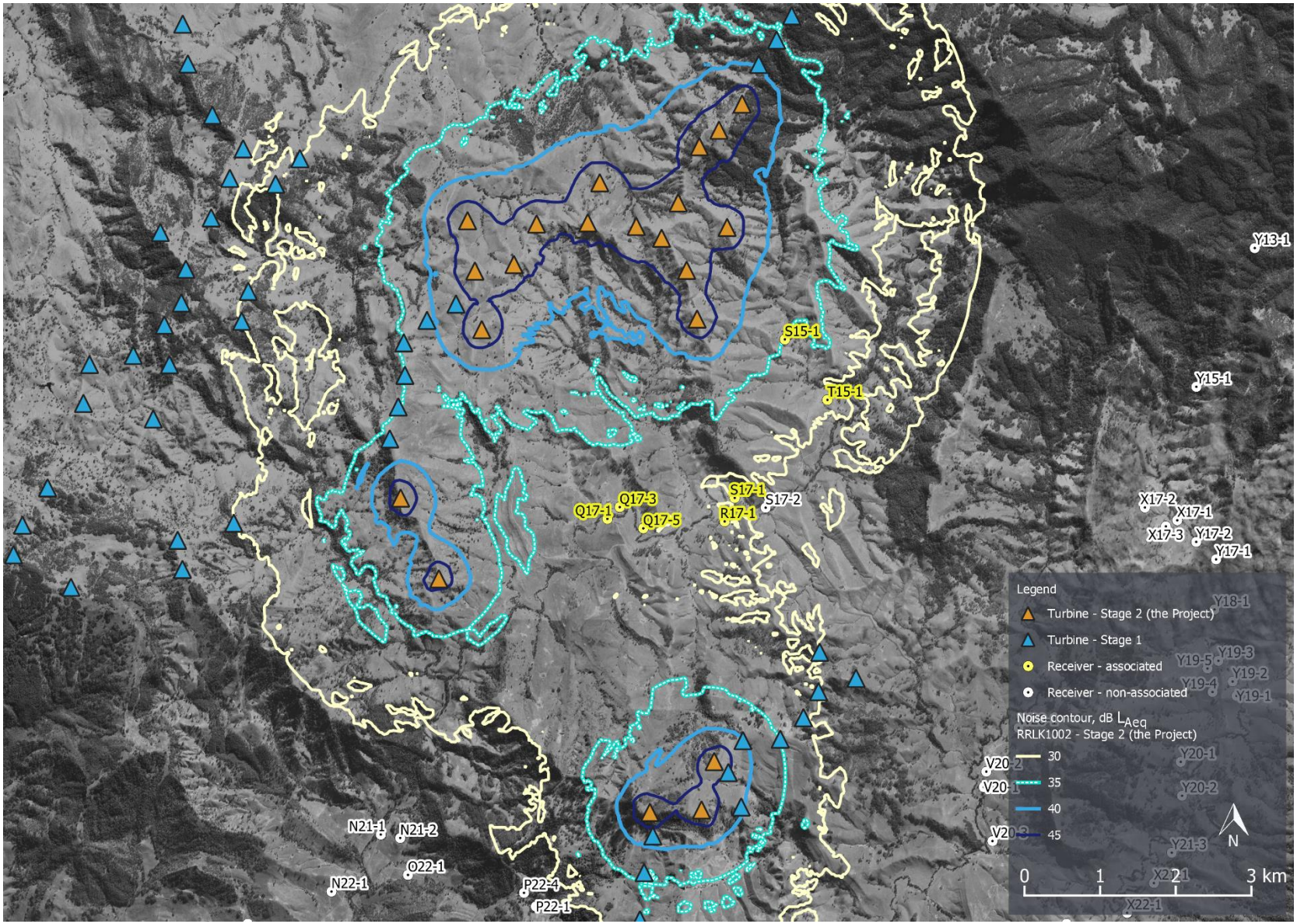


Figure 4: Highest predicted noise levels (corresponding to hub height wind speeds of 11 m/s) - Zoomed



5.2 Cumulative wind farm noise levels

Due to the proximity of Stage 1 to the Project, cumulative noise impact needs to be considered.

As described in Section 1.0, Stage 1 comprises fifty-four (54) wind turbines, located to the north, south, and west of the Project. The coordinates of the Stage 1 wind turbines are provided in Table 7 of Appendix B, and the relative locations of wind turbines related to the Project, and Stage 1, are shown in Appendix D.

The Stage 1 development has been approved by the NSW IPC, with noise assessment conducted by parties other than MDA, using methods, procedures, and assumptions that differ to that documented in this report. Independent noise modelling has therefore been conducted by MDA based on the following:

- Wind turbine layout comprising fifty-four (54) wind turbines provided by the Proponent;
- Wind turbine hub height of 139 m, as specified in the layout document;
- Candidate wind turbine model as detailed in Section 2.2;
- Wind turbine sound power levels as detailed in Section 2.3; and
- Assessment method as detailed in Section 4.0 and Appendix E.

As an indication of potential cumulative noise, Table 5 provides separate and cumulative predicted noise levels for the Project and Stage1, for the receiver locations where the cumulative predicted noise level is above 30 dB L_{Aeq}.

For consistency within this document, results are grouped by associated and non-associated status with respect to the Project. However, only receivers classed as associated for both the Project and Stage 1 can be considered as associated for the purposes of cumulative noise assessment. Receivers that are only associated with the Project or Stage 1, or not associated with either, are subject to the non-associated criteria. For clarity, the associated receivers (for the Project) that are not associated with Stage 1 are marked in the table.

Table 5: Cumulative assessment for Bowmans Creek Wind Farm Stage 1 and the Project with predicted cumulative levels over 30 dB L_{Aeq}

Receiver	Predicted noise level, dB L_{Aeq}			Noise limit, dB L_{Aeq}	Exceedance?		
	Stage 1	The Project	Cumulative		Stage 1	The Project	Cumulative
Associated receivers							
Q17-1[1]	31.1	31.9	34.5	35	--	--	--
Q17-3[1]	31.0	31.5	34.3	35	--	--	--
Q17-5[1]	31.6	31.2	34.4	35	--	--	--
R17-1	31.8	30.5	34.2	45	--	--	--
S15-1	29.7	35.0	36.1	45	--	--	--
S17-1	31.3	30.0	33.7	45	--	--	--
T15-1[1]	30.1	32.0	34.2	35	--	--	--
Non-associated receivers							
F16-1	30.4	15.7	30.6	35	--	--	--
F17-1	30.7	15.3	30.8	35	--	--	--

Receiver	Predicted noise level, dB L_{Aeq}			Noise limit, dB L_{Aeq}	Exceedance?		
	Stage 1	The Project	Cumulative		Stage 1	The Project	Cumulative
F18-1	32.1	15.1	32.1	35	--	--	--
G15-1	31.3	16.9	31.5	35	--	--	--
G15-2	30.4	16.4	30.5	35	--	--	--
G15-3	31.2	16.5	31.3	35	--	--	--
G17-1	33.1	16.0	33.2	35	--	--	--
H11-1	30.9	17.5	31.1	35	--	--	--
H11-2	30.8	17.1	31.0	35	--	--	--
H12-1	31.4	17.4	31.5	35	--	--	--
H12-2	30.8	17.8	31.0	35	--	--	--
H12-3	30.9	17.8	31.2	35	--	--	--
M9-1	29.5	24.1	30.6	35	--	--	--
M9-2	29.2	24.3	30.4	35	--	--	--
N21-2	28.6	25.5	30.3	35	--	--	--
O22-1	29.2	24.7	30.6	35	--	--	--
P22-1	**34.2**	**27.7**	**35.1**	**35**	**--**	**--**	**0.1**
P22-4	33.0	26.3	33.9	35	--	--	--
S17-2	31.4	27.9	33.0	35	--	--	--
T6-1	31.1	19.4	31.4	35	--	--	--
T6-9	30.0	18.5	30.3	35	--	--	--
U6-1	29.9	19.4	30.3	35	--	--	--
V20-1	31.3	24.0	32.0	35	--	--	--
V20-2	31.9	24.1	32.6	35	--	--	--
V20-3	29.2	22.7	30.1	35	--	--	--
W20-1	31.6	23.2	32.2	35	--	--	--

1 Receiver is not classed as associated for both the Project and Stage 1, and therefore assessed to the base noise limit for non -associated receivers.

For receiver P22-1, predicted noise levels related to Stage 1 and the Project are below the base noise limit of 35 dB L_{Aeq}, however, cumulative noise levels are predicted to be 0.1 dB above the base noise limit.

Potential mitigation strategies for cumulative noise would be considered in the EIS stage for the Project, following the completion of baseline noise monitoring and wind-speed based noise limits being established.

Predicted noise contours for Stage 1, and Stage 1 and the Project cumulatively are provided in Figure 5 and Figure 6, respectively.

Figure 5: Stage 1 predicted noise levels

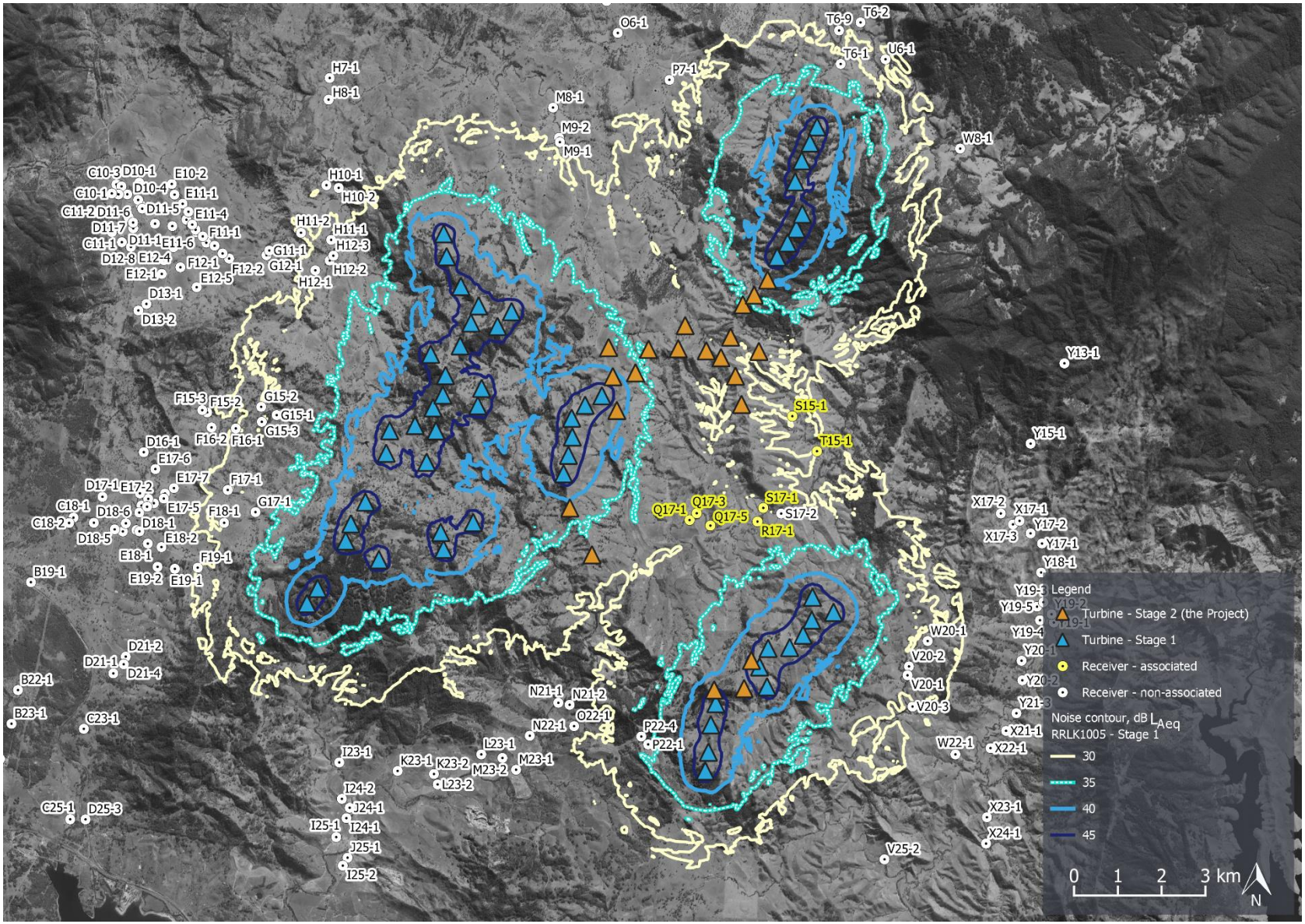
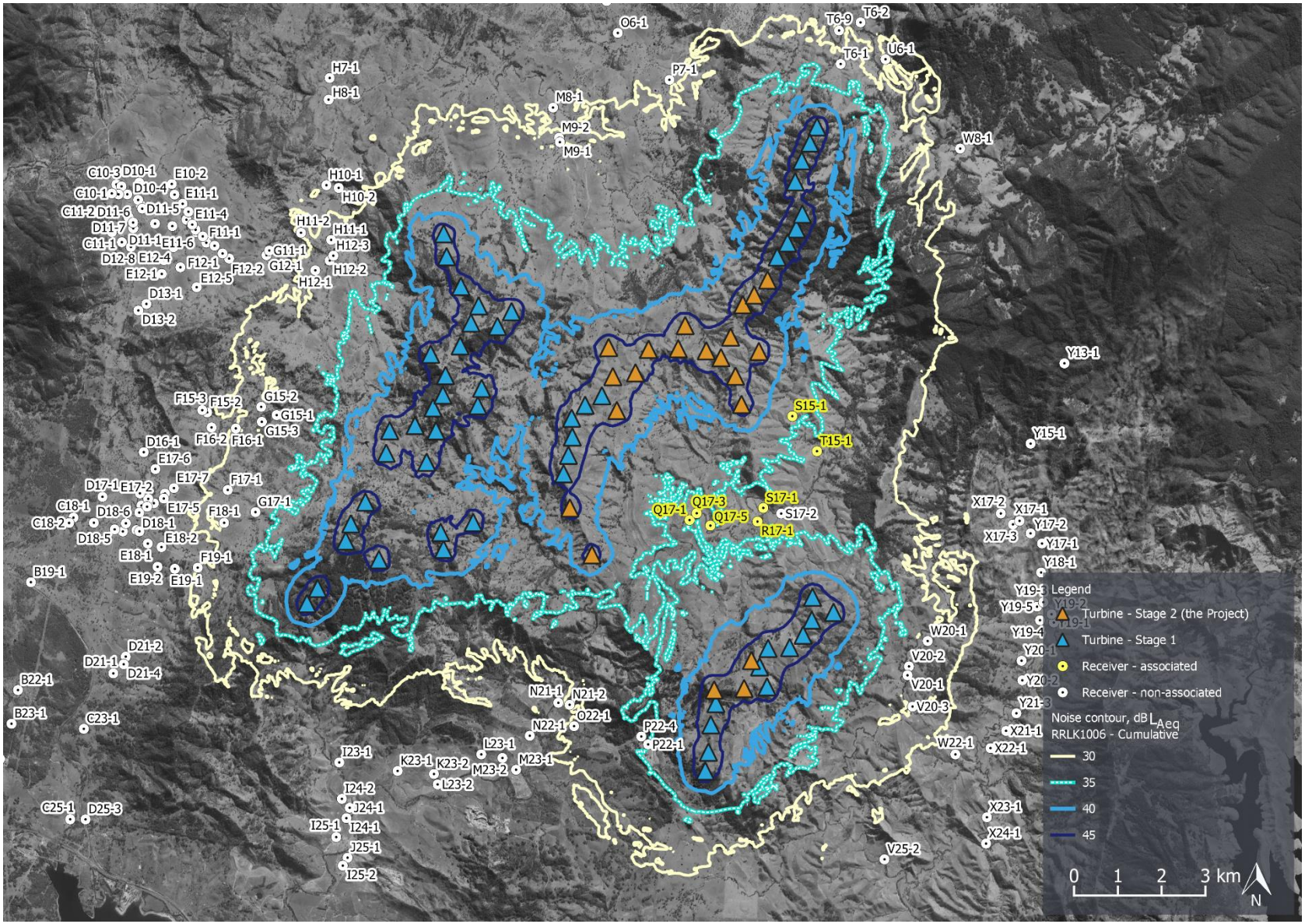


Figure 6: Cumulative predicted noise levels for the Project and Stage 1



6.0 DETAILED ASSESSMENT PHASE

A detailed assessment of a wind farm development in NSW involves addressing a number of environmental noise considerations detailed in the project specific SEARs.

Project specific SEARs are yet to be issued for the Project however the document titled *Standard Secretary's Environmental Assessment Requirements* dated September 2016 notes that an EIS must address:

- Operational wind turbine noise
- Ancillary infrastructure noise
- Construction noise
- Construction traffic noise
- Construction vibration.

Environmental noise considerations relating to construction and ancillary infrastructure would be addressed at the SSDA phase of the assessment once the Project specific SEARs have been released.

Given the findings of the preliminary noise modelling presented in Section 5.1, further detailed assessment work will involve background noise monitoring at key receiver locations to determine the applicable criteria in accordance with the NSW Noise Assessment Bulletin, and further consideration of cumulative noise levels for the Project in conjunction with Stage 1.

The results of any background noise monitoring would be documented in the noise assessment report prepared to accompany the SSDA for the Project. Where required, potential mitigation strategies for the Project, taking into account cumulative noise impacts, would be considered in the EIS stage. Mitigation strategies would be developed following the completion of baseline noise monitoring and wind-speed based noise limits being established.

The NSW Noise Assessment Bulletin specifies additional criteria relating to *special characteristics*, defined as tonality and low frequency. While tonality cannot be readily predicted, in relation to low frequency noise, the bulletin states that:

> *Noise assessments for proposed wind energy projects shall assess the potential for non-associated residential receiver locations to experience low frequency noise levels exceeding 60 dB(C).*

Low frequency noise characteristics are highly specific to the wind turbine being considered, and its assessment can involve detailed modelling using alternative procedures to those used for A-weighted noise levels. In accordance with the NSW Noise Assessment Bulletin, this modelling data is to be provided as part of an application to develop a wind farm. Accordingly, this modelling is to be undertaken and reported at the SSDA phase of the assessment.

7.0 SUMMARY

A preliminary assessment of operational noise for the proposed Project has been carried out in accordance with the NSW Noise Assessment Bulletin.

The preliminary noise assessment has been prepared based on the current Project design comprising twenty-one (21) wind turbines, with a maximum blade-tip height of 241 m above ground level, as an extension to fifty-four (54) wind turbines included in Stage 1 development.

Stage 1 has already progressed through the NSW planning and approvals pathway under SSD-10315. Staging of the Bowmans Creek Wind Farm was not proposed within the SSD-10315 approvals documentation. For simplicity and to assist in differentiating between the two (2) projects, all wind turbines and ancillary infrastructure associated with SSD-10315 are referred as Stage 1 throughout this report.

Due to the scale of additional infrastructure, and other requirements under the NSW planning system, the Project is proposed as a separate State Significant Development (SSD) to that already approved under Stage 1.

Noise modelling was carried out based on a candidate wind turbine model as nominated by the Proponent, typical of the size and type of wind turbine which is being considered for the site. While wind turbine manufacturer's data has been relied on for the assessment, the wind turbine make and model has not been specified at this stage for commercial reasons.

The results of the modelling demonstrate that the Project can be designed and operated to comply with the operational noise requirements of the NSW Noise Assessment Bulletin.

Once the SEARs are released for this Project, further detailed assessment would be undertaken to support a subsequent SSDA 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 wind turbine noise modelling assessment, noise mitigation strategies (where required) and other noise considerations including special noise characteristics, construction and ancillary infrastructure and cumulative noise.

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, unless as part of a direct quote of an external document.

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 WIND TURBINE COORDINATES

Table 6 sets out the coordinates of the current proposed wind turbine layout for the Project as supplied by the Proponent.

Table 6: Wind turbine coordinates for the Project – GDA2020 MGA zone 56

Wind turbine	Easting, m	Northing, m	Terrain elevation, m
73	324,500	6,424,117	522
74	325,180	6,424,188	440
75	325,311	6,424,836	460
76	321,541	6,427,043	430
77	320,976	6,428,081	500
78	321,923	6,430,364	497
79	321,789	6,431,131	525
80	321,655	6,431,790	500
81	322,300	6,431,247	520
82	322,569	6,431,798	508
83	323,244	6,431,851	560
84	323,373	6,432,388	481
85	323,887	6,431,840	503
86	324,230	6,431,702	530
87	324,584	6,431,298	480
88	324,758	6,430,662	450
89	324,423	6,432,182	540
90	325,087	6,431,893	520
91	324,661	6,432,938	594
92	324,908	6,433,171	600
93	325,194	6,433,532	558

The coordinates of the Stage 1 wind turbine layout supplied by the Proponent used for Stage 1 and cumulative noise predictions are provided in Table 7.

Table 7: Stage 1 wind turbine coordinates – GDA2020 MGA zone 56

Wind turbine	Easting, m	Northing, m	Terrain elevation, m
6	326,637	6,425,835	380
7	327,122	6,426,040	410
8	326,623	6,426,357	420
9	325,506	6,424,701	440
12	326,127	6,437,085	524
13	325,784	6,434,734	630
14	325,902	6,435,079	614
15	325,699	6,435,805	577
16	325,821	6,436,292	590
17	325,985	6,436,708	566
18	326,167	6,425,180	430
19	325,701	6,424,256	430
20	326,457	6,425,481	405
21	325,602	6,434,402	620
22	324,400	6,422,259	432
23	324,448	6,422,692	450
24	324,468	6,423,318	410
25	324,556	6,423,809	460
26	320,942	6,429,703	542
27	320,789	6,428,853	550
28	320,877	6,429,281	520
29	320,903	6,430,132	550
30	321,193	6,430,445	517
31	321,564	6,430,681	508
32	318,148	6,426,977	532
34	318,639	6,432,574	610
35	317,972	6,430,942	680
36	317,607	6,431,408	670
37	318,268	6,431,638	631
38	319,396	6,432,485	517
39	319,094	6,432,130	616

Wind turbine	Easting, m	Northing, m	Terrain elevation, m
40	318,485	6,432,174	666
41	317,652	6,428,942	490
42	317,341	6,429,767	580
43	317,825	6,429,670	600
44	318,747	6,430,296	600
45	318,812	6,430,696	579
46	317,729	6,430,189	690
47	317,937	6,430,494	687
48	316,689	6,426,659	594
49	318,063	6,427,359	557
50	318,791	6,427,627	496
51	317,846	6,433,652	605
52	318,208	6,432,995	617
57	317,749	6,434,174	549
58	316,718	6,429,096	520
59	316,307	6,427,954	530
63	316,770	6,429,613	539
66	315,104	6,425,568	493
67	315,328	6,425,925	520
69	315,907	6,427,046	573
70	316,003	6,427,443	552
71	325,384	6,434,068	540
72	325,676	6,425,133	420

APPENDIX C RECEIVER COORDINATES

The following table sets out the one hundred and three (103) noise sensitive receivers located within 5 km of a proposed wind turbine in either Stage 1 or the Project together with their respective distance to the nearest wind turbine. Notes are included where the nearest wind turbine to the subject receiver is within the Project. For all other receivers, the nearest wind turbine is in the Stage 1 development. Data has been provided by the Proponent.

Table 8: Receiver locations – GDA2020 MGA zone 56

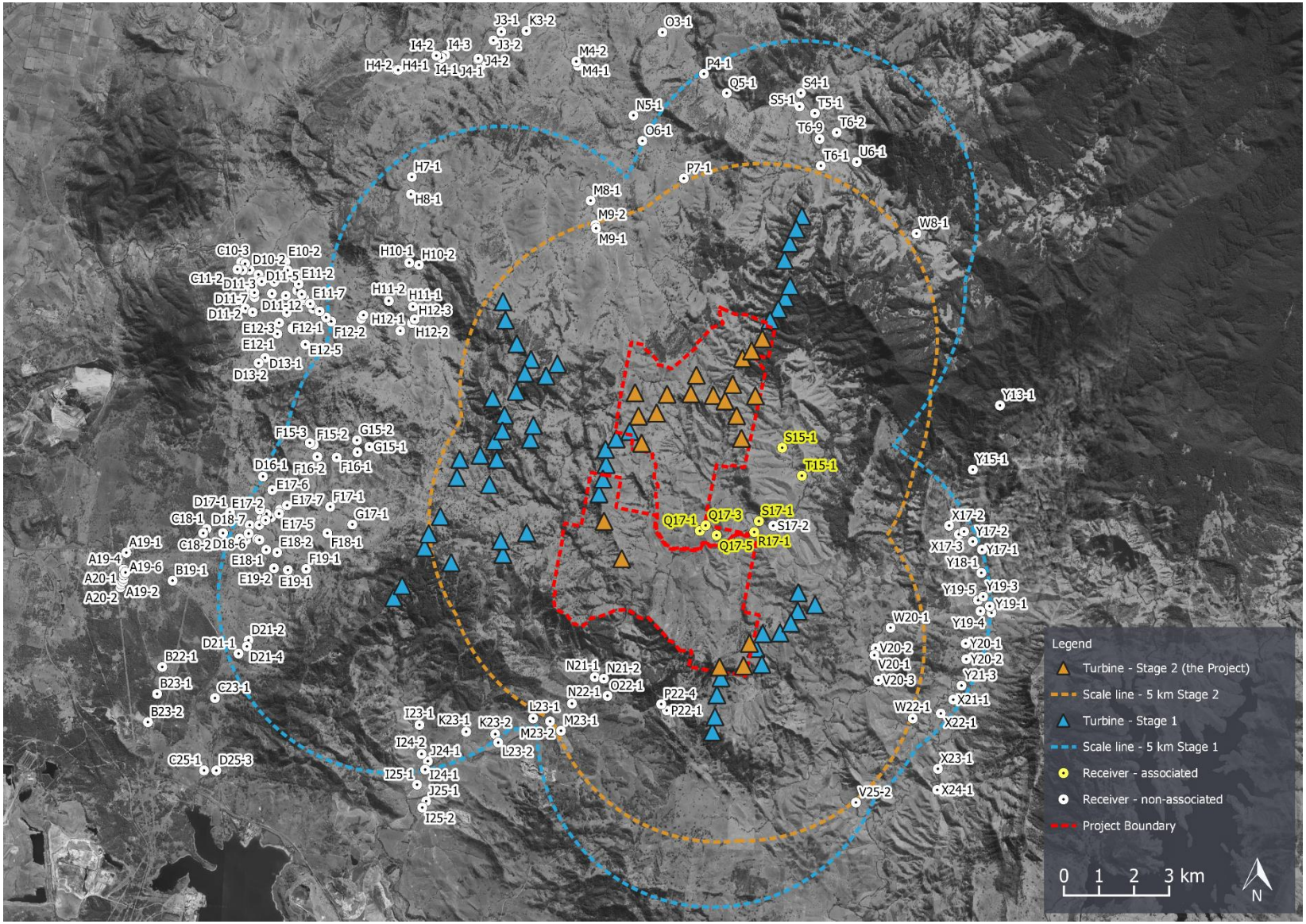
Receiver ID	Easting, m	Northing, m	Terrain elevation, m	Distance to the nearest wind turbine, m	Nearest wind turbine
Associated receivers					
Q17-1	323,722	6,427,958	234	2,370	76 (the Project)
Q17-3	323,876	6,428,123	231	2,578	76 (the Project)
Q17-5	324,203	6,427,860	238	2,789	76 (the Project)
R17-1	325,272	6,428,011	258	2,140	8
S15-1	325,933	6,430,458	333	1,203	88 (the Project)
S17-1	325,387	6,428,329	260	2,332	8
T15-1	326,539	6,429,691	310	2,035	88 (the Project)
Non-associated receivers					
D17-2	311,206	6,427,589	202	4,393	66
D17-3	311,154	6,427,865	201	4,571	66
D18-1	311,163	6,427,426	200	4,359	66
D18-2	311,122	6,427,024	212	4,242	66
D18-3	311,191	6,426,999	216	4,169	66
D18-4	310,813	6,426,975	200	4,518	66
D18-5	310,625	6,427,011	199	4,708	66
D18-6	310,872	6,427,164	200	4,525	66
D18-7	310,888	6,427,404	200	4,600	66
D21-1	310,777	6,423,727	230	4,704	66
D21-2	311,039	6,424,125	234	4,315	66
D21-4	311,003	6,423,947	230	4,412	66
E17-1	311,485	6,427,658	210	4,182	66
E17-2	311,351	6,427,751	205	4,344	66
E17-3	311,726	6,427,893	216	4,104	66
E17-4	311,334	6,427,569	207	4,270	66
E17-5	311,705	6,427,778	221	4,057	66
E17-6	311,475	6,428,439	226	4,603	67

Receiver ID	Easting, m	Northing, m	Terrain elevation, m	Distance to the nearest wind turbine, m	Nearest wind turbine
E17-7	311,923	6,428,029	215	4,005	67
E18-1	311,398	6,426,730	220	3,886	66
E18-2	311,714	6,426,668	223	3,567	66
E19-1	312,047	6,426,189	260	3,122	66
E19-2	311,650	6,426,213	230	3,516	66
F12-2	312,889	6,433,334	254	4,934	57
F15-2	312,584	6,429,797	250	4,154	70
F15-3	312,470	6,429,841	259	4,273	70
F16-1	313,258	6,429,469	278	3,407	59
F16-2	312,703	6,429,460	244	3,870	70
F17-1	313,152	6,428,055	240	2,919	70
F18-1	313,112	6,427,300	300	2,612	67
F19-1	312,567	6,426,244	250	2,629	66
G11-1	313,794	6,433,567	286	4,003	57
G12-1	313,737	6,433,459	276	4,077	57
G15-1	314,173	6,429,824	284	2,609	63
G15-2	313,810	6,429,993	267	2,988	63
G15-3	313,842	6,429,652	280	2,931	63
G17-1	313,813	6,427,585	274	2,166	69
H10-1	315,014	6,435,130	314	2,901	57
H10-2	315,296	6,435,084	302	2,620	57
H11-1	315,192	6,433,889	346	2,577	57
H11-2	314,494	6,434,013	410	3,261	57
H12-1	314,869	6,433,175	359	3,018	51
H12-2	315,185	6,433,417	352	2,675	51
H12-3	315,262	6,433,531	348	2,573	57
H7-1	314,951	6,437,578	267	4,408	57
H8-1	314,953	6,437,083	260	4,037	57
I23-1	316,043	6,421,985	153	3,707	66
I24-1	316,277	6,420,723	130	4,987	66
I24-2	316,150	6,421,158	150	4,535	66
J24-1	316,339	6,420,965	136	4,768	66

Receiver ID	Easting, m	Northing, m	Terrain elevation, m	Distance to the nearest wind turbine, m	Nearest wind turbine
K23-1	317,386	6,421,866	146	4,351	66
K23-2	318,217	6,421,842	164	4,858	66
L23-1	319,273	6,422,350	170	4,763	32
M23-1	320,085	6,422,045	160	4,322	22
M23-2	319,759	6,422,295	179	4,643	22
M8-1	320,082	6,437,189	335	3,815	57
M9-1	320,282	6,436,408	333	3,381	57
M9-2	320,257	6,436,507	333	3,428	57
N21-1	320,963	6,423,625	175	3,470	76 (the Project)
N21-2	321,223	6,423,594	200	3,260	24
N22-1	320,354	6,422,837	184	4,089	22
O22-1	321,352	6,423,113	189	3,126	24
P22-1	323,065	6,422,791	240	1,394	23
P22-4	322,898	6,422,962	229	1,580	23
P4-1	323,108	6,440,978	289	4,928	12
P7-1	322,701	6,437,970	390	3,521	17
Q5-1	323,789	6,440,465	280	4,112	12
S17-2	325,802	6,428,223	254	2,043	8
S4-1	325,899	6,440,587	306	3,512	12
S5-1	325,882	6,440,198	310	3,126	12
T5-1	326,331	6,440,034	301	2,959	12
T6-1	326,585	6,438,549	330	1,540	12
T6-2	326,985	6,439,522	323	2,587	12
T6-9	326,506	6,439,311	321	2,262	12
U6-1	327,602	6,438,714	350	2,202	12
V20-1	328,889	6,424,698	240	2,223	7
V20-2	328,912	6,424,903	249	2,125	7
V20-3	329,044	6,423,992	232	2,812	7
V25-2	328,599	6,420,473	162	4,565	22
W20-1	329,305	6,425,505	256	2,252	7
W22-1	330,083	6,422,957	223	4,277	7
W8-1	329,418	6,436,771	380	3,309	12

Receiver ID	Easting, m	Northing, m	Terrain elevation, m	Distance to the nearest wind turbine, m	Nearest wind turbine
X17-1	331,246	6,428,361	270	4,735	7
X17-2	330,810	6,428,506	330	4,438	7
X17-3	331,100	6,428,273	290	4,564	7
X21-1	331,207	6,423,558	207	4,782	7
X22-1	330,874	6,423,145	205	4,741	7
Y17-2	331,513	6,428,091	263	4,848	7
Y18-1	331,804	6,427,212	250	4,828	7
Y19-2	332,096	6,426,275	238	4,982	7
Y19-3	331,894	6,426,538	252	4,800	7
Y19-4	331,839	6,426,122	270	4,720	7
Y19-5	331,755	6,426,428	269	4,651	7
Y20-1	331,471	6,425,176	230	4,436	7
Y20-2	331,513	6,424,731	238	4,584	7
Y21-3	331,420	6,423,972	210	4,772	7

APPENDIX D SITE LAYOUT PLAN



APPENDIX E NOISE PREDICTION MODEL

In Australia, wind turbine 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[2], 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. Notably, ISO 9613-2:2024 introduces an informative annex on wind turbine 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*, NZS 6808:2010 *Acoustics – Wind farm noise* and AS 4959:2010 *Acoustics – Measurement, prediction and assessment of noise from wind turbine generators.*

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 wind turbines, 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 wind turbine 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.

