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New England Renewable Energy Zone Network Infrastructure Project

Environmental Impact Statement

Final

October 2026



Acknowledgement of Country

The Energy Corporation of New South Wales acknowledges that it stands on Aboriginal land. We acknowledge the Traditional Custodians of the land and we show our respect for Elders past and present through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

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Document Status

EIS Rev No.	Reviewer	Date	Approved	Date
Final	Amanda Antcliff	2 October 2026	John Merrell	2 October 2026

EIS Declaration

Project Details	
Project name	New England Renewable Energy Zone Network Infrastructure Project
Application number	SSI-74175972 EPBC-2025/10405
Address of the land on which the infrastructure is to be carried out	Between the New England REZ (north west of Armidale) to Bayswater Power Station (south of Muswellbrook) and is located across the Local Government Areas of Armidale Shire, Uralla Shire, Tamworth Regional, Walcha Shire, Liverpool Plains Shire, Upper Hunter Shire, Muswellbrook Shire and Singleton.
Proponent Details	**Proponent Details**
Proponent name	Energy Corporation of NSW
ABN	13 495 767 706
Proponent address	GPO Box 5469, Sydney NSW 2001

Details of person(s) by whom this EIS was prepared		
Name	Amanda Antcliff	Daniel Sullivan
Address	Umwelt (Australia) Pty Ltd, 75 York Street, Teralba NSW 2284	Umwelt (Australia) Pty Ltd, 75 York Street, Teralba NSW 2284
Professional qualifications	Bachelor of Environmental Science, University of Newcastle Graduate Diploma, Urban and Regional Planning, University of New England Registered Planner, Planning Institute of Australia (PIA) Registered Environmental Assessment Practitioner (REAP) (PIA)	Bachelor of Environmental Science, University of Newcastle Certified Environmental Practitioner (CEnvP) & CEnvP – Impact Assessment Specialist, Environment Institute of Australia and New Zealand (EIANZ) Registered Environmental Assessment Practitioner (REAP) (EIANZ)

Declaration by registered environmental assessment practitioner	
Name	John Merrell
Registration number	R80008
Organisation registered with	EIANZ
Address	Umwelt (Australia) Pty Ltd 75 York Street, Teralba NSW 2284
Professional qualifications	Bachelor of Environmental Science, University of Newcastle Certified Environmental Practitioner (CEnvP) & CEnvP – Impact Assessment Specialist, Environment Institute of Australia and New Zealand (EIANZ)
Declaration	The undersigned declares that this EIS: • has been prepared in accordance with the Environmental Planning and Assessment Regulation 2021 • contains all available information relevant to the environmental assessment of the development, activity or infrastructure to which the EIS relates • does not contain information that is false or misleading • addresses the Planning Secretary's environmental assessment requirements (SEARs) for the project • identifies and addresses the relevant statutory requirements for the project, including any relevant matters for consideration in environmental planning instruments • has been prepared having regard to the Department's State Significant infrastructure Guidelines - Preparing an Environmental Impact Statement • contains a simple and easy to understand summary of the project as a whole, having regard to the economic, environmental and social impacts of the project and the principles of ecologically sustainable development • contains a consolidated description of the project in a single chapter of the EIS • contains an accurate summary of the findings of any community engagement • contains an accurate summary of the detailed technical assessment of the impacts of the project as a whole.
Signature	
Date	2 October 2026

Project Terminology

Term	Definition
access track	Temporary and permanent access tracks from the public road network to the transmission line corridor, energy hubs and temporary construction areas, not including public roads.
ancillary infrastructure	Infrastructure necessary for the construction and operation of the project other than the key project infrastructure of transmission lines and energy hubs. Ancillary infrastructure includes but is not limited to: maintenance facilities, access tracks and public road works, upgrade and / or augmentation of existing electricity and utility infrastructure, installation and operation of communication infrastructure and facilities, optical repeater stations, workforce accommodation camps and construction ancillary sites.
bulk corridor	The bulk corridor refers to the section of the alignment containing the dual 500 kilovolt (kV) transmission lines extending from the Central- South Hub to the Bayswater Power Station substation, which facilitates connection of the New England Renewable Energy Zone to the National Electricity Market to the south of Muswellbrook.
Community and Employment Benefit Program	A program being established by EnergyCo to provide funding for community projects and benefits through grants, government partnerships and direct delivery. The program would be funded by access fees, which are paid by energy generation and storage developers who connect to the project.
construction ancillary sites	Temporary facilities used to support project construction, which may include workforce accommodation camps, site offices and amenities; concrete batch plants; crushing, grinding and screening plant; high volume laydown areas and helicopter landing pads.
Consumer Trustee	The *Electricity Infrastructure Investment Act 2020* (NSW) (EII Act) establishes the NSW Consumer Trustee as an independent statutory role with various planning, advisory and procurement functions which oversees the long-term financial interests of NSW electricity customers to improve the affordability, reliability, security and sustainability of electricity supply. Australian Energy Market Operator services, as the NSW Consumer Trustee, runs competitive tenders for Long-Term Energy Services Agreements and Renewable Energy Zone Access Rights to support investment, construction and operation of renewable energy generation and long duration storage infrastructure in NSW.
dewatering	Any activity that involves the removal of ponded stormwater or infiltrated groundwater from any location on the construction site and the subsequent reuse, discharge or disposal including by re-injection of that water.

Term	Definition
disturbance footprint	An estimation of the likely magnitude of the area that would be directly impacted by the construction of the project, including (but not limited to) transmission towers and easement clearing, the energy hubs, access tracks to and along the easements and to the energy hubs, public road works, and ancillary sites and infrastructure. The disturbance footprint has been used to inform the impact assessment in this EIS and will be finalised as part of the detailed design and project implementation process. The management of design refinements and change is discussed in Section 6 of the EIS.
double circuit steel tower transmission line	Transmission lines which typically comprise 3 sets of conductors along with earthing and communication wires, carried on a single tower set. For 500 kV and 330 kV transmission lines, each conductor typically comprises 2 conductor cables (that is, 6 conductors in total carried on a single tower).
dual transmission lines	A pair of transmission lines running parallel to each other.
easement	A legal property right attached to a parcel of land that enables the use of an identified part of the land by a third party other than the owner. For transmission lines, an easement defines the corridor area where the lines are located and that allows access, construction, operation and maintenance work to take place.
easement affected receiver	A receiver (dwelling) located on a private landholding within which the project transmission line easement is located.
enabling works	Enabling works are activities that are required to be carried out early in the overall construction program such as site establishment and operation of construction ancillary facilities including workforce accommodation facilities and related access tracks and road improvements. Enabling works may be carried out prior to the formal commencement of main construction works as they would be of minor and low impact and typically not involve impact to features of high environmental or heritage significance or result in significant amenity impacts to nearby receivers.
energy hub	A substation or switching station where energy exported from renewable energy generation projects is aggregated, transformed to 500 kV (where required) and exported to the transmission network.
EnergyCo	The Energy Corporation of New South Wales constituted by section 7 of the *Energy and Utilities Administration Act 1987* as the NSW Government statutory authority responsible for the delivery of NSW's Renewable Energy Zones.

Term	Definition
habitat connectivity corridor	Habitat connectivity corridors are located where the transmission lines would span a watercourse or gully, and where no infrastructure or construction work is proposed. Vegetation (and associated habitat corridor function) would be retained in full, for the width of the transmission easement. Indicative locations of habitat connectivity corridors have been identified in the EIS based on the reference design and will be further refined as the project progresses to the detailed design stage.
Network Operator	As defined in Section 5 of the EII Act. Refers to a private entity appointed by EnergyCo to design, finance, build, operate and maintain the project.
New England Renewable Energy Zone	Formally declared on 17 December 2021 under the EII Act. A geographic area of approximately 15,500 km^2 centred by Armidale and Guyra, extending west to Bendemeer, east between Walcha and Yarrowitch, to Nowendoc in the south and Deepwater in the north. This REZ is intended to combine renewable energy generation, storage and high voltage transmission infrastructure to deliver energy to electricity consumers.
no-impact area	An area within or proximate to the project area in which no disturbance is proposed to occur. No-impact areas are designated to avoid impact to areas of environmental, cultural, or ecological sensitivity.
operation	The carrying out of the project upon completion of construction, but does not include commissioning trials of equipment or use of temporary facilities. Note: there may be overlap between the carrying out of construction and operation if the phases of the project are staged. Commissioning trials of equipment and the temporary use of any part of the project are within the definition of construction.
operational area	An indicative area within the project area that is based on the elements of the reference design that are relevant to the operational phase of the project such as the operational transmission line easement, energy hubs, permanent access tracks, substation extension area, maintenance facility and other permanent ancillary infrastructure. This area has been developed to provide more refined estimates of the amount of land that would be affected by the project during operation.
operational footprint	An estimate of the area that would be directly occupied by permanent infrastructure elements of the project based on the reference design such as substations, switching stations, transmission line towers, maintenance facility and other permanent ancillary infrastructure. This footprint excludes transmission line easements.
project area	The project area represents the area within which the construction and operation of the project would occur and provides flexibility for the final siting of project infrastructure and disturbance footprint. Final siting of the infrastructure and disturbance footprint can move within the assessed project area subject to recommended environmental management measures and avoidance of identified 'no-impact' areas.

Term	Definition
reference design	The project design detailing key components and technical parameters for the transmission lines, energy hubs, ancillary infrastructure and access tracks. The reference design has been used to determine the disturbance footprint, operational area and operational footprint, inform the project area and provide a basis for the environmental assessment of the project. The reference design will be further refined as the project progresses to the detailed design stage.
Renewable Energy Zone	A geographic area with high-quality variable renewable energy resources (such as wind and solar), suitable topography and land use designations for development, and demonstrated interest from project developers. Renewable Energy Zones are identified and declared by the NSW Government.
stringing sites	Areas used to support stringing of the transmission lines. These sites are required at regular intervals along the transmission lines and would be located within the construction area. Stringing sites may contain a range of plant and equipment including conductors, winches, cable drums and tensioners and concrete anchor blocks. Stringing sites are also referred to as brake and winch sites.
substation	A facility used to increase or decrease voltages between incoming and outgoing transmission lines (e.g. 330 kV to 500 kV).
switching station	A facility used to connect 2 or more distinct transmission lines of the same designated voltage.
the project	The New England REZ network infrastructure project as described in this EIS, consisting of new 500 kV and 330 kV transmission lines and related infrastructure to facilitate construction and operation of the project, that would allow renewable energy generators and storage projects in the New England REZ to connect to the NEM.
transport routes	The routes on the public road network that would be used by vehicles associated with the project. It does not include access tracks. These transport routes are also known as construction access routes.
transposition location	Locations along a transmission line where the conductors are intentionally rearranged to balance electrical characteristics and improve transmission reliability. These locations typically involve additional transmission line towers and slightly wider easements to facilitate the rearrangement.
workforce accommodation camps	Areas containing temporary accommodation and associated living facilities that would be constructed and operated during the construction phase to house the construction workforce.

Abbreviations

Term	Definition
ABS	Australian Bureau of Statistics
ACHA	Aboriginal Cultural Heritage Assessment
ACHMP	Aboriginal Cultural Heritage Management Plan
AEC	Area of Environmental Concern
AEMO	Australian Energy Market Operator
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
AIA	Aviation Impact Assessment
ANZECC	Australian and New Zealand Environment Conservation Council
ANZG	Australian and New Zealand Guidelines
APZ	Asset Protection Zone
ARTC	Australian Rail Track Corporation
ASS	Acid Sulfate Soils
ASSMP	Acid Sulfate Soils Management Plan
AQIA	Air Quality Impact Assessment
BAL	Bushfire Attack Level
BAM	Biodiversity Assessment Method
BAM-C	Biodiversity Assessment Method Calculator
BDAR	Biodiversity Development Assessment Report
BESS	Battery Energy Storage System
BFRMP	Bush Fire Risk Management Plan
BMP	Biodiversity Management Plan
BIMS	Biodiversity Impact Monitoring Strategy

Term	Definition
BOM	Bureau of Meteorology
BOS	Biodiversity Offset Strategy
BSA	Biodiversity Stewardship Agreement
BSAL	Biophysical Strategic Agricultural Land
BTEXN	Benzene, toluene, ethylbenzene, xylene and naphthalene
CASA	Civil Aviation Safety Authority
CATI	Computer Assisted Telephone Interview
CEBP	Community and employment benefit program
CEMP	Construction Environmental Management Plan
CHL	Commonwealth Heritage List
CIA	Cumulative Impact Assessment
CIC	Critical Industry Cluster
CMT	Culturally Modified Tree
CNVG	Construction Noise and Vibration Guideline
CPHR	Conservation Programs, Heritage and Regulation division of DCCEEW (NSW)
COPC	Contaminants of Potential Concern
CRN	Country Regional Network
CSEP	Community and Stakeholder Engagement Plan
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSSI	Critical State Significant Infrastructure
CVA	Cultural Values Assessment
DA	Development application
dBA	A-weighted decibels
DCCEEW (NSW)	Department of Climate Change, Energy, the Environment and Water (NSW)
DCCEEW (Cth)	Department of Climate Change, Energy, the Environment and Water (Commonwealth)
DMP	Dewatering Management Plan
DPHI	Department of Planning, Housing and Infrastructure (NSW)
DPI	Department of Primary Industries (NSW) (former)

Term	Definition
DPIRD	Department of Primary Industries and Regional Development (NSW)
ENM	Excavated Natural Materials
EII Act	*Electricity Infrastructure Investment Act 2020* (NSW)
EIS	Environmental Impact Statement
EMF	Electric and Magnetic Field
EMI	Electromagnetic interference
EnergyCo	Energy Corporation of NSW
EP	Emergency Plan
EP&A Act	*Environmental Planning and Assessment Act 1979 (NSW)*
EPA	NSW Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999 (Cth)*
EPI	Environmental Planning Instrument
EPL	Environment Protection Licence
ESCP	Erosion and Sediment Control Plan
ESD	Ecologically Sustainable Development
EWMS	Environmental Work Method Statements
FCNSW	Forestry Corporation NSW
FM Act	*Fisheries Management Act 1994* (NSW)
FTE	Full Time Equivalent
GDE	Groundwater Dependent Ecosystems
GHG	Greenhouse Gas
GPS	Global Positioning System
GW	Gigawatts
GWIA	Groundwater Impact Assessment
GWMP	Groundwater Management Plan
ha	Hectare
HHIA	Historical Heritage Impact Assessment
HHRF	Historical Heritage Recording Forms

Term	Definition
HHMP	Historical Heritage Management Plan
HTP	Hunter Transmission Project
HV	High Voltage
IAQM	Institute of Air Quality Management
IBRA	Interim Biogeographic Regionalisation for Australia
ICNG	Interim Construction Noise Guideline
ICNIRP	International Commission for Non-Ionizing Radiation Protection
ICOMOS	International Council on Monuments and Sites
IIOR	Infrastructure Investment Objectives Report
IO	Input-Output
IS	Infrastructure Sustainability
ISP	Integrated System Plan
KFH	Key Fish Habitat
km	Kilometre
km/h	Kilometres per hour
kV	Kilovolt
LALC	Local Aboriginal Land Council
LCVIA	Landscape Character and Visual Impact Assessment
LCZ	Landscape Character Zone
LED	Light Emitting Diode
LEP	Local Environmental Plan
LGA	Local Government Area
LiDAR	Light Detection and Ranging
LLS	Local Land Services
LoS	Level of Service
LSALT	Lowest Safe Altitudes
LSC	Land and Soil Capability
LUCRA	Land Use Conflict Risk Assessment

Term	Definition
m	Metre
mbgl	Metres below ground level
MCA	Multi-Criteria Analysis
MIC	Maximum Instantaneous Charge
ML	Megalitre
MNES	Matters of National Environmental Significance
Mt	Million tonnes
MW	Megawatts
NBN	National Broadband Network
NDC	Nationally Determined Contribution
NEM	National Electricity Market
NEPM	National Environmental Protection Measures
NHL	National Heritage List
NHVR	National Heavy Vehicle Regulator
NIS	Network Infrastructure Strategy
NLP	Newcastle Logistics Precinct
NOA	Naturally Occurring Asbestos
NML	Noise Management Level
NPfI	Noise Policy for Industry
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
NPWS	National Parks and Wildlife Service
NSW	New South Wales
NVBMP	Noise, Vibration and Blast Management Plan
NVIA	Noise and Vibration Impact Assessment
OCP	Organochlorine pesticide
OEMP	Operational Environmental Management Plan
OJD	Ovine Johne's Disease
OLS	Obstacle Limitation Surface

Term	Definition
OOH	Out of Hours
OPP	Organophosphate pesticides
OSOM	Over Size and Over Mass
PAD	Potential Archaeological Deposit
PAH	Polycyclic aromatic hydrocarbons
PASS	Potential Acid Sulfate Soil
PANS-OPS	Procedures for Air Navigation Services - Aircraft Operations
PBP	Planning for Bush Fire Protection 2019
PCB	Polychlorinated biphenyl
PCT	Plant Community Type
PFAS	Per- and Polyfluoroalkyl Substances
PM	Particulate Matter
PMF	Probable Maximum Flood
PMST	Protected Matters Search Tool
PNTL	Project Noise Trigger Levels
POEO Act	*Protection of the Environment Operations Act 1997* (NSW)
PPV	Peak Particle Velocity
PSN	Public Safety Network
RAP	Registered Aboriginal Party
REZ	Renewable Energy Zone
RFS	NSW Rural Fire Service
RNP	Road Noise Policy
SAII	Serious and Irreversible Impact
SAL	Suburb and Locality
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SES	State Emergency Services
SFPP	Special Fire Protection Purpose

Term	Definition
SHR	State Heritage Register
SIA	Social Impact Assessment
SIM Plan	Social Impact Management Plan
SIS	State Infrastructure Strategy
SODA	Strategic Offset Delivery Agreement
SRLUP	Strategic Regional Land Use Policy
SSI	State Significant Infrastructure
SWA	Surface Water Assessment
SWMP	Soil and Water Management Plan
SVTM	State Vegetation Type Mapping
TEC	Threatened Ecological Community
TfNSW	Transport for NSW
TRH	Total recoverable hydrocarbons
TSR	Travelling Stock Reserve
TTIA	Traffic and Transport Impact Assessment
TTMP	Traffic and Transport Management Plan
UCFP	Unexpected Contamination Finds Plan/Procedure
UHF	Ultra High Frequency
UNE	University of New England
UXO	Unexploded Ordnance
VENM	Virgin Excavated Natural Materials
VHF	Very High Frequency
VOC	Volatile organic compounds
WAL	Water Access Licence
WHS	Work Health and Safety
WM Act	*Water Management Act 2000* (NSW)
WMP	Waste Management Plan
WSP	Water Sharing Plan

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EIS Appendices

Appendix A: SEARs checklist
Appendix B: Route options and avoidance paper
Appendix C: Road and intersection treatments and schedule of utility adjustments and crossings
Appendix D: Statutory compliance table
Appendix E: Engagement outcomes
Appendix F: Summary of management and mitigation measures

Technical Reports

Technical Report 1: Biodiversity Development Assessment Report
Technical Report 2: Aboriginal Cultural Heritage Assessment
Technical Report 3: Historical Heritage Impact Assessment
Technical Report 4: Social Impact Assessment
Technical Report 5: Landscape Character and Visual Impact Assessment

Technical Report 6: Agriculture Impact Assessment
Technical Report 7: Traffic and Transport Impact Assessment
Technical Report 8: Economic Assessment
Technical Report 9: Noise and Vibration Assessment
Technical Report 10: Preliminary Risk Screening
Technical Report 11: Aviation Impact Assessment
Technical Report 12: Bushfire Risk Assessment
Technical Report 13: Electric and Magnetic Field Study (including Telecommunications)
Technical Report 14: Surface Water Assessment
Technical Report 15: Flooding Assessment
Technical Report 16: Groundwater Impact Assessment
Technical Report 17: Air Quality Impact Assessment
Technical Report 18: Greenhouse Gas Assessment
Technical Report 19: Contamination Assessment
Technical Report 20: Anthrax Assessment
Technical Report 21: Equine Health Assessment
Technical Report 22: Equine Critical Industry Cluster Assessment.

Introduction



Section 1

1 Introduction

This Environmental Impact Statement (EIS) has been prepared for the New England Renewable Energy Zone Network Infrastructure Project (the project). It describes the project, assesses its environmental, social and economic impacts, and identifies appropriate mitigation and management measures to address potential impacts during construction and operation. The EIS will inform the determination of the project by the NSW Minister for Planning and Public Spaces and the Commonwealth Minister for the Environment and Water.

1.1 Background

The NSW energy system is undergoing a once-in-a-generation transformation as the State moves from reliance on coal-fired power to renewable energy to meet its daily needs. Coal-fired power stations currently provide most of NSW's electricity supply as well as the firming capacity that keeps the grid stable during peak periods such as summer heat waves. Most of these power stations are reaching the end of their life and are due to shut in the next 10 years. At the same time, electricity demand in NSW is increasing as the population grows and there is increased use of electricity in vehicles, homes, businesses and industry. This means NSW needs new electricity supply and associated infrastructure urgently.

The NSW Government has developed the NSW Electricity Infrastructure Roadmap (DPIE, 2020a) (the Roadmap) to transition NSW to a cleaner future and ensure this new supply of electricity can be reliably distributed to consumers. EnergyCo is responsible for coordinating the delivery of the Roadmap.

Renewable Energy Zones (REZs) are the centrepiece of the Roadmap. The Roadmap's supporting legislation, the *Electricity Infrastructure Investment Act 2020* (EII Act), has declared 5 REZs in the Central West, New England, South-West, Hunter-Central Coast and Illawarra regions of NSW. REZs group new renewable energy generation and energy storage systems in locations from which electricity can be transmitted across NSW. These REZs will become modern-day power stations and deliver an intended network capacity of 12 gigawatts (GW). The key features of a REZ are illustrated on Figure 1.1.

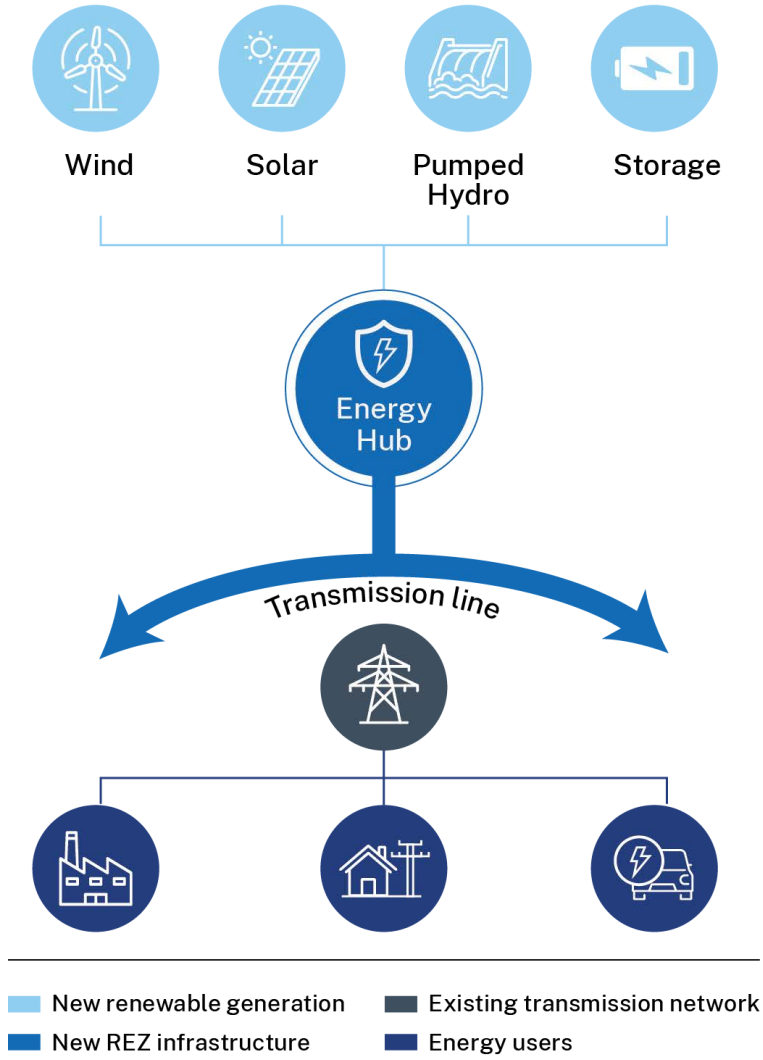


Figure 1.1. Key features of a Renewable Energy Zone

1.2 The New England Renewable Energy Zone

The New England REZ was formally declared on 17 December 2021 and has an intended network transfer capacity of 8 GW. Centrally located between Sydney and Brisbane (refer to Figure 1.2), the New England REZ will provide opportunities to increase NSW's energy resilience in future years.

As NSW's largest REZ (based on network capacity), the establishment of the New England REZ will allow the region to play a pivotal role in supporting energy system reliability and the delivery of inexpensive, clean electricity for homes and businesses. The journey towards more sustainable forms of energy generation will also bring with it significant jobs and investment for the region.

The New England region has a range of attributes that make it an ideal location for a REZ including:

- Some of the best natural energy resources in the country and some of NSW's finest potential sites for pumped-hydro facilities
- Access to existing transmission lines that connect to the NSW east coast, Upper Hunter and Queensland
- Strong generator interest for sustainable energy projects connecting to the transmission network
- The ability to increase NSW's energy resilience



Figure 1.2. New England Renewable Energy Zone

1.3 The project

The project supports the delivery of the New England REZ and has been declared a Critical State Significant Infrastructure (CSSI) project. As the remaining coal-fired power stations close, the project is critical for ensuring energy security in NSW by providing the transmission infrastructure necessary to collect and transfer renewable energy generated within the New England REZ to the existing transmission network at Bayswater Power Station.

EnergyCo has identified 9 key objectives for the project and the New England REZ as a whole, as detailed on Figure 1.3.

The key features of the project are illustrated on Figure 1.4 and include:

- new transmission infrastructure including new dual 500 kilovolt (kV) transmission lines and associated infrastructure to connect the New England REZ to the National Electricity Market (NEM) at the existing Bayswater Power Station
- 5 energy hubs to connect future energy generation and storage projects within the New England REZ to the new 500 kV network infrastructure
- new 500 kV and 330 kV lines to connect to energy hubs within the New England REZ
- a maintenance facility to support the operational requirements of the project
- ancillary development to support the project, including:
  - establishment and/or upgrade of access tracks and upgrades to public roads
  - upgrade and/or augmentation to existing electricity and utility infrastructure
  - installation and operation of communications infrastructure and facilities.
- other construction related works and facilities, such as laydown and staging areas, earthworks material sites with crushing and screening plants, concrete batch plants, stringing sites, helicopter landing pads, site offices and workforce accommodation camps.

Construction is planned to commence in 2028 and is expected to take around 6 years to complete. The project would be energised in 2 stages. Stage 1 would provide 2.4 GW of transfer capacity with an additional 3.6 GW of capacity delivered in Stage 2, for a total transfer capacity of 6 GW[1]. Stage 1 is expected to be energised in 2032 and Stage 2 in 2034.

[1] The project would deliver 6 GW of network transfer capacity. Network transfer capacity is the maximum amount of electricity that the network can safely transfer from renewable energy projects to the NEM at one time. A further 2 GW of transfer capacity may be delivered in the future if needed to meet demand, subject to separate planning approval, noting the intended network capacity of the New England REZ is 8 GW.

ENERGYCO'S OBJECTIVES FOR THE NEW ENGLAND REZ

STRATEGIC

Emissions reduction

Support government emissions reduction targets and the transition of the National Electricity Market from traditional energy sources to lower emission renewable energy generation and storage.

Network resilience

Improve energy security and reliability by connecting new large scale renewable energy generation and storage projects to the National Electricity Market.

Value for money

Deliver the REZ in a way that protects the long-term financial interests of NSW energy consumers and helps improve the affordability of the energy supply through lower generation costs and increased competition.

Private investment

Encourage the development of viable grid-scale renewable energy projects in the REZ and reduce barriers to investment.

DELIVERY

Stakeholder coordination

Work collaboratively with generators, government and other stakeholders to coordinate the delivery of the REZ in a way that minimises impacts to local communities.

Community

Carry out meaningful engagement with landowners, communities and stakeholder groups, including Aboriginal and Torres Strait Islander communities.

Environment and land use

Protect natural and cultural resources through the planning and delivery of the REZ and minimise impacts to biodiversity, heritage, high value agricultural land and other sensitive land uses.

Jobs, skills and supply chain

Encourage local participation and deliver long-term benefits for regional communities through employment, training and supplier opportunities.

Safety

Protect the safety of workers and communities during construction and operation through a robust safety culture and policy framework.

Figure 1.3. EnergyCo's objectives for the New England REZ

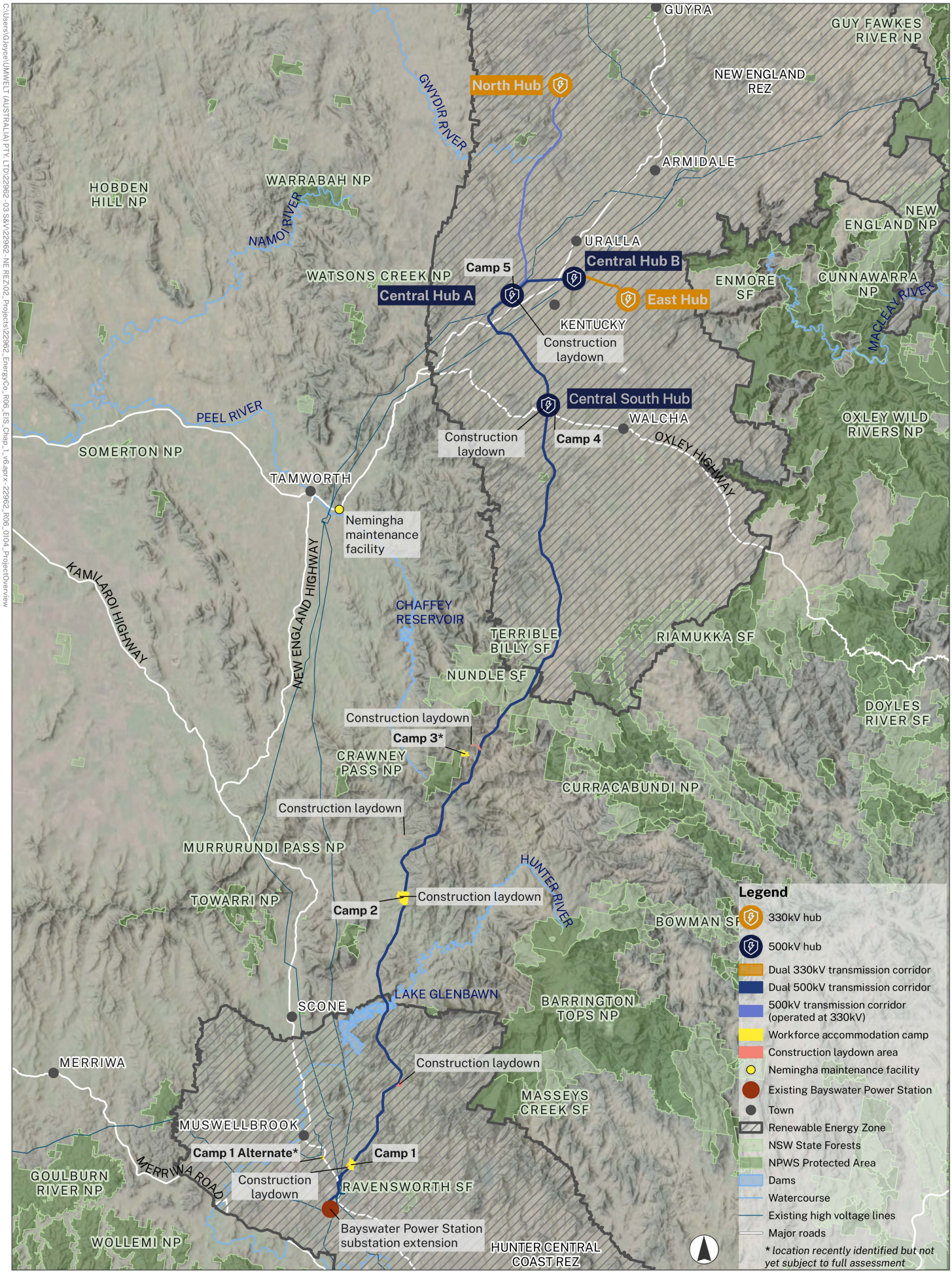


FIGURE 1.4 Project overview

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

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

0 20 40
Kilometres

1.4 Related development

There are a number of other development projects that would be required as a consequence of the project or that are related to it. Examples of these types of development projects include:

- generation and storage projects which would connect to the project
- other flow on developments associated with the development of the New England REZ (such as change to existing transmission infrastructure).

Given the nature of the project, and its purpose to facilitate connections between renewable energy hubs and the electricity grid, there are also development projects that, while separate from the project, are nevertheless required in order for the project to operate. Examples of this type of development include:

- new and upgraded enabling infrastructure including upgrades to local roads and adjustments and upgrades to public roads between the Port of Newcastle and the REZ to facilitate the movement of over size and/or over mass (OSOM) deliveries – referred to as the Port to REZ program of works
- the Bayswater South switching station that is proposed as part of the Hunter Transmission Project (HTP) and to which one of the project's 500 kV transmission lines would connect.

The development projects outlined above are referred to in this EIS as "related development". Related development projects are subject to separate planning and approval processes. However, where relevant, related development has been considered in the project's cumulative impact assessment (refer to Section 24).

1.5 The proponent

EnergyCo is a NSW Government statutory authority established under the NSW *Energy and Utilities Administration Act 1987*. The role of EnergyCo is to maximise the opportunities created by the transformation of the NSW electricity network by planning the REZs and associated infrastructure across NSW to facilitate coordinated investment in transmission and generation.

EnergyCo is the proponent of the project and is responsible for carrying out detailed planning and design of the project, selecting a network operator for the project, consulting with the local community and key stakeholders, and securing the necessary approvals for the project under the EII Act, NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). EnergyCo's details are provided in Table 1.1.

Table 1.1. Proponent details

Requirement	Proponent Details
Name	Energy Corporation of NSW
ABN	13 495 767 706
Postal Address	GPO Box 5469, Sydney NSW 2001

1.6 Purpose of the EIS

The project requires approval from both the NSW Government and Australian Government before it can proceed. Due to its strategic importance, the NSW Minister for Planning and Public Spaces has declared the project to be CSSI. Accordingly, approval for the project is required under Part 5, Division 5.2 of the EP&A Act.

The project has also been declared a controlled action under the EPBC Act and requires approval from the Commonwealth Minister for the Environment and Water. Under the existing NSW Bilateral Agreement, the NSW Department of Planning, Housing and Infrastructure (DPHI) will coordinate a detailed assessment of the impacts of the project under both the EP&A Act and EPBC Act.

An EIS is required to accompany the CSSI application for the project. The EIS must be prepared in accordance with the Secretary's Environmental Assessment Requirements (SEARs) for the project which were provided by the Secretary of DPHI on 7 April 2026 and included supplementary SEARs from the Australian Government associated with the EPBC Act controlled action declaration. Appendix A provides the SEARs for the project and how they have been addressed in this EIS.

The planning and approval process for the project and other relevant NSW and Commonwealth planning and environmental approvals and how they are applicable to the project are discussed in Section 4.

This EIS has also been prepared with regard to the State Significant Infrastructure Guidelines (DPHI, 2026a), Undertaking Engagement Guidelines for State Significant Projects (DPHI, 2026b), Cumulative Impact Assessment Guidelines for State Significant Projects (DPHI, 2026c) and the NSW Government's Renewable Energy Policy Framework, including the Transmission Guideline: Guidance for State significant transmission infrastructure (DPHI, 2024c).