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

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.

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 wind turbines 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[3, 4, 5] 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.

The findings of these studies demonstrate the suitability of ISO 9613-2:1996 method to predict the propagation of wind turbine 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 wind turbine being represented by a single noise source located at the maximum tip height of the wind turbine rotor; and
- An adjustment of 3 dB is added to the predicted noise contribution of a wind turbine if the terrain between the wind turbine 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 wind turbine 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 wind turbine and receiver pairing, and then subsequently applies the adjustments to each wind turbine's predicted noise contribution where appropriate.

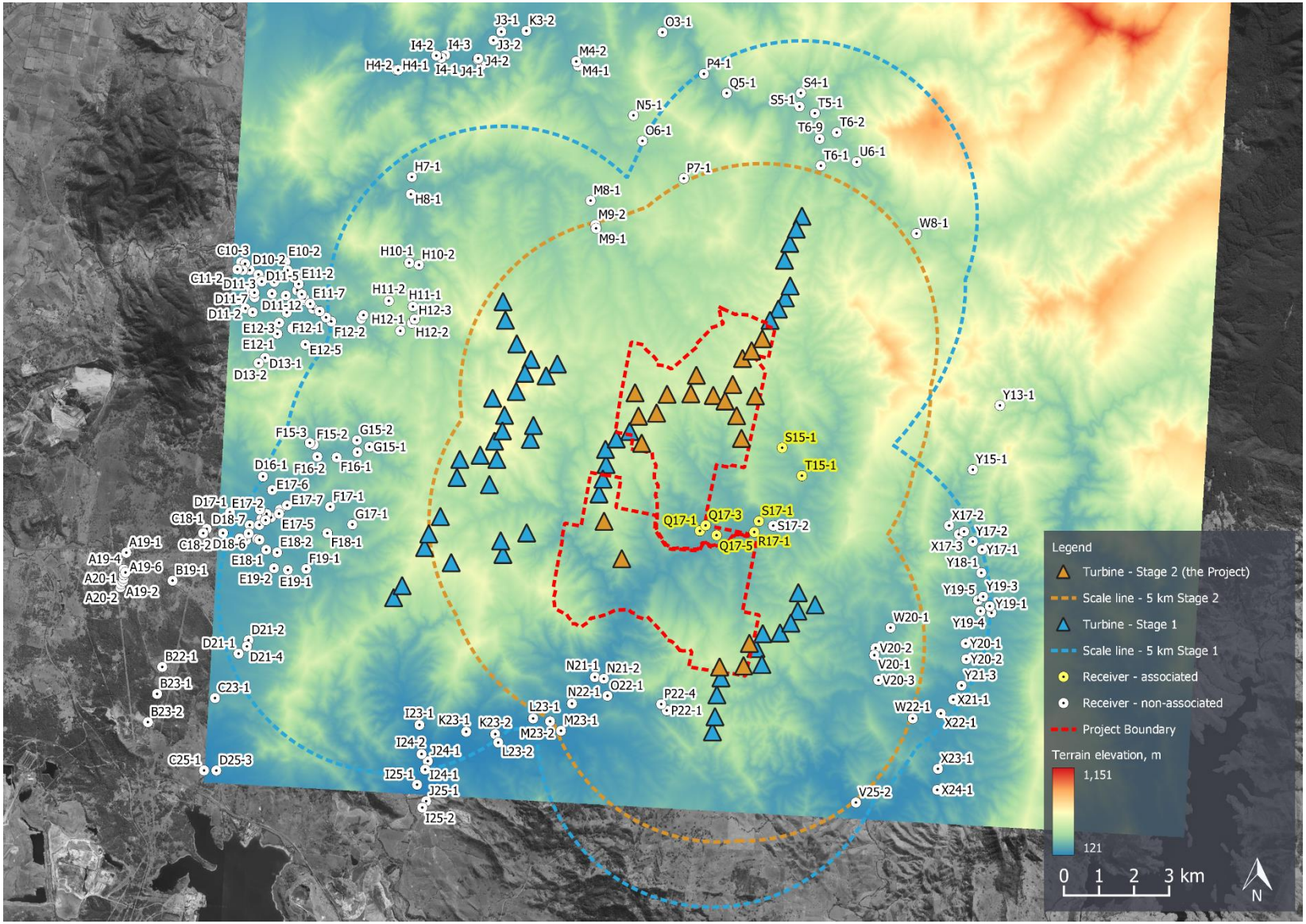
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3 Bullmore, Adcock, Jiggins & Cand – *Wind Farm Noise Predictions: The Risks of Conservatism*; Presented at the Second International Meeting on Wind Turbine Noise in Lyon, France September 2007.

4 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.

5 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.

APPENDIX F SITE TOPOGRAPHY



APPENDIX G TABULATED PREDICTED NOISE LEVEL DATA

Table 9: Predicted noise levels for all receivers within 5 km of the Project, dB L_{Aeq} (includes +1 dB allowance for measurement uncertainty)

Receiver	Hub-height wind speed (m/s)						
	4	5	6	7	8	9	≥10
Associated receivers							
Q17-1	21.2	21.4	23.3	26.3	29.1	31.4	31.9
Q17-3	20.8	21.0	22.9	25.9	28.7	31.0	31.5
Q17-5	20.5	20.7	22.6	25.6	28.4	30.7	31.2
R17-1	19.8	20.0	21.9	24.9	27.7	30.0	30.5
S15-1	24.3	24.5	26.4	29.4	32.2	34.5	35.0
S17-1	19.3	19.5	21.4	24.4	27.2	29.5	30.0
T15-1	21.3	21.5	23.4	26.4	29.2	31.5	32.0
Non-associated receivers							
M23-1	12.0	12.2	14.1	17.1	19.9	22.2	22.7
M9-1	13.4	13.6	15.5	18.5	21.3	23.6	24.1
M9-2	13.6	13.8	15.7	18.7	21.5	23.8	24.3
N21-1	14.7	14.9	16.8	19.8	22.6	24.9	25.4
N21-2	14.8	15.0	16.9	19.9	22.7	25.0	25.5
N22-1	12.9	13.1	15.0	18.0	20.8	23.1	23.6
O22-1	14.0	14.2	16.1	19.1	21.9	24.2	24.7
P22-1	17.0	17.2	19.1	22.1	24.9	27.2	27.7
P22-4	15.6	15.8	17.7	20.7	23.5	25.8	26.3
S17-2	17.2	17.4	19.3	22.3	25.1	27.4	27.9
V20-1	13.3	13.5	15.4	18.4	21.2	23.5	24.0
V20-2	13.4	13.6	15.5	18.5	21.3	23.6	24.1
V20-3	12.0	12.2	14.1	17.1	19.9	22.2	22.7
W20-1	12.5	12.7	14.6	17.6	20.4	22.7	23.2

APPENDIX H C-WEIGHTING ASSESSMENT RESULTS

H1 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, are applicable.

H2 Assessment requirement

The following excerpt concerning C-weighted wind turbine noise have 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.*

H3 Prediction method

As stated in Section 5.1.4, there is no commonly used, practical method to accurately predict the wind turbine low frequency noise levels at receiver locations.

In this case, the C-weighted noise levels at receiver locations have been estimated using a simplified approach based on 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 bands down to the 8 Hz octave band
- 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 worst-case wind speed in terms of C-weighted levels being 11 m/s.

H4 Results

Table 10 presents the results of the preliminary C-weighted noise predictions to align with the receivers detailed in Appendix G.

Table 10: Predicted C-weighted noise levels

Receiver ID	dB L_{Ceq}
Associated receivers	
Q17-1	52.1
Q17-3	51.9
Q17-5	51.4
R17-1	50.9
S15-1	54.5
S17-1	50.5
T15-1	52.1
Non-associated receivers	
M23-1	45.3
N21-1	47.1
N21-2	47.1
N22-1	45.5
O22-1	46.5
P22-1	48.2
P22-4	47.2
Q17-1	52.1
Q17-3	51.9
Q17-5	51.4
S17-2	48.9
T15-1	52.1
V20-1	46.6
W20-1	45.7

APPENDIX F

Biodiversity Constraints Assessment

Bowmans Creek Wind Farm (Stage 2)

Biodiversity Constraints Assessment

Umwelt, on behalf of Bowmans Creek Wind Farm Pty Ltd

27 May 2024

Final

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Report No. 23065RP1

The preparation of this report has been in accordance with the brief provided by the Client and has relied upon the data and results collected at or under the times and conditions specified in the report. All findings, conclusions or commendations contained within the report are based only on the aforementioned circumstances. The report has been prepared for use by the Client and no responsibility for its use by other parties is accepted by Cumberland Ecology.

Version	Date Issued	Amended by	Details
1	27/05/2024	NJ/GK/TP	Final for Scoping Report

Approved by:	Gitanjali Katrak
Position:	Principal Ecologist
Signed:	
Date:	27 May, 2024

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Figure 9 Threatened and Migratory species recorded within 20km of the Project Area

Glossary

Abbreviation	Definition
BAM	Biodiversity Assessment Method
BAM-C	Biodiversity Assessment Method Calculator
BC Act	NSW *Biodiversity Conservation Act 2016*
BDAR	Biodiversity Development Assessment Report
BCD	Biodiversity Conservation Division (part of DPHI)
BOM	Bureau of Meteorology
BV Map	Biodiversity Values Map
CEEC	Critically Endangered Ecological Community
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DPE	Former NSW Department of Planning and Environment
DPHI	Department of Planning, Housing and Infrastructure
EEC	Endangered Ecological Community
EHG	Environment and Heritage Group (part of NSW Department of Climate Change, Energy, the Environment and Water)
EIS	Environmental Impact Statement
EP&A Act	NSW *Environmental Planning & Assessment Act 1979*
EPBC Act	Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999*
FM Act	NSW *Fisheries Management Act 1994*
GDE	Groundwater Dependent Ecosystem
gw	gigawatt
IBRA	Interim Biogeographic Regionalisation for Australia
LEP	Local Environment Plan
LGA	Local Government Area
LLS Act	NSW *Local Land Services Act 2013*
MNES	Matters of National Environmental Significance
mw	megawatts
NPW Act	NSW *National Parks and Wildlife Act 1974*
NSW	New South Wales
NVR Map	Native Vegetation Regulatory Map
PCT	Plant Community Type
PMST	Protected Matters Search Tool
REZ	Renewable Energy Zone
SAII	Serious And Irreversible Impacts
SEARs	Secretary's Environmental Assessment Requirements

Abbreviation	Definition
SEPP	State Environmental Planning Policy
SSD	State Significant Development
SVTM	State Vegetation Type Map
TBDC	Threatened Biodiversity Data Collection
TEC	Threatened ecological community

1. Introduction

1.1. Purpose

Cumberland Ecology has been engaged by Umwelt (Australia) Pty Limited (Umwelt), on behalf of Bowmans Creek Wind Farm Pty Ltd (the Proponent), to provide an ecological assessment for the proposed Bowmans Creek Wind Farm Stage 2 (the Project). The capital investment value of the Project is valued at over $30 million and the project is considered State Significant Development (SSD) under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and the *State Environmental Planning Policy (Planning Systems 2021)* (Planning Systems SEPP). Therefore, the Project will require the issue of the Planning Secretary's Environmental Assessment Requirements (SEARs) by the NSW Department of Planning, Housing and Infrastructure (DPHI) (formerly the Department of Planning and Environment, DPE).

The purpose of this biodiversity constraints assessment is to provide preliminary biodiversity information to inform the scoping report currently being prepared by Umwelt to support the Request for SEARs for the Project.

While this report is not designed to satisfy the legislative and statutory requirements of the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act), NSW *Environmental Planning and Assessment Act 1979* (EP&A Act), NSW *Biodiversity Conservation Act 2016* (BC Act) and other relevant legislation (refer **Section 1.4** of this report), it nonetheless provides discussion of the legislative requirements for the future development of the Project and identification of the likely assessment pathways under both Commonwealth and NSW legislation.

1.2. Background

1.2.1. Project Overview

Bowmans Creek Wind Farm Pty Ltd (the Proponent) propose to develop Bowmans Creek Wind Farm Stage 2 (the Project) to provide a reliable and affordable source of energy for the people of New South Wales (NSW) and contribute to reducing greenhouse gas emissions associated with energy generation.

The Project is located at Bowmans Creek, approximately 21 km east of Muswellbrook and ~120 km from the Port of Newcastle in NSW. The Project extends predominantly across two Local Government Areas (LGAs), being the Muswellbrook and Singleton LGAs (**Figure 1**).

The Project comprises the development of a new wind farm that will connect to the Bowmans Creek Stage 1 project and generally involves the construction, operation, maintenance and decommissioning of up to 21 wind turbines, electricity infrastructure (including substations and transmission lines), access tracks and ancillary infrastructure.

The Project Boundary is the maximum spatial extent of the Project defined by all current land access available to the Proponent. It includes all Lot and DP for involved landholders and encompasses all aspects of the Project except for the off-site transport route. The Project Area encompasses all land within and including the Project Boundary and covers an area of approximately 3,551.60 hectares (ha).

The Project Area is zoned as RU1 Primary Production under the Singleton Local Environmental Plan (LEP) 2013 and the Muswellbrook LEP 2009. The majority of land that surrounds the Project Area is also zoned RU1 Primary

Production. However, the Mount Royal National Park (east to the Project Area) is zoned as E1 National Parks and Nature Reserves (**Figure 2**).

The Development Corridor is defined as the area within which all WTG and associated infrastructure will be placed, providing the necessary flexibility for the detailed design of the Project whilst also allowing a detailed environmental assessment process to be completed. The proposed Development Corridor associated with the Project is approximately 427.56 ha based on the current indicative Project layout, which will be subject to further design refinement and revision as the Project progresses. This represents ~12% of the total Project Area.

The proposed Development Footprint for the Project (also referred to as the Disturbance Area) is the area which is anticipated to be disturbed as a result of the Project which sits within the Development Corridor, and currently encompasses an area of approximately 167.30 ha.

The topography across the Disturbance Area and wider Project Area varies significantly. The lands associated with public roads occur on relatively flat to gently undulating areas. Terrain within the main farming property ranges from undulating hills to steep slopes with multiple ridgelines. The topography across the Disturbance Area ranges from about 210 m AHD around the public road to approximately 610 m AHD in the north-western parts of the Disturbance Area.

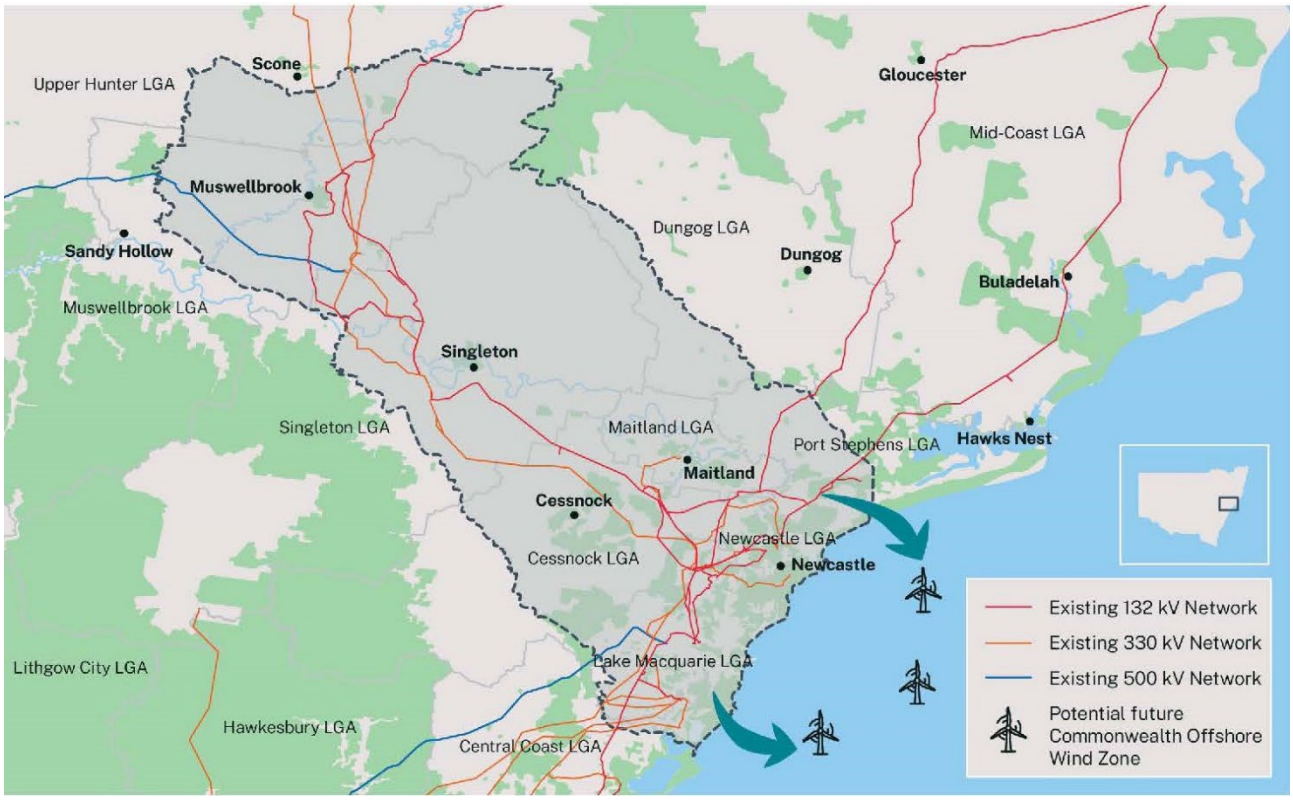
1.2.2. Renewable Energy Zone (REZ)

The NSW Government, as part of their 'Electricity Strategy' and 'Electricity Infrastructure Roadmap' designated multiple Renewable Energy Zones (REZs), these being the Central-West Orana, New England, South-West, Hunter-Central Coast and Illawarra REZs. The purpose of the REZs is to group new wind and solar power generation into locations where it can be efficiently stored and transmitted across NSW.

The Project Area is located entirely within the Hunter-Central Coast REZ. However the Project does not anticipate using any Hunter-Central Coast REZ infrastructure to support the connection to the grid.

The Hunter-Central Coast REZ was chosen as the region has excellent renewable energy resources and can utilise existing power stations, rehabilitated mining land, electricity network infrastructure, port and transport infrastructure and a skilled workforce. EnergyCo NSW is responsible for planning and is continuing to refine the geographical extent of REZs. However, based on current mapping prepared in 2021, the proposed Project is within the boundaries of the REZ. **Image 1** below shows the location of the current proposed Hunter-Central Coast REZ.

Image 1 Hunter Central Coast Renewable Energy Zone



1.2.3. Indicative Project Design

The proposed development is seeking approval for up to 21 wind turbine generators (WTGs), with a maximum blade-tip height of 250 m AGL and a generating capacity of up to ~120 MW. The power generated by the Project will feed into the electricity grid (i.e. the National Energy Market, NEM) via connection to the Stage 1 electrical reticulation network (subject to project determination).

The key components of the Project include:

- Up to 21 (3 blade) WTGs, with a maximum blade-tip height of 250 m AGL;
- Power infrastructure providing connection to the NEM, including:
    - one (1) on-site collector substation and associated medium voltage transmission line connecting the on-siter substation to the Stage 1 project electrical reticulation network;
    - one (1) overhead transmission line connecting the proposed wind turbines in the south of the Project Area to the Stage 1 project electrical reticulation network; and
    - an internal electrical reticulation network (i.e., underground 33 kV transmission lines) connecting all turbines to the Stage 1 project electrical reticulation network;
- Internal electrical reticulation network i.e., low voltage 33 kV transmission network connecting the northern turbines to the Stage 1 project electrical reticulation network;

- Other associated permanent infrastructure including hardstands, new access tracks, upgrades to existing access tracks, and access point/s from public roads; and
- Permanent and temporary meteorological monitoring masts.

Temporary construction facilities proposed to facilitate the construction of the Stage 1 project will be utilised for the construction of this Project (i.e., Stage 2), including:

- Construction compound/s and site office buildings and storage areas, including fencing and screen as required.
- On-site concrete batching plants for use during the construction phase.
- Laydown areas used for wind turbine installation and storage of wind turbine components.
- Potential construction material areas such as borrow pits, quarry and rock crushing facilities.

The operations and maintenance (O&M) facility proposed in Stage 1 would also be utilised for Stage 2.

1.3. Statutory Considerations

Commonwealth and State Legislation relevant to this biodiversity constraints assessment report is described in **Table 1.**

Table 1 Legislation relevant to the project

Relevant legislation	Governing Agency	Summary
Commonwealth legislation		
Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	The EPBC Act prescribes the Commonwealth's role in environmental assessment, biodiversity conservation and the management of protected areas of national significance. It also provides a mechanism for national environment protection and biodiversity conservation. The EPBC Act is administered by the Department of Climate Change, Energy, the Environment and Water (DCCEEW) and provides protection for listed Matters of National Environmental Significance (MNES) including: • Listed species and communities (e.g. listed threatened species and ecological communities and migratory species); • Protected areas (e.g. World Heritage properties, Ramsar wetlands of international significance, conservation zones); and • National, Commonwealth and Indigenous Heritage. Under the EPBC Act, any action (which includes a development, project or activity) that is considered likely to have a significant impact on MNES must be referred to the Commonwealth Minister for DCCEEW. The significance of the proposed action on MNES can

Relevant legislation	Governing Agency	Summary
		be determined through self assessment using Significant Impact Guidelines 1.1 - Matters of National Environmental Significance (insert REF from endnote). In accordance with the Bilateral Agreement reached between the NSW and Commonwealth Governments, an Environmental Impact Statement (EIS) under the NSW Environmental Planning & Assessment Act 1979 (EP&A Act, see below) for State Significant Development (SSD) can also be used for an EIS under the EPBC Act. This is possible for a "controlled action" and if directed by the Commonwealth Minister.
State legislation		
Environmental Planning and Assessment Act 1979 (EP&A Act)	Department of Planning, Housing and Infrastructure (DPHI)	The Environmental Planning & Assessment Act 1979 (EP&A Act) is the overarching planning legislation in NSW that provides for the creation of planning instruments that guide land use. The EP&A Act also provides for the protection of the environment, including the protection and conservation of native animals and plants. This includes threatened species, populations and ecological communities, and their habitats of biodiversity values as listed in the Biodiversity Conservation Act 2016 (BC Act) and NSW Fisheries Management Act 1994 (FM Act). The EIS anticipated to be prepared for the Project will meet the necessary environmental assessment requirements under the relevant provisions of the EP&A Act.
Biodiversity Conservation Act 2016 (BC Act)	DPHI and NSW Department of Climate Change, Energy, the Environment and Water – Biodiversity and Conservation Division (BCD)	The BC Act is the key piece of legislation in NSW relating to the protection and management of biodiversity and threatened species. The purpose of the BC Act is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development. The BC Act is supported by several regulations, including the *Biodiversity Conservation Regulation 2017* (BC Regulation). A key component of the BC Act is the introduction of the Biodiversity Offsets Scheme (BOS). The BOS is intended to simplify biodiversity assessment and improve biodiversity outcomes by creating consistent assessment requirements to measure the likely biodiversity loss of development proposals and gains in biodiversity value achieved at offset sites through active management. The BOS has several triggers for entry into the scheme for local development while SSD and SSI automatically enter the scheme unless a waiver is granted. Projects that trigger entry into the BOS are assessed via a Biodiversity Development Assessment Report (BDAR) prepared by

Relevant legislation	Governing Agency	Summary
		an accredited assessor in accordance with the Biodiversity Assessment Method (BAM) established under Section 6.7 of the BC Act. The potential impacts associated with the Project are such that a BDAR will be required.
National Parks and Wildlife Act 1974 (NPW Act)	DPHI	The National Parks and Wildlife Act 1974 (NPW Act) provides for the protection of Aboriginal sites and designated conservation areas as well as the flora and fauna within conservation areas. The objective of the NPW Act is to consolidate and amend the law relating to the establishment, preservation and management of national parks, historic sites, certain other areas, and the protection of certain fauna, native plants and Aboriginal objects. There are no conservation areas declared under the NPW Act that are within Project Area. However, the Mount Royal National Park is located to the east-north-east of the Project Area.
Fisheries Management Act 1994 (FM Act)	Department of Primary Industries (DPI)	The FM Act protects threatened fish species and marine vegetation and identifies associated threatening processes and is administered by the DPI (Fisheries). The FM Act has the objective to conserve, develop and share the fishery resources of NSW for the benefit of present and future generations. In particular, this Act includes measures to conserve fish stocks and key fish habitats, to conserve threatened species, populations and ecological communities of fish and marine vegetation, and to promote ecologically sustainable development, including the conservation of biological diversity. Assessments under the FM Act are required to assess potential impacts to areas mapped as Key Fish Habitat and/or indicative distributions of threatened freshwater species.
Local Land Services Act 2013 (LLS Act)	Local Land Services (LLS)	The Local Land Services Act 2013 (LLS Act), supported by the Local Land Services Regulation 2014 (LLS Regulation), established 11 regional Local Land Services organisations to provide biosecurity, natural resources management and agricultural advisory services. Under Part 5A of the LLS Act and the supporting regulation, a Native Vegetation Regulatory (NVR) map showing the extent of categorised land in NSW is to be published. The NVR map underpins the legislative framework for native vegetation clearing in rural areas by categorising land in NSW. However, the map applies only to the following zones (if they are not in an excluded LGA): Zone RU1 Primary Production, Zone RU2 Rural Landscape, Zone RU5 Primary Production Small Lots and Zone RU6 Transition. Currently, various map categories have been released under staged transitional arrangements. The online NVR map viewer

Relevant legislation	Governing Agency	Summary
		currently displays a) Excluded Land, b) Category 2 – Vulnerable Land and c) Category 2 – Sensitive Land. Category 1 – Exempt Land and Category 2 – Regulated Land maps have not yet been released. During the transition period landholders must determine if their land is Category 1 or Category 2 under the LLS Act.
Biosecurity Act 2015	DPI	The Biosecurity Act is a wide-ranging legislation that outlines the requirements of government, councils, private landholders, and public authorities in the management of biosecurity matters. Priority weeds are regulated under the Biosecurity Act with a general biosecurity duty to prevent, eliminate or minimize any biosecurity risk they may pose. Some priority weeds have additional management obligations which may apply generally, or under specific circumstances. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised as is reasonably practicable.
State Environmental Planning Policy (Biodiversity and Conservation) – 2021: Chapter 3 Koala Habitat Protection 2020	DPHI and BCD	State Environmental Planning Policy (Biodiversity and Conservation) 2021 (Biodiversity and Conservation SEPP) came into force on 1 March 2022 and consolidates and repeals the provisions of multiple SEPPs. The Koala Habitat Protection Chapters of the SEPP (Chapter 3 and Chapter 4) aim to help reverse the decline of koala populations by ensuring koala habitat is properly considered during the development assessment process. Of these Chapter 3 Koala Habitat Protection 2020 potentially applies to the Project as it comprises land zoned RU1 Primary Production and is outside of the Sydney Metropolitan Area and Central Coast. However, as the Project comprises State Significant Development and the provisions of Chapter 3 only apply to applications requiring consent from councils, the provisions of the SEPP do not apply to the Project. The SEPP Chapter does not establish any specific obligations or considerations for SSD.

2. Methodology

2.1. Desktop Assessment

Database analysis was conducted for the locality using the Environment and Heritage Group (EHG) BioNet Atlas (EHG, 2023a) and the Commonwealth Protected Matters Search Tool (PMST) (DCCEEW, 2023). The locality is defined as the area within a 20 km buffer around the Project Area. The BioNet Atlas and PMST outputs were examined for records of any threatened flora and fauna species listed under the NSW *Biodiversity Conservation Act 2016* (BC Act) and/or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) within the locality.