Relevant technical guidelines considered in each specialist impact assessment are discussed in the technical reports that form attachments to this EIS.

1.7 Structure of the EIS

The structure of this EIS is presented in Table 1.2.

Table 1.2. EIS structure: main report and appendices

Section / Appendix	Description
Executive summary	Provides a summary of the project as a whole including the environmental, social and economic impacts of the project.
Section 1: Introduction	Provides background to the project, an overview of the key project components and outlines the purpose and structure of the EIS.
Section 2: Strategic context	Outlines the strategic context for the project, including the need for and benefits of the project, a summary of the regional context in which the project is located, an overview of the environmental, cultural and social setting, alternatives, route options, and impact avoidance and minimisation measures.

Section / Appendix	Description
Section 3: Project description	Contains a description of the project, including key features of the project, the proposed construction and operational activities.
Section 4: Statutory context	Summarises the relevant Commonwealth and NSW statutory requirements applicable to the environmental assessment and planning approval process for the project.
Section 5: Stakeholder engagement	Discusses engagement undertaken with the community and other stakeholders including government agencies. Outlines how the engagement aims have been addressed, the key issues raised by the community and other stakeholders and where they have been addressed in the EIS, and the proposed approach to ongoing engagement.
Section 6: Assessment approach	Provides an overview of the approach to the assessment of impacts for the project and further information regarding the definition of the project area and disturbance areas used in the impact assessments.
Sections 7 to 24: Assessment of impacts	Contains an analysis of the environmental, social and economic matters relevant to the project and the specialist assessments undertaken for this EIS, including consideration of potential cumulative impacts.
Section 25: Environmental management and mitigation measures	Provides a consolidated summary of the proposed approach to environmental management for the project.
Section 26: Project justification and conclusion	Provides a justification and evaluation for the project, having regard to the environmental, social and economic impacts of the project and the principles of ecologically sustainable development.
References	Provides a list of references used to prepare the EIS.
Appendix A: SEARs checklist	Provides a summary of the SEARs and supplementary SEARs and how they have been addressed in this EIS.
Appendix B: Route options and avoidance paper	Provides a summary of the route options assessment for the project and discusses the selection process for the project as described in this EIS. It also discusses how the proposed design avoids impacts that might otherwise have occurred with alternate designs considered.
Appendix C: Road and intersection treatments and schedule of utility adjustments and crossings	Provides details of the required road and intersection treatments, utility adjustments and crossings associated with the project.
Appendix D: Statutory compliance table	Provides a summary of planning and environment related statutory requirements relevant to the assessment of the project.

Section / Appendix	Description
Appendix E: Engagement outcomes	Provides a consolidated summary of community and stakeholder engagement outcomes.
Appendix F: Summary of management and mitigation measures	Provides a consolidated summary of all environmental mitigation and management measures which would be implemented for the project, consistent with the findings of this EIS and specialist assessments.
Technical Reports 1 to 22	Detailed technical assessment reports for each key environmental, social and economic aspect assessed in this EIS: Technical Report 1: Biodiversity Development Assessment Report Technical Report 2: Aboriginal Cultural Heritage Assessment Technical Report 3: Historical Heritage Impact Assessment Technical Report 4: Social Impact Assessment Technical Report 5: Landscape Character and Visual Impact Assessment Technical Report 6: Agriculture Impact Assessment Technical Report 7: Traffic and Transport Impact Assessment Technical Report 8: Economic Assessment Technical Report 9: Noise and Vibration Assessment Technical Report 10: Preliminary Risk Screening Technical Report 11: Aviation Impact Assessment Technical Report 12: Bushfire Risk Assessment Technical Report 13: Electric and Magnetic Field Study (including Telecommunications) Technical Report 14: Surface Water Assessment Technical Report 15: Flooding Assessment Technical Report 16: Groundwater Impact Assessment Technical Report 17: Air Quality Impact Assessment Technical Report 18: Greenhouse Gas Assessment Technical Report 19: Contamination Assessment Technical Report 20: Anthrax Assessment Technical Report 21: Equine Health Assessment Technical Report 22: Equine Critical Industry Cluster Assessment.

Strategic context



Section 2

2 Strategic context

This section outlines the strategic context for the project as part of the energy transition underway in NSW, demonstrating the critical need for new network infrastructure connecting the New England REZ to the NEM. It describes the relevant Australian and NSW Government policies and targets that the project supports.

This section also describes the regional context for the project, alternatives to the project, the route selection process and avoidance and minimisation measures for the project alignment.

2.1 The energy transition

2.1.1 Overview

The NSW energy system is undergoing a profound structural transformation, shifting from a highly centralised electricity supply model dominated by large coal-fired generators located near metropolitan centres to a more decentralised system based on renewable energy generation, primarily wind, solar and energy storage, located where environmental conditions and resource availability permit. This fundamental shift is reshaping the spatial distribution of electricity generation across NSW and the NEM.

This transition requires substantial investment in transmission infrastructure. The existing transmission network was designed to support a small number of large, centrally located generators and does not have the capacity or geographic reach to accommodate the scale and location of new renewable generation now being developed throughout NSW.

This section outlines the strategic context of the energy transition in NSW in which the project exists, demonstrating the critical need for new network infrastructure connecting the New England REZ to the NEM. The NSW government has confirmed this critical need by determining that the project is CSSI.

2.1.2 Electricity supply and the National Electricity Market

Electricity is produced and delivered to homes and businesses through an interconnected electricity supply system. This is made up of 4 main components:

- **generation** – converting energy from natural sources such as coal, gas, wind or sunlight into electricity. Historically in NSW this has been dominated by coal-fired generators, with more recent growth in renewable generation
- **transmission** – moving electricity from where it is generated (for example a wind farm or power station) to major substations located close to where it will be used. This is done through high voltage transmission lines, including interstate connections that allow electricity to be shared across state boundaries

- **distribution** – moving electricity from substations to consumers through lower voltage distribution lines. Electricity generated from rooftop solar systems can also be exported back into the distribution network
- **retail** – selling electricity via retailers to consumers such as households and businesses.

Electricity supply in NSW operates within the NEM which connects NSW with Queensland, Victoria, South Australia and Tasmania. The NEM consists of both a wholesale electricity market and physical interconnected electricity infrastructure facilitating the exchange of electricity between generators and retailers across the NEM. The NEM is one of the largest electricity systems in the world, consisting of about 40,000 kilometres (km) of transmission lines and distribution network which transport electricity to more than 85 per cent of Australia's population (AEMO, 2026a).

The primary function of the NEM is to ensure that electricity supply and demand are balanced in real time, while maintaining the reliability, security and efficient operation of the power system.

2.1.3 Transitioning to a renewable energy system in NSW

Electricity generation in NSW has been dominated since the late 1960s by a small number of large, coal-fired generators centrally located in the Hunter Valley, Central Coast and Lithgow regions, all in proximity to the major load centres. For several decades up to the early 2010s, coal typically supplied around 80 per cent of electricity generated in NSW and two thirds of the firming capacity[2] required during summer heat waves, reflecting the State's extensive coal resources and dominance of coal-fired generators providing baseload generation within the NEM (NSW Resources, 2019; AEMO, 2023; Australian Energy Statistics).

The share of coal-fired generation in NSW to the NEM has been declining progressively and is predicted to continue to decline due to the staged retirement of ageing coal-fired generators that are reaching the end of their operating lives, and an increasing diversification and decarbonisation of the electricity sector. In 2025, coal contributed around 52 per cent of the generation supply mix to the NEM (AEMO, 2026b) and is forecast to continue to decline (AEMO, 2026b). This reduction is reflective of the permanent closure of Liddell Power Station in April 2023 and the planned closure of NSW's remaining 4 coal-fired generators, with Eraring Power Station scheduled to close by April 2029, Bayswater Power Station and Vales Point B Power Station both expected to close around 2033, and Mount Piper Power Station scheduled to close by 2040 (AEMO, 2026c).

These closures represent the withdrawal of a significant proportion of NSW's existing generation capacity over the coming decades. At the same time, ongoing population growth and the progressive electrification of the transport, residential, commercial and industrial sectors is driving sustained increases in electricity demand. The coordinated and timely delivery of new generation and associated transmission infrastructure is required to meet NSW's future power needs.

[2] Firming capacity refers to the electricity supply that is available to support the electricity system when demand exceeds average levels or when variable renewable generation (such as wind and solar) is low or unavailable. Firming resources do not necessarily operate continuously but are critical to maintain system reliability, security, and resilience, particularly during peak demand periods and extreme weather events.

The speed and scale of NSW's transition from coal-fired generation to renewable energy is identified in the NSW Network Infrastructure Strategy, as illustrated on Figure 2.1[3], which shows that 8.3 GW of capacity from ageing coal-fired generators needs to be replaced by 2040 (EnergyCo, 2023).

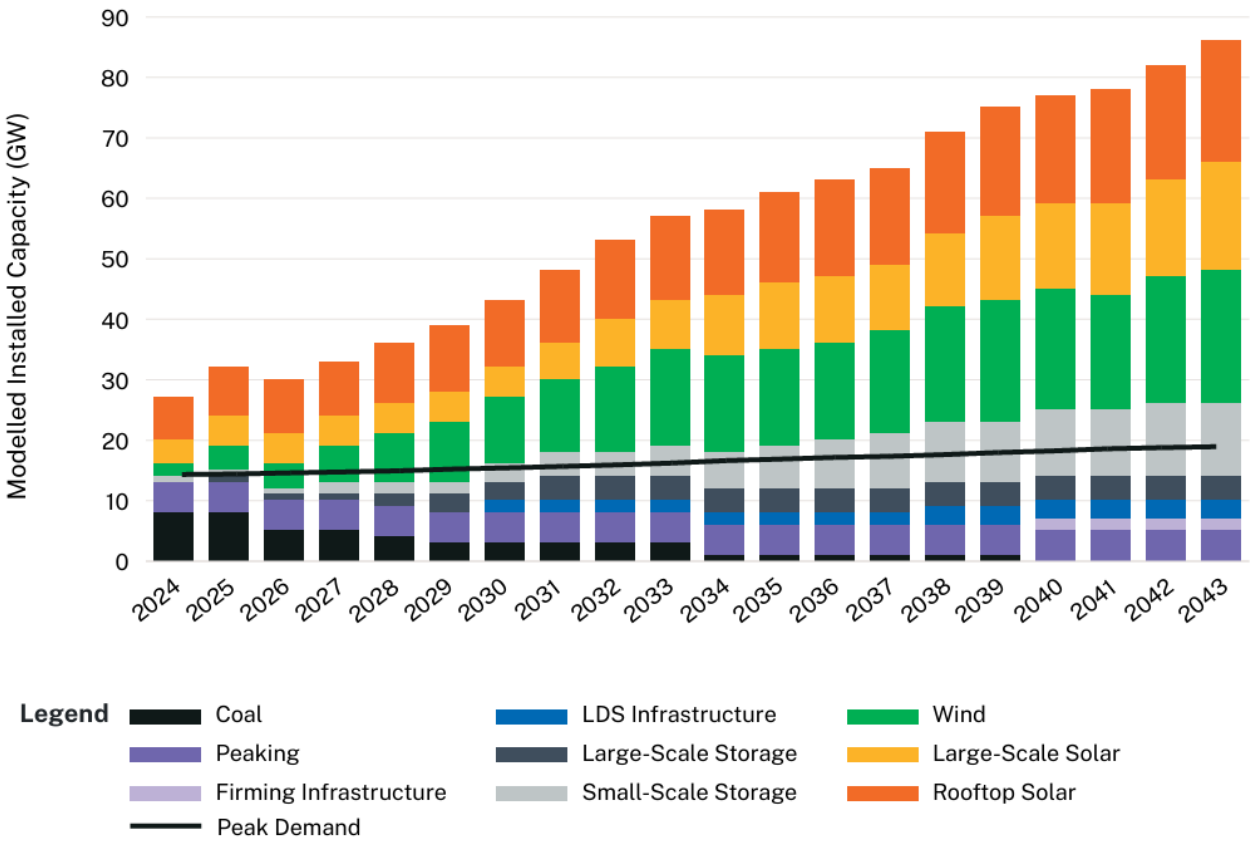


Figure 2.1. Forecast expansion of new NSW generation, storage and firming capacity

In 2020, the Australian and NSW Governments entered into the Energy and Emissions Reduction Agreement committing both governments to jointly invest in energy security, transmission infrastructure and emissions reduction initiatives. These commitments have since been strengthened and expanded through the Australian Government's Rewiring the Nation program, a key focus of which includes the acceleration of the delivery of REZ enabling infrastructure. By connecting multiple renewable energy projects and electricity storage, REZs are planned to capitalise on economies of scale to deliver affordable, reliable and clean electricity for homes and businesses in NSW.

[3] Peaking refers to electricity generation or dispatchable energy resources that are available to operate during periods of high electricity demand or reduced renewable energy output, supporting the reliable operation of the electricity system.

LDS: long duration storage

The NSW Government expects REZs will deliver multiple benefits to NSW, including:



Energy bill savings from reduced wholesale electricity costs



Emissions reduction from a cleaner energy sector



Reliable energy from significant amounts of new energy supply



Host community benefits through strategic planning and best practice engagement and formalised benefit sharing arrangements

The NSW Government has developed the Roadmap with the objective of guiding the transition of the State's electricity system to a cleaner, more reliable and affordable future. The Roadmap responds to the scheduled closure of ageing coal-fired generators and the need to replace this capacity with new sources of electricity generation that are primarily renewable.

As described in Section 1.2, a key component of the Roadmap is the establishment of the New England REZ, which has been identified for its strong wind, solar and hydro resources and its strategic role in supplying new renewable electricity to NSW and the broader NEM. The New England REZ is expected to support the development of large-scale renewable generation and energy storage projects that will contribute significantly to replacing retiring coal-fired generation capacity.

The planned scale of renewable development proposed within the New England REZ exceeds the capacity and geographic reach of the existing transmission network. Accordingly, substantial expansion and upgrading of transmission infrastructure is required to unlock the full potential of the New England REZ, enable the efficient connection of new generation and storage facilities, and transfer electricity from the New England region to the existing transmission network at Bayswater Power Station.

The HTP (refer to Section 1.4) will provide additional transmission capacity between Bayswater Power Station and Olney, enabling electricity from the New England REZ to be transferred to the NEM and major demand centres. Together, the projects form key components of the Roadmap and the State's future 500 kV transmission network.

The coordinated delivery of new and upgraded transmission infrastructure is therefore a critical enabler of the New England REZ and a cornerstone of the Roadmap. The project would support system reliability, investment certainty, regional economic development and the timely delivery of new electricity supply to meet growing demand and emissions reduction objectives.

2.1.4 Net zero emissions targets

Australia is a Party to the Paris Agreement, a legally binding international treaty on climate change adopted in 2015 and entered into force in 2016 under the United Nations Framework Convention on Climate Change. Australia's Nationally Determined Contribution (NDC) under the Paris Agreement includes a long-term commitment to reach net zero greenhouse gas emissions by 2050, supported by progressively stronger interim targets, most recently committing to a 62–70 per cent reduction below 2005 levels by 2035. Under the *Commonwealth Climate Change Act 2022*, the Australian Government has legislated greenhouse gas emission reduction targets of 43 per cent below 2005 levels by 2030 and net zero greenhouse gas emissions by 2050.

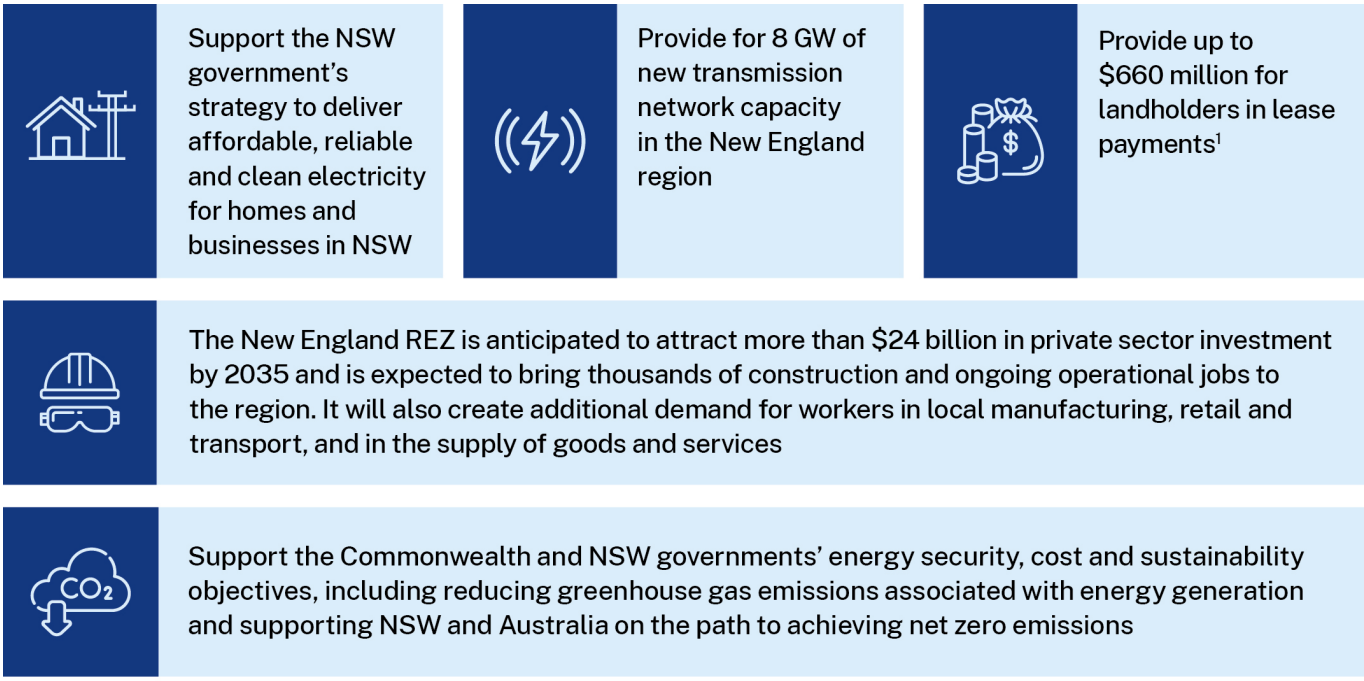
Consistent with this national framework, the NSW Government has established legislated net zero emissions targets committing the State to achieve net zero greenhouse gas emissions by 2050. NSW also has interim targets of reducing emissions by 50 per cent by 2030 and 70 per cent by 2035 (from 2005 levels). Decarbonising electricity is the cornerstone of NSW's net zero strategy. This will occur through the transformation of the electricity sector from one dominated by coal-fired generators to renewable energy generation, development of REZs and major expansion of the transmission network.

As discussed above, new transmission infrastructure is required to connect the REZs to the existing transmission network and is critical to achieving the energy security, cost and sustainability objectives of the Australian and NSW Governments.

As NSW's largest REZ (based on network capacity), and being centrally located between Sydney and Brisbane, the New England REZ will play a pivotal role in the energy transition (AEMO, 2018). The project would directly support the Australian and NSW Governments' net zero greenhouse gas emissions reduction targets by facilitating connection of renewable energy and firming resources, strengthening system resilience and enabling efficient sharing of renewable energy generation across jurisdictions and the NEM.

2.1.5 Benefits of the New England REZ

The project would facilitate the realisation of the major benefits of the New England REZ. In broad terms, the New England REZ will:



[1] NSW Department of Planning, Industry and Environment (DPIE) (2020) NSW Electricity Infrastructure Roadmap

Further detail on the benefits and challenges associated with the delivery of the Roadmap and the New England REZ is provided in Section 2.2 and Section 2.3.

2.1.6 Long-term benefits to NSW electricity consumers

The Central-West Orana REZ, South-West REZ and Hunter-Central Coast REZ will collectively address some of the predicted energy shortfall, particularly in the period to 2030, but the AusEnergy Services Limited (ASL) 2025 Infrastructure Investment Objectives Report shows more generation is needed to replace retiring coal-fired generation and address demand growth (ASL, 2025).

Through comprehensive electricity market modelling, ASL's most recent Infrastructure Investment Objectives Report (ASL, 2025) has determined that an ambitious infrastructure build, with New England REZ as a key element, best serves the long-term financial interests of NSW electricity customers.

Further economic and consumer benefits modelling is being undertaken to assess and support the network infrastructure required for the New England REZ.

To this end, under the EII Act the Consumer Trustee has the function of authorising REZ network infrastructure projects following a recommendation from EnergyCo as Infrastructure Planner. In exercising this function, the Consumer Trustee is required to act independently and in the long-term financial interests of NSW electricity customers and consistent with the objectives of the Act.

2.2 Strategic importance of the project

2.2.1 Project need

The Australian and NSW Governments recognise the strategic importance of the project. Delivery of the project will achieve or support achievement of key strategies in NSW and Commonwealth strategic plans.

The crucial role of transmission infrastructure in the energy transition was recognised by AEMO in its first Integrated System Plan in 2018, with the specific requirement for new transmission infrastructure to support the New England REZ identified in the second Integrated System Plan in 2020. Since then, all major electricity strategic planning reports at Commonwealth and State levels have highlighted the critical need for the project (refer to Section 2.2.2).

The project is critical to unlocking the generation capacity of the New England REZ and:

- is an anticipated project under AEMO's 2026 Integrated System Plan for the transition of the NEM to renewable energy over the next 20 years
- is consistent with Australia's NDC Communication 2025 under the Paris Agreement, facilitating the longer-term transition to low emission energy sources from the New England REZ into the NEM
- is recognised as a critical project for NSW in the 2025 Infrastructure Investment Objectives Report
- is a 'Deliver Now' project under the Network Infrastructure Strategy (EnergyCo, 2023) to support the delivery of the Roadmap.

The project would:

- unlock the potential renewable generation capacity within the New England REZ by providing 6 GW in new transfer capacity to connect renewable generation (wind, solar, hydro and storage) to the NEM
- support energy system reliability and the delivery of inexpensive, clean electricity for homes and businesses in NSW
- allow realisation of the benefits of the New England REZ as outlined in Section 2.1.5.

The project would also provide the following benefits:

- strategic benefit payments to private landholders on which the transmission infrastructure would be located ($200,000 per kilometre of transmission infrastructure to be paid in instalments over 20 years starting from the commencement of operations). These strategic benefit payments are in addition to compensation payable under the *Land Acquisition (Just Terms Compensation) Act 1991*
- estimated average annual economic contributions (including both direct and indirect impacts) during construction including:
  - within the New England region, annual outputs of $632 million, annual value add of $291 million, annual household income of $111 million, and 1,009 jobs

  - within the Upper Hunter region, annual outputs of $250 million, annual value add of $105 million, annual household income of $42 million, and 392 jobs
  - within NSW, annual outputs of $1.27 billion, annual value add of $722 million, annual household income of $218 million, and 2,082 jobs.
- estimated total annual economic contributions (including both direct and indirect impacts) during operations including:
  - within the New England region, annual outputs of $59 million, annual value add of $32 million, annual household income of $6 million, and 47 jobs
  - within the Upper Hunter region, annual outputs of $25 million, annual value add of $13 million, annual household income of $2 million, and 18 jobs
  - within NSW, annual outputs of $187 million, annual value add of $110 million, annual household income of $20 million, and 171 jobs.
- increasing income and employment opportunities for local Aboriginal people under the First Nations Guidelines to the value of at least 1.5 per cent of the contract value of the project
- maximising the employment of locals and the purchase of local goods and services
- supporting the wider regional community benefits of the New England REZ development, including the Community and Employment Benefit Program.

2.2.2 Project consistency with Government policy framework

The Australian and NSW Governments have developed a detailed policy framework for achieving net-zero emissions by 2050 through renewable energy generation. The project is consistent with the Commonwealth and NSW strategic policy framework supporting the energy transition.

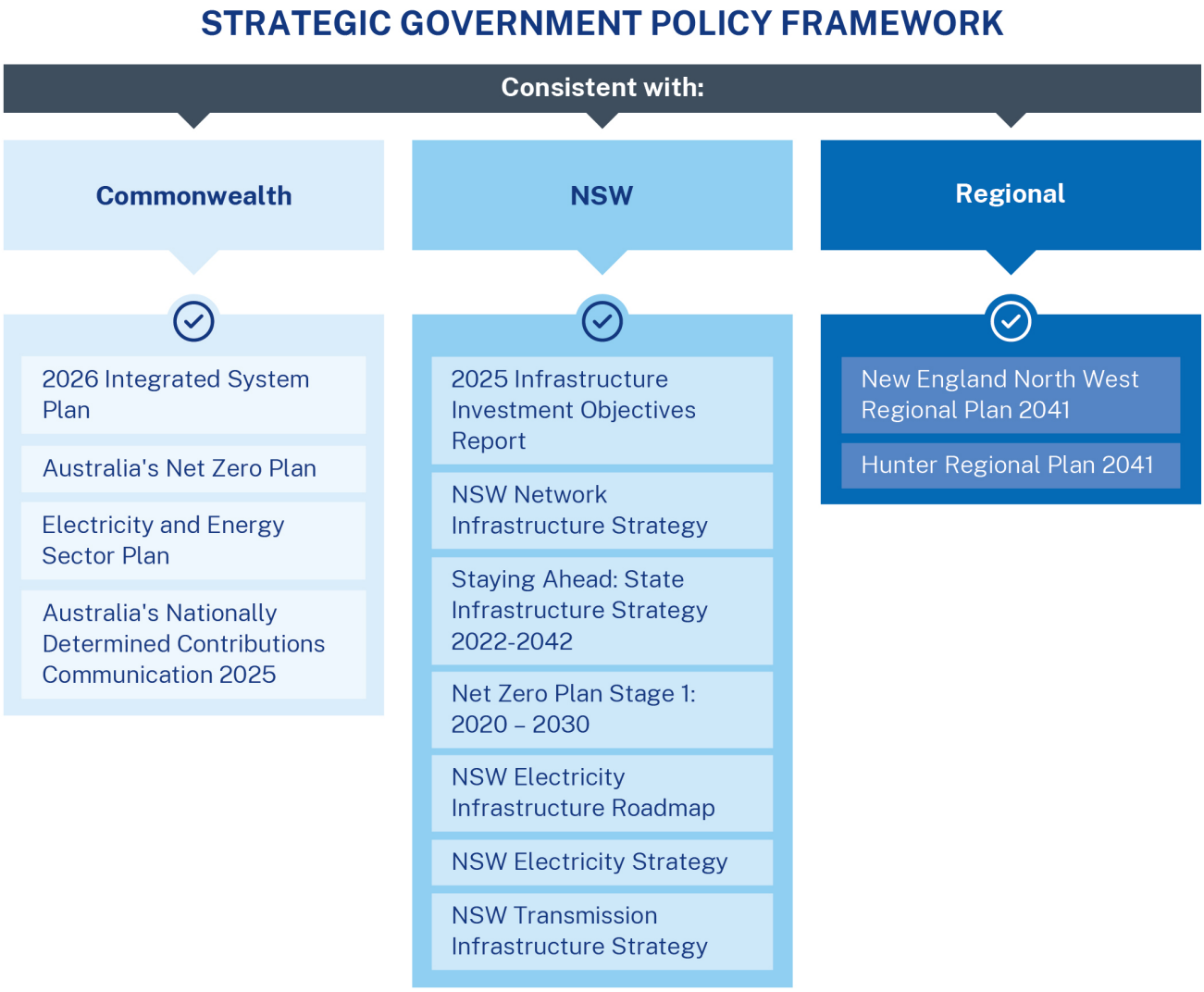


Table 2.1 and Table 2.2 provide an overview of relevant strategic framework policies and plans and summarise how the project aligns with their key objectives.

Table 2.1. Consistency with Commonwealth policies and plans

Policy / plan	Project consistency with policy / plan
2026 Integrated System Plan (2026 ISP) (AEMO, 2026b) The 2026 Integrated System Plan is an actionable roadmap for eastern Australia's power system designed to optimise consumer benefits through a transition of the energy market. It has been developed to provide an optimal development path to support Australia's complex and rapid energy transformation towards net zero emissions, including guidance on the significant investment needed in the physical infrastructure of the NEM. The 2026 ISP modelling incorporates all relevant government policies and targets, including the Australian Government's target of achieving 82 per cent renewable electricity by 2030 and the economy-wide target emission reduction targets of 2030 emissions being 43 per cent below 2005 levels, and 62–70 per cent below 2005 levels by 2035. The 2026 ISP recognises that significant investment is required in the physical infrastructure of the NEM, reaffirming that renewable energy, connected through transmission and distribution networks, firmed with storage and backed up by gas presents the least-cost pathway to supply reliable electricity to consumers as coal plants retire, while meeting government policies through to 2050. The 2026 ISP forecasts that around 6,000 km of new transmission is needed to connect new generation and storage opportunities and deliver renewable energy to consumers through the NEM.	The project is identified in the 2026 ISP as an 'anticipated project', advancing from its 'actionable' project status in the 2024 ISP, reflecting its advanced progress under the NSW EII Act framework. Anticipated projects are those that are in the process of meeting the relevant commitment criteria and are required to be delivered as quickly as possible to contribute to the optimal development path towards a cleaner energy market. Within the 2026 ISP's optimal development path, the project is a key enabling investment that supports the least-cost transition to a renewable-dominated system by facilitating large-scale renewable generation, replacing retiring coal-fired capacity, improving system reliability, and delivering substantial net market benefits through enhanced network efficiency.

Policy / plan	Project consistency with policy / plan
Australia's Net Zero Plan (Cwth DCCEEW, 2025b) and associated Electricity and Energy Sector Plan (Cwth DCCEEW, 2025c) Australia's Net Zero Plan provides the Australian Government's overarching framework to achieve net zero greenhouse gas emissions by 2050, consistent with the *Climate Change Act 2022* and Australia's international commitments under the Paris Agreement. The Plan is supported by 6 sectoral emissions reduction plans covering electricity and energy, industry, transport, the built environment, agriculture and land, and resources, which together set out coordinated pathways to reduce emissions across the economy while supporting growth, competitiveness and energy security. Central to the Net Zero Plan is the transformation of the electricity and energy system through rapid expansion of renewable generation, storage, transmission and firming infrastructure, enabling economy-wide electrification and emissions reductions in other sectors. The Electricity and Energy Sector Plan 2025, one of the sectoral emissions reduction plans supporting the Net Zero Plan, highlights transmission network expansion as a nationally significant reform required to unlock REZs, improve interregional power flows and deliver least-cost decarbonisation across the NEM.	By increasing transmission capacity to support renewable energy generation from the New England REZ, the project directly supports the net zero greenhouse gas emissions target by facilitating connection of renewable energy and firming resources, strengthening system resilience, and enabling efficient sharing of renewable energy generation across jurisdictions and the NEM.

Policy / plan	Project consistency with policy / plan
Australia's Nationally Determined Contribution Communication 2025 Australia's NDC Communication submitted in 2025 sets an economy-wide target to reduce greenhouse gas emissions by 62–70 per cent below 2005 levels by 2035 and reaffirms Australia's commitment to achieving net zero emissions by 2050 under the Paris Agreement. The 2025 NDC builds on existing 2030 targets and is supported by the Australian Government's Net Zero Plan and associated sectoral emissions reduction plans, with a strong emphasis on transforming the electricity and energy system through increased renewable generation, electrification, energy efficiency and supporting infrastructure.	The project would facilitate the longer-term transition to low emission energy sources as it involves the construction of new transmission infrastructure from the New England REZ and into the NEM. The successful establishment of the New England REZ would support the lowering of Australia's greenhouse gas emissions from the energy sector and would therefore contribute to the Australian Government's NDC under the Paris Agreement. The project is critical to the establishment of the New England REZ. It is therefore consistent with Australia's NDC Communication 2025.

Table 2.2. Consistency with NSW policies and plans

Policy / plan	Project consistency with policy / plan
2025 Infrastructure Investment Objectives Report (AusEnergy Services Limited (ASL), 2025) The 2025 Infrastructure Investment Objectives Report sets out the NSW Consumer Trustee's 20 year development pathway for the construction of electricity infrastructure in NSW to achieve the infrastructure investment objectives included in the ***NSW Electricity Infrastructure Investment Act 2020*** in a practically feasible way. The development pathway seeks to support the entry of new generation and storage infrastructure as soon as practicable, having regard to supply chain constraints and opportunities, independent of the timing of coal plant withdrawals. This approach is designed to ensure that sufficient energy is available in NSW in advance of any unexpectedly early coal plant withdrawal that may occur and also allows for construction to be brought forward if such a withdrawal were to occur. The development pathway prioritises generation construction that aligns with the development of REZ network infrastructure for the Central-West Orana and New England REZs. The objective is to maximise the utilisation of REZ network infrastructure as soon as it is available.	The project is recognised as a critical project underpinning the NSW Consumer Trustee's 20 year development pathway as it would provide the network infrastructure to connect renewable energy generation projects from the New England REZ, providing for the availability of 6 GW of network transfer capacity to the NEM.

Policy / plan	Project consistency with policy / plan
NSW Network Infrastructure Strategy (EnergyCo, 2023) The Network Infrastructure Strategy (NIS) (EnergyCo, 2023) is a strategy for the practical coordination of NSW network infrastructure to connect new generation, firming and storage in NSW's 5 REZs, and otherwise to assist NSW to meet the EII Act objectives. The Strategy proposes options that add between 14 GW and 24 GW of network capacity over the next 20 years, including 6 GW in the New England REZ to be delivered now, with additional capacity to be planned for the future. The NIS indicates that the 6 GW network capacity should progress as quickly as possible for delivery by 2033 at the latest.	The project is recognised as a 'Deliver Now' project in the NIS, meaning it is required to be developed in the near term to support grid scale generation and storage in REZs to maintain the supply of electricity as coal-fired generators close in NSW. The project would unlock 2.4 GW by around 2032 and an additional 3.6 GW by around 2034.
Staying Ahead: State Infrastructure Strategy 2022–2042 (SIS) (Infrastructure NSW, 2022) Staying Ahead: State Infrastructure Strategy 2022–2042 is Infrastructure NSW's 20-year framework for guiding infrastructure planning and investment across NSW to support economic growth, productivity, resilience and liveability. An objective of the SIS is to achieve an orderly and efficient transition to net zero, which includes the strategic directions to 'ensure that the clean energy transition is orderly and cost effective' and to 'support a new wave of transmission infrastructure in a manner consistent with community expectations'.	The project aligns directly with the SIS by leveraging NSW's renewable energy resources and enabling the efficient integration of clean energy into the electricity system. The project provides a critical piece of state significant enabling transmission infrastructure that is required for the energy transition, connecting renewable energy generation in the New England REZ to the NEM and consumers.

Policy / plan	Project consistency with policy / plan
NSW Government's Net Zero Plan Stage 1: 2020–2030 (Net Zero Plan) (DPIE, 2020b) The Net Zero Plan Stage 1: 2020–2030 sets out how the NSW Government will deliver on the objectives to achieve net zero emissions by 2050 by creating new jobs, cutting household costs and attracting investment over the next decade. There are 4 priority areas for action: • 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.	The project is aligned with this plan, as it would provide transmission infrastructure that supports renewable energy generation and emissions reduction, enable the uptake of proven emissions reduction technologies that grow the economy, create new jobs and reduce the cost of living.
NSW Electricity Infrastructure Roadmap (DPIE, 2020a) The Electricity Infrastructure Roadmap (the Roadmap) provides a coordinated framework for the delivery of new transmission, generation, storage and firming infrastructure to support low carbon renewable energy and the replacement of coal-fired power station capacity scheduled to close in the next 2 decades. The Roadmap notes the State committed to an initial 12 GW of new transmission capacity and 2 GW of storage capacity by 2030. The key to the transition of the energy sector is the 5 REZs, including the New England REZ. The REZs need to be supported by new transmission infrastructure to transfer the expected energy generation efficiently to the major load centres of the Sydney–Wollongong–Newcastle–Hunter Valley area.	The project is aligned with the Roadmap as it would facilitate the delivery of lower-cost renewable energy sources to the NEM. The project would contribute to the Roadmap goal of 12 GW of new transmission capacity in NSW by providing 6 GW of transfer capacity from the New England REZ by around 2034, with potential for additional capacity in the future which would be subject to separate planning approval.