The following databases and datasets were also interrogated:

- BioNet Vegetation Classification database (EHG, 2023b);
- Threatened Biodiversity Data Collection (TBDC) (EHG, 2023c);
- Biodiversity Values Map (DPE, 2023a);
- ePlanning Spatial Viewer – Land Zoning Maps (DPE, 2023b);
- Hydrological datasets (DPIE, 2021);
- Groundwater Dependent Ecosystems Atlas (BOM, 2023); and
- Probable Vegetation Groundwater Dependent Ecosystems in NSW (DPE - Water, 2023).

2.2. Vegetation Mapping

Mapping layers from the NSW State Vegetation Type Map (SVTM) (DPIE, 2022) which covers the Project Area and wider locality were reviewed to determine the potential vegetation communities within Project Area and Disturbance Area, including those that align to Threatened Ecological Communities (TECs).

2.3. Site Visit

Cumberland Ecology conducted preliminary reconnaissance surveys of an early iteration of the Disturbance Area between 5 – 9 December 2022. The vegetation within the proposed Disturbance Area was ground-truthed to examine and verify the mapping of the condition and extent of the different plant communities with particular reference to TECs.

TECs considered during the vegetation mapping, particularly grassland areas, included but were not limited to:

- BC Act Listed communities including:
    - White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (referred to as Box Gum Woodland) – Critically Endangered Ecological Community (CEEC);
    - Central Hunter Ironbark – Spotted Gum - Grey Box Forest in the NSW North Coast and Sydney Basin Bioregions – Endangered Ecological Community (EEC);
    - Lower Hunter Valley Dry Rainforest – Vulnerable Ecological Community (VEC)

- EPBC Act Listed Communities, including:
    - White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland (CEEC); and
    - Central Hunter Valley Eucalypt Forest and Woodland (CEEC).

Mapping of plant communities within the Disturbance Area was undertaken by random meander surveys through patches of vegetation, noting key characteristics of areas in similar broad condition states such as similar tree cover, shrub cover, ground cover, weediness or combinations of these. Records of plant community boundaries were made using a hand-held Global Positioning System and mark-up of aerial photographs. The resultant information was synthesised using GIS to create a spatial database that was used to interpret and interpolate the data to produce a vegetation map of the proposed Disturbance Area.

The presence of fauna habitat within the proposed Disturbance Area was also noted. Specific attention was paid to the potential occurrence of waterbodies (including artificial dams), creek lines, rocky outcrops and presence of hollow bearing trees.

2.3.1. Limitations and Constraints

As the field surveys comprised preliminary reconnaissance surveys, not all vegetation patches or areas of fauna habitat within the proposed Disturbance Area could be surveyed in detail in the time allowed. Therefore, representative areas were surveyed in detail with other vegetation patches assessed from the roadside or nearest ridgeline/vantage point, including use of binoculars to estimate dominant canopy trees and community structure (e.g. open forest, shrubby woodland, grassy woodland).

3. Existing Biodiversity Values

3.1. Landscape Context

The landscape context which describes attributes that are potentially relevant to the biodiversity occurring in the Project Area is outlined in **Table 2** and shown on **Figure 3** below.

Table 2 Landscape features of the Project Area

Landscape features	Landscape context
IBRA region	North Coast
IBRA subregion	Upper Hunter and Tomalla
NSW (Mitchell) Landscapes	• Scone – Gloucester Foothills • Manning Great Escarpment Southern Aspects
Land tenure, parks and reserves	• Private freehold • Public roads • Mount Royal National Park (located north-east of the Project Area)
Rivers, stream and estuaries	The Project Area and wider locality contain several streams that range from 1st order (as per the Strahler System of ordering watercourses) to 6th order streams. The main stream passing through the Project Area is Bowmans Creek. The lower order creeks are largely ephemeral while higher order creeks, including Bowmans Creek appear to have intermittent flow based on stream flow data measured downstream of the Project. Road crossings over creeks are present within the existing public road corridors while various levels of 'dirt track' crossings are present within the farming properties.
Wetlands (within, adjacent to and downstream)	No important wetlands listed in the Directory of Important Wetlands in Australia are present in the Project Area and wider locality. The closest important wetland based on the Directory of Important Wetlands in Australia is the Barrington Tops Swamps, located approximately 34 km north-east of the northernmost point of the Disturbance Area.
Areas of geological significance or soil hazard features	No acid sulphate soils as per the OEH Acid Sulfate Soils Risk mapping (OEH, 2016) have been mapped within the Project Area and Disturbance Area.
Connectivity	The Project Area and wider locality is comprised of multiple agricultural properties with a series of ridges, valleys and gullies. The historic land use of the locality has impacted on the presence of fauna corridors within the landscape as extensive land clearing has occurred for agricultural uses as well as development of open cut mines. Within the wider locality, the vegetation corridors are somewhat fragmented, ranging from dense native vegetation on the steeper slopes of the ranges and lightly wooded areas on spurs and gentle slopes. The extent of wooded areas in the locality varies from property

Landscape features	Landscape context
	to property depending on the individual land management practices of existing and previous land managers/owners. The main fauna corridor occurs in to the north-east of the Project Area. The vegetation in this corridor lies at the western extent of a band of dense vegetation that extends generally eastwards towards Mount Royal National Park (NP). The closest straight line distance between the south-western corner of Mount Royal NP and the north-east parts of the Project Area is approximately 8.5 km. On a wider regional level, with the exception of the Mt Royal National Park vegetation corridor, there is patchy or 'stepping-stone' connectivity due to widespread clearing across agricultural lands.

3.2. Biodiversity Values Map

The Biodiversity Values (BV) map identifies land with high biodiversity value that is especially sensitive to impacts from development and clearing.

Review of the Biodiversity Values Map (BV Map) confirmed that parts of the Project Area, including some parts of the Disturbance Area are mapped on the BV Map. The BV mapping within the Project Area largely follows the mapped hydrolines of Bowmans Creek and other creeklines and therefore is based on presence of riparian lands (**Figure 4**).

3.3. Important Habitat Mapping

Important habitat maps identify areas that are considered essential to support critical life stages of specific species, for example breeding areas or locations important for foraging or over-wintering for migratory species. Important habitat maps, in accordance with Section 5.1.3 of the BAM, are provided for the following species:

- Regent Honeyeater (*Anthochaera phrygia*);
- Swift Parrot (*Lathamus discolor*);
- Plains-wanderer (*Pedionomus torquatus*); and
- Migratory Shorebirds.

Important habitat mapping for the Swift Parrot (*Lathamus discolor*), Plains-wanderer (*Pedionomus torquatus*), Regent Honeyeater (*Anthochaera phrygia*) and Migratory Shorebirds are not present within the Project Area.

3.4. Vegetation Communities

3.4.1. Plant Community Types

Desktop assessments of the Eastern NSW State Vegetation Type Map (SVTM) and the reconnaissance surveys by Cumberland Ecology identified 24 Plant Community Types (PCTs) within the Project Area. The extent of these PCTs within the Project Area, Disturbance Area as well as a Development Corridor (comprising the Disturbance Area and surrounding buffer area) is summarised in **Table 3**. Note the values below includes remapping of some parts of the Disturbance Area following reconnaissance surveys by Cumberland Ecology.

Table 3 Plant Community Types and potential threatened ecological community associations

Plant Community Type	Area (ha) within Disturbance Area	Area (ha) within Development Corridor	Area (ha) within Project Area
3056 - Central Eastern Ranges Riparian Dry Rainforest	-	-	1.18
3076 - Hunter Valley Whalebone Dry Rainforest	-	1.19	69.53
3086 - Lower North Hinterland Riparian Dry Rainforest	-	5.62	83.71
3091 - Lower North Waterhousea-Water Gum Rainforest	-	-	0.78
3114 - Upper Hunter Ranges Moist Gully Forest	0.30	0.31	1.17
3120 - Hunter-Peel Ranges Dry Rainforest	-	-	1.80
3236 - Hunter Valley Hills Wet Vine Forest	-	2.56	27.47
3240 - Lower North Escarpment Red Gum Grassy Forest	63.43	85.74	141.03
3241 - Lower North White Mahogany-Spotted Gum Moist Forest	25.62	33.02	107.62
3245 - West Mount Royal Slopes Grassy Forest	-	3.90	6.86
3285 - Lower North Escarpment Blue Gum Grassy Forest*	-	0.18	3.19
3315 - Central Hunter Ironbark-Spotted Gum Forest	9.17	9.41	13.35
3354 - Liverpool Range Box-Silvertop Stringybark Forest	1.65	1.65	1.75
3395 - Northwest Elevated White Box Woodland	-	0.28	0.95

Plant Community Type	Area (ha) within Disturbance Area	Area (ha) within Development Corridor	Area (ha) within Project Area
3396 - Northwest Flats Box-Blakelys Red Gum Forest	30.48	32.51	60.68
3397 - Northwest Flats Yellow Box Woodland	-	-	5.98
3401 - Upper Hunter Sheltered Viney Shrub Forest	-	-	0.17
3431 - Central Hunter Ironbark Grassy Woodland	0.46	11.68	79.96
3439 - Hunter Escarpment Grey Gum Sheltered Forest	-	3.78	58.30
3446 - Lower North Foothills Ironbark-Box-Gum Grassy Forest	-	0.09	11.90
3521 - Northwest White Box Woodland	2.00	7.05	92.41
3525 - Upper Hunter Box-Blakelys Red Gum Grassy Forest	-	1.81	10.36
4073 - Lower North Hinterland River Oak Forest	1.10	2.79	65.41
4079 - Northern Hinterland Grassy River Oak Forest	-	-	0.16
Not classified/Non-native vegetation	33.08	224.01	2705.88
Total	***167.30***	***427.56***	***3,551.60***

The reconnaissance surveys confirmed the presence of the following PCTs within the Disturbance Area:

- 3114 - Upper Hunter Ranges Moist Gully Forest;
- 3240 - Lower North Escarpment Red Gum Grassy Forest;
- 3241 - Lower North White Mahogany-Spotted Gum Moist Forest;
- 3315 - Central Hunter Ironbark-Spotted Gum Forest;
- 3354 - Liverpool Range Box-Silvertop Stringybark Forest;
- 3396 - Northwest Flats Box-Blakelys Red Gum Forest; and
- 4073 – Lower North Hinterland River Oak Forest.

The distribution of PCTs within the Disturbance Area and Project Area is shown in **Figure 5**.

It should be noted that this mapping is preliminary and would require further surveys and refinement as part of the biodiversity assessments carried out to support any EIS prepared as part of the SSD planning approvals process.

3.4.2. Threatened Ecological Communities

Of the 24 PCTs of the Eastern NSW SVTM mapping present in the Project Area and Disturbance Area, 11 are associated with a TEC under the BC Act and/or EPBC Act.

A summary of TEC associations for the PCTs, as per the Eastern NSW SVTM mapping, is provided in **Table 4** while the distribution of the TECs is shown in **Figure 6**. A total of two TECs were confirmed within the Disturbance Area during the reconnaissance surveys (**Table 4**). Based on the results of the reconnaissance surveys, as well as assessments for the surrounding Bowmans Creek Stage 1 project, the other potential TECs, as per the Eastern NSW SVTM, are considered unlikely to occur within the Disturbance Area.

Descriptions of the TECs recorded within the Disturbance Area are provided in subsequent sections.

Table 4 Threatened ecological communities in the Project Area and Disturbance Area

Plant Community Type	BC Act Association(s) of PCT	EPBC Act Association of PCT	Candidate Serious and Irreversible Impact Entity	Recorded within Disturbance Area
3056 - Central Eastern Ranges Riparian Dry Rainforest	EEC: Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions	-	No	No
3076 - Hunter Valley Whalebone Dry Rainforest	VEC: Lower Hunter Valley Dry Rainforest in the Sydney Basin and NSW North Coast Bioregions EEC: Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions	CEEC: Lowland Rainforest of Subtropical Australia	No	No
3086 - Lower North Hinterland Riparian Dry Rainforest	EEC: Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions	-	No	No
3120 - Hunter-Peel Ranges Dry Rainforest	EEC: Hunter Valley Vine Thicket in the NSW North Coast and Sydney Basin Bioregions EEC: Semi-evergreen Vine Thicket in the Brigalow Belt South and Nandewar Bioregion	EEC: Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Yes (part)	No
3315 - Central Hunter Ironbark-Spotted Gum Forest	EEC: Central Hunter Ironbark—Spotted Gum—Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions	CEEC: Central Hunter Valley Eucalypt Forest and Woodland	No	Yes

Plant Community Type	BC Act Association(s) of PCT	EPBC Act Association of PCT	Candidate Serious and Irreversible Impact Entity	Recorded within Disturbance Area
3395 – Northwest Elevated White Box Woodland	CEEC: 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 Bioregion	CEEC: White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Yes	No
3396 - Northwest Flats Box-Blakelys Red Gum Forest	CEEC: 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 Bioregion	CEEC: White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Yes	Yes
3397 - Northwest Flats Yellow Box Woodland	CEEC: 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 Bioregion	CEEC: White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Yes	No

Plant Community Type	BC Act Association(s) of PCT	EPBC Act Association of PCT	Candidate Serious and Irreversible Impact Entity	Recorded within Disturbance Area
3401 - Upper Hunter Sheltered Viney Shrub Forest	EEC: Hunter Valley Vine Thicket in the NSW North Coast and Sydney Basin Bioregions	-	Yes	No
3431 – Central Hunter Ironbark Grassy Woodland	EEC: Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions	CEEC: Central Hunter Valley Eucalypt Forest and Woodland	No	No
3446 - Lower North Foothills Ironbark-Box-Gum Grassy Forest	EEC: Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions	CEEC: Central Hunter Valley Eucalypt Forest and Woodland	No	No

The Commonwealth PMST database search indicated the following TECs as listed under the EPBC Act as having potential to occur:

- Ben Halls Gap Sphagnum Moss Cool Temperate Rainforest (CEEC);
- Central Hunter Valley eucalypt forest and woodland (CEEC);
- Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland (EEC);
- Hunter Valley Weeping Myall (Acacia pendula) Woodland (CEEC);
- Lowland Rainforest of Subtropical Australia (CEEC);
- River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (CEEC);
- Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions (EEC);
- Warkworth Sands Woodland of the Hunter Valley (CEEC); and
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (CEEC)

The reconnaissance surveys confirmed the presence of Central Hunter Valley eucalypt forest and woodland CEEC (as PCT 3315) and White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC (as PCT 3396) within the Disturbance Area. Based on the results of the reconnaissance surveys, as well as assessments for the surrounding Bowmans Creek Stage 1 project, the other potential TECs as per the PMST search are considered unlikely to occur within the Disturbance Area.

3.4.2.1. TECs recorded within the Disturbance Area

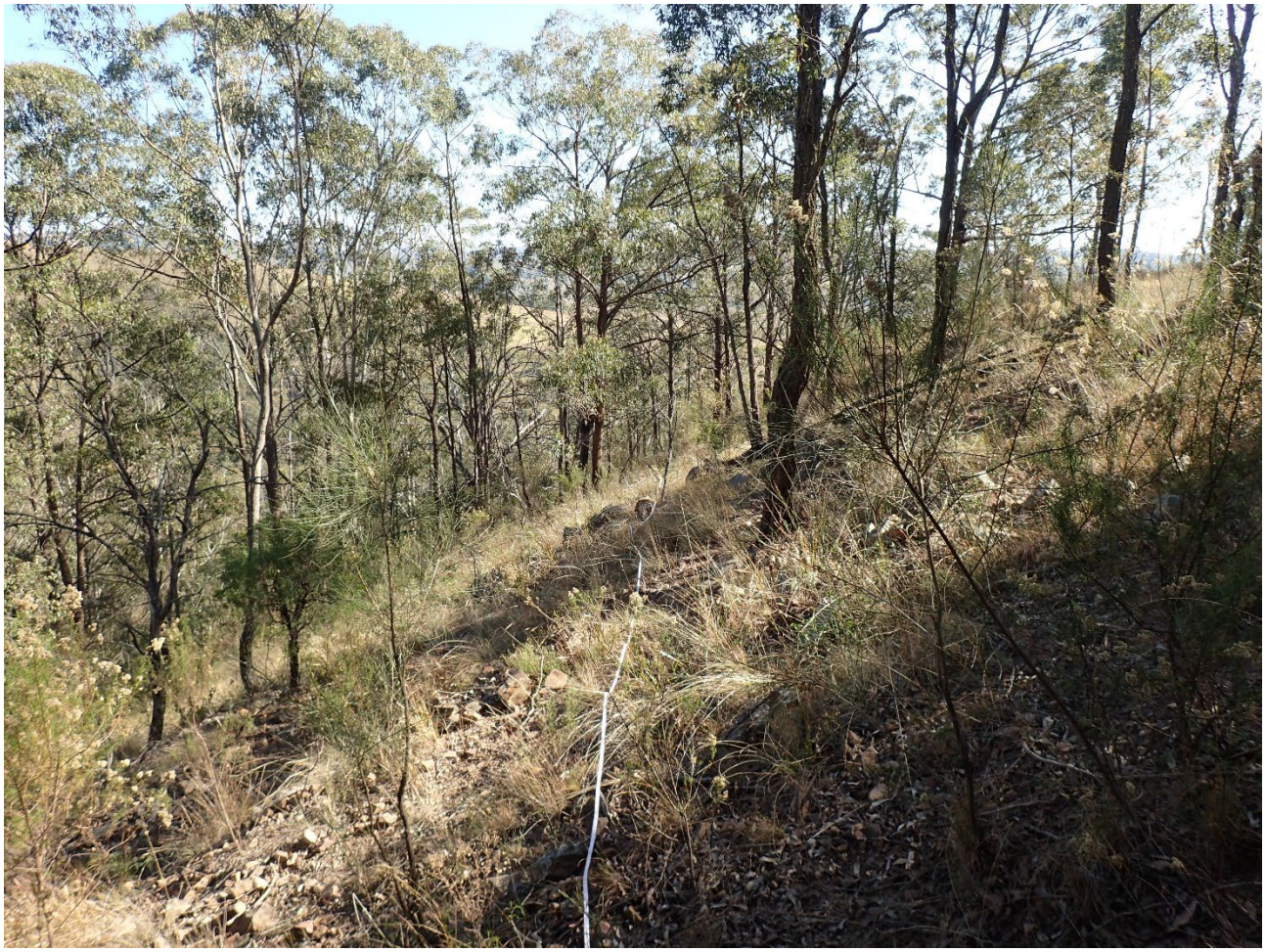
i. PCT 3315 - Central Hunter Ironbark-Spotted Gum Forest

BC Act Status – EEC: Central Hunter Ironbark—Spotted Gum—Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions

EPBC Act Status - CEEC: Central Hunter Valley Eucalypt Forest and Woodland

The distribution of PCT 3315 is limited to slopes in the southern parts of the Disturbance Area and is wholly contained within the Upper Hunter IBRA subregion. This community is dominated by *Corymbia maculata* (Spotted Gum) and *Eucalyptus crebra* (Narrow-leaved Ironbark) with occurrences of *Eucalyptus blakelyi* (Blakely's Red Gum), *Eucalyptus eugenioides* (Thin-leaved Stringybark), *Allocasuarina littoralis* (Black She-Oak) and *Brachychiton populneus* (Kurrajong). The shrub layer is sparse and includes species such as *Breynia oblongifolia* (Coffee Bush) and *Hibbertia obtusifolia* (Hoary Guinea Flower). The ground layer is dominated by the native grasses *Cymbopogon refractus* (Barbwire Grass), *Themeda triandra* (Kangaroo Grass), and *Aristida ramosa* (Purple Wiregrass). An example of this PCT within the Disturbance Area is provided in **Photograph 1** below.

Photograph 1 Example of PCT 3315 within Disturbance Area



ii. PCT 3396 - Northwest Flats Box-Blakely's Red Gum Forest

BC Act Status – CEEC: 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 Bioregion.

EPBC Act Status - CEEC: White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

PCT 3396 largely occurs on slopes in the northern parts of the Disturbance Area, i.e within the Tomalla IBRA subregion, with scattered occurrences in the southern parts (Upper Hunter IBRA subregion).

This community is dominated by *Eucalyptus blakelyi* (Blakely's Red Gum) with occurrences of *Eucalyptus albens* (White Box). The shrub layer is sparse and includes scattered occurrences of *Rubus parviflorus* (Native Raspberry) and *Cassinia quinquefaria*. Dominant native grasses in the groundlayer include *Microlaena stipoides (*Weeping Meadow grass*), Poa sieberiana* (Snow grass) and *Sporobolus creber (*Slender Rat's Tail grass*)*. An example of this PCT within the Disturbance Area is provided in **Photograph 2** below.

Photograph 2 Example of PCT 3396 within Disturbance Area



3.4.3. Groundwater Dependent Ecosystems

Groundwater dependent ecosystems (GDEs) are defined as "any ecosystem that uses groundwater at any time or for any duration in order to maintain its composition and condition" (Serov, Kuginis, & Williams, 2012)

The GDE Atlas (BOM, 2023) delineates GDEs into the following types:

- Aquatic ecosystems – this includes surface water ecosystems which may have a groundwater component, such as rivers, wetlands, and springs.
- Terrestrial ecosystems – this includes all vegetation ecosystems that rely on the subsurface presence of groundwater; and
- Subterranean ecosystems – this includes cave and aquifer ecosystems.

As per the GDE Atlas (BOM, 2023), the Project Area is mapped as containing the following types of GDEs:

- Aquatic - Moderate Potential GDE (national assessment);

- Terrestrial – High Potential GDE (regional study); and
- Terrestrial – Low Potential GDE (regional study).

This is supported by the NSW GDE mapping (DPE - Water, 2023) which maps high probable GDEs along the creeklines such as Bowmans Creek and other smaller waterbodies and low probable GDEs outside of the riparian areas (**Figure 6**).

3.5. Threatened Flora

The NSW BioNet Wildlife Atlas search, Commonwealth PMST search and threatened flora species associations with recorded PCTs for the Tomalla and Upper Hunter IBRA subregions identified 35 threatened flora species known or with potential to occur within a 20 km radius of the Project Area. An assessment of the likelihood of occurrence for these species based on records and results of surveys conducted to date is provided in **Table 5**. Threatened flora species recorded within a 20km locality of the Project Area are shown in **Figure 7**.

Table 5 Threatened flora potentially occurring in the Project Area

Scientific name	Common name	BC Act	EPBC Act	Candidate SAII entity	Likelihood of occurrence
Acacia pendula	Acacia pendula population in the Hunter catchment	E	-	Yes	Low
Androcalva procumbens (Commersonia procumbens)	-	V	V	No	Low
Angophora inopina	Charmhaven Apple	V	V	No	Low
Asperula asthenes	Trailing Woodruff	V	V	No	High
Callistemon linearifolius	Netted Bottle Brush	V	-	No	Moderate
Corybas dowlingii	Red Helmeted Orchid	E	-	No	Low
Cryptostylis hunteriana	Leafless Tongue-orchid	V	V	No	Low
Cymbidium canaliculatum	Cymbidium canaliculatum population in the Hunter Catchment	E	-	No	High
Cynanchum elegans	White-flowered Wax Plant	E	E	No	Low
Dichanthium setosum	Bluegrass	V	V	No	Moderate
Diuris tricolor	Pine Donkey Orchid	V	-	No	Moderate
Eucalyptus camaldulensis	Eucalyptus camaldulensis population in the Hunter catchment	E	-	No	Low
Eucalyptus glaucina	Slaty Red Gum	V	V	No	High
Eucalyptus largeana	Craven Grey Box	E	E	No	Moderate

Scientific name	Common name	BC Act	EPBC Act	Candidate SAII entity	Likelihood of occurrence
Eucalyptus nicholii	Narrow-leaved Black Peppermint	V	V	No	Moderate
Eucalytpus oresbia	Small-fruited Mountain Gum	V	-	Yes	Moderate
Euphrasia arguta	Euphrasia arguta	CE	CE	Yes	Low
Haloragis exalata subsp. velutina	Tall Velvet Sea-berry	V	V	No	Low
Lepidium aschersonii	Spiny Peppercress	V	V	No	Low
Ozothamnus tesselatus	Ozothamnus tesselatus	V	V	No	Moderate
Picris evae	Hawkweed	V	V	No	Low
Pomaderris brunnea	Brown Pomaderris	E	V	No	Moderate
Prasophyllum petilum	Tarengo Leek Orchid	E	E	No	Moderate
Prasophyllum sp. Wybong	a leek-orchid	-	CE	Yes	Low
Pterostylis chaetophora	-	V	-	No	Moderate
Pterostylis gibbosa	Illawarra Greenhood	E	E	No	Low
Rhizanthella slateri	Eastern Underground Orchid	V	E	Yes	Low
Rhodamnia rubescens	Scrub Turpentine	CE	CE	Yes	High
Rhodomyrtus psidioides	Native Guava	CE	CE	Yes	High
Rutidosis heterogama	Heath Wrinklewort	V	V	No	Moderate
Swainsona murrayana	Slender Darling-pea	V	V	No	Low
Syzygium paniculatum	Magenta Lilly Pilly	E	V	No	Low
Tetratheca juncea	Black-eyed Susan	V	V	No	Moderate
Thesium austral	Austral Toadflax	V	V	No	Moderate
Tylophora linearis	-	V	E	No	Low

3.6. Threatened Fauna

The NSW BioNet Wildlife Atlas search, Commonwealth PMST search and threatened fauna species associations with recorded PCTs for the Tomalla and Upper Hunter IBRA subregions collectively identified 84 threatened fauna species (excluding fish) known or with potential to occur within a 20 km radius of the Project Area. Threatened fish, as per the PMST search, were assessed unlikely to occur in the Project Area and were not included in assessments for this constraints assessment.

An assessment of the likelihood of occurrence for these species based on records, including known records within Bowmans Creek Stage 1 areas, and results of surveys conducted to date is provided in **Table 6**. Threatened fauna species recorded within a 20 km locality of the Project Area are shown in **Figure 8.**

Table 6 Threatened fauna species potentially occurring in the Project Area

Scientific name	Common name	BC Act	EPBC Act	Candidate SAII entity	Likelihood of occurrence
Amphibians					
Litoria aurea	Green and Golden Bell Frog	E	V	No	Low
Litoria booroolongensis	Booroolong Frog	E	E	No	Low
Litoria daviesae	Davies' Tree Frog	V	V	No	Low
Mixophyes balbus	Stuttering Frog	E	V	Yes	Low
Pseudophryne australis	Red-crowned Toadlet	V	-	No	Low
Birds					
Anseranas semipalmata	Magpie Goose	V	-	No	Low
Anthochaera phrygia	Regent Honeyeater	CE	CE	Yes	Low
Aphelocephala leucopsis	Southern Whiteface		V	No	Low
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V	-	No	Known
Botaurus poiciloptilus	Australasian Bittern	E	E	No	Low
Burhinus grallarius	Bush Stone-curlew	E	-	No	Low
Calidris acuminata	Sharp-tailed Sandpiper		V	No	Low
Calidris ferruginea	Curlew Sandpiper	E	CE	Yes	Low
Callocephalon fimbriatum	Gang-gang Cockatoo)	V	E	No	High
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	V	V	No	High
Certhionyx variegatus	Pied Honeyeater	V	-	No	Low
Chthonicola sagittata	Speckled Warbler	V	-	No	Known
Circus assimilis	Spotted Harrier	V	-	No	Known
Climacteris picumnus victoriae	Brown Treecreeper (south-eastern)	V	-	No	Known
Daphoenositta chrysoptera	Varied Sittella	V	-	No	Low

Scientific name	Common name	BC Act	EPBC Act	Candidate SAII entity	Likelihood of occurrence
Ephippiorhynchus asiaticus	Black-necked Stork	E	-	No	Low
Erythrotriorchis radiatus	Red Goshawk	CE	V	Yes	Low
Falco hypoleucos	Grey Falcon	V	V	No	Low
Falco subniger	Black Falcon	V	-	No	Low
Gallinago hardwickii	Latham's Snipe		V	No	Low
Glossopsitta pusilla	Little Lorikeet	V	-	No	Known
Grantiella picta	Painted Honeyeater	V	V	No	Low
Haematopus longirostris	Pied Oystercatcher	E	-	No	Low
Haliaeetus leucogaster	White-bellied Sea-Eagle	V	-	No	High
Hieraaetus morphnoides	Little Eagle	V	-	No	Moderate
Hirundapus caudacutus	White-throated Needletail	-	V	No	Moderate
Hydroprogne caspia	Caspian Tern			No	Low
Lathamus discolor	Swift Parrot	E	CE	Yes	Low
Lophoictinia isura	Square Tailed Kite	V	-	No	Known
Melanodryas cucullata cucullata	Hooded Robin	V	-	No	Low
Melithreptus gularis gularis	Black-chinned Honeyeater	V	-	No	Low
Neophema chrysostoma	Blue-winged Parrot	V	V	No	Low
Neophema pulchella	Turquoise Parrot	V	-	No	Low
Ninox connivens	Barking Owl	V	-	No	Moderate
Ninox strenua	Powerful Owl	V	-	No	Moderate
Numenius madagascariensis)	Eastern Curlew	-	CE	Yes	Low
Oxyura australis	Blue-billed Duck	V	-	No	Low
Pachycephala olivacea	Olive Whistler	V	-	No	Low
Petroica boodang	Scarlet Robin	V	-	No	Known
Petroica phoenicea	Flame Robin	V	-	No	Moderate
Polytelis swainsonii	Superb Parrot	V	V	No	Low
Pomatostomus temporalis temporalis	Grey-crowned Babbler	V	-	No	Low

Scientific name	Common name	BC Act	EPBC Act	Candidate SAII entity	Likelihood of occurrence
Pycnoptilus floccosus	Pilotbird	-	V	No	Low
Rostratula australis	Australian Painted Snipe	E	E	No	Low
Stagonopleura guttata	Diamond Firetail	V	-	No	Low
Stictonetta naevosa	Freckled Duck	V	-	No	Low
Tringa nebularia	Common Greenshank		E	No	Low
Turnix maculosus	Red-backed Button-quail	V	-	No	High
Tyto longimembris	Eastern Grass Owl	V	-	No	Low
Tyto novaehollandiae	Masked Owl	V	-	No	Moderate
Tyto tenebricosa	Sooty Owl	V	-	Yes	Low
Mammals					
Aepyprymnus rufescens	Rufous Bettong	V	-	No	Low
Cercartetus nanus	Eastern Pygmy-possum	V	-	No	Low
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Yes	Known
Dasyurus maculatus maculatus	Spotted-tailed Quoll	V	E	No	Moderate
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-	No	Moderate
Micronomus norfolkensis	Eastern Coastal Freetail Bat	V	-	No	Known
Miniopterus australis	Little Bent-winged Bat	V	-	Yes	High
Miniopterus orianae oceanensis	Large Bent-winged Bat	V	-	Yes	Known
Myotis macropus	Southern Myotis	V	-	No	High
Notamacropus parma	Parma Wallaby	V	V	No	Low
Nyctophilus corbeni	Corben's Long-eared Bat	V	V	No	Moderate
Petauroides volans	Southern Greater Glider	E	E	No	Low
Petaurus australis australis	Yellow-bellied Glider	V	V	No	Low
Petaurus norfolcensis	Squirrel Glider	V	-	No	Moderate

Scientific name	Common name	BC Act	EPBC Act	Candidate SAII entity	Likelihood of occurrence
Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	Yes	Low
Phascogale tapoatafa	Brush-tailed Phascogale	V	-	No	High
Phascolarctos cinereus	Koala	E	E	No	Moderate
Potorous tridactylus tridactylus	Long-nosed Potoroo	V	V	No	Low
Pseudomys novaehollandiae	New Holland Mouse	-	V	No	Low
Pseudomys oralis	Hastings River Mouse	E	E	No	Low
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	No	Moderate
Saccolaimus flaviventris	Yellow-bellied Sheathtail Bat	V	-	No	Known
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	No	Moderate
Thylogale stigmatica	Red-legged Pademelon	V	-	No	Low
Vespadelus troughtoni	Eastern Cave Bat	V	-	Yes	Low
Reptiles					
Aprasia parapulchella	Pink-tailed Legless Lizard	V	V	No	Low
Delma impar	Striped Legless Lizard	V	V	No	Low
Hoplocephalus stephensii	Stephen's Banded Snake	V	-	No	Low

3.7. Migratory species

The Commonwealth PMST search identified 16 migratory species with potential to occur within a 20 km radius of the Project Area. An assessment of the likelihood of occurrence for these species based on records, including known records within Bowmans Creek Stage 1 areas, and results of surveys conducted to date is provided in **Table 7**. Migratory fauna species recorded within a 20 km locality of the Project Area are shown in **Figure 8.**

Table 7 Migratory species potentially occurring in the Project Area

Scientific name	Common name	BC Act	EPBC Act	Likelihood of occurrence
Migratory (marine)				

Scientific name	Common name	BC Act	EPBC Act	Likelihood of occurrence
Apus pacificus	Fork-tailed Swift	-	-	Known
Migratory (terrestrial)				
Cuculus optatus	Oriental Cuckoo	-	-	Low
Hirundapus caudacutus	White-throated Needletail	-	V	High
Monarcha melanopsis	Black-faced Monarch	-	-	Moderate
Motacilla flava	Yellow Wagtail	-	-	Moderate
Myiagra cyanoleuca	Satin Flycatcher	-	-	Known
Rhipidura rufifrons	Rufous Fantail	-	-	Moderate
Symposiachrus trivirgatus	Spectacled Monarch	-	-	Moderate
Migratory (wetland)				
Actitis hypoleucos	Common Sandpiper	-	-	Low
Calidris acuminata	Sharp-tailed Sandpiper	-	V	Low
Calidris ferruginea	Curlew Sandpiper	E	CE	Low
Calidris melanotos	Pectoral Sandpiper	-	-	Low
Gallinago hardwickii	Latham's Snipe	-	V	Low
Numenius madagascariensis	Eastern Curlew	-	CE	Low
Pandion haliaetus	Osprey	V	-	Low
Tringa nebularia	Common Greenshank	-	E	Low

3.8. Matters of National Environmental Significance

The EPBC Act provides protection of the environment from actions proposed to have the potential to significantly impact on Matters of National Environmental Significance (MNES) or the environment of Commonwealth land. MNES protected under the EPBC Act include:

- World Heritage Properties.
- National Heritage Places.
- Ramsar Wetlands.
- Threatened species or ecological communities listed in the EPBC Act.
- Migratory species listed in the EPBC Act.
- Commonwealth marine environment.
- Nuclear actions.
- Great Barrier Reef Marine Park.