Policy / plan	Project consistency with policy / plan
NSW Electricity Strategy (DPIE, 2019a) The NSW Electricity Strategy outlines a plan for a reliable, affordable and sustainable electricity system for NSW. It identifies the need to connect new generation projects to the existing transmission network to meet NSW's future energy needs, making it critical to efficiently develop transmission connections to these new generation projects.	The project would assist in delivering on this commitment and provide regional investment in lower-cost, new energy infrastructure to connect the New England REZ to the NEM.
NSW Transmission Infrastructure Strategy (DPE, 2018) The NSW Transmission Infrastructure Strategy (DPE, 2018) identifies the NSW Government's plan to unlock private sector investment through priority transmission infrastructure projects, which can deliver least-cost energy to customers through to 2040 and beyond. The Strategy aims to increase NSW's energy capacity by prioritising Energy Zones in the Central-West, South-West and New England regions of NSW, which will become a driving force to deliver affordable energy into the future.	The project would enable the connection of renewable energy projects in the New England REZ to the NEM, providing certainty to private sector investors and cost savings to energy consumers.
New England North West Regional Plan (DPE, 2022a): The New England North West Regional Plan 2041 sets the strategic land use planning framework for the New England region, including employment areas, town centres, housing and related infrastructure to the natural environment and future hazards such as climate change. The plan provides an overarching framework to guide subsequent and more detailed land use plans, development proposals and infrastructure funding decisions.	Objective 9 of the Regional Plan relates to a strategic and integrated approach to leading renewable energy technology and investment in the New England REZ. The project would support achievement of this objective by enabling the connection of new renewable energy projects in the New England REZ to the NEM. In addition to meeting Objective 9, the project would also contribute to Objective 8 (Adapt to climate change and natural hazards and increase climate resilience) through unlocking network capacity for low emissions technology and contributing to the State's objective to reach net-zero by 2050.

Policy / plan	Project consistency with policy / plan
Hunter Regional Plan 2041 (DPE, 2022b): The Hunter Regional Plan 2041 sets the strategic land use framework for continued economic growth and diversification for the Hunter Region.	The project contributes to Objective 1 of the Hunter Regional Plan which defines the strategic framework for the diversification of the Hunter's mining, energy and industrial capacity as NSW moves towards a net zero economy and acknowledges that REZs, by connecting multiple generators and storage facilities in the same location, capitalise on economies of scale to deliver cheap, reliable and clean electricity for homes and businesses in NSW.

2.3 NSW Roadmap coordination and benefits

A range of government agencies and other stakeholders are working together to deliver the Roadmap. As the Infrastructure Planner responsible for delivering the REZs, EnergyCo's role is to lead the development, coordination and delivery of the REZs in a way that benefits consumers, investors, and regional communities.

2.3.1 Roadmap coordination

The *Renewables Delivery Steering Committee* has been established to bring together key agencies across NSW Government, including EnergyCo, to coordinate actions that support timely delivery of the Roadmap and to ensure effective strategic oversight, particularly in relation to logistics planning, local infrastructure needs, community-wide impacts and social legacy opportunities.

This forum enables the agencies responsible for planning, regulation, service delivery and infrastructure investment to work together to identify practical solutions in response to the challenges identified for REZ delivery.

To this end, the NSW Government has prepared a number of Regional Major Infrastructure Studies to help plan for the future needs of communities in and around REZs, and ensure REZs are delivered in ways that encourage sustainable demand for skills, services and infrastructure, and appropriately manage regional impacts and benefits.

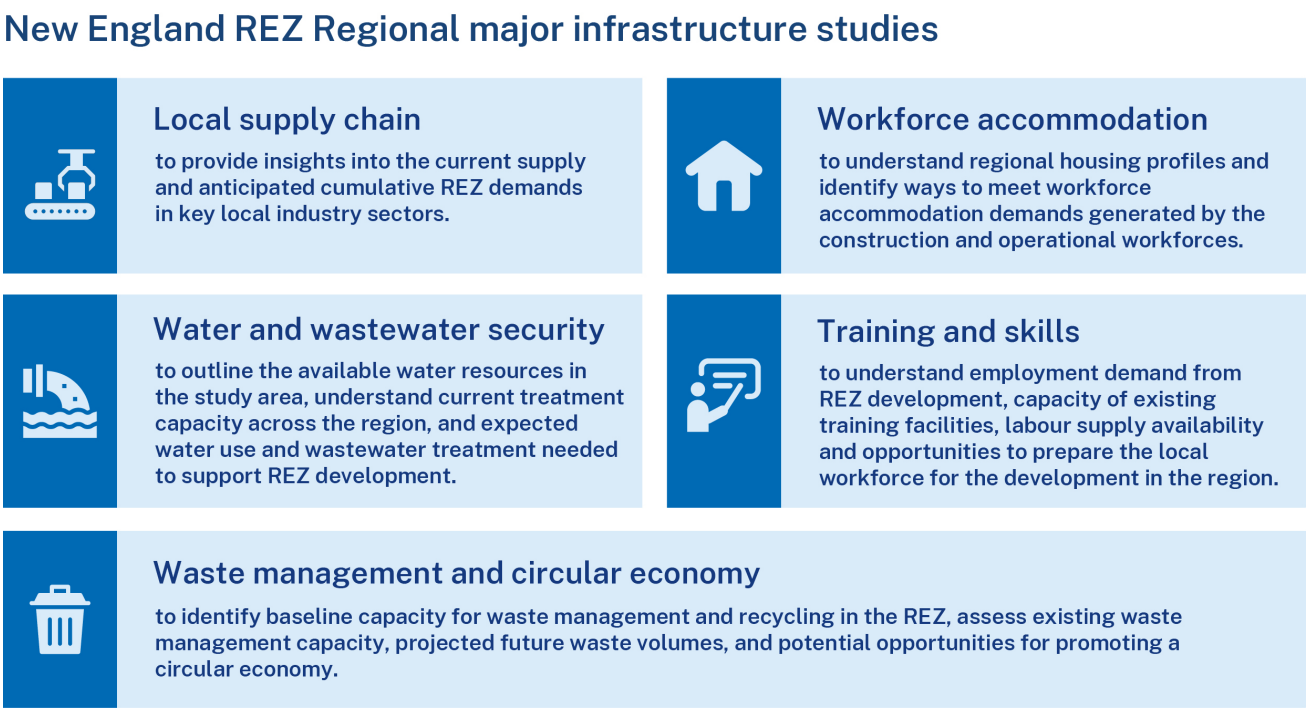
Regional coordination forums, including for the New England region, have also been established to support on-the-ground and collaborative identification of emerging regional impacts, risks and opportunities.

As Infrastructure Planner, EnergyCo works closely with agency delivery partners, local councils and industry stakeholders across these forums to minimise potential regional impacts of REZ delivery, support steady regional growth and maximise benefits for regional communities.

2.3.2 Regional major infrastructure studies

As the Infrastructure Planner, EnergyCo's role is to ensure the New England REZ is planned in a careful and coordinated way. To better understand the potential regional challenges and opportunities, EnergyCo has prepared a series of Regional Major Infrastructure Studies which aim to provide a point-in-time analysis of potential impacts and opportunities associated with major infrastructure and renewable energy projects in the New England region.

The studies, published in December 2025, form part of EnergyCo's broader work to coordinate the development of the New England REZ, and consider the potential impacts of the anticipated electricity infrastructure in the REZ and include:



The studies were informed by desktop investigations, council consultation workshops, stakeholder interviews, and region wide data analysis and evaluation. The study area covers 10 local government areas (LGAs) which intersect the New England REZ boundary and project area, including Tenterfield Shire, Glen Innes Severn, Inverell Shire, Armidale Regional, Uralla Shire, Tamworth Regional, Walcha, Liverpool Plains, Upper Hunter and Muswellbrook. The Regional Major Infrastructure Studies are available on the project website: New England REZ Regional Major Infrastructure Studies.

The release of the studies was accompanied by a 'have your say' community survey to invite feedback on local priorities through an online survey. The survey was open between December 2025 and April 2026 and was completed by 399 participants. A feedback report with a summary of the survey findings is available at the following link: New England REZ community needs and priorities survey report.

Following release of the studies, EnergyCo has continued engaging with local councils and other stakeholders to identify potential opportunities which respond to identified challenges. NSW Government agencies will use this information to develop the New England REZ in a way that supports growth and sustainable demand for skills, services and infrastructure across the region in the years to come.

Table 2.3 provides an overview of the how the project was considered in the Regional Major Infrastructure Studies, how the EIS has responded to the findings of the studies and identifies the planned next steps for EnergyCo, key agencies across the NSW Government and other stakeholders in relation to addressing the key issues identified in the studies.

Table 2.3. Project consideration in Regional Major Infrastructure Studies

Priority topic	Regional Major Infrastructure Study, author and key findings	How the project was considered in the Regional Major Infrastructure Study	How the EIS has responded to the findings of the Regional Major Infrastructure Study	Next steps following release of the Regional Major Infrastructure Study
Workforce accommodation	**Workforce Accommodation Study (Urbis, 2025)** The study found that up to 4,800 non-local workers would require accommodation during peak construction of the New England REZ. With low unemployment and limited rental housing availability across the region, a significant proportion of the workforce is expected to come from outside the area, increasing the need for dedicated temporary accommodation close to worksites. The study also identified opportunities for local businesses through the provision of accommodation and support services, while noting that well-planned temporary accommodation could contribute to longer-term housing benefits for local communities.	Workforce modelling developed as part of the study incorporated early workforce profiles for the project together with major generation and storage projects, and major non-renewable projects. The study adopted a nominal 45-60 minute travel time between workforce accommodation locations and the worksite which aligned with EIS planning.	The project includes the establishment and operation of workforce accommodation camps to minimise impacts to housing and accommodation markets within the region. The location of the camps has been informed by a travel distance of around 45 minutes, in addition to other considerations such as land availability, access, and environmental values. The EIS documents similar findings of the workforce accommodation study through independent targeted research. Based on this information, the EIS documents an assessment of a smaller workforce requiring accommodation during construction of the camps, based on existing supply and occupancy rates, and includes management measures to reduce pressure or over-concentration in individual towns. The EIS also includes measures to identify targets and facilitate local employment and business participation in the project.	Building on the findings of the Workforce Accommodation Study, EnergyCo is developing a Workforce Accommodation Strategy which would provide an approach for the provision of temporary accommodation for the workforce needed to deliver the New England REZ. This includes exploring a range of supply side options, and engaging with local councils, government agencies and other industry stakeholders. EnergyCo is also working with local councils to identify potential workforce accommodation sites and explore what legacy opportunities may exist for each site. While this could involve housing, it may also involve activating a site by leaving it 'development ready', such as having utilities, services and kerbing.
Waste management and circular economy	**Waste and Circular Economy Management Study (MRA Consulting, 2025)** The study found that most waste associated with the New England REZ would be generated during project construction, particularly construction, demolition, organic and packaging waste. While renewable energy waste streams such as solar panels, wind turbine blades and batteries would make up a smaller proportion of total waste, they present more complex recycling and recovery challenges. The study concluded that, without upgrades, existing local waste infrastructure may not have sufficient capacity to manage the increased waste volumes during peak construction, highlighting the need for improved waste management and recycling solutions.	Waste demand modelling developed for the waste and circular economy study incorporated a representative waste profile for transmission infrastructure construction (for example, waste volumes and typology, indicative recycling targets, etc.) consistent with the analysis carried out for the Central-West Orana Regional Major Infrastructure Study, along with relevant major generation and storage projects, and major non-renewable projects.	The EIS has identified waste types, indicative volumes and classification types. Consistent with the study findings, the project seeks to reduce the volumes of waste generated by the project by adopting waste management hierarchy strategies during the planning, procurement, construction and operational phases.	EnergyCo continues to engage with local councils and the NSW Environment Protection Authority (EPA) to identify potential waste management and circular economy solutions which respond to the challenges and opportunities identified in the study. EnergyCo has set clear waste reduction and recycling targets for the network operator to achieve during the delivery of the network infrastructure project.

Priority topic	Regional Major Infrastructure Study, author and key findings	How the project was considered in the Regional Major Infrastructure Study	How the EIS has responded to the findings of the Regional Major Infrastructure Study	Next steps following release of the Regional Major Infrastructure Study
Water security and wastewater management	**Water and Wastewater Security Study (Jacobs, 2025)** The study found that delivery of the New England REZ construction would increase demand for water and wastewater services, with water needed for construction activities, workforce accommodation and materials production. Water requirements would be assessed as part of individual project approvals, and projects would be required to provide solutions to meet demand, with additional water and treatment infrastructure potentially needed in areas experiencing higher levels of development.	Modelling of regional water demands, and wastewater volumes developed for the water and wastewater security study incorporated early demand analysis for the project. This was input into the regional water demand assessments and potential impacts on regional water and wastewater infrastructure together with all known major generation and storage projects, and major non-renewable projects. The study adopted a conservative approach, which has since been refined based on more realistic assumptions and inputs (refer to Section 2.3.2.1).	In recognition of the need to reduce the demand on water take and potential impacts to users, the EIS documents a water sourcing strategy that prioritises the capture, storage and reuse of water, including reuse of treated wastewater, prior to taking water from unregulated sources (refer to Section 18.3.5).	In collaboration with the Water Group of the NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW), a refined water demand profile has been developed (refer to Section 2.3.2.1). EnergyCo continues to engage with local councils and DCCEEW to identify potential solutions which respond to the challenges and opportunities identified in the study. EnergyCo has established the New England REZ Regional Steering Committee which includes representatives from councils and key agencies, including DCCEEW. The Regional Steering Committee is a quarterly forum where local and State government representatives discuss regional issues, including water security and wastewater management.
Training, skills and jobs	**Training and Skills Study (UTS, 2025)** The study found that the region's limited workforce capacity and low unemployment rates would require efforts to expand and diversify the renewable energy workforce. Key priorities include increasing participation from Aboriginal and Torres Strait Islander peoples, women, people with disabilities, skilled migrants and other underrepresented groups, while creating pathways for school students and offering pre-employment programs to support local employment. Existing regional training facilities were found to have the capacity to help meet these workforce development needs.	Early workforce profiles developed for the project and all known major generation and storage projects, and major non-renewable projects were inputs into the modelling of regional employment demands and labour availability for the New England REZ. The study included analysis of job and role profiles for the project to inform the assessment of required renewable energy occupations and skillsets.	The EIS identifies opportunities for local employment, skills development and training for the project's workforce, drawing on the findings from the Training and Skills Study, and consultation carried out for the EIS. To facilitate these opportunities, the EIS includes the requirement for a local industry participation plan that sets out targets, initiatives and programs for training and skills development.	In collaboration with the NSW Department of Education, a New England Skills and Training Coordinator has been appointed to connect training providers, employers and jobseekers to New England REZ related employment opportunities. The New England REZ Regional Steering Committee (as noted above) includes the Department of Education and TAFE. The Regional Steering Committee includes discussion on training, skills and jobs. EnergyCo is developing a regionally focused Jobs Guide which will provide information on training and skills pathways in the renewable energy sector.

Priority topic	Regional Major Infrastructure Study, author and key findings	How the project was considered in the Regional Major Infrastructure Study	How the EIS has responded to the findings of the Regional Major Infrastructure Study	Next steps following release of the Regional Major Infrastructure Study
Local supply chain	**Local Supply Chain Study (Arup, 2025)** The study found that demand for goods and services would increase significantly as the New England REZ and associated projects are delivered, creating opportunities for local industries, particularly in construction, transport, equipment hire and materials supply. While some specialist skills and equipment would need to be sourced from outside the region, local businesses are generally well placed to support project delivery. However, smaller businesses may require additional support to meet increased demand, and greater transparency about the New England REZ project pipeline would help businesses plan and participate effectively.	Modelling of the anticipated cumulative New England REZ demands in key local industry sectors, included the analysis of the project, along with all known major generation and storage projects. This informed the analysis of potential opportunities for the local supply chain to support and benefit from the development of the New England REZ in a balanced and suitable manner that meets the needs of local councils and communities. Supply chains were mapped for each renewable energy technology type, including transmission, to identify sectors and sub-sectors that could be delivered by the local supply chain.	The EIS documents the anticipated location and estimated quantities of resources and materials that are needed to construct the project. The EIS includes measures to identify targets and facilitate local employment and business participation on the project.	In collaboration with the NSW Department of Primary Industries and Regional Development (DPIRD), EnergyCo has developed a series of business awareness and upskilling programs (e.g. Ready for Renewables). The New England REZ Regional Steering Committee (as noted above) includes DPIRD. The Regional Steering Committee includes discussion on regional issues including local supply chain. EnergyCo continues to participate in regional forums promoting the renewable energy transition and highlighting the potential opportunities for local businesses and service providers.

2.3.2.1 Planning for regional water demands in the New England REZ

Effective management of water resources is critical to the successful delivery of the New England REZ. In addition to the specific water demands associated with the delivery of the project, as outlined in Section 3.3.13.1, EnergyCo, as the Infrastructure Planner, is focused on improving its understanding of the regional water demand profile associated with the broader development of the New England REZ, including generation and storage projects. Refining this regional understanding would support the identification of practical solutions to facilitate timely delivery of the New England REZ while minimising pressure on existing water sources and regional infrastructure. It is recognised that this would be an iterative process, with the understanding of potential water demand continuing to evolve as the New England REZ develops and further information becomes available.

An initial regional water demand profile was developed as part of the New England REZ Water and Wastewater Security Study (Jacobs, 2025). To ensure potential challenges and opportunities could be identified early, the study adopted a broad and conservative approach, considering all major renewable energy projects and non-renewable projects known at that time. The study established a baseline understanding of regional water demands and identified a range of opportunities to address potential water security challenges.

Further refinement of the regional water demand profile has been developed collaboratively with the Water Group of DCCEEW based on further understanding of the potential generation and storage project landscape, anticipated project delivery timeframes and sequencing. This refinement would result in a more realistic representation of how New England REZ-related water demand may occur over time.

The refined regional water demand profile will be available at: New England Renewable Energy Zone.

This refined regional water demand profile considers New England REZ related water demand only. It considers renewable energy projects and incorporates:

- water demands for the project consistent with those as described in Section 3.3.13.1
- a single 'realistic' scenario with a combined generation and standalone storage capacity of between 13–15 GW which incorporates contemporary knowledge as of September 2026 and aligns with the access scheme positions paper (refer to the New England Renewable Energy Zone Access Scheme Design Position Paper for more details on the combined generation and standalone storage capacity scenario)
- refined assumptions on the water required by renewable energy projects for concrete production.

It is important to note that the list of renewable energy projects connecting to the network infrastructure will not be known until the access rights allocation process is completed in 2028.

This means while the refined water demand profile continues to be based on assumptions around the number, size, type and location of renewable energy projects, the use of the most up to date information and a better understanding of a potential New England REZ development profile means it is a more realistic reflection of water demand than that presented in the original 2025 study (Jacobs, 2025).

While many of the generation and storage projects are not expected to publicly exhibit their individual EISs for the next few years, it is recognised that it is important to develop an understanding of the regional water demand profile now to enable appropriately scaled solutions to be developed along with a coordinated approach to water supply and use that minimises impacts on existing water users, local communities and the environment.

Although this work remains ongoing and significant progress has already been made, it is important to note that the refined modelling identifies that water demand peaks are not expected for a further 2–4 years when the renewable energy projects are in construction. EnergyCo will continue to engage with local councils and DCCEEW to identify potential supply solutions.

2.3.3 Newcastle Logistics Precinct

The logistics challenge of importing and transporting the components required to support the energy transition is significant. The delivery of renewable energy and transmission projects requires importation of OSOM equipment, most notably wind turbine components, high-voltage transformers, synchronous condensers and other equipment required for construction.

The Port of Newcastle has been identified as the critical import and logistics hub, however, it has limited portside storage capacity which is already well utilised by other industries. To address this critical need the NSW Government is investing $115.5 million to develop the Newcastle Logistics Precinct (NLP).

The NLP would almost double the existing storage capacity within the Port of Newcastle and reduce reliance on the well-used Mayfield 4 berth hardstand. As a result, the NSW Government and renewable developers would have greater certainty over critical REZ and non-REZ project logistics.

The NLP will connect to the state road network and the Port to REZ program route and is intended to be used for deliveries associated with construction of the project.

2.3.4 Port to REZ program

The Port to REZ program is essential for the transition to renewable energy. The program, which is being assessed separately, addresses the transport challenges of delivering OSOM renewable energy components, such as substation transformers, wind turbines and other large pieces of electrical equipment, between the Port of Newcastle and the REZs. The first stage of the program being delivered (known as ‘Stage 1’) involves the road infrastructure treatments between the Port and Central West Orana REZ. Construction of Stage 1 is now underway.

The Port to REZ program will deliver treatments to key roads and intersections from the Port of Newcastle to the New England REZ, facilitating the movement of OSOM vehicles for the project as well as the broader renewable energy generation developments in the New England REZ.

EnergyCo is working with Transport for NSW (TfNSW) to determine the most suitable, low-impact OSOM route to deliver energy components from the Port of Newcastle to the New England REZ. Upgrades to road intersections and pinch-points would be required to allow large components to be moved safely across the route to renewable energy projects.

EnergyCo and TfNSW are delivering the Port to REZ program, with TfNSW responsible for coordinating OSOM movements and traffic management. All road treatments would be developed and delivered in consultation with the relevant roads authority.

Investigations and assessments are also underway to progress 'Stage 2' of the Port to REZ program, which would enable access to key points within the New England REZ. Delivery of these components is essential to build renewable generation projects as well as the transmission infrastructure needed to connect them to the electricity network. The Port to REZ program route in the vicinity of the project area is shown on Figure 2.2.

Road and intersection treatments specific to the project are described in Section 3.

2.3.5 Community and Employment Benefit Program

To ensure that investment in electricity infrastructure delivers long-term, legacy benefits for local communities, EnergyCo has established the Community and Employment Benefit Program (CEBP) under the Roadmap. Through the CEBP, regional communities hosting renewable energy and electricity infrastructure will share the benefits of this once-in-a-generation opportunity. It will bring new investment and funding for local projects, as well as programs to support small business development, training and local employment opportunities. The CEBP will continue for many years after the REZs have been delivered.

The CEBP aims to leave communities that host the required infrastructure in a better position than they were before the energy transition began. Through the CEBP EnergyCo is seeking to make a serious contribution to the prosperity of regional communities and leave a long-term legacy.

There will be a range of projects, programs or services delivered, including those that provide immediate outcomes as well as those that contribute to the long term economic, social or environmental benefit of the community over time. This may be coordinated with other programs or investment such as from local, State or Commonwealth levels of government and/or the renewable energy industry.

The objectives of the CEBP are to:

- **improve liveability** in regional communities impacted by new energy infrastructure by supporting better public services and infrastructure such as roads, housing and accommodation and access to health services
- **improve and create local employment opportunities** through training and skills programs or infrastructure that increases the capacity of the local community to benefit from local employment and income generating opportunities
- **improve outcomes for Aboriginal and Torres Strait Islander people** by increasing capacity of Aboriginal and Torres Strait Islander organisations and providing additional services and infrastructure to support Aboriginal and Torres Strait Islander people to maximise the economic opportunities from the energy transition
- **support regional economic development** through tourism programs, infrastructure and legacy projects that provide enduring benefits for host communities

- **improve community connection** by making it easier for people to access quality recreation infrastructure and other community facilities, as well as arts and cultural programs that bring people together
- **boost resilience and innovation** through community energy programs and environmental improvement programs.

These objectives align with the Roadmap, the objects of the EII Act and the description of 'community purposes' and 'employment purposes' under the EII Act and EII Regulation.

The CEBP will be funded by access fees payable by solar, wind and other energy generators participating in the New England REZ access scheme, which will include a component to be used for community and employment purposes.

The EII Act and EII Regulation sets out the minimum proportion of annual access fees which are to be used to fund the CEBP, including:

- for 'community purposes' this is $1,700 per megawatt (if the participant's annual access fee is $2,600 per megawatt or more, or otherwise 60 per cent), and
- for 'employment purposes' this is $600 per megawatt (if the participant's annual access fee is $2,600 per megawatt or more, or otherwise 20 per cent).

These annual contributions are to occur for the lifetime of the access scheme, generating hundreds of millions of dollars and providing significant investment to communities which host the REZ and supporting the enduring prosperity of the region.

In May 2026, the NSW Government announced an initial $60 million New England REZ funding commitment under the CEBP so it can be invested in priorities that matter to local communities, to create lasting benefits that support long-term regional prosperity alongside renewable energy development. The funding was brought forward to ensure CEBP initiatives can start to be delivered well before New England REZ projects begin construction. The NSW Government has identified that this investment is just the beginning of further benefits to the region that will be unlocked by the New England REZ.

To ensure local community and stakeholder input to inform the development of the New England CEBP, EnergyCo undertook a process of community consultation. This consultation process was designed to ensure that the people that live and work in local communities have a say on how the CEBP is delivered. EnergyCo will continue to monitor the implementation of the CEBP to ensure benefits are delivered and the CEBP objectives are achieved. EnergyCo will publicly report on the projects that are funded through the CEBP.

More information on the CEBP can be found at EnergyCo Community Employment Benefit Program.

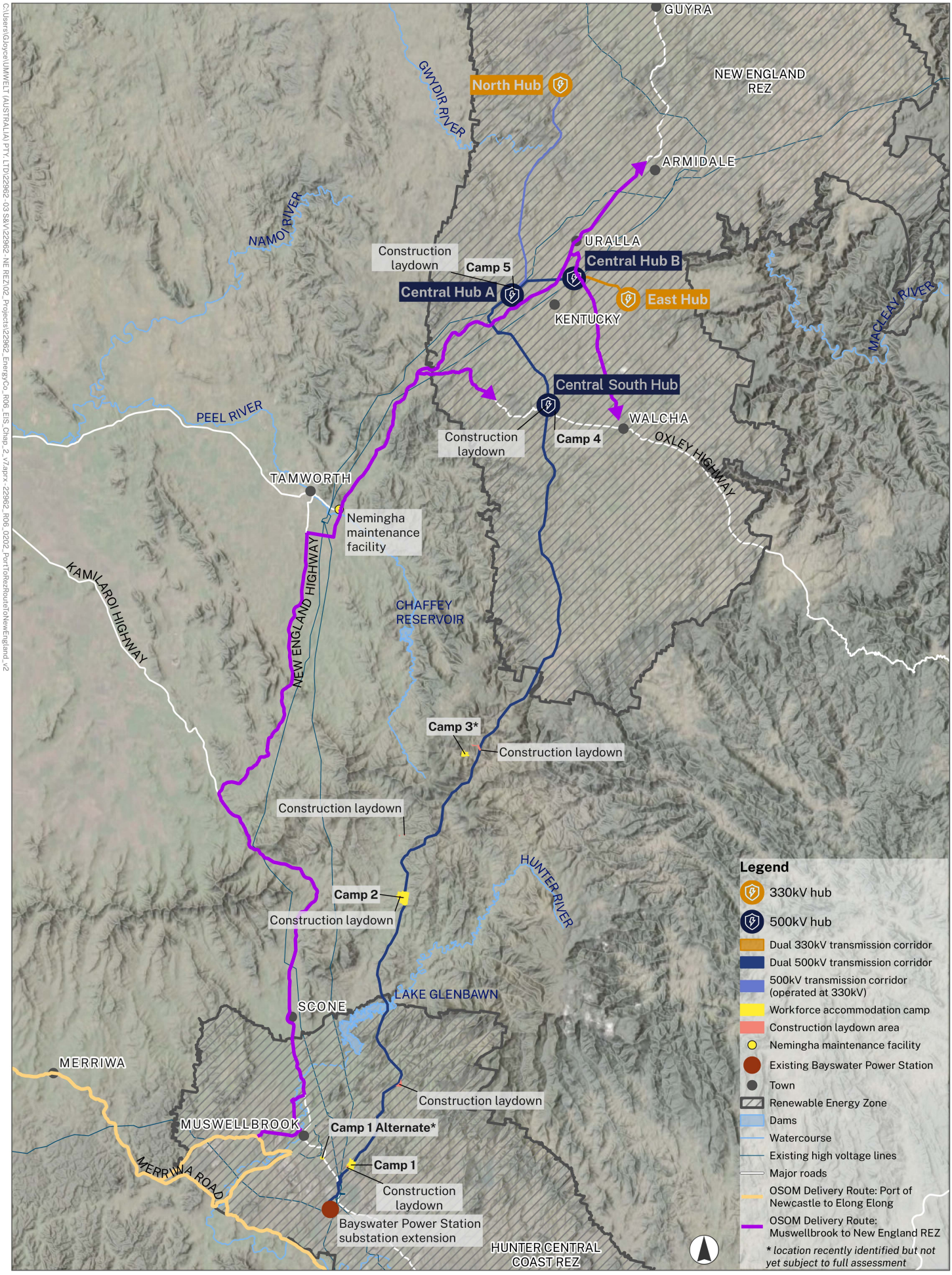


FIGURE 2.2 Port to REZ route to New England

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

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

2.4 Project-level cumulative impacts

In addition to understanding the regional challenges and opportunities for the energy transition for the New England region (through the Regional Major Infrastructure Studies, the CEBP, NLP and Port to REZ), the potential cumulative impacts of the project have been assessed in accordance with the Cumulative Impact Assessment Guidelines for State Significant Projects (DPHI, 2026c) (CIA Guideline). The CIA Guideline sets clear requirements for assessing project-level cumulative impacts relating to State Significant Infrastructure (SSI) projects (including CSSI).

Relevant future projects (as defined under the CIA Guideline) which may interact with the project have been identified and an assessment of potential cumulative impacts and benefits has been completed for the EIS and are detailed in Section 24.

Cumulative impacts are also considered in accordance with the CIA Guideline in each of the relevant technical assessments completed as part of this EIS and incorporated as part of the appendices to this EIS. This has included consideration of key environmental, heritage and social aspects (as relevant) including biodiversity, Aboriginal heritage, historical heritage, visual amenity, agriculture, social (including workforce accommodation, health and other services), noise and vibration, hazards, air quality, traffic and transport, water and water supply, waste and wastewater.

2.5 Environmental and social context

2.5.1 Regional setting

The project is located within the New England and Hunter regions of NSW, with the key connection infrastructure (energy hubs) for the New England REZ located in the New England region. Armidale and Tamworth town centres are the major service hubs for the New England region, hosting important educational, airport and health facilities that service the broader area, as well as residential populations outside the town centres.

The New England and Hunter regions are situated within a predominantly agricultural landscape used for cropping, animal production and grazing land. The major towns of Tenterfield, Glen Innes, Inverell, Guyra, Armidale, Uralla and Walcha all support productive rural communities that predominantly produce beef, sheep and wool. Significant smaller industries within the New England region include forestry, apples and stone fruit, potatoes, glasshouse tomatoes, dairy farms, alpacas and cool climate wineries, while the Hunter region is well known for its coal mining, thoroughbred horse industry and viticulture (LLS, undated).

The protection of regionally significant agricultural land from incompatible land uses is identified as a regional strategic goal for the New England and Hunter regions, as reflected in Objective 2 of the New England North West Regional Plan 2041 (DPE, 2022a) and Objective 9 of the Hunter Regional Plan 2041 (DPE, 2022b). Parts of these regions have also been identified as Biophysical Strategic Agricultural Land (BSAL) and Critical Industry Cluster (CIC) - equine (equine CIC), including areas in and around Scone in the Hunter region (DPE, 2022b). These form part of the NSW Government's Strategic Regional Land Use Policy (SRLUP), introduced in response to land use conflict between mining and coal seam gas developments and high-value agricultural land.

The project intersects 8 LGAs, including LGAs outside the New England REZ. These LGAs are Armidale Regional, Uralla Shire, Tamworth Regional, Walcha, Liverpool Plains Shire, Upper Hunter Shire, Muswellbrook Shire and Singleton. The LGAs intersecting and surrounding the project are shown on Figure 2.3.

Key regional land uses are shown on Figure 2.4 and include agriculture, primarily grazing, across the majority of the project area in the New England REZ, key education and service hubs of Armidale and Tamworth and energy generation and coal mining across the southern portion of the project area.

Land tenure in the project area is predominantly freehold, with areas of Crown land including Nundle, Terrible Billy and Hanging Rock State Forests, Lake Glenbawn, road reserves, rail corridors and travelling stock reserves.