- A water resource, in relation to coal seam gas development and large coal mining development.

A search of the Commonwealth PMST was undertaken on 8 September 2023 with a further updated search conducted on 22 January 2024. The search included a 20 km buffer around the Project Area. The search results are summarised below in **Table 8** and a record of the 22 January 2024 PMST report is provided in **Appendix A**.

Table 8 Matters of National Significance (MNES)

MNES	Within 20km Buffer
World Heritage Properties	None
National heritage properties	None
Wetlands of international importance	None
The Great Barrier Reef Marine Park	None
Commonwealth marine area	None
Threatened ecological communities	9
Threatened species	62
Migratory species	15
State and territory reserves	3

Assessments of TECs, threatened flora, threatened fauna and migratory species have been presented previously in ***Section 3.4.2, Section 3.5, Section 3.6 and Section 3.7*** respectively.

The PMST identified the following state reserves within 20 km of the Project Area:

- Barrington Tops National Park;
- Mount Royal National Park; and
- Woolooma National Park

Mount Royal National Park is located to the east to north east of the Project Area with Barrington Tops National Park further north-north-east of Mount Royal National Park. Woolooma National Park lies ~18-19km north of the northern most point of the Project Area.

As potential for significant impacts on MNES are uncertain, the Project is being referred to DCCEEW as a separate process to the Scoping Report. The purpose of the referral is to determine whether the proposed action (i.e. the Project) comprises a Controlled Action, which would require formal assessment and approval under the EPBC Act. In the event of the proposed action being declared a Controlled Action, it is assumed that assessments for Commonwealth purposes will be conducted in accordance with the Bilateral Agreement between the Commonwealth and the State of NSW and the NSW Biodiversity Assessment Method (BAM).

4. Survey Requirements

Detailed assessments will be required under the BAM, which will require extensive field surveys comprising:

- Vegetation mapping delineating PCTs and vegetation condition zones;
- Completion of Vegetation Integrity Assessments or BAM plots; and
- Targeted surveys for species credit species and dual credit species (species for which breeding habitat is a species credit component).

The total number of BAM plots required is dependent on the final vegetation mapping and vegetation conditions zones. BAM plot survey effort will be stratified in accordance with the BAM based on extent of mapped vegetation condition zones.

Targeted species requirements are dependent on several factors such as PCTs, patch size, presence/absence of specified habitat constraints or extent of degradation of microhabitats (as determined by preliminary assessments). Targeted surveys for species credit species (or species components for dual credit species) are required to be conducted during survey periods specified in the Threatened Biodiversity Data Collection (TBDC).

Preliminary Biodiversity Assessment Method Calculator (BAM-C) assessments based on PCTs recorded, in conjunction with BioNet Atlas records, were conducted to determine preliminary lists of species credit species (or species components of dual credit species) that would likely require survey and assessment in accordance with the BAM. The survey requirements for species credit species are summarised in **Table 9** (flora) and **Table 10** (fauna).

Table 9 Threatened flora species credit species likely requiring survey

Common Name (*Scientific Name*)	BC Act	EPBC Act	Habitat Constraints	Geographic Limitations	Entity with the potential for SAII	Survey Period											
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Acacia pendula – Endangered population *(Acacia pendula)*	E	-	-	Within Hunter River Catchment	Yes												
Austral Toadflax (*Thesium australe)*	V	V	-	-	No												
Black-eyed Susan (*Tetratheca juncea)*	V	V	-	-	No												
Bluegrass (*Dichanthium setosum)*	V	V	-	-	No												
Brown Pomaderris (*Pomaderris brunnea*)	E	V	-	-	No												
Charmhaven Apple (*Angophora inopina)*	V	V	-	Within 10km of Wallaroo National Park	No												

Common Name (*Scientific Name*)	BC Act	EPBC Act	Habitat Constraints	Geographic Limitations	Entity with the potential for SAII	Survey Period											
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Craven Grey Box (*Eucalyptus largeana)*	E	E	-	-	No												
Cymbidium canaliculatum (*Cymbidium canaliculatum)*	E	-	Epiphytic in a range of eucalypts; Cut stumps or logs on the ground	Hunter Catchment as defined by Australia's River Basins	No												
Eucalyptus camaldulensis (*Eucalyptus camaldulensis)*	E	-	Floodplains of watercourses, including rivers, creeks, intermittent streams or billabongs	Hunter catchment as per the Determination	No												
Heath Wrinklewort (*Rutidosis heterogama)*	V	V	-	-	No												
Native Guava (*Rhodomyrtus psidioides)*	CE	CE	-	-	Yes												
Netted Bottle Brush	V	-	-	-	No												

Common Name (*Scientific Name*)	BC Act	EPBC Act	Habitat Constraints	Geographic Limitations	Entity with the potential for SAII	Survey Period											
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(*Callistemon linearifolius)*																	
Pterostylis chaetophora (*Pterostylis chaetophora)*	V	-	-	-	No												
Red Helmet Orchid (*Corybas dowlingii*)	E	-	-	Columbey National Park and east of the Park	No												
Scrub Turpentine (*Rhodamnia rubescens)*	CE	CE	-	-	Yes												
Slaty Red Gum (*Eucalyptus glaucina)*	V	V	-	-	No												
Small-fruited Mountain Gum (*Eucalyptus oresbia)*	V	-	-	-	Yes												

Table 10 Threatened fauna species credit species likely requiring survey

Common Name (*Scientific Name*)	BC Act	EPBC Act	Habitat Constraints	Geographic Limitations	Entity with the potential for SAII	Survey Period											
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Barking Owl (*Ninox connivens)* (Breeding)	V	-	Living or dead trees with hollows greater than 20 cm diameter and greater than 4m above the ground	-	No												
Booroolong Frog (*Litoria booroolongensis)*	E	E	-	-	No												
Brush-tailed Phascogale (*Phascogale tapoatafa)*	V	-	-	-	No												
Brush-tailed Rock-wallaby (*Petrogale penicillate)*	E	V	Land within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or clifflines	-	Yes												

Common Name (*Scientific Name*)	BC Act	EPBC Act	Habitat Constraints	Geographic Limitations	Entity with the potential for SAII	Survey Period											
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Davies' Tree Frog (*Litoria daviesae)*	V	-	Streams or swamps or within 250m of waterbodies	-	No												
Eastern Pygmy-possum (*Cercartetus nanus)*	V	-	-	-	No												
Gang-gang Cockatoo (*Callocephalon fimbriatum)* (Breeding)	V	E	Eucalypt tree species with hollows at least 3 m above the ground and with hollow diameter of 7 cm or larger	-	No												
Glossy Black-Cockatoo (*Calyptorhynchus lathami)* (Breeding)	V	V	Living or dead tree with hollows greater than 15cm diameter and greater than 8m above ground.		No												

Common Name (*Scientific Name*)	BC Act	EPBC Act	Habitat Constraints	Geographic Limitations	Entity with the potential for SAII	Survey Period											
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Green and Golden Bell Frog (*Litoria aurea)*	E	V	Within 1km of wet areas, swamps, or waterbodies	-	No												
Grey-headed Flying-fox (*Pteropus poliocephalus)* (Breeding)	V	V	Breeding camps	-	No												
Koala (*Phascolarctos cinereus)*	E	E	Presence of Koala use trees	-	No												
Large Bent-winged Bat (*Miniopterus orianae oceanensis)* (Breeding)	V	-	Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records with microhabitat code "IC - in	-	Yes												

Common Name (*Scientific Name*)	BC Act	EPBC Act	Habitat Constraints	Geographic Limitations	Entity with the potential for SAII	Survey Period											
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			cave;" observation type code "E nest-roost;" with numbers of individuals >500														
Large-eared Pied Bat (*Chalinolobus dwyeri)*	V	V	Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels.	-	No												
Little Bent-winged Bat (*Miniopterus australis)* (Breeding)	V	-	Cave, tunnel, mine, culvert or other structure known or suspected to be	-	No												

Common Name (*Scientific Name*)	BC Act	EPBC Act	Habitat Constraints	Geographic Limitations	Entity with the potential for SAII	Survey Period											
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			used for breeding including species records in BioNet with microhabitat code 'IC – in cave'; observation type code 'E nest-roost'; with numbers of individuals >500; or from the scientific literature.														
Little Eagle (*Hieraaetus morphnoides)* (Breeding)	V	-	Nest trees - live (occasionally dead) large old trees within vegetation	-	No												
Masked Owl (*Tyto novaehollandiae)* (Breeding)	V	-	Living or dead trees with hollows	-	No												

Common Name (*Scientific Name*)	BC Act	EPBC Act	Habitat Constraints	Geographic Limitations	Entity with the potential for SAII	Survey Period											
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			greater than 20cm diameter														
Parma Wallaby (*Macropus parma)*	V	V	-	-	No												
Powerful Owl (*Ninox strenua)* (Breeding)	V	-	Living or dead trees with hollow greater than 20cm diameter	-	No												
Red Goshawk (*Erythrotriorchis radiatus)*	CE	V	-	-	Yes												
Red-backed Button-quail (*Turnix maculosus)*	V	-	-	-	No												
Red-crowned Toadlet (*Pseudophryne australis)*	V	-		-	No												
Sooty Owl (*Tyto tenebricosa)* (Breeding)	V	-	Caves or clifflines/ledges; Living or dead trees with	-	Yes												

Common Name (*Scientific Name*)	BC Act	EPBC Act	Habitat Constraints	Geographic Limitations	Entity with the potential for SAII	Survey Period											
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			hollows greater than 20cm diameter.														
Southern Greater Glider (*Petauroides volans)*	E	E	-	-	No												
Southern Myotis (*Myotis Macropus)*	V	-	Waterbodies with permanent pools/stretches 3m or wider, including rivers, large creeks, billabongs, lagoons, estuaries, dams and other waterbodies, on or within 200m of the site	-	No												

Common Name (*Scientific Name*)	BC Act	EPBC Act	Habitat Constraints	Geographic Limitations	Entity with the potential for SAII	Survey Period											
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Square-tailed Kite (*Lophoictinia isura)* (Breeding)	V	-	Nest trees	-	No												
Squirrel Glider (*Petaurus norfolcensis)*	V	-	-	-	No												
Stephens' Banded Snake (*Hoplocephalus stephensii)*	V	-	Hollow bearing trees, arboreal vine tangles, fallen/standing dead timber or within 500m of these habitats	-	No												
Stuttering Frog (*Mixophyes balbus)*	E	V	-	-	Yes												
White-bellied Sea-Eagle (*Haliaeetus leucogaster)* (Breeding)	V	-	Living or dead mature trees within suitable vegetation within	-	No												

Common Name (*Scientific Name*)	BC Act	EPBC Act	Habitat Constraints	Geographic Limitations	Entity with the potential for SAII	Survey Period											
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			1km of a rivers, lakes, large dams or creeks, wetlands and coastlines														

5. Potential Impacts

Under the BAM, assessment of various types of impacts on biodiversity values as a result of any proposed development is required for construction and operational phases. The types of impacts, as defined in the BAM, requiring assessment include:

- **Direct impacts**: impacts on biodiversity values and threatened species habitat that relate to clearing native vegetation and impacts on biodiversity values prescribed by the BC Regulation.
- **Indirect impacts**: impacts that occur when the proposal affects native vegetation and threatened species habitat beyond the development footprint or within retained areas (e.g. transporting weeds or pathogens, dumping rubbish).
- **Prescribed impacts**: means the prescribed impacts identified in clause 6.1 of the BC Regulation. Prescribed impacts can be direct or indirect impacts.
- **Serious and irreversible impacts (SAII)**: impacts likely to contribute significantly to the risk of a threatened species or ecological community becoming extinct in accordance with the principles set out in clause 6.7(2) of the BC Regulation.

Based on the findings of the desktop assessment and site inspection, the potential impacts to biodiversity from the Project are detailed in **Table 11** below.

Table 11 Potential impacts associated with the Project

Impact Type	Potential Impact
Direct Impact	Removal of native vegetation Removal of threatened species and their habitat
Indirect impacts	Inadvertent impacts on adjacent habitat or vegetation Reduced viability of adjacent habitat due to edge effects Reduced viability of adjacent habitat due to noise, dust, or light spill Transport of weeds and pathogens from the site to adjacent vegetation
Prescribed impacts	Impacts from wind turbine strike
	Impacts to water bodies, water quality and hydrological processes
	Impacts to habitat connectivity
	Impacts from vehicle strike
Serious and Irreversible Impacts (SAII)	Clearing of vegetation or habitat for species comprising candidate SAII entities

6. Avoidance Strategy

The BOS is underpinned by the hierarchy of 'avoid-minimise-offset'. Consequently, the BAM requires proponents to demonstrate how impacts on biodiversity have been avoided and minimised through project development and design, including during the process of selecting project location. All projects must demonstrate that that reasonable steps to avoid and minimise impacts to biodiversity values have been carried out as part of project development. Impacts must be avoided and minimised before offsets are proposed to compensate for any residual impacts. Justifications for residual impacts must be provided within the BDAR.

An avoid-minimise hierarchy to assist with avoiding and minimising impacts during project development is summarised in **Table 12**. The hierarchy ranks biodiversity values recorded during this biodiversity constraints assessment in order of priority for avoidance and minimisation during the early stages of project development. As the project progresses, the ranking of different biodiversity values for avoidance and minimisation may need to be reviewed and revised based on new information, such as data from future on-ground biodiversity surveys.

Table 12 Potential impacts and associated avoidance measures associated with the Project

Avoid – minimise hierarchy (from highest to lowest priority)	Relevant strategy
SAII Candidate Entities	Impacts to entities with the potential for SAII should be avoided and minimised as a priority. To date one candidate SAII entity, namely 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 Bioregion (as PCT 3396) has been recorded in woodland and grassland forms within the Development Corridor. This candidate SAII entity is potentially also present as PCT 3395 or PCT 3397 within the wider Disturbance Area and Project Area. Based on the SVTM mapping, a further candidate SAII Entity, namely Hunter Valley Vine Thicket in the NSW North Coast and Sydney Basin Bioregions (as PCT 3120 and PCT 3401) is present within the Project Area and could potentially occur within the Development Corridor and Disturbance Area.
Threatened Ecological Communities (Woody vegetation)	Where feasible impacts to TECs comprising of woody vegetation should be avoided or minimised. Large patches of TEC or patches of TECs which are contiguous with large tracts of non-threatened woody vegetation should be prioritised for retention over smaller, fragmented patches or scattered trees. Impacts to these smaller patches or scattered trees may be avoided or minimised at a later stage of project development.
Non-threatened woody vegetation	Where feasible impacts to woody vegetation not conforming to a TEC but comprising habitat for a large variety of threatened species should be avoided or minimised. Large tracts of non-threatened woody vegetation should be prioritised for retention over smaller, fragmented patches or scattered trees. Impacts to these smaller patches or scattered trees may be avoided or minimised at a later stage of project development.

Avoid – minimise hierarchy (from highest to lowest priority)	Relevant strategy
Biodiversity Corridors	Where feasible, impacts to biodiversity corridors should be avoided and/or minimised. Examples of biodiversity corridors include riparian vegetation, significant roadside vegetation and corridors mapped by Councils, LLS, DPHI, BCD etc. for conservation purposes.
Threatened species and their habitat	Where feasible, impacts to known locations of threatened species should be avoided and/or minimised. The feasibility of avoiding/minimising impacts may be species dependent, with flora species more easily avoided. It should be noted that the importance of avoiding impacts to threatened species and their habitat will become more important once detailed biodiversity surveys for the project commence, and more accurate on-ground data is available.
Threatened Ecological Communities (Grassy vegetation)	Where feasible impacts to grassland forms of TECs should be avoided or minimised.
Riparian land	Impacts to riparian corridors (width dependent on Strahler stream order) should be avoided (with exception of creek crossings). Where feasible avoid locating WTGs, roads, ancillaries within 40 m of creeklines (riparian land as per Water Management Act 2000).

Where feasible, grassland forms of PCTs that do not comprise a TEC, Category 1 – exempt land (if present), exotic vegetation and established access tracks and internal roads should be prioritised for development as part of the Project.

7. References

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APPENDIX A :
Protected Matters Search Tool (PMST)

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 22-Jan-2024

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	1
National Heritage Places:	1
Wetlands of International Importance (Ramsar	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	9
Listed Threatened Species:	62
Listed Migratory Species:	15

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	9
Commonwealth Heritage Places:	None
Listed Marine Species:	22
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	3
Regional Forest Agreements:	1
Nationally Important Wetlands:	None
EPBC Act Referrals:	41
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	1
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

World Heritage Properties [Resource Information]

Name	State	Legal Status	Buffer Status
Gondwana Rainforests of Australia	QLD	Declared property	In buffer area only

National Heritage Places [Resource Information]

Name	State	Legal Status	Buffer Status
Natural			
Gondwana Rainforests of Australia	NSW	Listed place	In buffer area only

Wetlands of International Importance (Ramsar Wetlands) [Resource Information]

Ramsar Site Name	Proximity	Buffer Status
Hunter estuary wetlands	50 - 100km upstream from Ramsar site	In feature area

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Ben Halls Gap Sphagnum Moss Cool Temperate Rainforest	Critically Endangered	Community may occur within area	In buffer area only
Central Hunter Valley eucalypt forest and woodland	Critically Endangered	Community likely to occur within area	In feature area
Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland	Endangered	Community may occur within area	In feature area
Hunter Valley Weeping Myall (Acacia pendula) Woodland	Critically Endangered	Community may occur within area	In buffer area only
Lowland Rainforest of Subtropical Australia	Critically Endangered	Community likely to occur within area	In feature area
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	Critically Endangered	Community may occur within area	In buffer area only
Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions	Endangered	Community likely to occur within area	In feature area

Community Name	Threatened Category	Presence Text	Buffer Status
Warkworth Sands Woodland of the Hunter Valley	Critically Endangered	Community may occur within area	In buffer area only
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area	In feature area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Aphelocephala leucopsis Southern Whiteface [529]	Vulnerable	Species or species habitat known to occur within area	In feature area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Callocephalon fimbriatum Gang-gang Cockatoo [768]	Endangered	Species or species habitat likely to occur within area	In feature area
Calyptorhynchus lathami lathami South-eastern Glossy Black-Cockatoo [67036]	Vulnerable	Species or species habitat known to occur within area	In feature area
Climacteris picumnus victoriae Brown Treecreeper (south-eastern) [67062]	Vulnerable	Species or species habitat known to occur within area	In feature area
Erythrotriorchis radiatus Red Goshawk [942]	Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Melanodryas cucullata cucullata South-eastern Hooded Robin, Hooded Robin (south-eastern) [67093]	Endangered	Species or species habitat known to occur within area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat may occur within area	In feature area
Polytelis swainsonii Superb Parrot [738]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Pycnoptilus floccosus Pilotbird [525]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area	In feature area
Stagonopleura guttata Diamond Firetail [59398]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Tringa nebularia](#) Common Greenshank, Greenshank [832]	Endangered	Species or species habitat may occur within area	In buffer area only
FISH			
[Galaxias sp. nov. 'Hunter'](#) Hunter Galaxias, Hunter Upland Galaxias [90728]	Critically Endangered	Species or species habitat likely to occur within area	In buffer area only
FROG			
[Litoria aurea](#) Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
[Litoria booroolongensis](#) Booroolong Frog [1844]	Endangered	Species or species habitat likely to occur within area	In feature area
[Litoria daviesae](#) Davies' Tree Frog [78964]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
[Mixophyes balbus](#) Stuttering Frog, Southern Barred Frog (in Victoria) [1942]	Vulnerable	Species or species habitat known to occur within area	In feature area
MAMMAL			
[Chalinolobus dwyeri](#) Large-eared Pied Bat, Large Pied Bat [183]	Endangered	Species or species habitat known to occur within area	In feature area
[Dasyurus maculatus maculatus (SE mainland population)](#) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area	In feature area
[Notamacropus parma](#) Parma Wallaby [89289]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Nyctophilus corbeni](#) Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
[Petauroides volans](#) Greater Glider (southern and central) [254]	Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Petaurus australis australis](#)			
Yellow-bellied Glider (south-eastern) [87600]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Petrogale penicillata](#)			
Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area	In feature area
[Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)](#)			
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat known to occur within area	In feature area
[Potorous tridactylus tridactylus](#)			
Long-nosed Potoroo (northern) [66645]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Pseudomys novaehollandiae](#)			
New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Pseudomys oralis](#)			
Hastings River Mouse, Koontoo [98]	Endangered	Species or species habitat known to occur within area	In feature area
[Pteropus poliocephalus](#)			
Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
PLANT			
[Androcalva procumbens](#)			
[87153]	Vulnerable	Species or species habitat likely to occur within area	In feature area
[Asperula asthenes](#)			
Trailing Woodruff [14004]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
[Cryptostylis hunteriana](#)			
Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat may occur within area	In buffer area only
[Cynanchum elegans](#)			
White-flowered Wax Plant [12533]	Endangered	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Dichanthium setosum bluegrass [14159]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Eucalyptus glaucina Slaty Red Gum [5670]	Vulnerable	Species or species habitat known to occur within area	In feature area
Eucalyptus nicholii Narrow-leaved Peppermint, Narrow-leaved Black Peppermint [20992]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Euphrasia arguta [4325]	Critically Endangered	Species or species habitat may occur within area	In feature area
Haloragis exalata subsp. velutina Tall Velvet Sea-berry [16839]	Vulnerable	Species or species habitat may occur within area	In feature area
Lepidium aschersonii Spiny Peppercress [10976]	Vulnerable	Species or species habitat may occur within area	In feature area
Ozothamnus tesselatus [56203]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Picris evae Hawkweed [10839]	Vulnerable	Species or species habitat may occur within area	In feature area
Pomaderris brunnea Rufous Pomaderris, Brown Pomaderris [16845]	Vulnerable	Species or species habitat may occur within area	In feature area
Prasophyllum sp. Wybong (C.Phelps ORG 5269) a leek-orchid [81964]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
Pterostylis gibbosa Illawarra Greenhood, Rufa Greenhood, Pouched Greenhood [4562]	Endangered	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Rhizanthella slateri Eastern Underground Orchid [11768]	Endangered	Species or species habitat may occur within area	In feature area
Rhodamnia rubescens Scrub Turpentine, Brown Malletwood [15763]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Rhodomyrtus psidioides Native Guava [19162]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
Swainsona murrayana Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Syzygium paniculatum Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307]	Vulnerable	Species or species habitat may occur within area	In feature area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Vincetoxicum forsteri listed as Tylophora linearis [92384]	Endangered	Species or species habitat may occur within area	In buffer area only
REPTILE			
Aprasia parapulchella Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Delma impar Striped Legless Lizard, Striped Snake-lizard [1649]	Vulnerable	Species or species habitat known to occur within area	In buffer area only

Listed Migratory Species		[Resource Information]	
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Terrestrial Species			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area	In buffer area only
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area	In feature area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area	In feature area
Symposiachrus trivirgatus as Monarcha trivirgatus Spectacled Monarch [83946]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Gallinago hardwickii			
Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Pandion haliaetus			
Osprey [952]		Species or species habitat likely to occur within area	In buffer area only
Tringa nebularia			
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat may occur within area	In buffer area only

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State	Buffer Status
Commonwealth Bank of Australia		
Commonwealth Land - Commonwealth Bank of Australia [12536]	NSW	In buffer area only
Commonwealth Trading Bank of Australia		
Commonwealth Land - Commonwealth Trading Bank of Australia [12533]	NSW	In buffer area only
Commonwealth Land - Commonwealth Trading Bank of Australia [12530]	NSW	In buffer area only
Communications, Information Technology and the Arts - Telstra Corporation Limited		
Commonwealth Land - Australian Telecommunications Commission [12535]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [12615]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [12587]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [12537]	NSW	In buffer area only
Commonwealth Land - Telstra Corporation Limited [12614]	NSW	In buffer area only
Defence - Defence Housing Authority		
Commonwealth Land - Defence Housing Authority [15955]	NSW	In buffer area only

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat known to occur within area overfly marine area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat likely to occur within area overfly marine area	In feature area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Lathamus discolor](#) Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
[Merops ornatus](#) Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
[Monarcha melanopsis](#) Black-faced Monarch [609]		Species or species habitat known to occur within area overfly marine area	In feature area
[Motacilla flava](#) Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area	In feature area
[Myiagra cyanoleuca](#) Satin Flycatcher [612]		Species or species habitat known to occur within area overfly marine area	In feature area
[Neophema chrysostoma](#) Blue-winged Parrot [726]	Vulnerable	Species or species habitat may occur within area overfly marine area	In feature area
[Pandion haliaetus](#) Osprey [952]		Species or species habitat likely to occur within area	In buffer area only
[Pterodroma cervicalis](#) White-necked Petrel [59642]		Species or species habitat may occur within area	In feature area
[Rhipidura rufifrons](#) Rufous Fantail [592]		Species or species habitat known to occur within area overfly marine area	In feature area
[Rostratula australis as Rostratula benghalensis (sensu lato)](#) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Symposiachrus trivirgatus as Monarcha trivirgatus			
Spectacled Monarch [83946]		Species or species habitat may occur within area overfly marine area	In feature area
Tringa nebularia			
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat may occur within area overfly marine area	In buffer area only

Extra Information

State and Territory Reserves [Resource Information]

Protected Area Name	Reserve Type	State	Buffer Status
Barrington Tops	National Park	NSW	In buffer area only
Mount Royal	National Park	NSW	In buffer area only
Woolooma	National Park	NSW	In buffer area only

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included. Please see the associated resource information for specific caveats and use limitations associated with RFA boundary information.