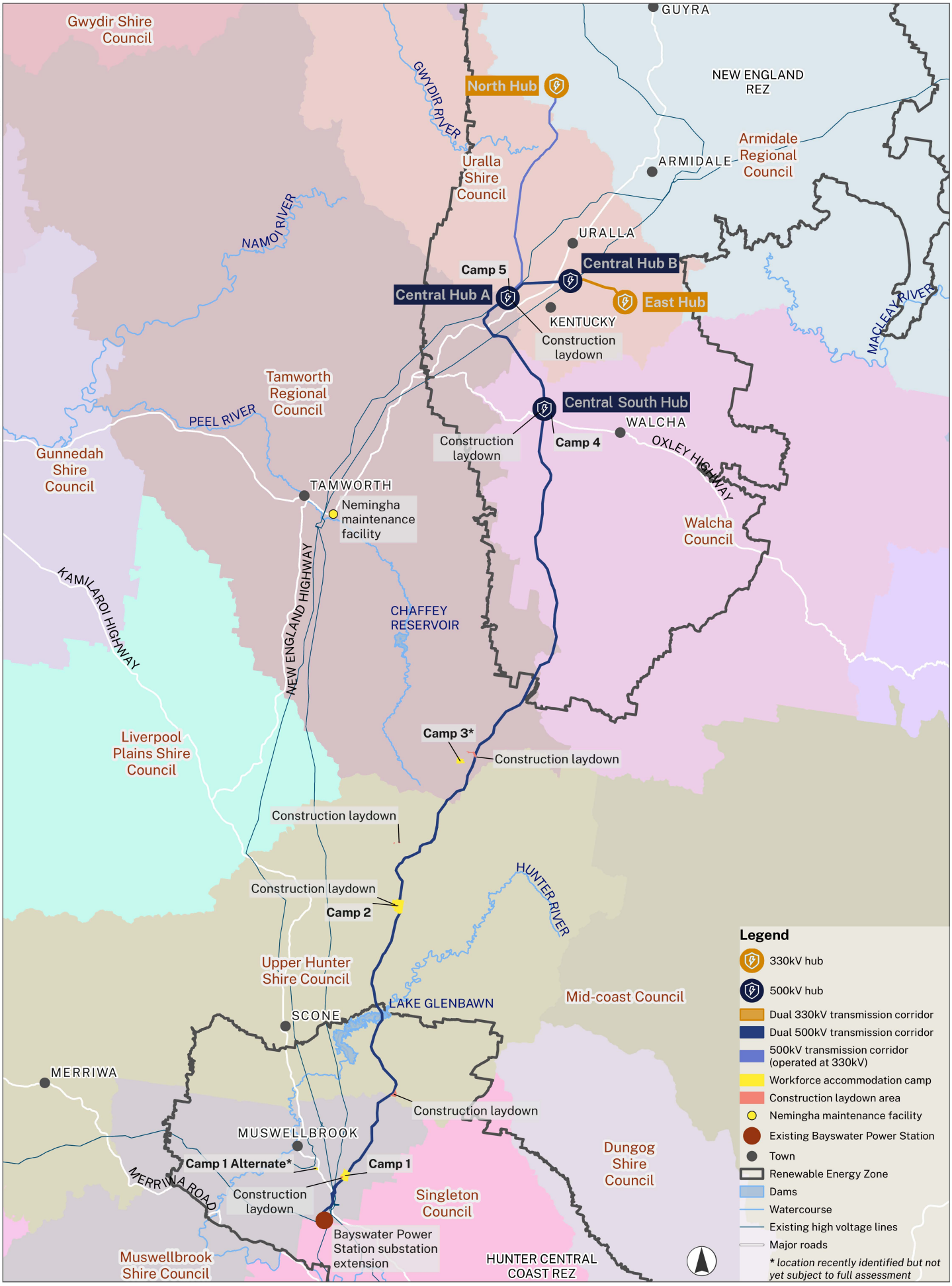


FIGURE 2.3 Local government areas within proximity to the project

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

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

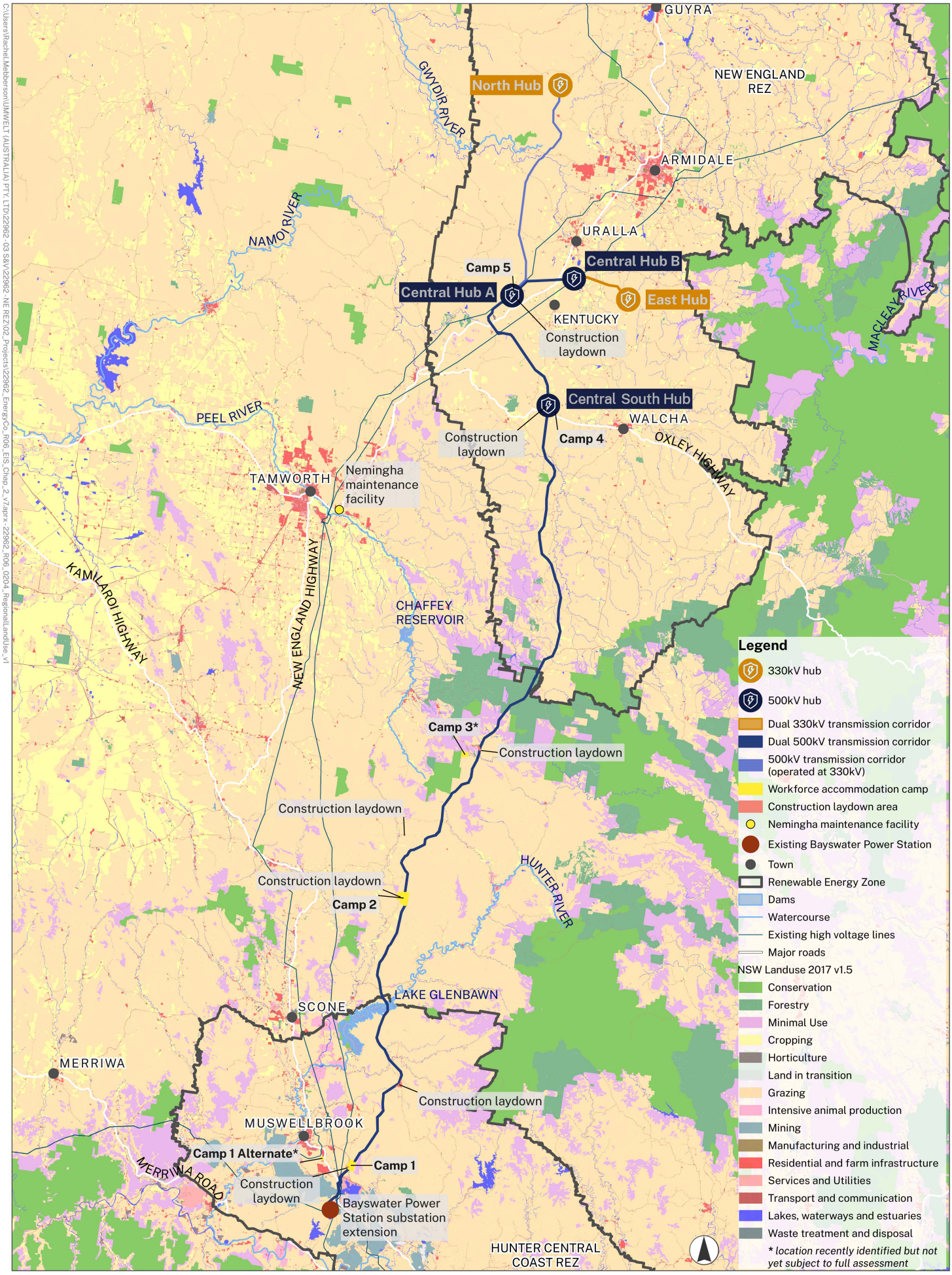


FIGURE 2.4 Regional land use across the project

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

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

2.5.2 Natural environment

The project traverses a diverse landscape across its length, with varying land use, topography and vegetation communities, from the New England Tableland plateau traversing down to the broad floor of the Hunter Valley near Muswellbrook.

In the northern portion of the project area elevations range from 1,170 metres Australian Height Datum (m AHD) (that is, above mean sea level) around Dumaresq to 780 m AHD near Yarrowyck, then rising to an elevation of 1,350 m AHD near Nundle State Forest. From there, elevations gradually decrease heading south to 130 m AHD near Muswellbrook.

With the extensive agricultural land use history within and surrounding the project area combined with other land use developments including townships and infrastructure (roads, dams, transmission lines etc.) a mosaic of different vegetation patterns exist from extensive areas of cleared grazing lands to heavily vegetated slopes and escarpment areas fringing the New England Tableland plateau.

The project intersects 4 bioregions as described by the Interim Biogeographic Regionalisation for Australia (IBRA): New England Tablelands, Nandewar, Sydney Basin and NSW North Coast (refer to Figure 2.5).

The New England Tablelands Bioregion is home to a diversity of plant communities and fauna species. Approximately 70 species of Eucalyptus occur in this bioregion, about a third of which are endemic or near endemic to the bioregion. The New England Tablelands supports a variety of open forests and woodlands including the critically endangered box-gum woodland. The New England Tableland Bioregion, together with the Nandewar Bioregion, supports a significant proportion of the NSW population of the critically endangered regent honeyeater (*Xanthomyza phrygia*) (NPWS, 2003).

The Nandewar Bioregion is characterised by box-gum woodlands. Within steeper sloping areas with decreasing soil fertility, the box-gum woodlands are replaced by ironbark and cypress pine communities in woodlands and open forests, which characterise much of the less productive agricultural areas of Nandewar. The Nandewar Bioregion supports many plant species of conservation significance (including *Macrozamia* and *Homoranthus* genera), with 467 vertebrate fauna species known to occur in the bioregion, including birds, frogs, reptiles, arboreal mammals and bats (NPWS, 2003).

The NSW North Coast Bioregion includes soils derived from basalts and granites which support dry sclerophyll forests, with pockets of dry rainforest. Dominant canopy species include Grey Box (*Eucalyptus moluccana*), Blakley's red gum (*Eucalyptus blakeyli*) and Narrow leaved Ironbark (*Eucalyptus crebra*) (NPWS, 2003). There are a range of threatened communities and species that occur within this bioregion, with portions of the project traversing the south west portion of this bioregion.

Within the NSW North Coast Bioregion, a notable natural feature is the karst landforms of Timor Caves, located approximately 24 kilometres northeast of Murrurundi in the Upper Hunter Valley (refer to Figure 2.6). About 80 caves have been identified at Timor although many of them are relatively small. Main Cave is known to support a winter roost for the threatened large bent-wing bat (*Miniopterus orianae oceanensis*) (OEH, 2011a). The surface vegetation is dominated by a high density and large expanses of grass trees (*Xanthorrhoea glauca*) (Webb et al., 2023). Timor Caves are popular with cavers, youth and scouting groups and the local community. Additional karst landforms

also occur near Barry. The transmission line corridor for the project was redesigned to avoid these karst landforms.

The Sydney Basin Bioregion is one of the most species diverse bioregions in Australia (NPWS, 2003). This is a result of the variety of rock types, topography and climates in the bioregion. Important vegetation communities include yellow box – ironbark woodlands in the northern escarpments of the bioregion, with the project traversing this part of the bioregion. There are also a range of threatened communities and species that occur throughout the bioregion including on the broad landscape along the floor of the Hunter Valley, with the southern end of the project traversing this landscape.

The project area does not intercept any national park estate. National park estate areas that are located within proximity to the project area (within 10 kilometres) are shown on Figure 2.6. The project has also been designed to avoid biodiversity offset sites and other conservation areas in the region, with minor exceptions.

In this regard, the project area intersects a wildlife refuge at Lake Glenbawn protected under the *National Parks and Wildlife Act 1974* (NPW Act). Access tracks for the project also intercept a small portion of a recently approved biodiversity stewardship site (Gundy Mountain BSA, BS0268) which has been recently formally executed (mid 2026) under the *Biodiversity Conservation Act 2016* (BC Act). The transmission corridor portion of the project area is not within the biodiversity stewardship site (refer to Figure 2.6). EnergyCo has been working with the Biodiversity Conservation Trust (BCT) and other stakeholders in relation to these interactions.

The intersections with these 2 conservation areas are discussed further in Section 12.

The project area also intersects a portion of Nundle State Forest, and very small portions of Terrible Billy and Hanging Rock State Forests (refer to Figure 2.6). The Forestry Corporation of NSW (FCNSW) has a number of different forestry management zones which guide forestry and ecological management activities. The project area intersects with the following forestry management zones:

- Zone 2 Special Management Zone: this zone provides for selective or low impact forestry activities whilst protecting identified environmental or cultural values
- Zone 3A Harvesting Exclusion Zone: harvesting activities are excluded from this zone associated with identified constraints
- Zone 4 General Management Zone: areas of state forest where timber production is not the primary objective, but where the land is managed for a range of other forest uses and values
- Zone 5 Hardwood Plantation Zone: areas managed specifically for commercial hardwood plantation forestry, typically involving planted native hardwood species
- Zone 6 Softwood Plantation Zone: areas managed specifically for commercial softwood plantation forestry, typically involving planted pine species.

The majority of the project area intersecting Nundle State Forest is located within Zone 4 and Zone 6, with only a small portion of Zone 2, Zone 3A and Zone 5 intersected. This is further discussed in Section 12. The project area intersecting Terrible Billy State Forest associated with a minor encroachment by the transmission line corridor is located within Zone 4. The project area intersecting Hanging Rock State Forest associated with a minor encroachment by proposed public road upgrades is located within Zone 6.

Additional state forest areas that are located within proximity to the project area (within 10 kilometres) are shown on Figure 2.6. The interaction of the project with State forest land and activities is discussed further in Section 12.

In regard to drainage systems and catchments, the project passes through the regional water catchments associated with the Gwydir, Macleay, Namoi, Manning and Hunter Rivers. Of these river systems, the Gwydir and Namoi Rivers originate on the western slopes of the Great Dividing Range and are tributaries of the Murray-Darling Basin. The Macleay, Manning and Hunter Rivers are coastal river systems and flow east from the Great Dividing Range into the Pacific Ocean. Drainage systems are discussed further in Section 18.

2.5.3 Key risks and hazards

2.5.3.1 Bushfire

Bushfire is a known key risk for the region and requires consideration for the project, including both risk to project infrastructure due to bushfires that may occur in the region, and the need to manage bushfire risk associated with construction and operational activities. The project area intersects with Bushfire Prone Land mapped by the NSW Government (refer to Figure 2.7), including:

- Vegetation Category 1: typically areas of forest, woodlands, heaths, forested wetlands and timber plantations that are considered the highest bushfire risk vegetation.
- Vegetation Category 2: typically areas of rainforest and lower risk vegetation parcels (for example remnant vegetation and land with ongoing land management practices that actively reduces bushfire risk). Vegetation Category 2 is considered to be a lower bushfire risk than Category 1 or Category 3.
- Vegetation Category 3: typically areas of grassland, freshwater wetlands, semi-arid woodlands and arid shrubs that are considered to be medium bushfire risk vegetation.

The Bushfire Prone Land mapping is a strategic, council-prepared planning dataset subject to ongoing update. Mapping currency varies across local government areas, and as such it provides a general guide only to bushfire prone land across and in the vicinity of the project area. The project has undertaken a site-specific bushfire assessment, as detailed in Technical Report 12.

The proposed transmission line and any potential interaction with aerial firefighting water scooping operations conducted at Lake Glenbawn required consideration as part of the design and assessment of the project. The potential impacts on aerial firefighting, including water scooping operations and aerial firefighting near transmission lines as a result of the project is provided in Section 17.3.5 and Technical Report 11.

Detailed consideration of controls relating to the effective management of bushfire risk for the project have been assessed as part of the bushfire risk assessment (refer to Section 17). These controls would be applied as part of the detailed design and during construction and operational activities.

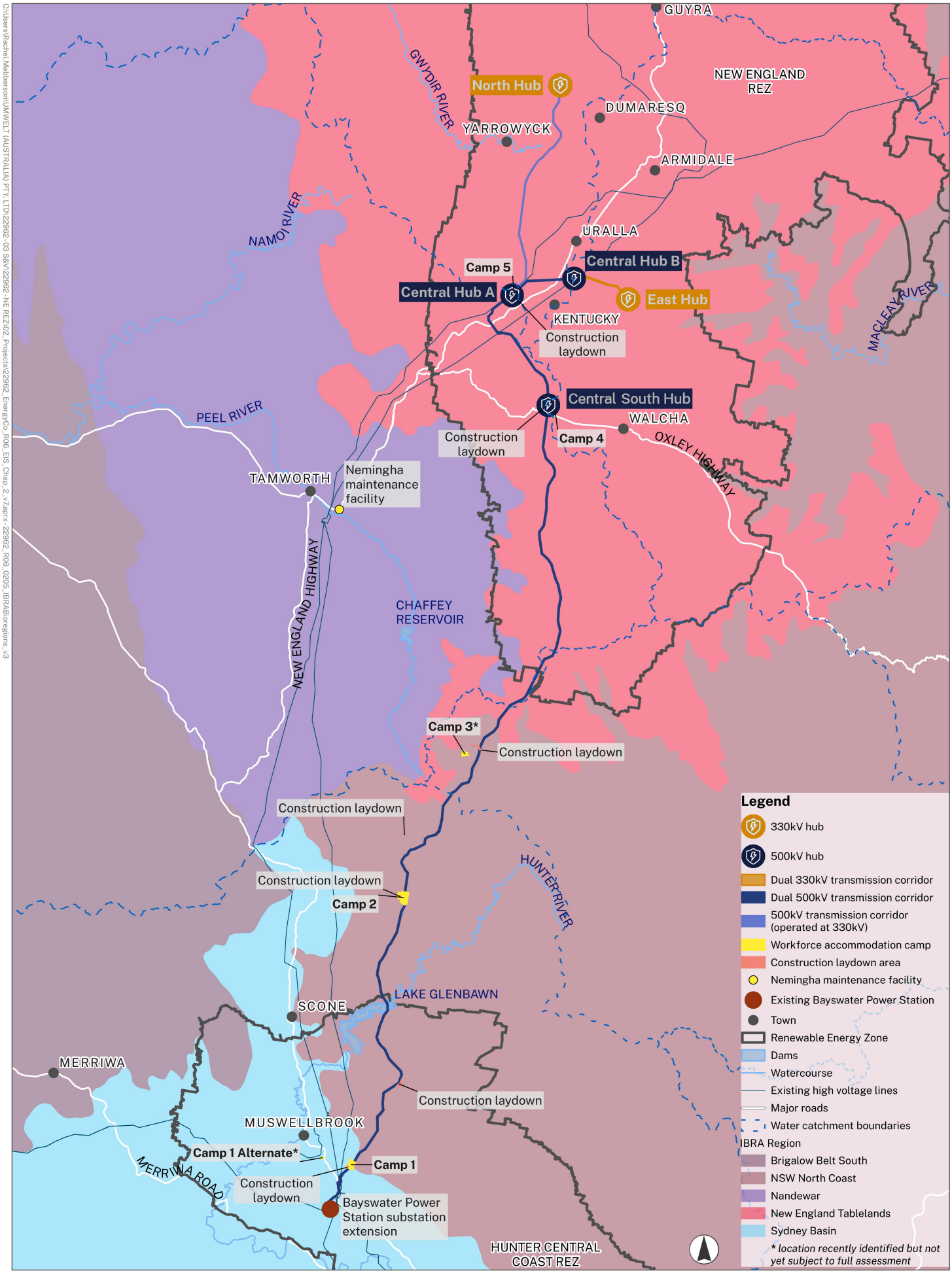
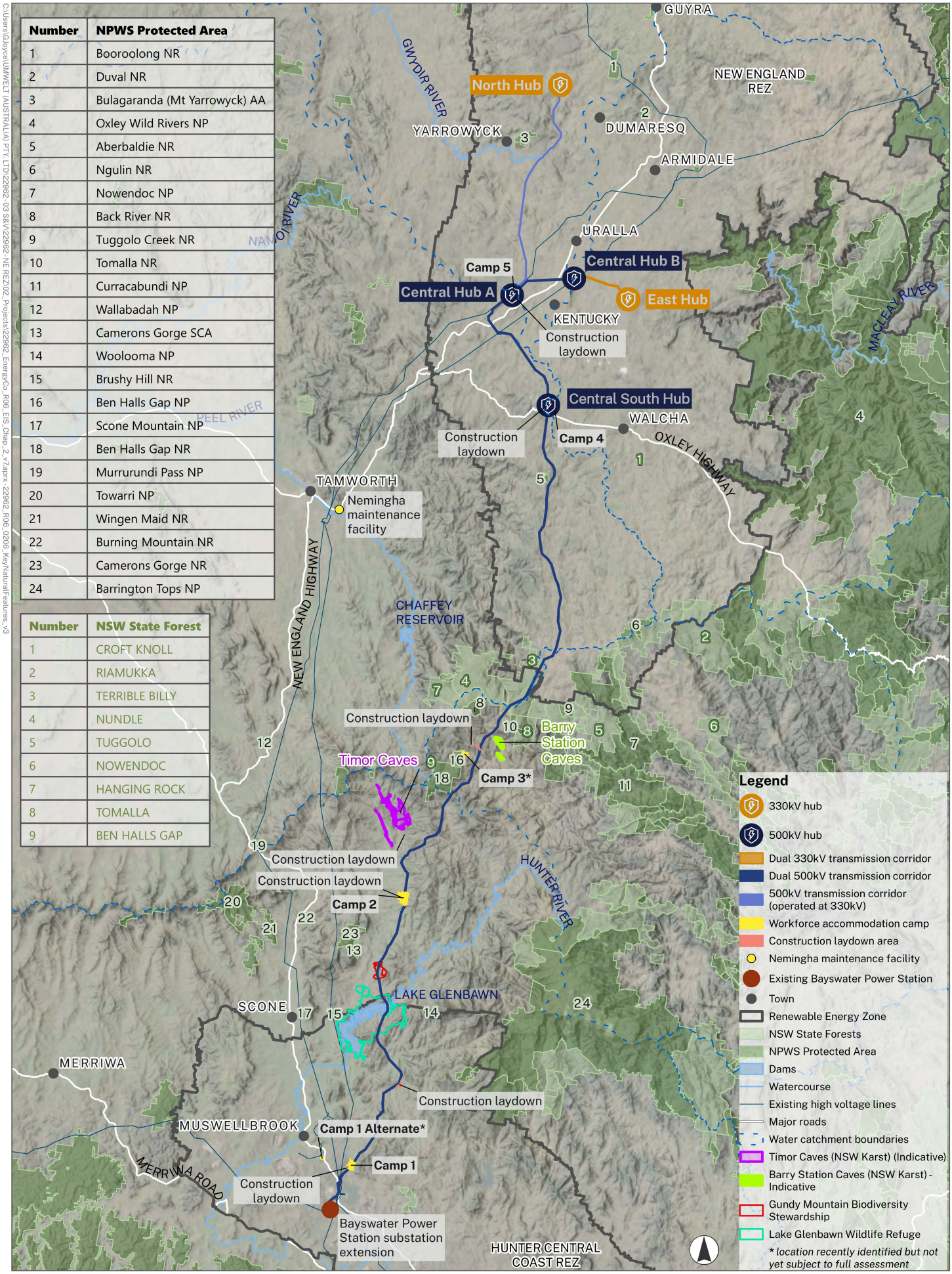