RFA Name	State	Buffer Status
North East NSW RFA	New South Wales	In feature area

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Ashton Coal Operations Ravensworth Underground Mine	2022/09208		Assessment	In buffer area only
Bowmans Creek Wind Farm	2020/8631		Assessment	In feature area
Extension of Liddell open cut coal mining operations, NSW	2013/6908		Approval	In buffer area only
Hunter Valley Coal Mining Operations North - State approved mining, NSW	2016/7640		Post-Approval	In buffer area only
Hunter Valley Operations (HVO) North Open Cut Coal Continuation Project	2022/09207		Completed	In buffer area only
Hunter Valley Operations (HVO) North Open Cut Coal Continuation Project	2023/09651		Referral Decision	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Hunter Valley Operations (HVO) South Open Cut Coal Continuation Project	2022/09206		Completed	In buffer area only
Hunter Valley Operations (HVO) South Open Cut Coal Continuation Project	2023/09652		Referral Decision	In buffer area only
Liddell Future Land Use and Enabling Works Project	2022/09330		Assessment	In buffer area only
Muswellbrook Solar Farm	2022/09303		Assessment	In buffer area only
Controlled action				
Bayswater Power Station Water Infrastructure Upgrade	2020/8623	Controlled Action	Proposed Decision	In buffer area only
Gas Transmission Pipeline	2011/5917	Controlled Action	Completed	In buffer area only
Maxwell Coal Mine, Hunter Valley, NSW	2018/8287	Controlled Action	Post-Approval	In buffer area only
Mt Arthur Coal Extension Project Hunter Valley NSW	2011/5866	Controlled Action	Post-Approval	In buffer area only
Mt Arthur Coal open cut mine modification, Muswellbrook, NSW	2014/7377	Controlled Action	Post-Approval	In buffer area only
Mt Owen continued coal mining operation	2013/6978	Controlled Action	Post-Approval	In buffer area only
Queensland Hunter Gas Pipeline, approximately 825 km in length	2008/4483	Controlled Action	Completed	In buffer area only
Ravensworth Operations Project	2010/5389	Controlled Action	Post-Approval	In buffer area only
Thomas Mitchell Drive Upgrade, Muswellbrook, NSW	2012/6533	Controlled Action	Completed	In buffer area only
Not controlled action				
Ashton Coal Project	2001/524	Not Controlled Action	Completed	In buffer area only
Ashton Coal South East Open Cut Project	2010/5315	Not Controlled Action	Completed	In buffer area only
Clearance of 35 ha in Ravensworth State Forest for extension of Mt Owen coal mining operations	2004/1369	Not Controlled Action	Completed	In feature area
clearing of GWB Woodland for residential development	2004/1771	Not Controlled Action	Completed	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Construction of a new power line	2011/5930	Not Controlled Action	Completed	In buffer area only
Dartbrook Mine Bord and Pillar Mining, Hunter Valley, NSW	2018/8295	Not Controlled Action	Completed	In buffer area only
Extension of operations to existing Muswellbrook No 1 Open Cut mine	2002/614	Not Controlled Action	Completed	In buffer area only
Hunter Valley Coal Mining Operations South - Modification 5	2016/7641	Not Controlled Action	Completed	In buffer area only
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
Integra Underground Mine Longwall Extension Modification, NSW	2017/8105	Not Controlled Action	Completed	In buffer area only
Ironbark Ridge Rural Residential Development	2009/5116	Not Controlled Action	Completed	In buffer area only
Kyoto Alternative Energy Farm	2008/3979	Not Controlled Action	Completed	In buffer area only
Liddell Battery, Decoupling and Bayswater Ancillary Works	2020/8844	Not Controlled Action	Completed	In buffer area only
Mount Owen Continued Operations ??? Modification 2, Mount Owen Complex, 20km north-west of Singleton	2017/8083	Not Controlled Action	Completed	In buffer area only
Production specialty steels for aerospace and machinery industry	2002/554	Not Controlled Action	Completed	In buffer area only
Queensland Hunter Gas Pipeline, approximately 833 km in length	2008/4620	Not Controlled Action	Completed	In buffer area only
Rix's Creek Continuation of coal Mining Project, northwest of Singleton, NSW	2014/7348	Not Controlled Action	Completed	In buffer area only
Sodium Chlorate Plant	2001/258	Not Controlled Action	Completed	In buffer area only
Not controlled action (particular manner)				
Aerial baiting for wild dog control	2006/2713	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Wild Dog Baiting	2006/2768	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action (particular manner) Referral decision				
Bayswater B 2000 MW Power Station	2009/5201	Referral Decision	Completed	In buffer area only
Clearing for development of rural subdivision	2009/4931	Referral Decision	Completed	In buffer area only

Bioregional Assessments

SubRegion	BioRegion	Website	Buffer Status
Hunter	Northern Sydney Basin	BA website	In buffer area only

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

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FIGURES

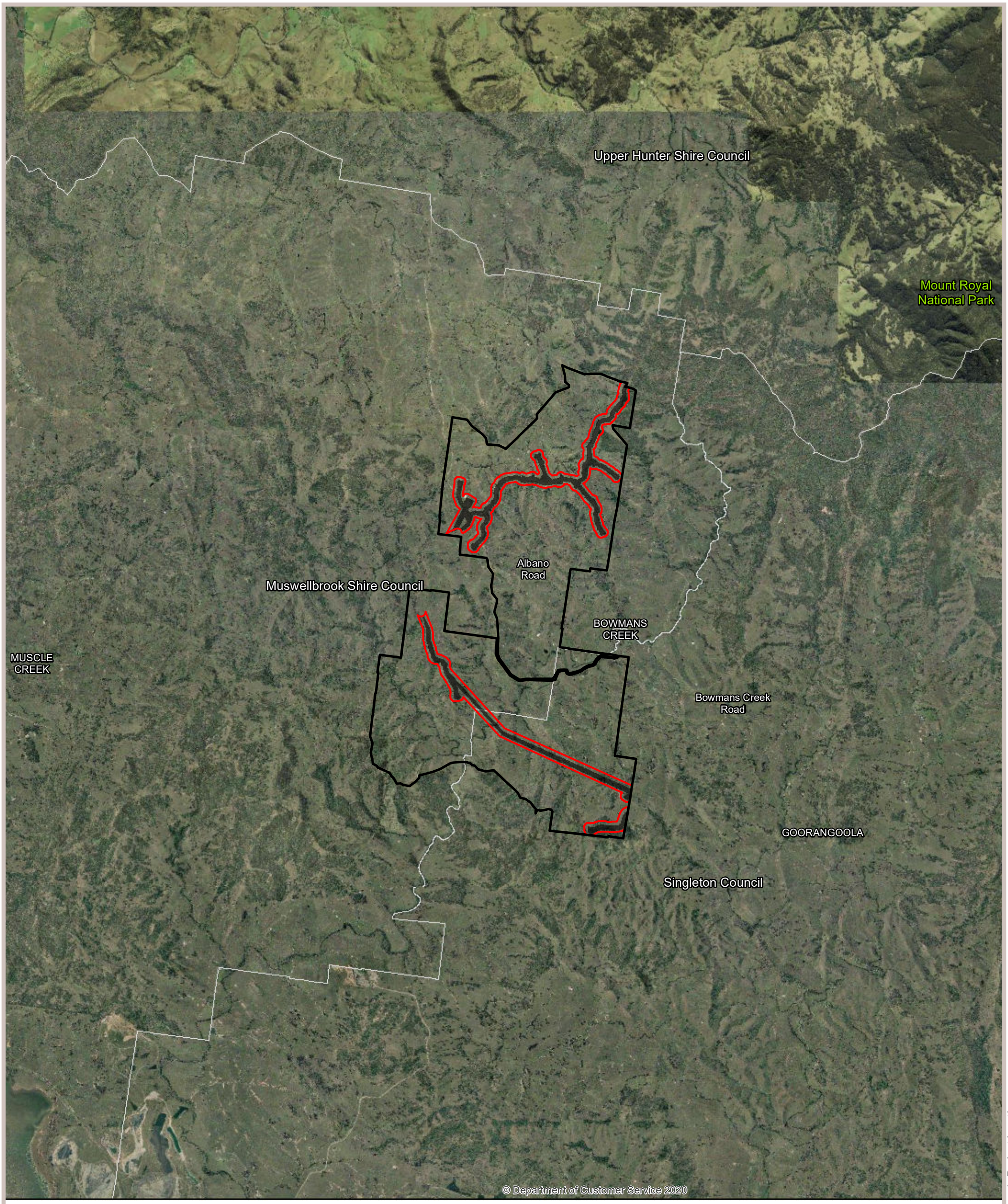


Figure 1. Project location

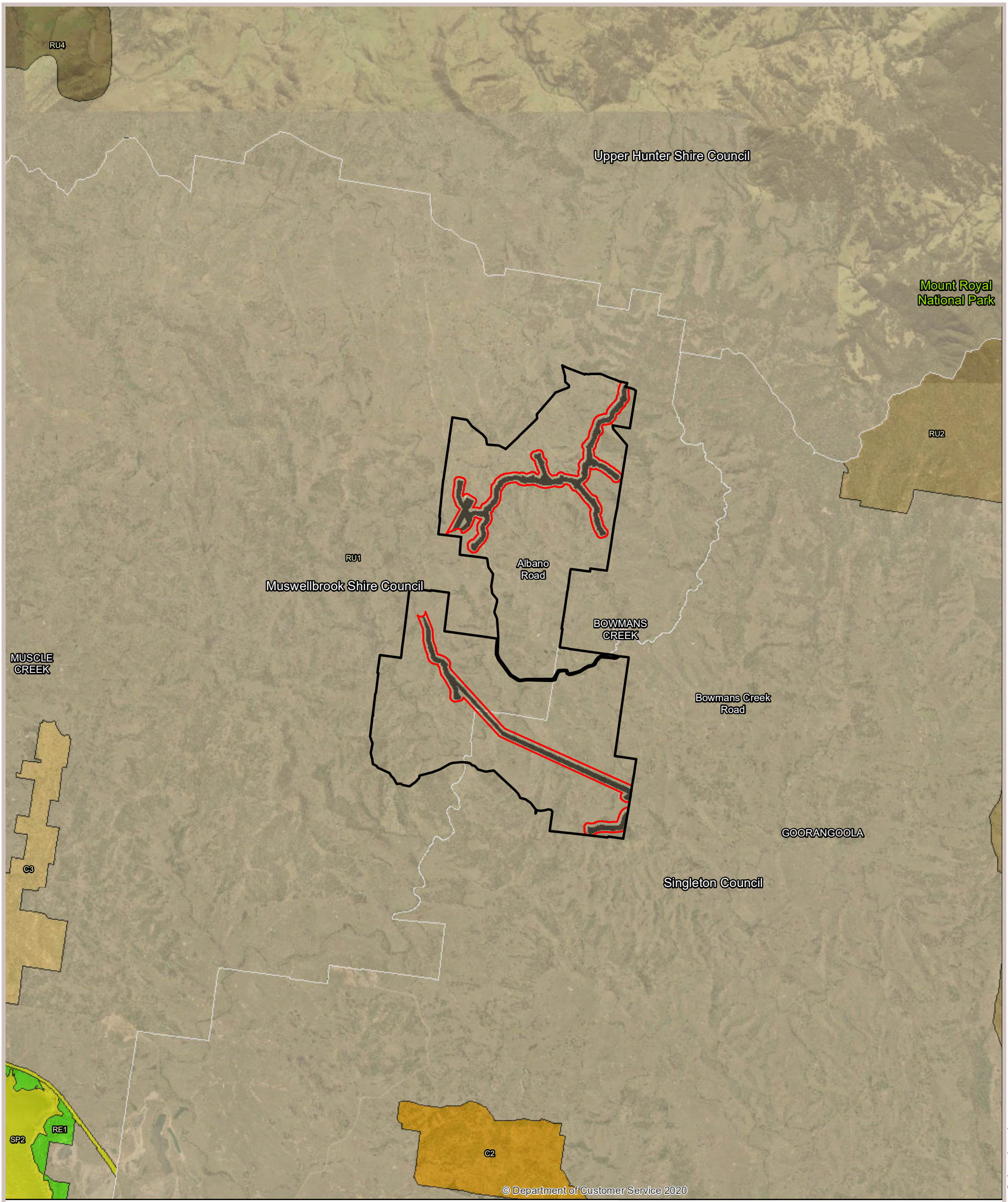


Figure 2. Land zoning

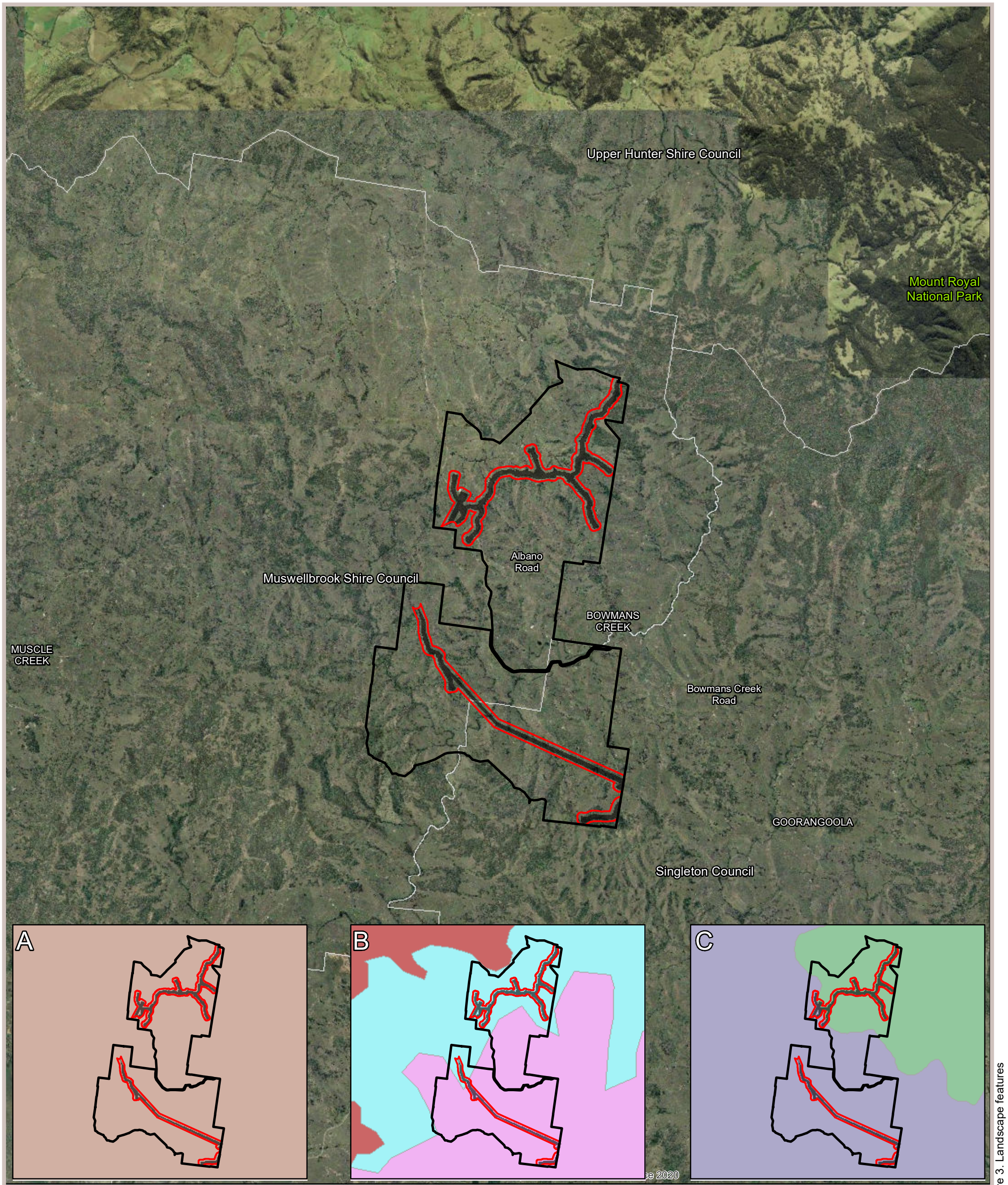


Figure 3. Landscape features

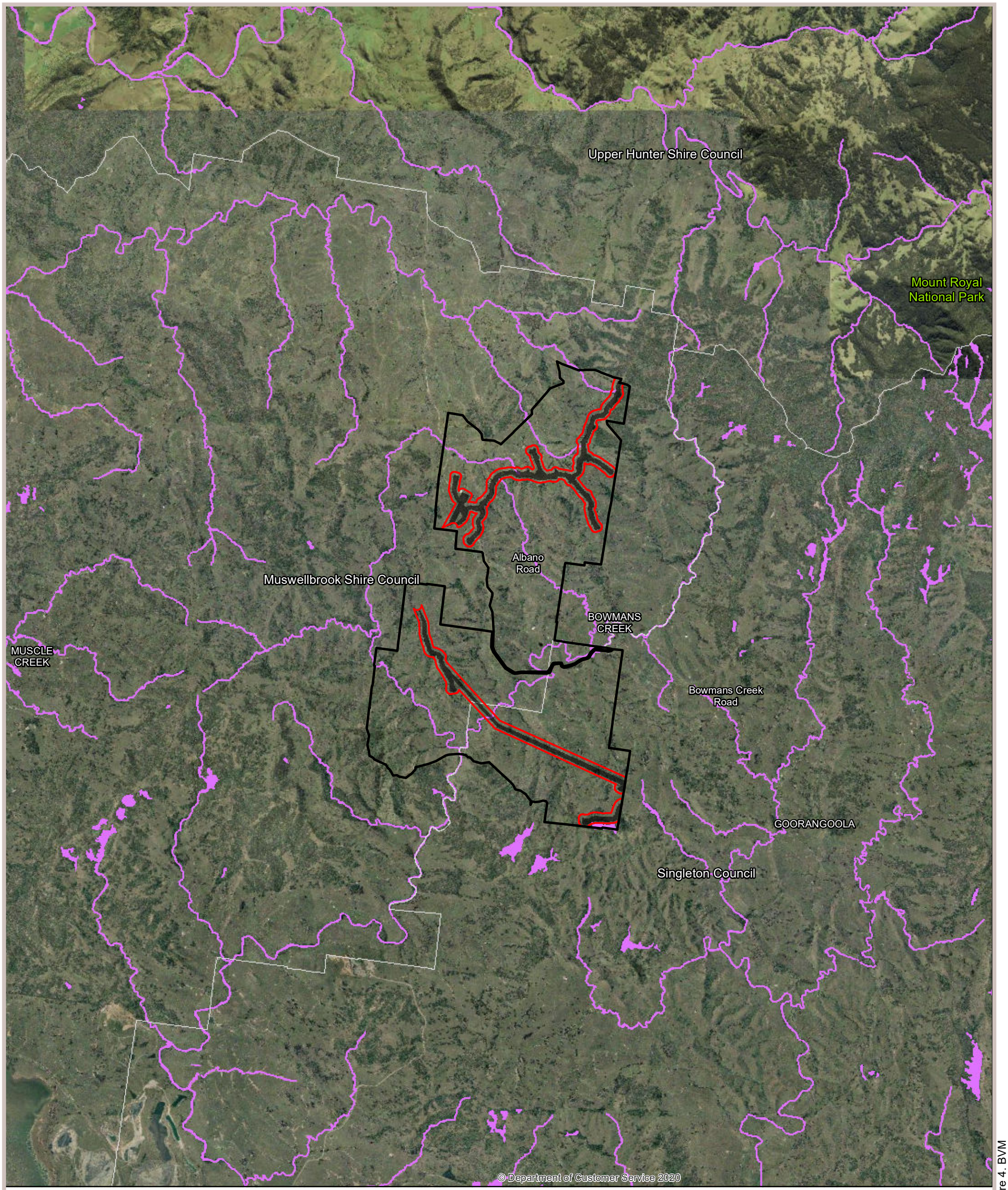


Figure 4. Biodiversity Values mapped within the Project Area

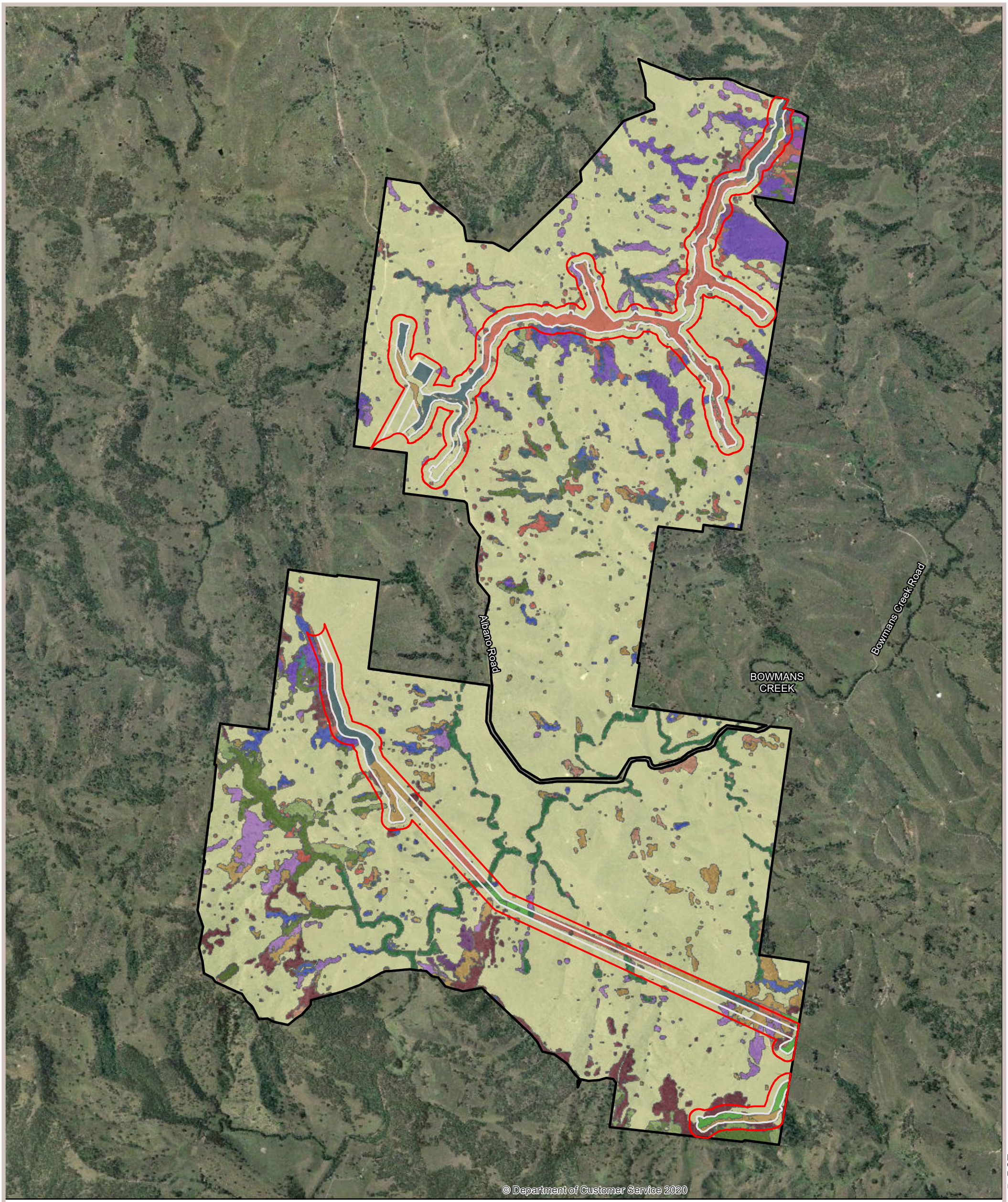


Figure 5. Plant Community types within the Project Area

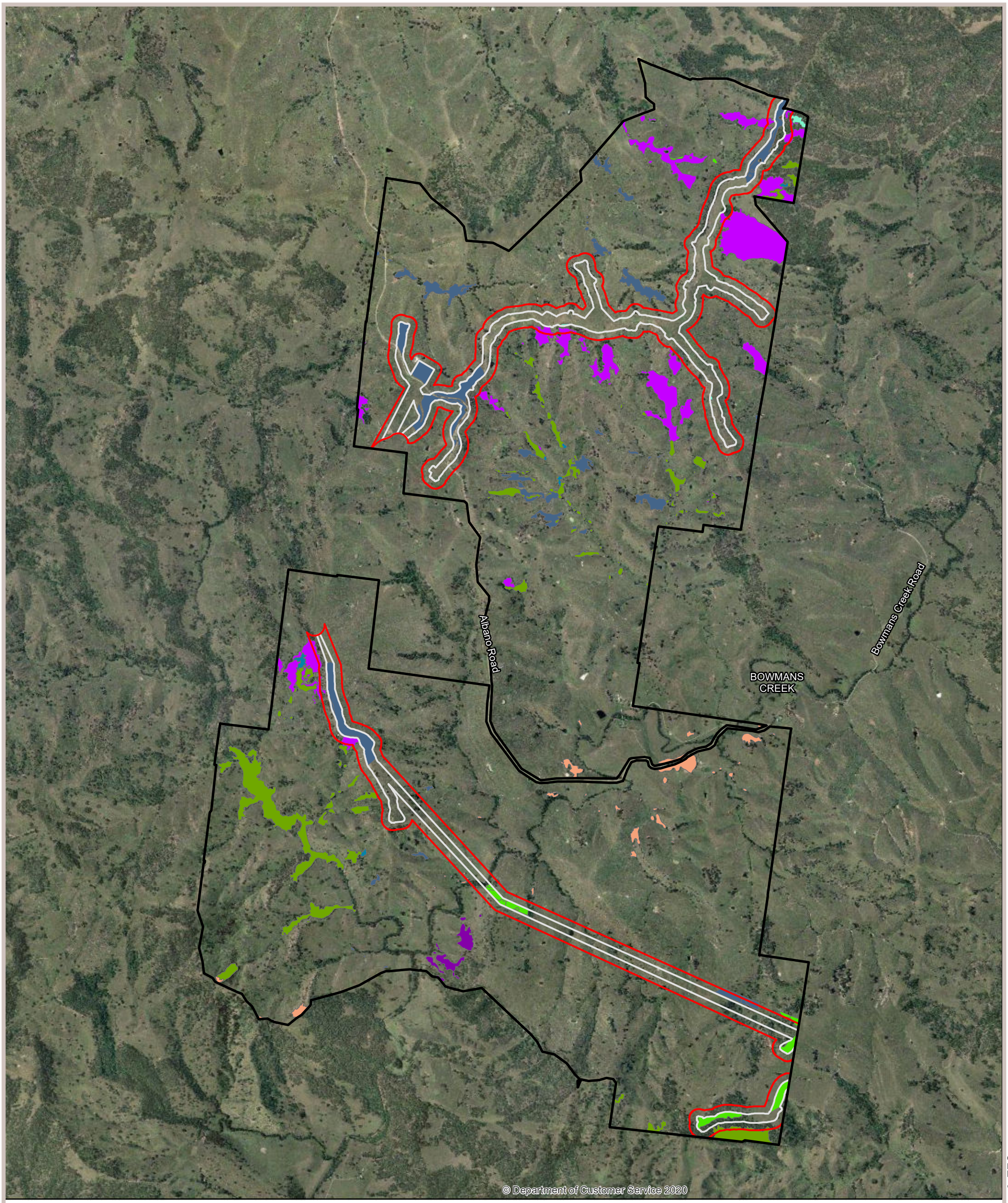


Figure 6. Threatened Ecological Communities within the Project Area

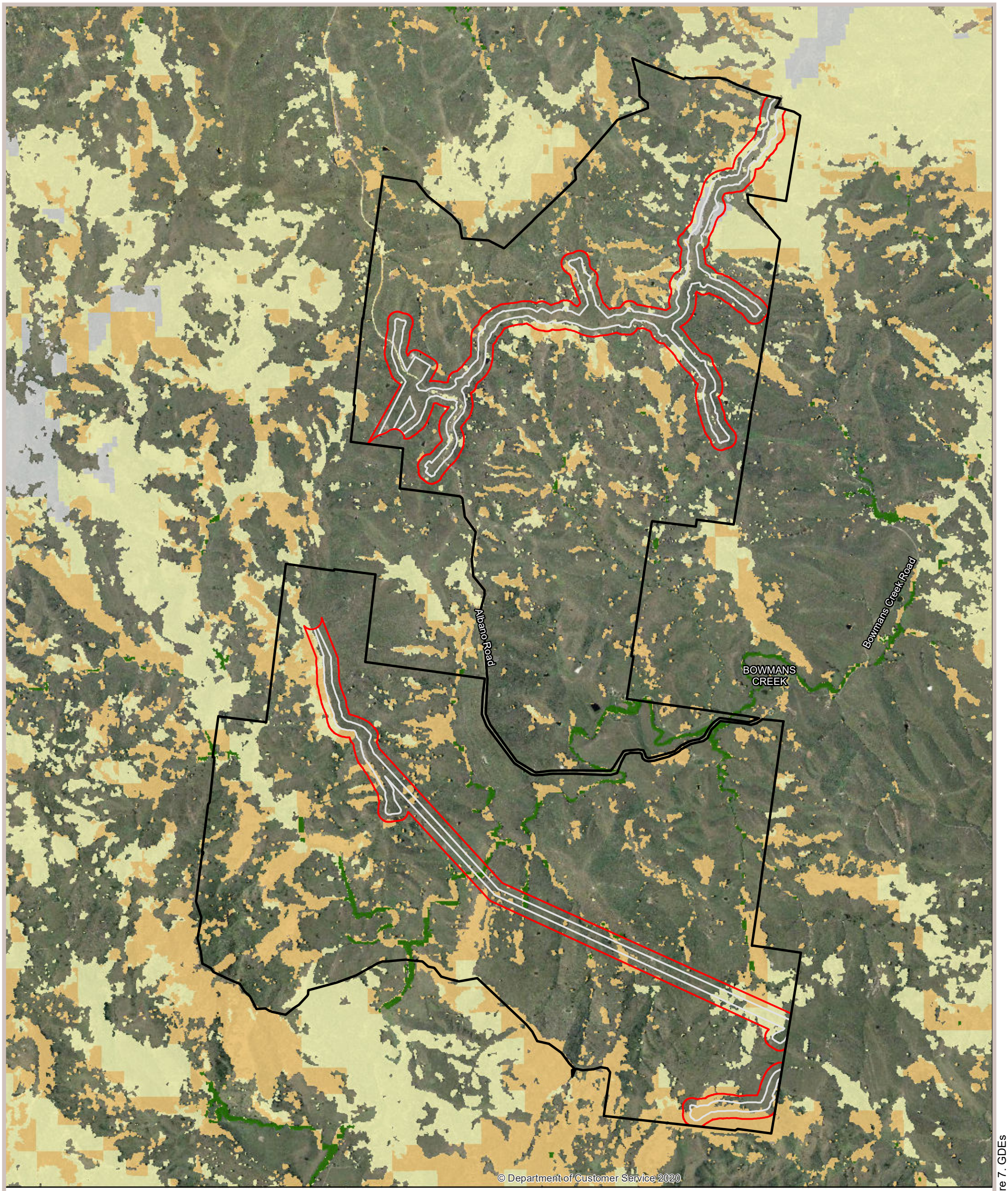
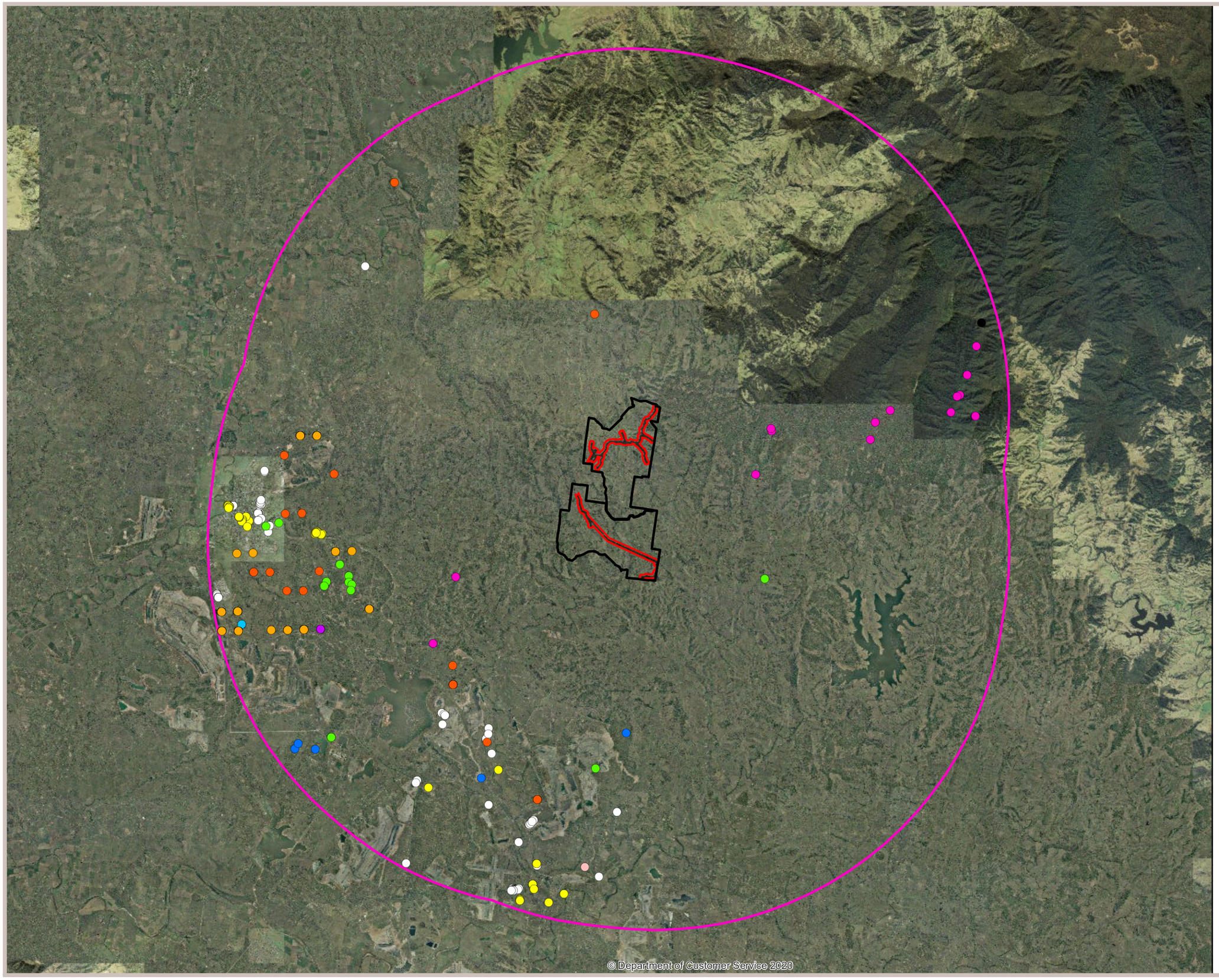


Figure 7. Probable Vegetation Groundwater Dependent Ecosystems within the Project Area



Legend

- Project Area
- Development Corridor
- Disturbance Area
- Locality (20 km)

Threatened Flora

- Acacia pendula
- Asperula asthenes
- Cymbidium canaliculatum
- Diuris tricolor
- Eucalyptus camaldulensis
- Eucalyptus glaucina
- Eucalyptus nicholii
- Ozothamnus tesselatus
- Prasophyllum petilum
- Rhodamnia rubescens
- Rhodomyrtus psidioides

Data Source:
BioNet Atlas of NSW Wildlife
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dated 24/1/2024

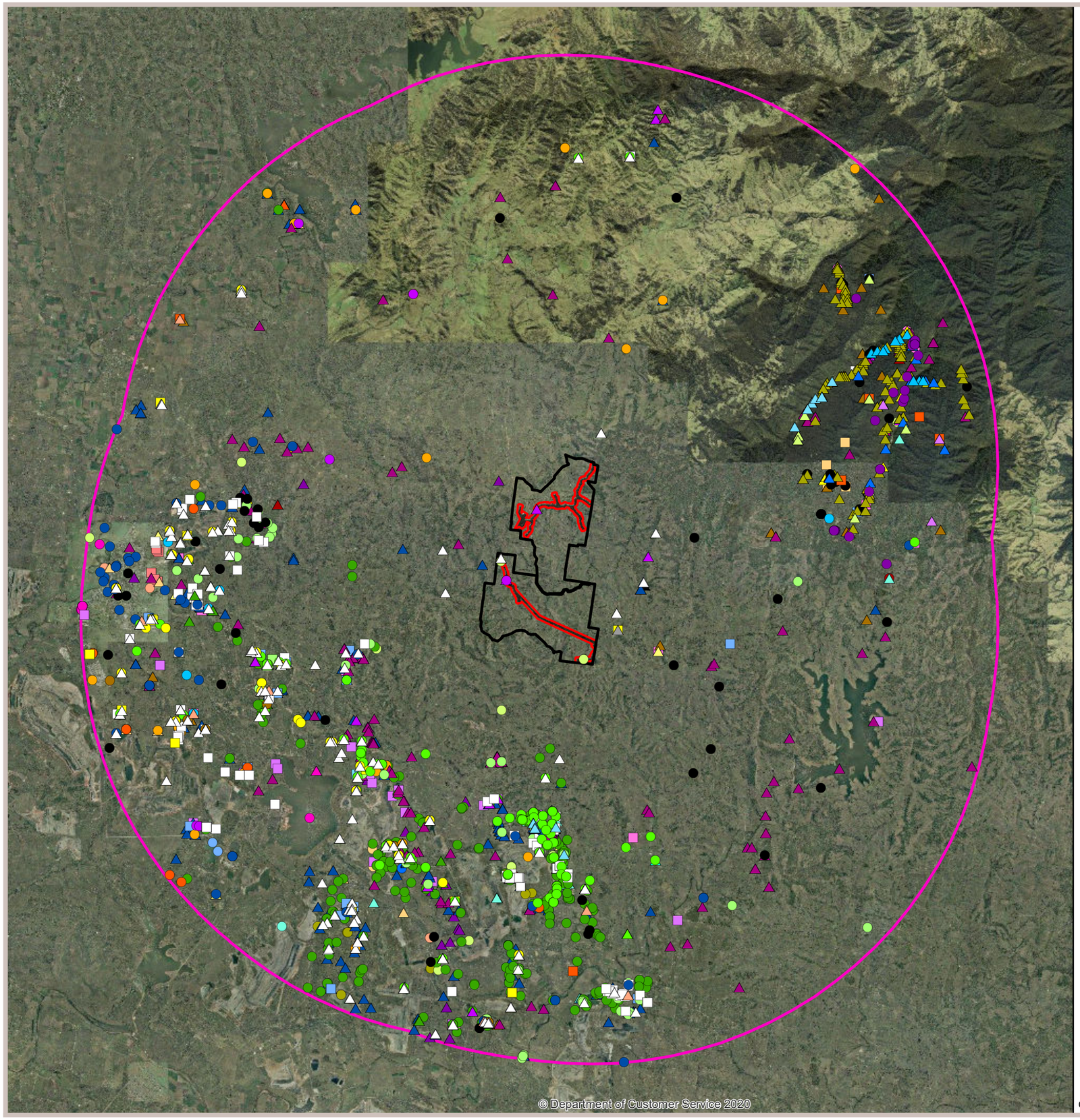
Coordinate System: MGA Zone 56 (GDA 94)

cumberland ecology

0 2 4 6 8 km

I:\...\23065\Figures\RP1\20240424\Figure 8. Threatened Flora_20km

Figure 8. Threatened Flora species recorded within 20km of the Project Area



Legend

- Project Area
- Development Corridor
- Disturbance Area
- Locality (20 km)

Threatened Fauna

- Barking Owl
- Black Falcon
- Black-chinned Honeyeater (eastern subspecies)
- Black-necked Stork
- Blue-billed Duck
- Blue-winged Parrot
- Brown Treecreeper (eastern subspecies)
- Brush-tailed Phascogale
- Brush-tailed Rock-wallaby
- Bush Stone-curlew
- Caspian Tern
- Corben's Long-eared Bat
- Davies' Tree Frog
- Diamond Firetail
- Dusky Woodswallow
- Eastern Cave Bat
- Eastern Coastal Free-tailed Bat
- Eastern False Pipistrelle
- Eastern Grass Owl
- Flame Robin
- Freckled Duck
- Gang-gang Cockatoo
- Greater Broad-nosed Bat
- Green and Golden Bell Frog
- Grey-crowned Babbler (eastern subspecies)
- Grey-headed Flying-fox
- Hastings River Mouse
- Hooded Robin (south-eastern form)
- Koala
- Large Bent-winged Bat
- Large-eared Pied Bat
- Latham's Snipe
- Little Bent-winged Bat
- Little Eagle
- Little Lorikeet
- Long-nosed Potoroo
- Magpie Goose
- Masked Owl
- New Holland Mouse
- Olive Whistler
- Parma Wallaby
- Pied Honeyeater
- Pied Oystercatcher
- Pilotbird
- Powerful Owl
- Red Goshawk
- Red-backed Button-quail
- Red-legged Pademelon
- Rufous Bettong
- Scarlet Robin
- Sharp-tailed Sandpiper
- Sooty Owl
- South-eastern Glossy Black-Cockatoo
- Southern Greater Glider
- Southern Myotis
- Speckled Warbler
- Spotted Harrier
- Spotted-tailed Quoll
- Square-tailed Kite
- Squirrel Glider
- Striped Legless Lizard
- Stuttering Frog
- Swift Parrot
- Turquoise Parrot
- Varied Sittella
- White-bellied Sea-Eagle
- White-throated Needletail
- Yellow-bellied Glider
- Yellow-bellied Sheathtail-bat

Data Source:
BioNet Atlas of NSW Wildlife
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dated 24/1/2024

Coordinate System: MGA Zone 56 (GDA 94)

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0 2 4 6 8 km

I:\...\23065\Figures\RP1\20240424\Figure 9. Threatened and Migratory Fauna_20km

Figure 9. Threatened and Migratory Fauna species recorded within 20km of the Project Area

APPENDIX G

Cultural Heritage Scoping Report



View of the general landscape characteristics of the Project Boundary.

ABORIGINAL CULTURAL AND HISTORIC HERITAGE SCOPING REPORT

BOWMANS CREEK WIND FARM - STAGE 2

BOWMANS CREEK, NSW

MAY 2024

Report prepared by

OzArk Environment & Heritage

For Umwelt (Australia) Pty Ltd on behalf of Bowmans Creek Wind Farm Pty Ltd

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Enquiries should be addressed to OzArk Environment & Heritage.

Acknowledgement

OzArk acknowledge the traditional custodians of the area on which this assessment will take place and pay respect to their beliefs, cultural heritage, and continuing connection with the land. We also acknowledge and pay respect to the post-contact experiences of Aboriginal people with attachment to the area and to the Elders, past and present, as the next generation of role models and vessels for memories, traditions, culture and hopes of local Aboriginal people.

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1 INTRODUCTION

1.1 PREAMBLE

OzArk Environment & Heritage (OzArk) has been engaged by Umwelt (Australia) Pty Ltd (Umwelt) on behalf of Bowmans Creek Wind Farm Pty Ltd (the proponent) to prepare a cultural heritage scoping report identifying potential Aboriginal and historical heritage constraints associated with the proposed Bowmans Creek Wind Farm Stage 2 (the project) (**Figure 1-1**).

1.2 GLOSSARY OF TERMS USED IN THIS REPORT

ACHAR	Aboriginal Cultural Heritage Assessment Report
Disturbance area	167 hectares of land where all impacts associated with the Stage 2 project will be located
EIS	Environmental Impact Statement
EP&A Act	*Environmental Planning & Assessment Act 1979*
Heritage Act	*Heritage Act 1977*
HIS	Historic Impact Statement
NPW Act	*National Parks and Wildlife Act 1974*
SEARs	Secretary's Environmental Assessment Requirements
SSD	State Significant Development
Project Boundary	3552 hectares of land where the Stage 2 project will be located. Includes the disturbance area.

1.3 PROJECT BACKGROUND

Bowmans Creek Wind Farm Stage 1 (SSD-10315) (i.e. 'Stage 1' or 'the Stage 1 project') is a renewable energy development consisting of 54 wind turbine generators in the Hunter Valley, New South Wales (NSW), which was approved by the NSW Independent Planning Commission (IPC) on 6 February 2024. Bowmans Creek Wind Farm Pty Ltd are proposing to develop an additional 21 WTGs on land parcels abutting the Stage 1 project boundary under a separate development application, known as Bowmans Creek Wind Farm Stage 2 (i.e. 'Stage 2' or the 'project').

The additional wind farm infrastructure associated with the project is proposed to increase capacity of the 'Bowmans Creek Wind Farm' (SSD-10315) (i.e., Stage 1). Because of the scale of additional infrastructure, and other requirements under the NSW planning system, the project

is proposed as a separate State Significant Development (SSD) to that already approved under 'Stage 1'.

Staging of the Bowmans Creek Wind Farm was not proposed within the SSD-10315 approvals documentation, however, for simplicity and to assist differentiate between the two projects, all wind turbines and ancillary infrastructure associated with SSD-10315 are referred as 'Bowmans Creek Wind Farm Stage 1', or simply 'Stage 1' throughout this report.

1.3.1 Proposed Development

Development proposed under Stage 2 includes the following components, as shown on **Figure 1-2**:

- Up to 21 three blade wind turbine generators, with a maximum blade-tip height of 250 metres (m) above ground level
- Power infrastructure providing connection to the National Energy Market, including:
    - one on-site collector substation and associated medium voltage transmission line connecting the on-site substation to the Stage 1 project electrical reticulation network
    - one overhead transmission line connecting the proposed wind turbines in the south of the Project Boundary to the Stage 1 project electrical reticulation network
    - an internal electrical reticulation network (i.e., underground 33kV transmission lines) connecting all turbines to the Stage 1 project electrical reticulation network
- other associated permanent infrastructure including hardstands, new access tracks, upgrades to existing access tracks, and access point/s from public roads
- permanent and temporary meteorological monitoring masts.

Ancillary infrastructure, including two substations and the operations and maintenance facility included in the Stage 1 project are also proposed to be utilised as part of the Stage 2 project, as well as other temporary construction facilities (i.e. construction compounds, batching plants, laydown areas etc.). This ancillary infrastructure was previously inspected during the Stage 1 survey. No constraints were identified during the inspection at these locations.

Stage 2 of the Bowmans Creek Wind Farm will be assessed as SSD, under Division 4.7 of the *Environmental Planning & Assessment Act 1979* (EP&A Act).

The Secretary's Environmental Assessment Requirements (SEARs) for the project have not yet been received, however, it is expected that they will not differ substantially from the Bowmans Creek Wind Farm Stage 1 SEARs, which required a robust heritage assessment (reported in an Aboriginal Cultural Heritage Assessment Report [ACHAR] and Historic Impact Statement [HIS]), with accompanying full Aboriginal community consultation.

1.4 PROJECT BOUNDARY

The Stage 2 Project Boundary is the maximum spatial extent of the project defined by all current land access available to the proponent. It includes all Lot and DP for involved landholders and encompasses all aspects of the project except for the off-site transport route.

The Stage 2 Project Boundary covers approximately 3552 hectares (ha), situated adjacent to the Bowmans Creek Wind Farm Stage 1 project in the NSW Hunter Valley region (**Figure 1-3**). The Stage 2 Project Boundary is generally located within steep hills overlooking the flat valley floor of the Hunter Valley with a maximum elevation of 610 m, although some areas of gently undulating terrain are also present.

Within the Project Boundary is the Stage 2 Disturbance Area that covers approximately 167 ha where all impacts associated with the Stage 2 project will be located (**Figure 1-2**). Therefore, approximately 95 per cent of the Project Boundary will not be disturbed by the Stage 2 project.

Figure 1-1: Location of the Stage 2 Project Boundary.

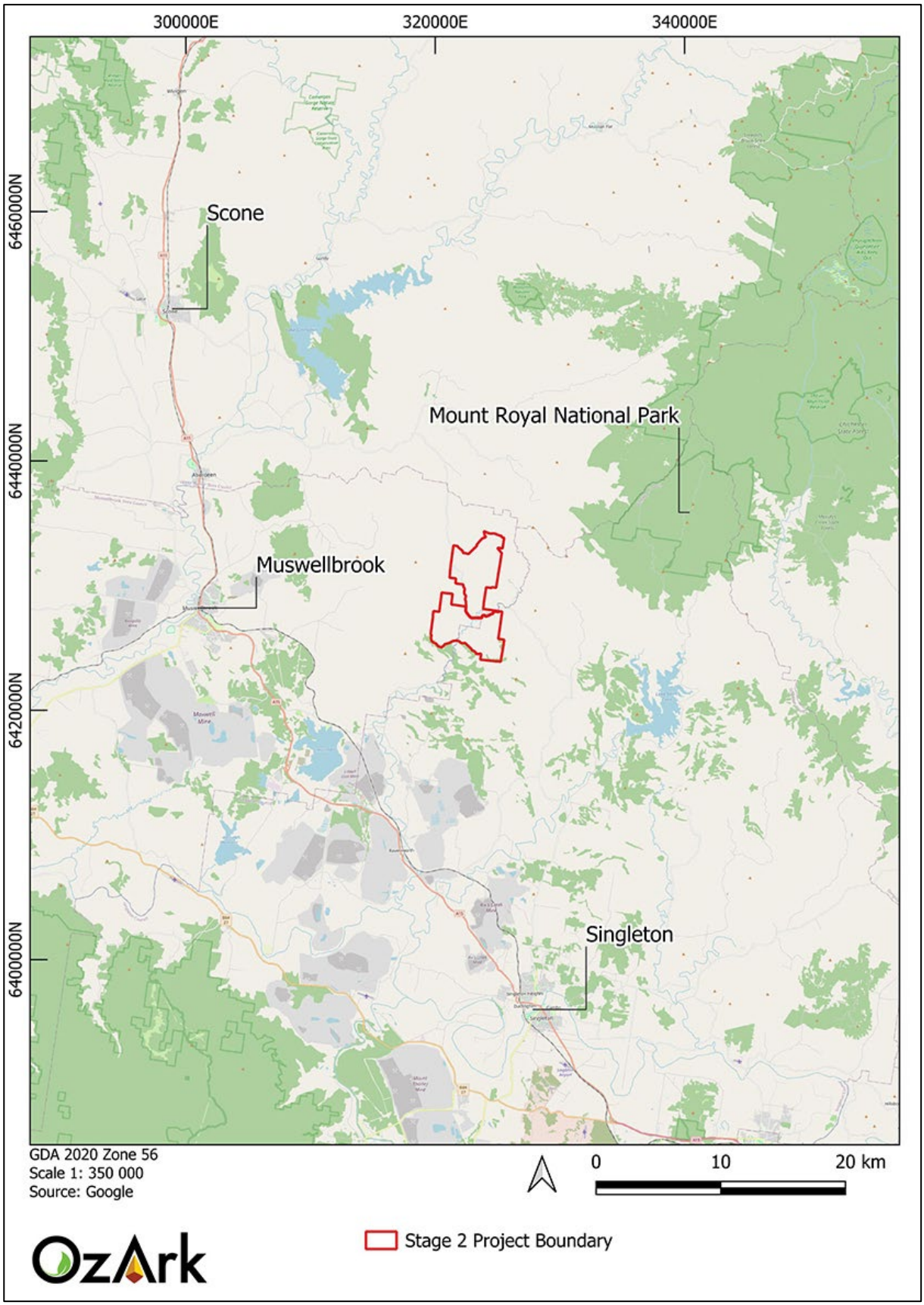


Figure 1-2: Stage 2 proposed Project components.

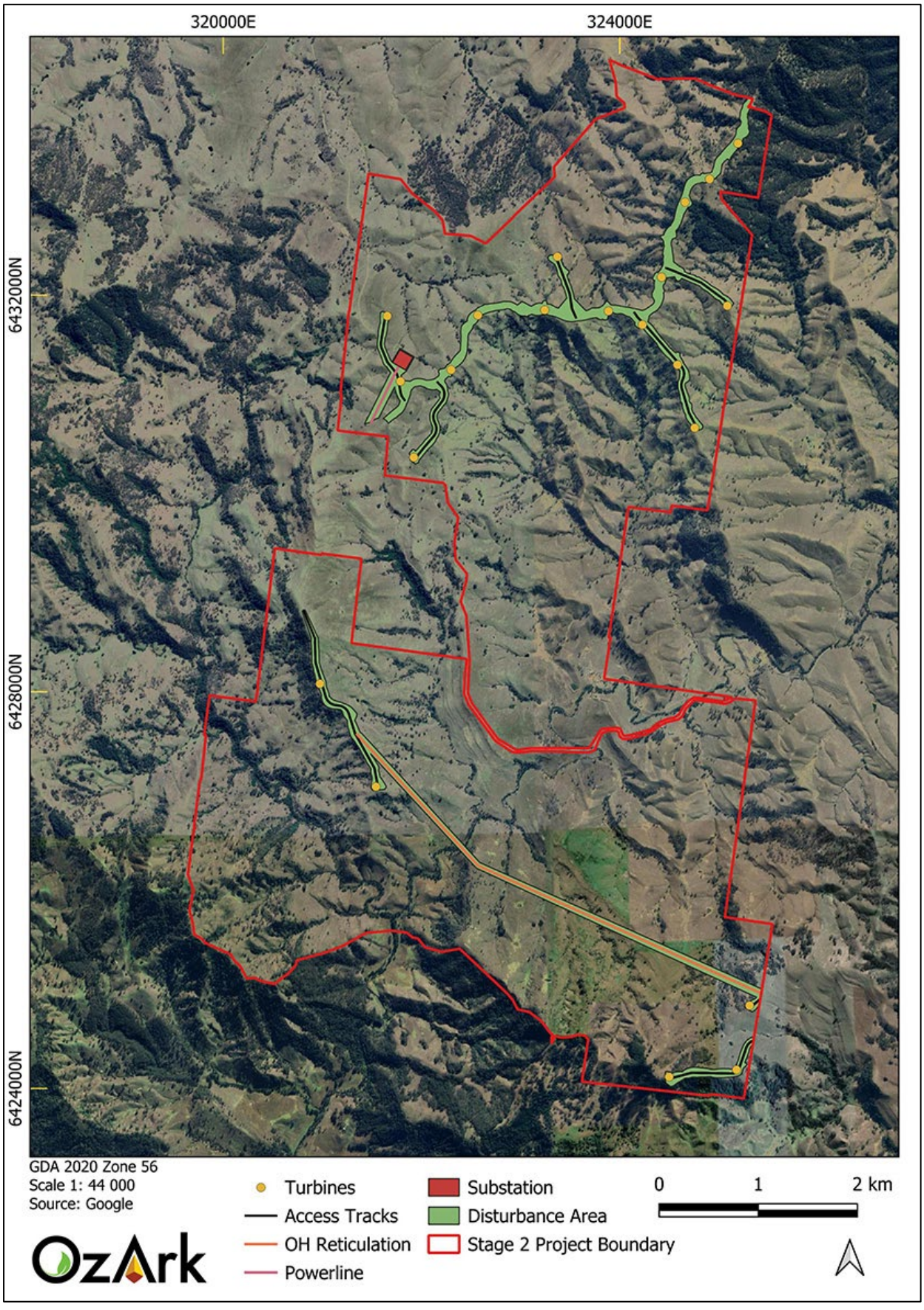
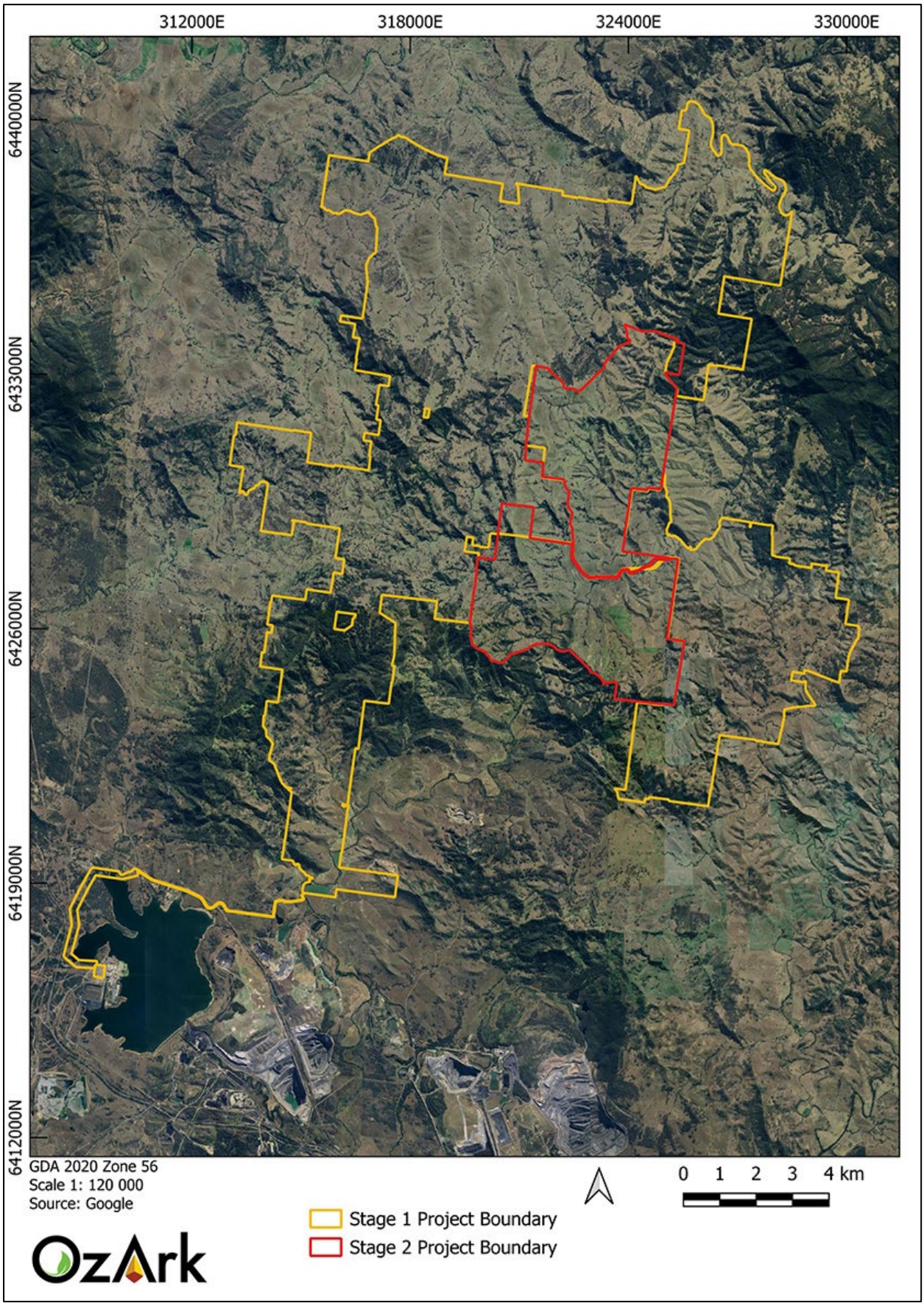


Figure 1-3: Aerial showing the Stage 1 and Stage 2 Project Boundaries.



1.5 LANDSCAPE CHARACTERISTICS

Many of the landscape characteristics of Stage 2 Project Boundary are similar or the same as the Stage 1 Project Boundary because the Stage 2 Project Boundary contains identical and contiguous landforms to those in the Stage 1 Project Boundary (**Figure 1-3**).

1.5.1 Topography

The geology of the Stage 2 Project Boundary influences the overall topography. The northern part of the Stage 2 Project Boundary is relatively elevated and rugged terrain where bedrock outcrops and linear escarpments are common. The southern portion of the Stage 2 Project Boundary comprises broad ridges with gently to moderately inclined slopes which gradually reduce in gradient southwards towards the southern boundary of the Stage 2 Project Boundary. In the south-centre of the Stage 2 Project Boundary is the relatively narrow Bowmans Creek valley (**Figure 1-4**).

1.5.2 Geology and Soils

The geology of the Stage 2 Project Boundary reflects a single geological era known as the Paleozoic (541–252 million years ago). Within the Paleozoic period are two distinct geological periods: the Carboniferous (359–299 million years ago) and Permian (299–252 million years ago). The name Carboniferous means ‘coal-bearing’ and refers to the many coal beds formed globally during that time, however, the Hunter Valley coal measures date to the succeeding period, the Permian. Most of the Stage 2 Project Boundary reflects the earlier Carboniferous period and is represented by an undifferentiated bedrock geology that includes conglomerates, sandstone, shale, and acid tuffs (Geological Survey of NSW 1969).

Soil analysis has important ramifications for archaeological research through the potential impact of different soils on human activity (such as agricultural exploitation) and the impact of the soils on archaeological evidence (such as post-depositional movement). The soils known to occur throughout the Stage 2 Project Boundary are mapped on **Figure 1-5** and include:

- Scrumlo soil landscape: This soil landscape covers undulating to rolling hills north of Singleton and is the dominant soil landscape within the Stage 2 Project Boundary. The main soils are Yellow Podzolic Soils on the steeper slopes with Yellow and Brown Solodic Soils and Soloths on breaks with easier slopes. Siliceous and Earthy Sands occur on conglomerate where rock outcrop is common. This soil landscape once supported a woodland of forest red gum and rough-barked apple. Where native vegetation has been cleared, there is grazing of stock on improved pastures. The Scrumlo soil landscape is generally erodible with a moderate fertility

- Bridgelands soil landscape: This soil landscape occurs on rolling hills with some rolling mountains. The main soils are Skeletal Loams (Lithosols) with Yellow Solodic Soils on midslopes and Red Soloths on mid to lower slopes. Terra Rossa Soils occur on limestone with some limestone outcrops. There are also Brown Clays, with Red Earths on upper

slopes of shale. These soils would have once supported Silvertop stringybark and forest oak, although much has been cleared for grazing. These soils have a low to moderate risk of erosion

- Rosevale soil landscape: This soil landscape covers rolling hills to the north of Glennies Creek Dam. These soils would have once supported a woodland community of yellow box, silvertop stringybark, manna gum, white box, and grey gum. Forest oak and broad-leaved red ironbark may occur. However, this vegetation community has been largely cleared for unimproved and improved pasture. There is minor to moderate sheet erosion on cleared areas and some mass movement on steeper slopes. Generally, moderately fertile

- Greenland soil landscape: This soil landscape covers small areas of undulating low hills to the north of Singleton and only a small portion of the Project Boundary. The main soils are Yellow Podzolic Soils on the lower flats, with Yellow Earth – Soloth intergrades on upper slopes. There are Alluvial Soils (sands) in drainage lines. These soils would have once supported a woodland of forest red gum and rough-barked apple, with river oak along the creeks, although much has been cleared for grazing. These soils have a low to moderate risk of erosion and moderate fertility.

1.5.3 Hydrology

As the Stage 2 Project Boundary covers a relatively large area of land in a generally well-watered part of NSW, it is intersected by several waterways, both named and unnamed.

The main source of water in the Stage 2 Project Boundary is Bowmans Creek (**Figure 1-4**). Bowmans Creek can run dry, but it is assumed that in the past it would have afforded permanent water, particularly as now-lost pools would have retained water into dry period. Beyond Bowmans Creek, there are several named waterways that were likely always ephemeral.

In terms of considerations for Aboriginal site locations, the archaeological context for the Stage 2 Project Boundary shows a strong correlation between site location and Bowmans Creek with three sites recorded in association with this waterway near the Project Boundary.

In the generally hilly environment of the Project Boundary, the gentle gradient landforms in the Bowmans Creek valley also attracted colonial settlement and these landforms have been more intensively used when compared to the surrounding sloping landforms.

Generally, disturbance from the Stage 2 project avoids waterways, except for the overhead electrical reticulation in the south of the Project Boundary that crosses Bowmans Creek and one of its tributaries.

As only very limited areas of disturbance are associated with landforms near Bowmans Creek, the probability that the disturbance associated with the Stage 2 project harming Aboriginal or historic heritage items is decreased.

Figure 1-4: Hydrology and topography of the Stage 2 Project Boundary.

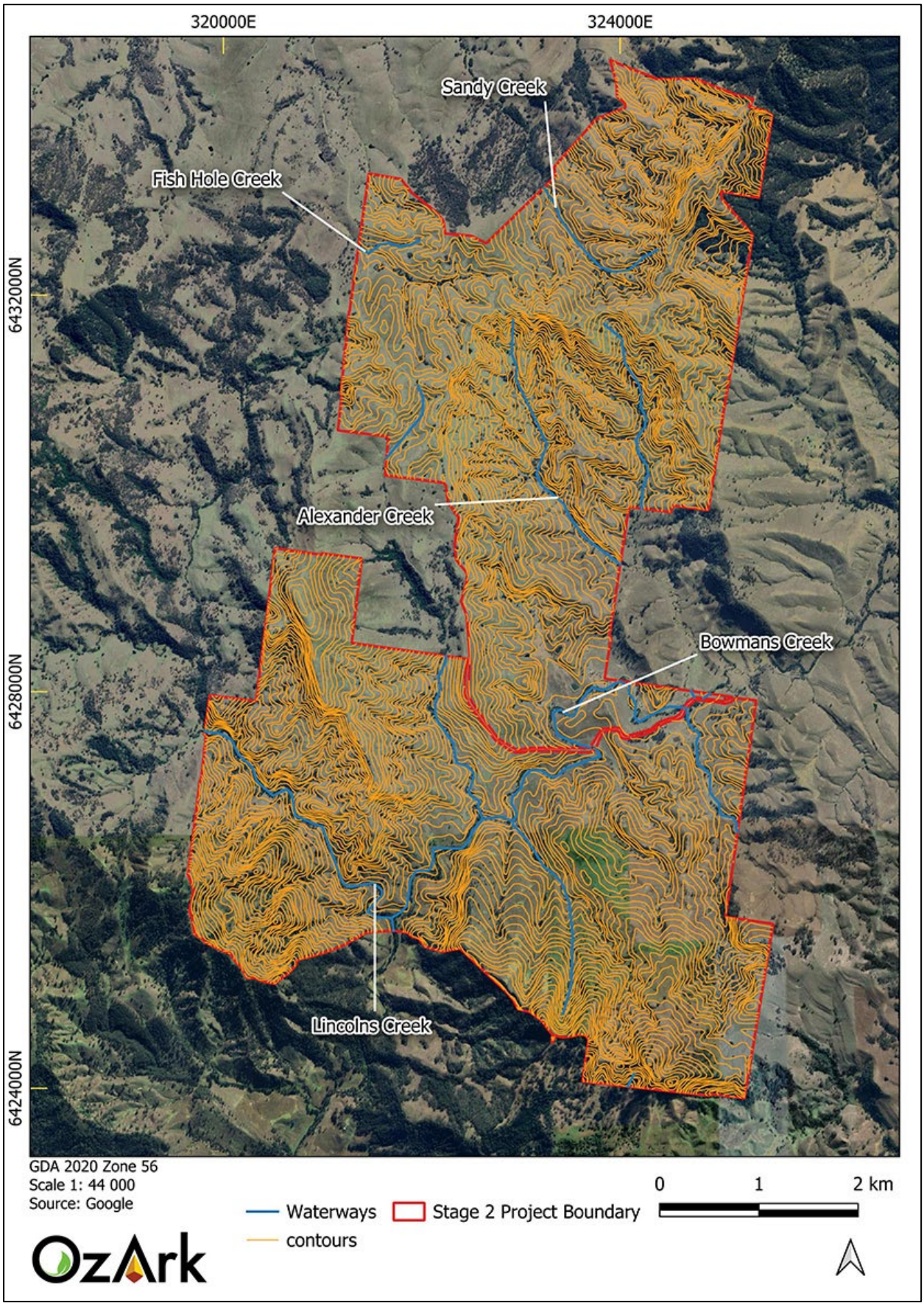
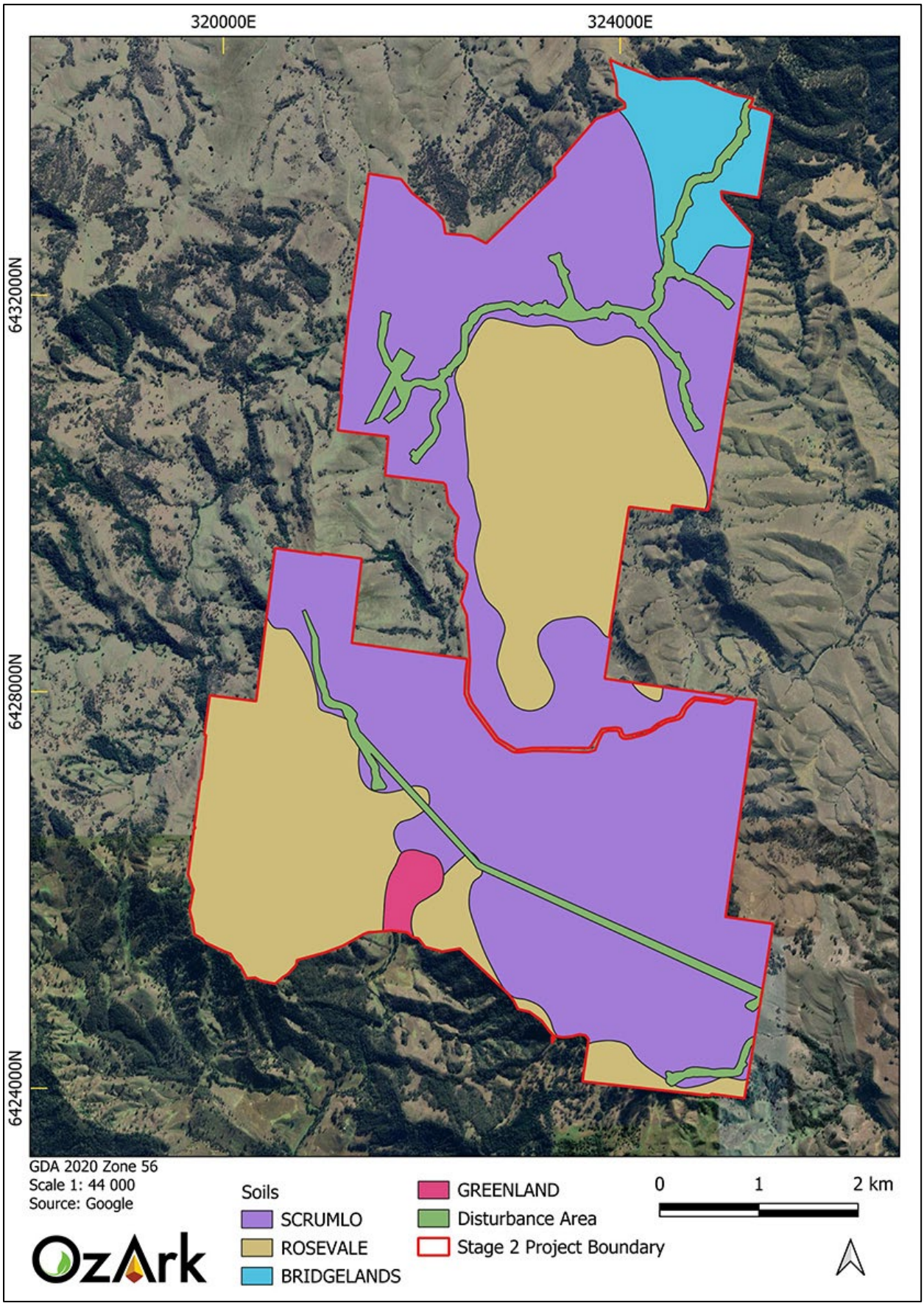


Figure 1-5: Soil landscapes of the Stage 2 Project Boundary.



1.5.4 Vegetation

The distribution of vegetation and water resources within the local landscape are important factors influencing patterns of Aboriginal land use and occupation. Additionally, the effectiveness of the archaeological survey is directly impacted by visibility conditions, of which vegetative cover is an important feature.

The Stage 2 Project Boundary has experienced widespread changes in vegetation during the past century, with the original vegetation essentially removed (for pastoral grazing), resulting in a mainly open area with minimal extant vegetation. The original vegetation of the local area consisted of woodland, with box gum and ironbark dominant. Natural vegetation likely included yellow box (*Eucalyptus melliodora*), white box (*Eucalyptus albens*), spotted gum (*Eucalyptus maculata*), Blakelys red gum (*Eucalyptus blakelyi*), rough-barked apple (*Callitris preissit*), kurrajong (*Brachychiton populneum*), bull oak (*Casurina leuhmannil*), swamp oak (*Casurina glauca*), smooth bark-apple (*Angophora costata*), narrow-leaved red ironbark (*Eucalyptus crebra*), grey gum (*Eucalyptus punctata*), and grey box (*Eucalyptus moluccana*) (Kovac and Lawrie 1991).

1.5.5 Historical land use and existing levels of disturbance

The predominant land use of the Stage 2 Project Boundary is grazing. The establishment of the grazing industry involved the widespread clearance of native vegetation and the introduction of heavy, hard hoofed animals.

The combination of steeply sloping terrain, high rainfall, the loss of trees, and the breaking apart of the soil by cattle has meant that the already thin soils have become much thinner. Sedimentation in waterways, such as the headwaters of Bowmans Creek, show the result of the downward movement of soils from the slopes.

1.5.6 Archaeological implications

Disturbances associated with the Stage 2 project are almost entirely confined to the Scrumlo soil landscape, with only a small portion within the Bridgelands soil landscape. The archaeological implications are that these soil landscapes would have supported resources to attract traditional Aboriginal occupation, as well as colonial settlers. However, the open woodland vegetation would have only provided limited hunting and gathering opportunities for Aboriginal people suggesting that conditions for long-term camping activities are not present. For colonial settlers, there were some forestry resources to be exploited and the moderate fertility of the soils encouraged vegetation clearing and the establishment of grazing agriculture. The rolling hill topography that characterises the Project Boundary would have provided fewer camping/building locations, and the erodible nature of the soils may have also dispersed or removed archaeological deposits that may have once been located in the topsoils that have been lost from across the area.

2 ABORIGINAL CULTURAL HERITAGE

2.1 ABORIGINAL PEOPLE OF THE PROJECT BOUNDARY

The Stage 2 Project Boundary is located in the border country of the Wonnarua, Geawegal, and Kamilaroi tribal areas of the upper Hunter River valley.

Tocomwall (2017:49) records that ethnographic accounts and anthropological notes written in the mid-to late 19th century indicate that the traditional territory of the Wonnarua people extended over a two thousand square mile area of land that included the Hunter River and all its tributaries from within ten miles of Maitland to the apex of the Liverpool Ranges. This interpretation is challenged by the Wanaruah Local Aboriginal Land Council (Tocomwall 2017:482) who states that there is much debate about the tribal boundaries and that the dividing line between the Wonnarua and the Kamilaroi may have been much further south in the area of 'Jerrys Plains'.

The Wonnarua people and their neighbours lived in an environment rich in food resources. Freshwater fish, shellfish, reptiles, mammals, birds, and plant food provide a diverse diet (see Brayshaw 1981). Brayshaw (1986:82) suggests that inland groups visited the coast during the summer when marine resources were plentiful, and coastal groups travelled inland to participate in the winter kangaroo hunts. Trade and/or exchange also occurred between the coastal and inland groups including visiting by coastal and inland groups for initiations and ceremonies seemed to occur. These were conducted within earthen circles. Carved trees were associated with these sites (Brayshaw 1981:12). Reed spears and shells were traded inland for possum skin rugs and fur cord (Brayshaw 1986:41).

2.2 LOCAL ARCHAEOLOGICAL CONTEXT

A desktop search was conducted on the following databases to identify any potential previously recorded Aboriginal or historic heritage within the Stage 2 Project Boundary. The results of each search are summarised in **Table 2-1** and presented in full in **Appendix 1**.

Table 2-1: Aboriginal cultural heritage: desktop-database search results.

Name of Database Searched	Date of Search	Type of Search	Comment
Commonwealth Heritage Listings	19/7/23	Singleton, Muswellbrook & Upper Hunter LGA	No places listed on either the National or Commonwealth heritage lists are located within the Project Boundary.
National Native Title Claims Search	19/7/23	NSW	No Native Title Claims cover the Project Boundary.
AHIMS	19/7/23	10 x 10 km from the centre of the Project Boundary	42 sites returned within the designated search area. None of these sites are within the Project Boundary.
Local Environmental Plan (LEP)	19/7/23	Singleton LEP 2017, Muswellbrook LEP 2009 & Upper Hunter LEP 2013	No LEP items are located within the Project Boundary.

The search of the AHIMS on 19 July 2023 returned 42 results for Aboriginal sites within a 10 kilometre (km) radius of the Project Boundary (GDA Zone 56 Eastings: 313203–333011; Northings: 6418712–6438588).

The most frequently recorded site types are isolated finds which contribute 40.48% of the site types in the vicinity of the Stage 2 Project Boundary (**Table 2-2**). Other frequent site types include artefact scatters (n=14, 33.33%) and open camp sites (n=10, 23.81%). A single grinding groove site was also located by the search.

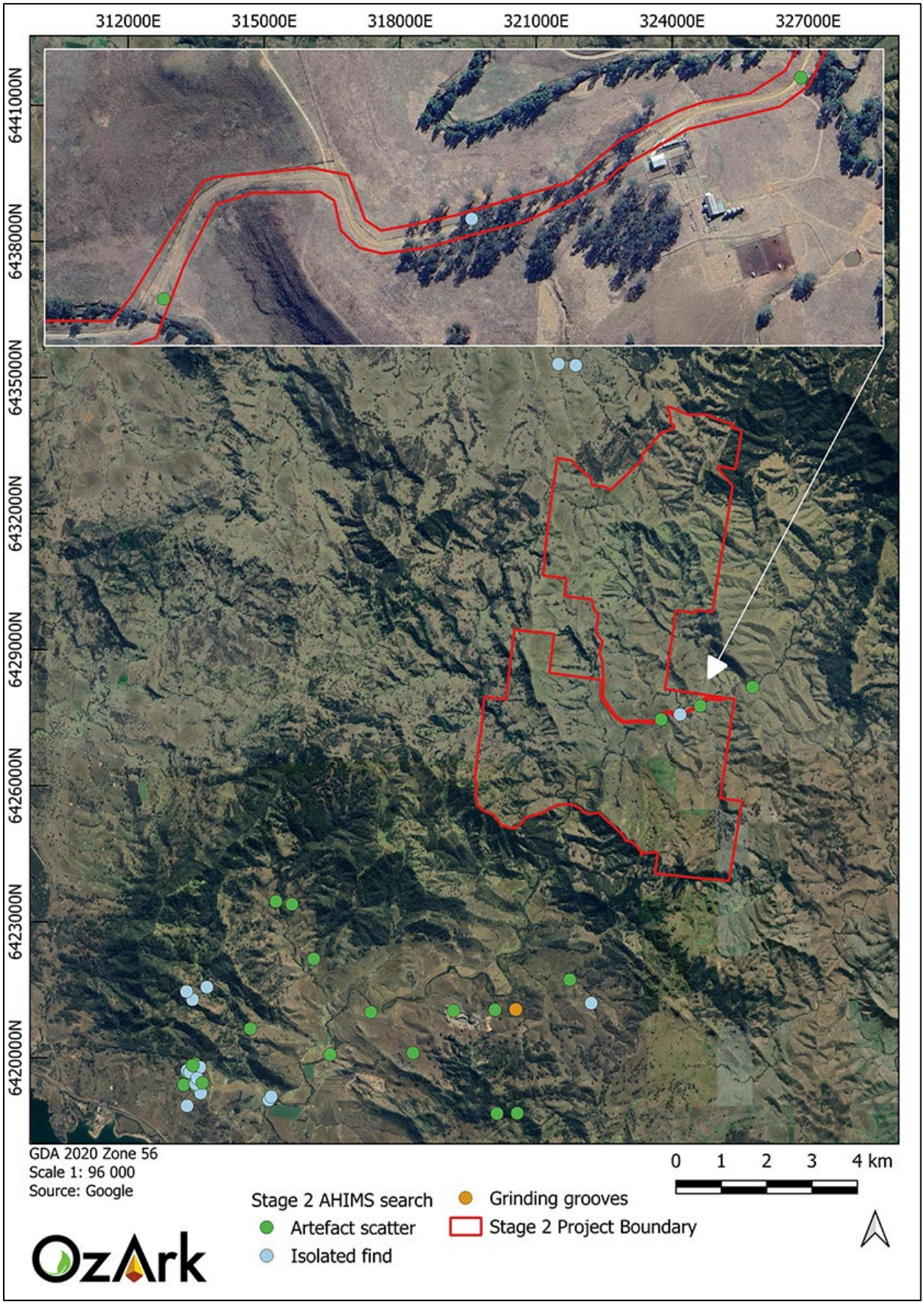
Sites have been largely recorded to the south and southwest of the Stage 2 Project Boundary in association with Bowmans Creek and the gentle gradient landforms around Lake Liddell. The steep sloping landforms which can be found within the Project Boundary are generally unsuitable for site types such as artefact scatters and grinding grooves, however, there remains a possibility that isolated finds will be recorded. Two isolated finds have been recorded in association with Sandy Creek, within the Stage 1 Project Boundary and 2.1 km north of the Stage 2 Project Boundary. Three Aboriginal sites, including two artefact scatters and an isolated find, have also been recorded within the Bowmans Creek Road corridor which extends through the Stage 2 Project Boundary but has been excluded from the development footprint.

Figure 2-1 shows the location of previously recorded sites in the vicinity of the Stage 2 Project Boundary. No previously recorded sites are located within the Stage 2 Project Boundary.

Table 2-2: Site types and frequencies of AHIMS sites near the Stage 2 Project Boundary.

Site Type	Number	% Frequency
Isolated find	17	40.48
Artefact scatter	14	33.33
Open camp site	10	23.81
Grinding grooves	1	2.38
Total	**42**	**100**

Figure 2-1. AHIMS sites in relation to the Stage 2 Project Boundary.



3 ABORIGINAL SITE PREDICTIVE MODEL

Across Australia, numerous archaeological studies in widely varying environmental zones and contexts have demonstrated a high correlation between the permanence of a water source and the permanence and/or complexity of Aboriginal occupation. Site location is also affected by the availability of and/or accessibility to a range of other natural resources including plant and animal foods; stone and ochre resources and rock shelters; as well as by their general proximity to other sites/places of cultural/mythological significance. Consequently, sites tend to be found along permanent and ephemeral water sources, along access or trade routes or in areas that have good flora/fauna resources and appropriate shelter.

In formulating a predictive model for Aboriginal archaeological site location within any landscape it is also necessary to consider post-depositional influences on Aboriginal material culture. In all but the best preservation conditions very little of the organic material culture remains of ancestral Aboriginal communities survives to the present. Generally, it is the more durable materials such as stone artefacts, stone hearths, shell, and some bones that remain preserved in the current landscape. Even these however may not be found in their original depositional context since these may be subject to either (a) the effects of wind and water erosion/transport—both over short and long-time scales—or (b) the historical impacts associated with the introduction of colonial farming practices. Scarred trees, by their nature, may survive for up to several hundred years but rarely beyond.

3.1 SITE TYPES IN THE REGION OF THE PROJECT BOUNDARY

The site types listed in **Table 3-1** are present in the 10 x 10 km search area undertaken encompassing the entire Stage 2 Project Boundary. The likelihood of these sites being present in the Stage 2 Project Boundary area is discussed in **Section 3.1.3**.

Table 3-1: Site types recorded in the region of the Stage 2 Project Boundary.

Site type	Site description
Artefact scatters/ open camp sites	Artefact scatters are defined as two or more artefacts, not located within a rock shelter, and located no more than 50 m away from any other constituent artefact. This site type may occur almost anywhere that Aboriginal people have travelled and may be associated with hunting and gathering activities, short- or long-term camps, and the manufacture and maintenance of stone tools. Artefact scatters typically consist of surface scatters or sub-surface distributions of flaked stone discarded during the manufacture of tools but may also include other artefactual rock types such as hearth and anvil stones. Less commonly, artefact scatters may include archaeological stratigraphic features such as hearths and artefact concentrations which relate to activity areas. Artefact density can vary considerably between and across individual sites. Small ground exposures revealing low density scatters may be indicative of a background scatter rather than a spatially or temporally distinct artefact assemblage. These sites are classed as 'open', that is, occurring on the land surface unprotected by rock overhangs, and are sometimes referred to as 'open camp sites'. Artefact scatters are most likely to occur on level or low gradient contexts, along the crests of ridgelines and spurs, and elevated areas fringing watercourses or wetlands. Larger sites may be expected in association with permanent water sources.

Site type	Site description
	Topographies which afford effective through-access across, and relative to, the surrounding landscape, such as the open basal valley slopes and the valleys of creeks, will tend to contain more and larger sites, mostly camp sites evidenced by open artefact scatters.
Isolated finds	May be indicative of random loss or deliberate discard of a single artefact, the remnant of a now dispersed and disturbed artefact scatter, or an otherwise obscured or subsurface artefact scatter. They may occur anywhere within the landscape but are more likely to occur in topographies where open artefact scatters typically occur.
Grinding grooves	Grinding grooves are the remnants of ground edge hatchet manufacture and sometimes from food preparation. The site is most likely to occur on flat outcrops of coarse-grained sandstone in the vicinity of water sources, however, grinding grooves have also been recorded on fine-grained granite and quartzite outcrops.

3.1.1 Bowmans Creek Wind Farm Stage 1 (OzArk 2022)

OzArk completed an ACHAR for Stage 1 of the Bowmans Creek Wind Farm project in March 2021 to support the project Environmental Impact Statement (EIS), and an amended ACHAR in September 2021 to support the amended project report. These reports involved both a desktop and field survey of the Stage 1 Project Boundary (**Figure 1-3**).

During the survey, 15 previously unrecorded Aboriginal sites were located. These sites consist of eight artefact scatters with a low–moderate artefact density and seven isolated artefacts. All recorded sites are artefact sites, and no other site type was recorded. Six sites are inside the Stage 1 Project Boundary, including: Coalhole Creek OS-01 [37-3-1594], Albano Road OS-02 [37-3-1588], Albano Road OS-03 [37-3-1589], Liddell Power Station-IF1 [37-2-6263], Sandy Creek-IF1 [37-3-1632], and Sandy Creek-IF2 [37-3-1633].

It was shown that there was a strong tendency for sites to be recorded in topography with slopes less than 10 degrees and that artefact scatters are almost exclusively recorded in landforms with a gentler topography. In terms of distance to water it was seen that there was not a strong correlation between previous site recordings and proximity of water.

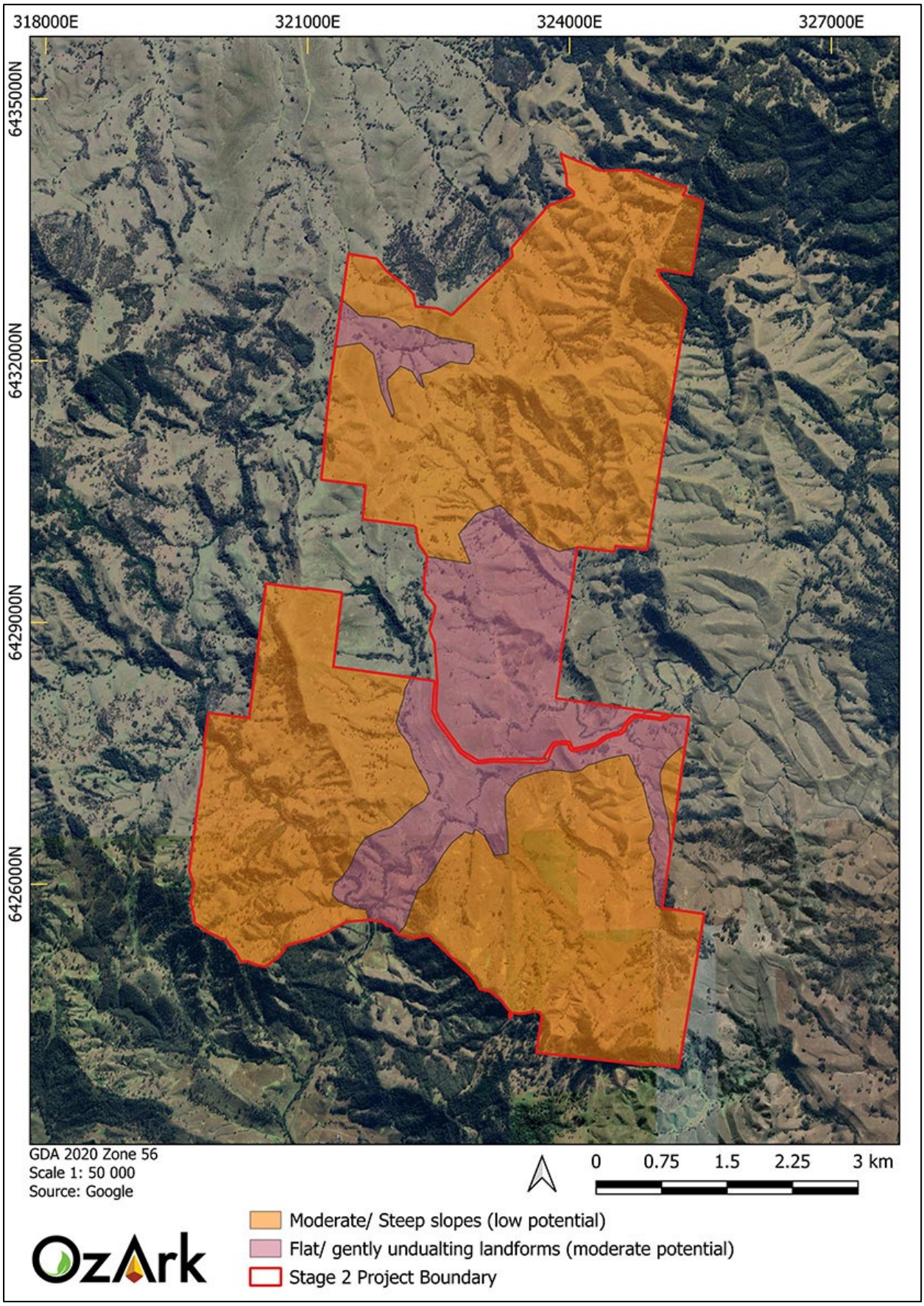
3.1.2 Landforms

A consideration of the landforms within the Project Boundary enables a prediction regarding the type and distribution of sites to be made. Landforms within the Stage 2 Project Boundary include areas of flat to gently undulating landforms (moderate potential to record Aboriginal sites), as well as significant amounts of moderate to steep slopes (low potential to record Aboriginal sites) (**Figure 3-1**).

As shown on **Figure 4-1**, almost all disturbances associated with the Stage 2 project are located in moderate to steep landforms and only limited areas of gentle gradient landforms will be disturbed.

Based on the results of the Stage 1 survey (**Section 3.1.1**), the implication is that the Stage 2 disturbance boundary will not record a significant number of Aboriginal sites, and if they are recorded, they will likely be isolated finds or low density artefact scatters.

Figure 3-1: Landforms within the Stage 2 Project Boundary.



3.1.3 Conclusion

Based on knowledge of the environmental and archaeological context of the Stage 2 Project Boundary and a desktop review of the known local and regional archaeological records, the following predictions have been made concerning the probability and potential for landforms within the Stage 2 Project Boundary to contain additional Aboriginal sites (**Table 3-2**), as well as what types of sites may be present within the Stage 2 Project Boundary (**Table 3-3**).

Table 3-2: Likelihood of landforms within the Stage 2 Project Boundary to contain Aboriginal objects.

Landform type	Likelihood to contain Aboriginal objects
Flat to gently undulating	Flat plains and gently undulating landforms are likely to have been a favoured landform for habitation sites, but the likelihood of this settlement to have taken place is determined by distance to water. Flat landforms near waterways have moderate-high potential for Aboriginal sites, but flat landforms distant from reliable water may not have been key areas for settlement strategies. As these landforms have been intensively used for farming during the modern period, the probability that sites, if they are present, have been disturbed.
Moderate to steep slopes	Slopes are a degrading landform, especially where vegetation removal has accelerated soil loss. These landforms are unsuitable for occupation and Aboriginal objects recorded in such landforms are likely to be in a secondary context. The exception is in localised flat benches, where occupation may have been possible. The extensive Stage 1 project survey recorded very few sites in this landform category.

Table 3-3: Likelihood of certain site types being present in the Stage 2 Project Boundary.

Site type	Likelihood of being present in the Project Boundary
Artefact scatters/ open camp sites	Artefact scatters are one of the most recorded site types within the surrounding region. A general correlation between different types of watercourses and the nature of the evidence of past Aboriginal occupation is evident. Higher artefact density sites are located near to permanent water sources and low-density artefact distributions are found elsewhere. Based on this, the moderate to steeply sloping landforms within the Project Boundary are unlikely to have been utilised for camping activities that result in artefact scatters. It is likely that such ridgelines were used as pathways in the past and any sites associated with such landforms are likely to have a low artefact density and a low complexity of tool types as the sites are either one-off events or only infrequently used.
Isolated finds	As isolated finds can occur anywhere, particularly within disturbed contexts, it is predicted that this site type could be recorded within the Project Boundary.
Grinding grooves	Grinding grooves are most likely to occur on flat outcrops of coarse-grained sandstone in the vicinity of water sources, however, grinding grooves have also been recorded on fine-grained granite outcrops. Given the low prospect of suitable rock exposures being present in the Project Boundary, grinding groove sites are unlikely to be present. In addition, the Project Boundary does not contain extensive lengths of waterways where such sites are more likely to be located.

4 POTENTIAL IMPACTS TO ABORIGINAL HERITAGE

4.1 PROPOSED DEVELOPMENT

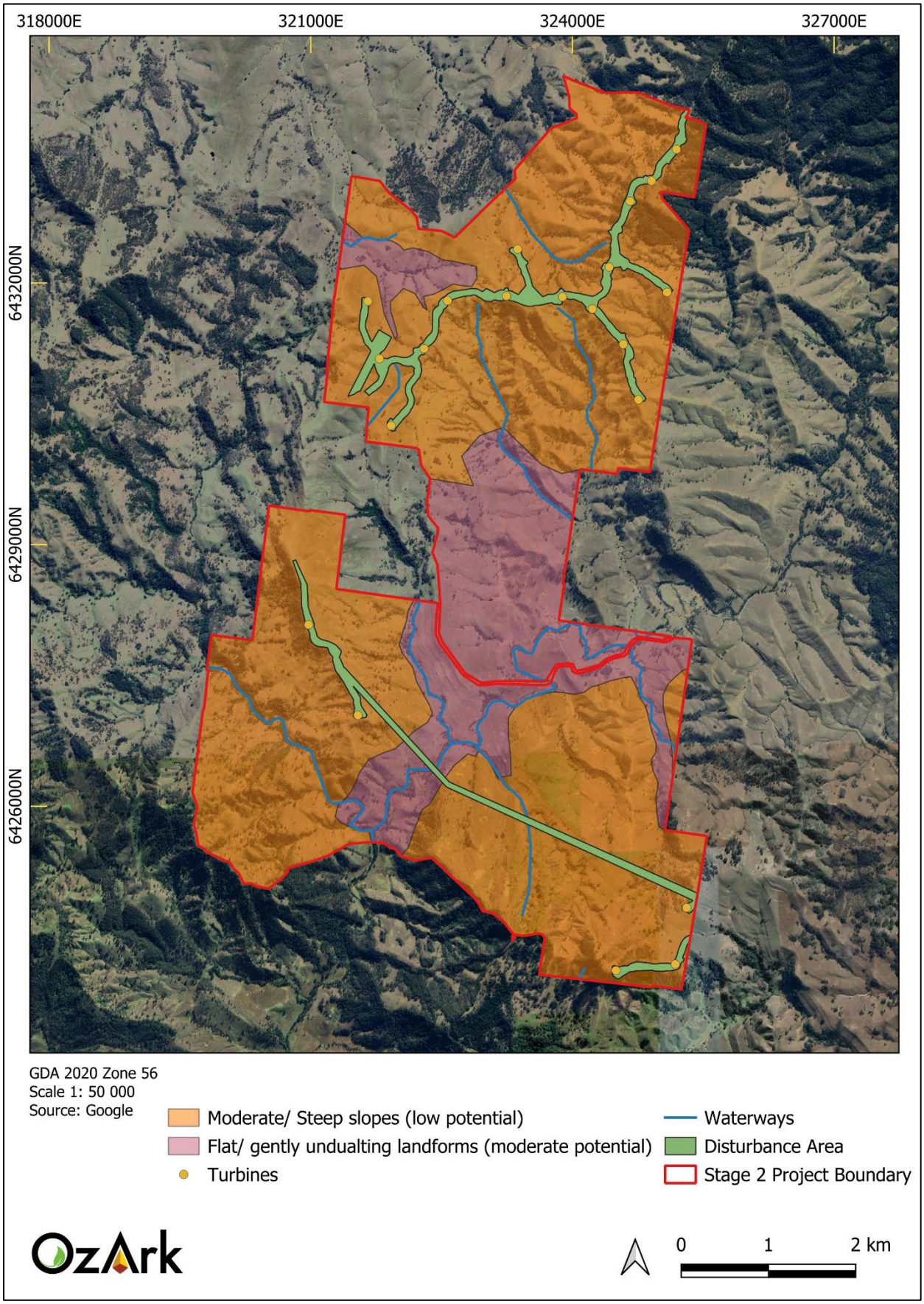
The proposed development is set out in **Section 1.3.1**.

4.2 LIKELY IMPACTS TO ABORIGINAL OBJECTS

It is concluded that there is a low likelihood for further Aboriginal objects being recorded within the Stage 2 Project Boundary. The results of the Stage 1 field survey indicate that sites such as artefact scatters and isolated finds have more likely to be recorded across the lower elevation landforms in association with named waterways. Therefore, the most likely landforms where Aboriginal objects may be recorded in the Stage 2 Project Boundary are within the lower elevation landforms near watercourses such as Bowmans Creek and a tributary to Bowmans Creek crossed by the overhead electricity reticulation line in the south of the Project Boundary (**Figure 4-1**). The exception to this observation would be site types that do not conform to landform modelling such as quarries or cultural/spiritual sites.

Based on the landforms present it is not expected that any Aboriginal objects within the Stage 2 Project Boundary will be of sufficient scientific significance to warrant their conservation, although this must be confirmed by undertaking systematic survey and gaining an appreciation of the cultural significance of any Aboriginal objects through consultation with the Aboriginal community.

Figure 4-1: Location of project components in relation to landforms within the Stage 2 Project Boundary.



4.3 INVESTIGATION OF ABORIGINAL CULTURAL HERITAGE VALUES

An ACHAR will be prepared for the Stage 2 project as part of the EIS.

As part of further investigations to be undertaken as part of the AHCAR, a survey will be completed by archaeologists and members of the Aboriginal community. The results of the survey will indicate whether test excavation within any specific landforms is warranted.

Further investigations to be undertaken as part of the ACHAR will be in accordance with the following guidelines:

- *National Parks and Wildlife Act 1974* (NPW Act)
- *Code of Practice for the Investigation of Aboriginal Objects in New South Wales 2010* (the Code of Practice, DECCW 2010a)
- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW 2011* (the Guide, OEH 2011)
- *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (ACHCRs, DECCW 2010b)

The investigation for the ACHAR will include following steps:

1. Desktop review to develop a predictive model for the location of Aboriginal objects
2. Consultation with the Aboriginal community following the ACHCRs
3. Site survey with the assistance of the Aboriginal community to identify any Aboriginal objects that may be present, as well as identifying any landforms where subsurface archaeological deposits may be present Survey will follow the Code of Practice and the Guide
4. Identify any areas/landforms of cultural significance in consultation with the Aboriginal community
5. Undertake test excavation if warranted
6. Determination of the significance of the Aboriginal objects and/or landforms identified during the site survey in consultation with the Aboriginal community
7. Assessment of the impact to identified Aboriginal heritage values including both tangible and intangible values
8. Development of mitigation measures to minimise impacts to Aboriginal cultural values.

Further investigation will include full consultation with the Aboriginal community following the ACHCRs and the assistance of the community will also be sought during the fieldwork phases of the program.

The results of the survey, Aboriginal community consultation, and any test excavation results (if required) will be presented in the ACHAR.

5 HISTORIC CULTURAL HERITAGE

5.1 PROPOSED DEVELOPMENT

Please see **Section 1.3.1** for details of the proposed development within the Stage 2 Project Boundary.

As for all renewable energy developments in NSW, there will be ground disturbance works associated with vegetation clearance, grading of the site, and constructing the project. The operational stage is unlikely to involve further significant ground disturbance.

5.2 LIKELY HISTORIC HERITAGE ITEMS WITHIN THE PROJECT BOUNDARY

Aerial imagery of the Project Boundary shows several groups of buildings within the Stage 2 Project Boundary associated with the various agricultural properties. At a desktop level it is not possible to know if any of the buildings associated with these residences have historic heritage significance. It does not appear, at a desktop level, that there are any built structures within the Stage 2 disturbance area.

There may well be other vernacular items associated with the long history of farming within the Project Boundary and broader Hunter region. These items, such a fences, yards, and items of moveable heritage, are unlikely to have significant heritage significance.

5.3 LIKELY IMPACTS TO HISTORIC HERITAGE ITEMS

There one listed heritage item approximately 530 m from the Stage 2 Project Boundary (Former Roman Catholic Church, item I156, **Figure 5-1**). This item is over 2.6 km from the Stage 2 disturbance area.

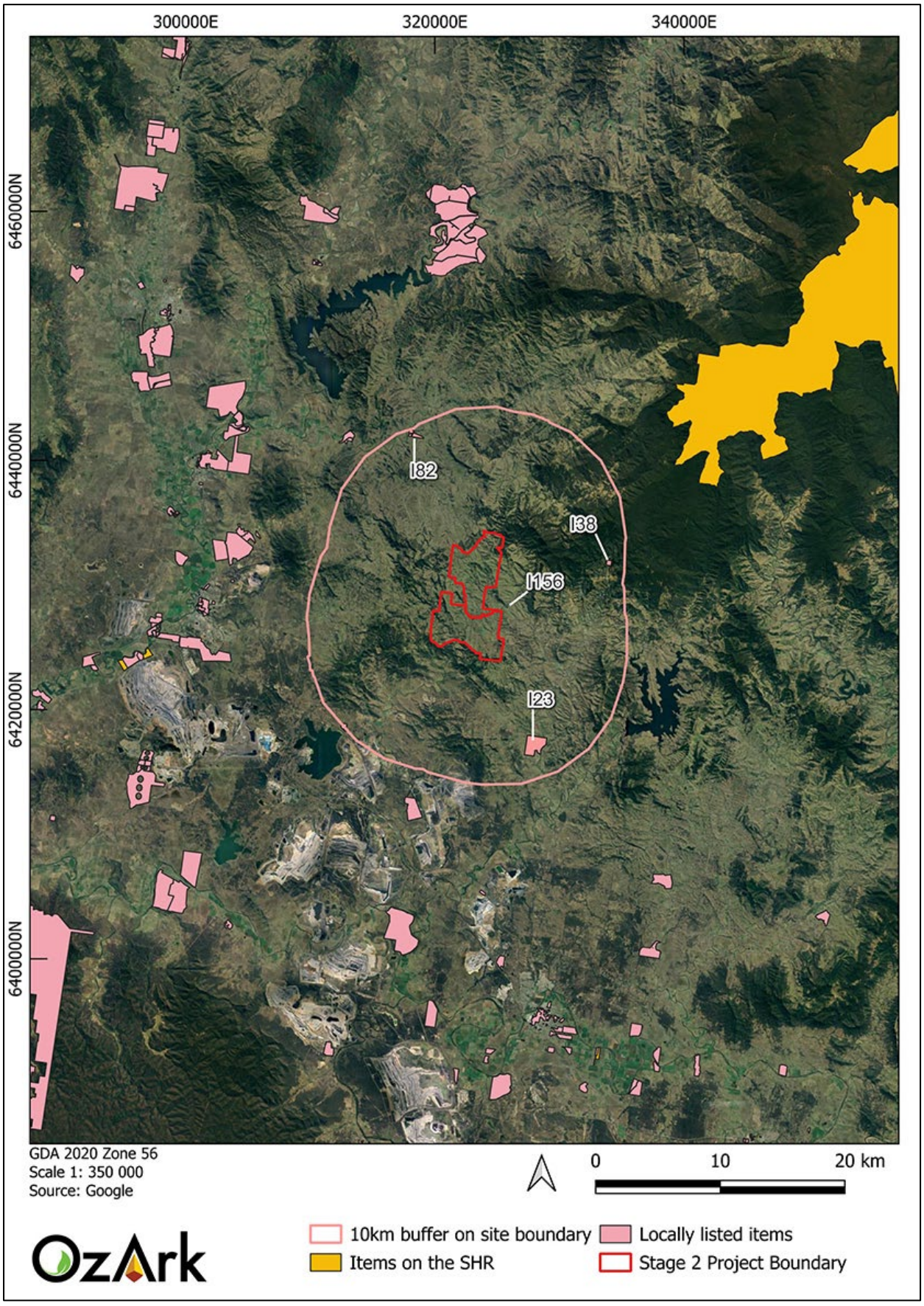
Within a 10 km buffer of the Stage 2 Project Boundary there are a further three locally listed items:

- 'Greylands' and outbuildings (I23)
- Richards Family Cemetery (I38)
- Timber house (I82).

It is very unlikely that the project will have indirect impacts to these items, for example associated with views to and from the listed heritage items, given their distance from the Stage 2 Project Boundary.

Due to a lack of known built structures within the Stage 2 disturbance area, significant historic heritage items are unlikely to be recorded within the Stage 2 Project Boundary. It is therefore unlikely that there will be any direct impacts to significant historic heritage items during construction of the Stage 2 project.

Figure 5-1: Heritage listed items near the Stage 2 Project Boundary.



5.4 INVESTIGATION OF HISTORIC HERITAGE

A HIS will be prepared as part of the EIS that will consider both the results of the assessment of heritage values within and near the Stage 2 Project Boundary.

The investigation for the HIS will include following steps:

1. Desktop review to develop a predictive model for the location of significant historic items
2. Site survey to identify any significant historic items that may be present, as well as identifying any landforms where subsurface archaeological deposits may be present
3. Undertake test excavation if warranted
4. Determination of the significance of the historic items and/or landforms identified during the site survey
5. Assessment of the impact to identified significant heritage values including both tangible and intangible values
6. Development of mitigation measures to minimise impacts to significant historic items.

Further investigations to be undertaken as part of the HIS will be in accordance with the following guidelines:

- The *Burra Charter* 2013
- NSW *Heritage Act 1977*
- *Investigating Heritage Significance. A guide to identifying and examining heritage items in NSW* (Heritage Council 2021)
- *Assessing heritage significance Guidelines for assessing places and objects against the Heritage Council of NSW criteria* (DPE 2023).

As part of the investigations to be undertaken for the HIS, the disturbance area will be subjected to pedestrian survey by archaeologists to assess for the potential for historic heritage values being present.

The investigation will include assessment of project impacts on the nearby listed and potential heritage items.

The results of the investigation will be presented in the HIS.

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Brayshaw 1981 — Helen Brayshaw. *Archaeological survey of Authorisation 89, proposed site of Bloomfield Collieries' Coal Mine at Rix's Creek, Singleton*. Report for NSW NPWS.

Brayshaw 1986 — Brayshaw, H. 1986. *Aborigines of the Hunter Valley: a study of colonial records*. Scone and Hunter Historical Society: Scone.

Burra Charter 2013 — International Council on Monuments and Sites 2013. *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance*.

DECCW 2010a — Department of Environment, Climate Change and Water 2010. *Code of Practice for the Protection of Aboriginal Objects in NSW*.

DECCW 2010b — Department of Environment, Climate Change and Water 2010. *Aboriginal cultural heritage consultation requirements for proponents.*

DPE 2023 — Department of Planning and Environment 2023. *Assessing heritage significance. Guidelines for assessing places and objects against the Heritage Council of NSW criteria*.

Heritage Council 2021 — Heritage Council NSW. *Investigating Heritage Significance. A guide to identifying and examining heritage items in NSW*.

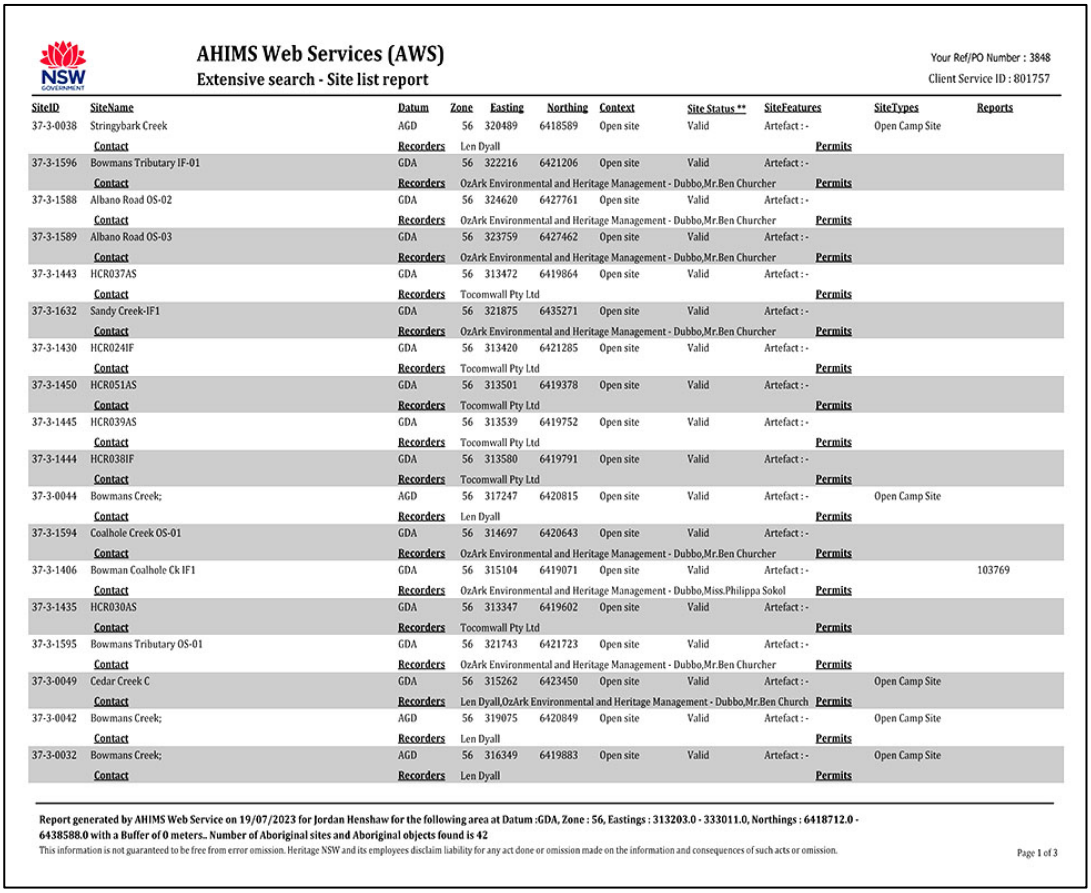
Kovac and Lawrie 1991 — M. Kovac, J.W. Lawrie. 1991. *Soil landscapes of the Singleton 1:250 000 sheet*. Soil Conservation Service of NSW.

OEH 2011 — Office of Environment and Heritage. 2011. *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales*.

OzArk 2022 — OzArk Environment & Heritage. 2022. *Revised Aboriginal Cultural Heritage Assessment Report.* Report to: James Bailey and Associates on behalf of Epuron Projects Pty Ltd.

Tocomwall 2017 — Tocomwall Pty Ltd. 2017. *Hillcrest Aboriginal Cultural Values Assessment Report*. Report to Glencore Coal Assets Australia.

APPENDIX 1: AHIMS SEARCH RESULTS



AHIMS Web Services (AWS)
Extensive search - Site list report

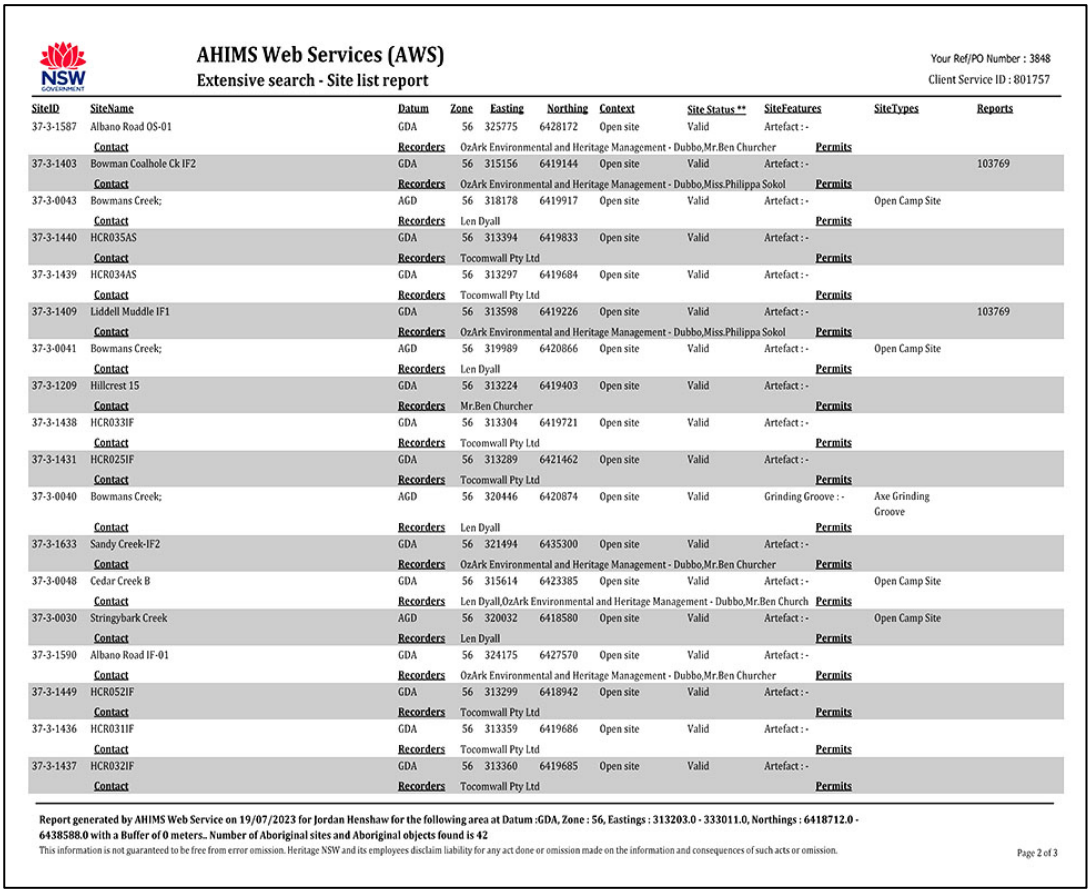
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Client Service ID : 801757

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
37-3-0038	Stringybark Creek	AGD	56	320489	6418589	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	Recorders	Len Dyall					Permits		
37-3-1596	Bowmans Tributary IF-01	GDA	56	322216	6421206	Open site	Valid	Artefact : -		
	Contact	Recorders	OzArk Environmental and Heritage Management - Dubbo,Mr.Ben Churcher					Permits		
37-3-1588	Albano Road OS-02	GDA	56	324620	6427761	Open site	Valid	Artefact : -		
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37-3-1589	Albano Road OS-03	GDA	56	323759	6427462	Open site	Valid	Artefact : -		
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37-3-1443	HCR037AS	GDA	56	313472	6419864	Open site	Valid	Artefact : -		
	Contact	Recorders	Tocomwall Pty Ltd					Permits		
37-3-1632	Sandy Creek-IF1	GDA	56	321875	6435271	Open site	Valid	Artefact : -		
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37-3-1430	HCR024IF	GDA	56	313420	6421285	Open site	Valid	Artefact : -		
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37-3-1450	HCR051AS	GDA	56	313501	6419378	Open site	Valid	Artefact : -		
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37-3-1445	HCR039AS	GDA	56	313539	6419752	Open site	Valid	Artefact : -		
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37-3-1444	HCR038IF	GDA	56	313580	6419791	Open site	Valid	Artefact : -		
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37-3-0044	Bowmans Creek;	AGD	56	317247	6420815	Open site	Valid	Artefact : -	Open Camp Site	
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37-3-1594	Coalhole Creek OS-01	GDA	56	314697	6420643	Open site	Valid	Artefact : -		
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37-3-1406	Bowman Coalhole Ck IF1	GDA	56	315104	6419071	Open site	Valid	Artefact : -		103769
	Contact	Recorders	OzArk Environmental and Heritage Management - Dubbo,Miss.Philippa Sokol					Permits		
37-3-1435	HCR030AS	GDA	56	313347	6419602	Open site	Valid	Artefact : -		
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37-3-1595	Bowmans Tributary OS-01	GDA	56	321743	6421723	Open site	Valid	Artefact : -		
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37-3-0049	Cedar Creek C	GDA	56	315262	6423450	Open site	Valid	Artefact : -	Open Camp Site	
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37-3-0042	Bowmans Creek;	AGD	56	319075	6420849	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	Recorders	Len Dyall					Permits		
37-3-0032	Bowmans Creek;	AGD	56	316349	6419883	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	Recorders	Len Dyall					Permits		

Report generated by AHIMS Web Service on 19/07/2023 for Jordan Henshaw for the following area at Datum :GDA, Zone : 56, Eastings : 313203.0 - 333011.0, Northings : 6418712.0 - 6438588.0 with a Buffer of 0 meters.. Number of Aboriginal sites and Aboriginal objects found is 42

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Extensive search - Site list report

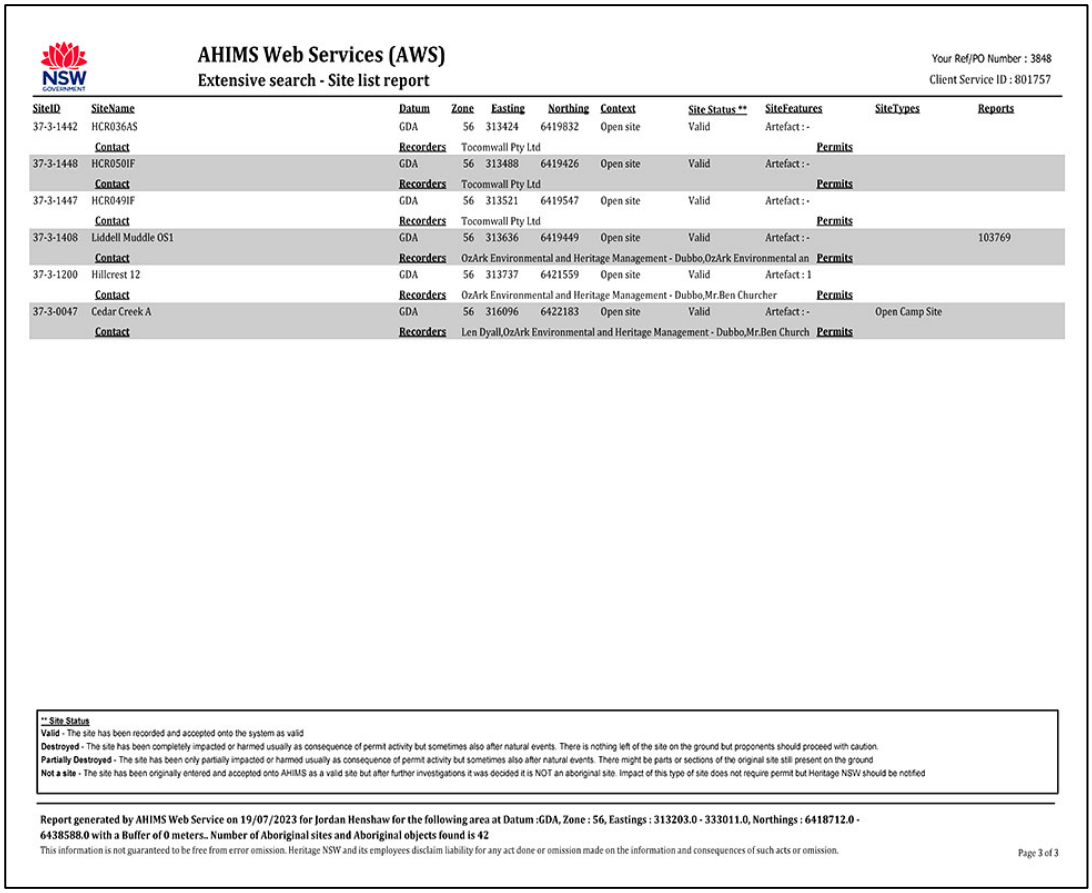
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Client Service ID : 801757

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37-3-1403	Bowman Coalhole Ck IF2	GDA	56	315156	6419144	Open site	Valid	Artefact : -		103769
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37-3-1440	HCR035AS	GDA	56	313394	6419833	Open site	Valid	Artefact : -		
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37-3-1439	HCR034AS	GDA	56	313297	6419684	Open site	Valid	Artefact : -		
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37-3-1409	Liddell Muddle IF1	GDA	56	313598	6419226	Open site	Valid	Artefact : -		103769
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37-3-0041	Bowmans Creek;	AGD	56	319989	6420866	Open site	Valid	Artefact : -	Open Camp Site	
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37-3-1209	Hillcrest 15	GDA	56	313224	6419403	Open site	Valid	Artefact : -		
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37-3-1438	HCR033IF	GDA	56	313304	6419721	Open site	Valid	Artefact : -		
	Contact	Recorders	Tocomwall Pty Ltd					Permits		
37-3-1431	HCR025IF	GDA	56	313289	6421462	Open site	Valid	Artefact : -		
	Contact	Recorders	Tocomwall Pty Ltd					Permits		
37-3-0040	Bowmans Creek;	AGD	56	320446	6420874	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	
	Contact	Recorders	Len Dyall					Permits		
37-3-1633	Sandy Creek-IF2	GDA	56	321494	6435300	Open site	Valid	Artefact : -		
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37-3-0048	Cedar Creek B	GDA	56	315614	6423385	Open site	Valid	Artefact : -	Open Camp Site	
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37-3-0030	Stringybark Creek	AGD	56	320032	6418580	Open site	Valid	Artefact : -	Open Camp Site	
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37-3-1590	Albano Road IF-01	GDA	56	324175	6427570	Open site	Valid	Artefact : -		
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37-3-1449	HCR052IF	GDA	56	313299	6418942	Open site	Valid	Artefact : -		
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37-3-1436	HCR031IF	GDA	56	313359	6419686	Open site	Valid	Artefact : -		
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37-3-1437	HCR032IF	GDA	56	313360	6419685	Open site	Valid	Artefact : -		
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Report generated by AHIMS Web Service on 19/07/2023 for Jordan Henshaw for the following area at Datum :GDA, Zone : 56, Eastings : 313203.0 - 333011.0, Northings : 6418712.0 - 6438588.0 with a Buffer of 0 meters.. Number of Aboriginal sites and Aboriginal objects found is 42

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Extensive search - Site list report

Your Ref/PO Number : 3848
Client Service ID : 801757

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37-3-1447	HCR049IF	GDA	56	313521	6419547	Open site	Valid	Artefact : -		
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37-3-1408	Liddell Muddle OS1	GDA	56	313636	6419449	Open site	Valid	Artefact : -		103769
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37-3-1200	Hillcrest 12	GDA	56	313737	6421559	Open site	Valid	Artefact : 1		
	Contact	Recorders	OzArk Environmental and Heritage Management - Dubbo,Mr.Ben Churcher					Permits		
37-3-0047	Cedar Creek A	GDA	56	316096	6422183	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	Recorders	Len Dyall,OzArk Environmental and Heritage Management - Dubbo,Mr.Ben Church					Permits		

** Site Status
Valid - The site has been recorded and accepted onto the system as valid
Destroyed - The site has been completely impacted or harmed usually as consequence of permit activity but sometimes also after natural events. There is nothing left of the site on the ground but proponents should proceed with caution.
Partially Destroyed - The site has been only partially impacted or harmed usually as consequence of permit activity but sometimes also after natural events. There might be parts or sections of the original site still present on the ground
Not a site - The site has been originally entered and accepted onto AHIMS as a valid site but after further investigations it was decided it is NOT an aboriginal site. Impact of this type of site does not require permit but Heritage NSW should be notified

Report generated by AHIMS Web Service on 19/07/2023 for Jordan Henshaw for the following area at Datum :GDA, Zone : 56, Eastings : 313203.0 - 333011.0, Northings : 6418712.0 - 6438588.0 with a Buffer of 0 meters.. Number of Aboriginal sites and Aboriginal objects found is 42

This information is not guaranteed to be free from error omission. Heritage NSW and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.

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