FIGURE 2.5 IBRA bioregions

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

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



Number	NPWS Protected Area
1	Booroolong NR
2	Duval NR
3	Bulagaranda (Mt Yarrowyck) AA
4	Oxley Wild Rivers NP
5	Aberbaldie NR
6	Ngulin NR
7	Nowendoc NP
8	Back River NR
9	Tuggolo Creek NR
10	Tomalla NR
11	Curracabundi NP
12	Wallabadah NP
13	Camerons Gorge SCA
14	Woolooma NP
15	Brushy Hill NR
16	Ben Halls Gap NP
17	Scone Mountain NP
18	Ben Halls Gap NR
19	Murrurundi Pass NP
20	Towarri NP
21	Wingen Maid NR
22	Burning Mountain NR
23	Camerons Gorge NR
24	Barrington Tops NP

Number	NSW State Forest
1	CROFT KNOLL
2	RIAMUKKA
3	TERRIBLE BILLY
4	NUNDLE
5	TUGGOLO
6	NOWENDOC
7	HANGING ROCK
8	TOMALLA
9	BEN HALLS GAP

FIGURE 2.6 Key natural features

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

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

0 20 40
Kilometres

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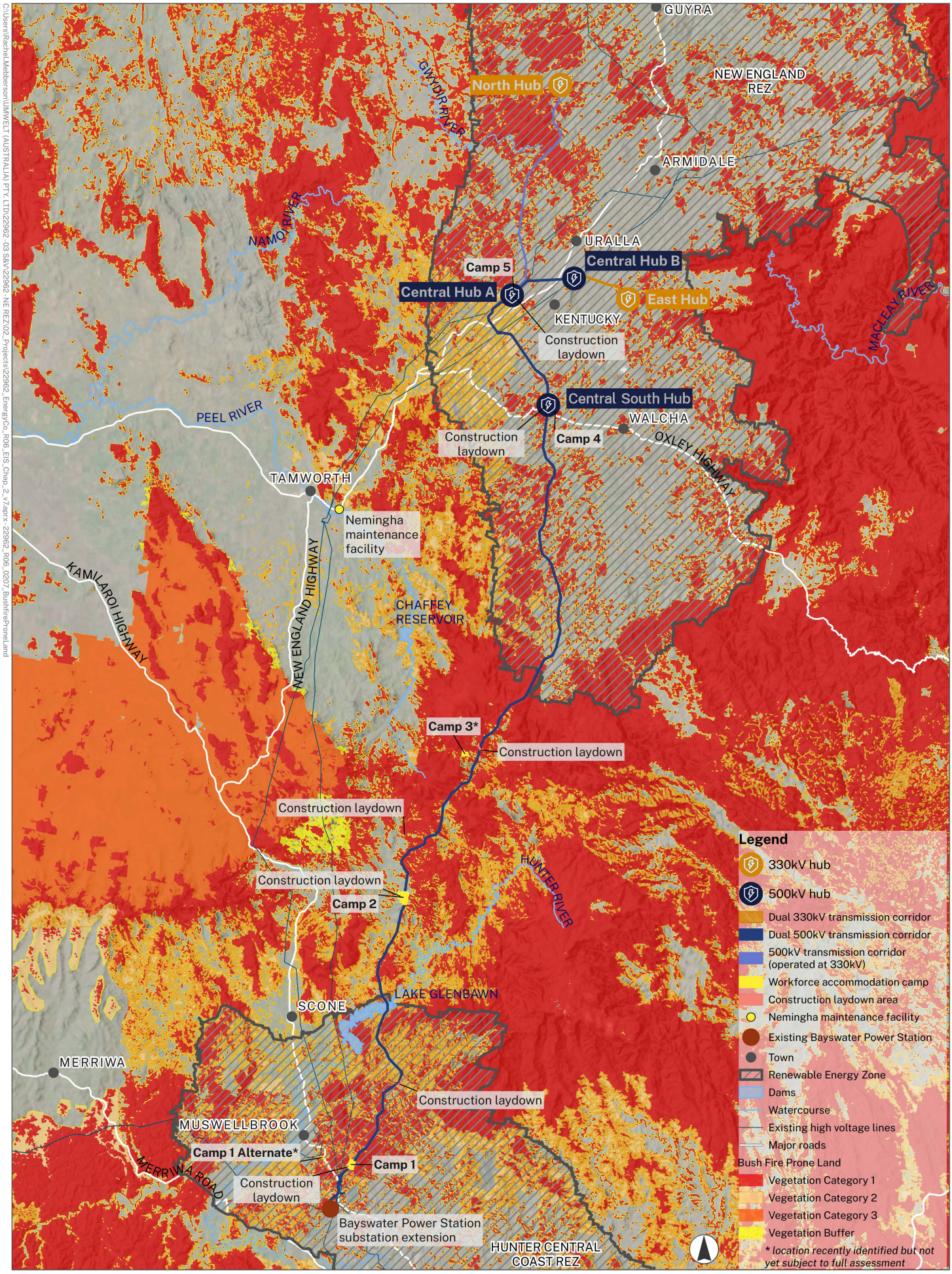


FIGURE 2.7 Bushfire Prone Land

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

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

2.5.3.2 Steep slopes

Complex terrain presents challenges for transmission construction, and this was a key driver in the route selection and design decisions for the project (discussed in further detail in Section 2.6 and Appendix B).

Route selection decisions have improved constructability, reduced steep terrain constraints and construction risks. The current project area has less aggregate elevation change than previously considered corridors (discussed in Appendix B). The current project area requires less work in steep terrain, including more standard tower pads, shorter and less steep access tracks and more conventional construction methods.

The local terrain would continue to be considered through the detailed design process.

2.5.3.3 Climate change

The impacts of climate change on the project have been considered through relevant environmental assessments and climate change scenario modelling, as required by the SEARs, including consideration within the bushfire, flooding and surface water assessments.

With a proposed transfer capacity of 6 GW, the project would make a material contribution to the NEM and support the State's transition away from fossil fuel reliance. The project would therefore support reducing greenhouse gas emissions from the electricity sector. Greenhouse gas emissions are linked to anthropogenic climate change, and reducing emissions would contribute to minimising impacts from climate change that may impact on future generations.

2.5.3.4 Biosecurity

Biosecurity risks are an important management focus during the planning, construction and operation of the project due to the movement of vehicles, equipment and people between locations to and within the project area. Biosecurity has been a key consideration in the planning of the project and biosecurity controls have been put in place for fieldwork undertaken as part of the project, including the fieldwork undertaken to inform the project design and this EIS.

The project is also located in proximity to a historical anthrax outbreak near Rouchel. Route selection and refinement as discussed in Section 2.6 sought to avoid and/or minimise impacts to the area subject to the historical outbreak, and a detailed anthrax risk assessment has been undertaken (refer to Section 12 and Technical Report 20).

Biosecurity risks and the management controls to be adopted as part of the project are discussed in Section 13.

2.5.3.5 Flooding

There are some areas of flood prone land associated with drainage systems intersected by the project area, with risk associated with flooding considered in a flood assessment as discussed in Section 18.

2.5.3.6 Contamination

Most areas within and in the vicinity of the project area have a low contamination risk. The highest potential for soil contamination to be encountered is in the southern portion of the project area at Bayswater Power Station. Contamination risks are discussed in Section 22.

2.5.3.7 Mine subsidence

A small portion of the project area associated with a public road upgrade near Muswellbrook is located within the Muswellbrook Mine Subsidence District. However, the main project infrastructure including the transmission corridor, energy hubs and other ancillary infrastructure is not located within a Mine Subsidence District.

2.6 Route selection and project design options

The development of large-scale transmission infrastructure follows a standard, staged process that progressively narrows from a broad study area to a defined corridor and, ultimately, the final easement and infrastructure footprint.

At each phase, the level of technical studies and landholder and community engagement increases from high-level desktop analysis to site-specific engineering design. This information is continuously reviewed, assessed and validated to confirm whether the project can progress to the next phase. Where information cannot be validated before progressing, earlier design phases are revisited to re-examine assumptions and review the design.

The route selection process for the project began in early 2022, following the formal declaration of the New England REZ in December 2021. Since then, a structured and iterative approach has been applied to identify and refine a corridor that is technically feasible, environmentally responsible, and aims to leave a positive legacy for the community.

Strategic and project objectives were established to guide corridor development based on EnergyCo's planning pillars and corresponding planning principles. These pillars and principles align with the foundational principles in the NSW Transmission Guideline (which was released in 2024 by DPHI) and the requirements of the EII Act. The relationship between EnergyCo's planning pillars and the NSW Transmission Guideline's foundational principles is outlined below.

KEY PLANNING PILLARS AND RELATED PLANNING PRINCIPLES FOR ROUTE OPTIONS SELECTION

People

Positive benefits and negative impacts on people's wellbeing, amenity and quality of life

Planning principles

- Minimise impacts on the visual amenity of residences and landscapes
- Minimise impacts on residential areas and rural residences
- Maximise opportunities to deliver community benefits

Environment

Impacts to natural and cultural environments

Planning principles

- Minimise impacts on biodiversity values
- Minimise impacts on cultural heritage values
- Maximise the use of available industrial and mining land

Economic

The cost of the option and its impacts on key industries

Planning principles

- Deliver energy infrastructure that is in the long-term financial interests of NSW energy consumers
- Minimise impacts on high value agricultural land, including Critical Industry Cluster (CIC) land and Biophysical Strategic Agricultural Land (BSAL)
- Maximise the use of suitable public land

Strategic

The consistency of the option with the NSW Electricity Infrastructure Road Map

Planning principles

- Deliver energy infrastructure that meets the objectives and timing requirements of the Roadmap
- Maximise co-location with existing transmission infrastructure
- Maximise co-location with existing and proposed energy projects

Technical

The technical efficiency and reliability of the option in meeting electricity demand

Planning principles

- Maintain energy security and reliability, ensuring resilience of the power system
- Optimise electricity infrastructure and power system development over the long term

To ensure a consistent and transparent evaluation process from the early planning phases, a structured Multi-Criteria Analysis (MCA) framework was applied at key phases of the route selection process for the project.

An overview of the corridor selection and refinement process for the project is detailed in Figure 2.8. Further details regarding each phase of the design development and route selection process are provided in Appendix B.

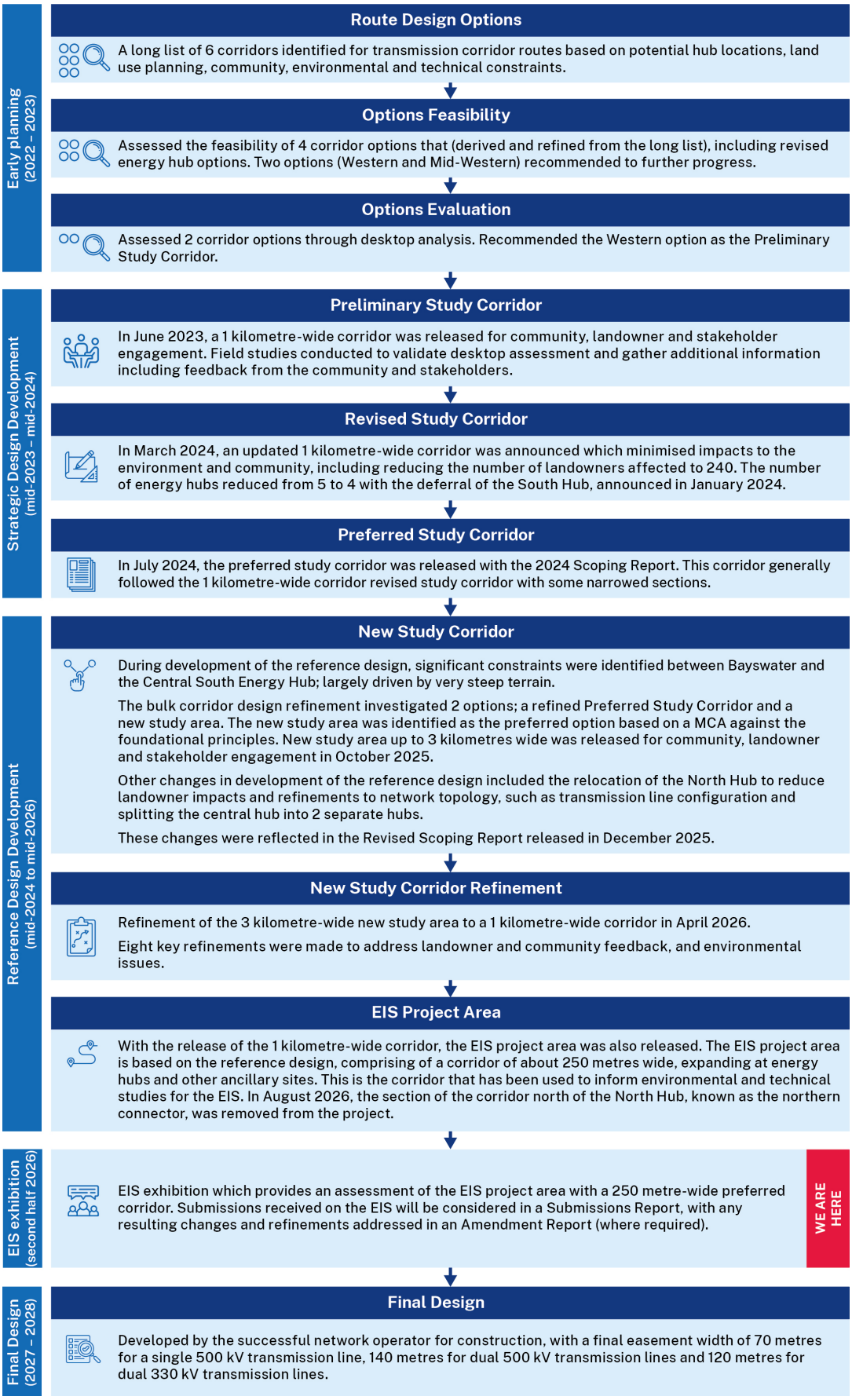


Figure 2.8. Overview of corridor selection and refinement process

During the early planning phase, multiple options were considered for feasibility. Two corridors were shortlisted for further evaluation, including the Western corridor closer to Tamworth, and the Mid-Western corridor near Ellerston. These are illustrated on Figure 2.9. Following evaluation, the Western corridor was selected as the Preliminary Study Corridor and announced publicly in June 2023.

A strategic design development phase followed, including landholder and stakeholder engagement, and technical and environmental studies. This led to a number of corridor refinements, including the removal of the South Hub, which were incorporated into the Preferred Study Corridor presented in the 2024 Scoping Report in July 2024.

Following completion of the 2024 Scoping Report, EnergyCo made a number of further changes to the project, responding to community feedback and the findings of detailed assessments. In May 2025, EnergyCo relocated the North Hub to reduce landholder impacts.

In October 2025, EnergyCo released a revised 3 kilometre-wide new study area for the central section of the corridor to address a number of constructability and related constraints (details of which are provided in the Bulk Corridor Design Refinement Report). EnergyCo also announced some network refinements including splitting of the Central Energy Hub into 2 hubs (Central Hub A and Central Hub B). A Revised Scoping Report addressing these and other changes to the project was published in December 2025.

After the release of the Revised Scoping Report, further corridor refinements were then made to the new study area in response to community feedback and outcomes of further detailed assessments.

In April 2026, EnergyCo announced a refinement of the 3 kilometre-wide study area to a 1 kilometre-wide study area. At the same time, EnergyCo released its (generally) 250 metre-wide EIS project area located within the 1 kilometre-wide corridor.

In August 2026, following updates to the network design and delivery approach for the New England REZ, EnergyCo announced that the infrastructure north of the North Hub, known as the northern connection, will be progressed separately from the project.

Following the above refinements, the reference design for the project was defined and has been used in this EIS. The EIS project area is based on the reference design and forms the basis for environmental assessments to support the EIS (refer to Section 3.).

The EIS project area will continue to be refined in response to ongoing engagement with landholders and other stakeholders, and submissions raised in the EIS.

Further detail regarding the route selection process is provided in Appendix B.

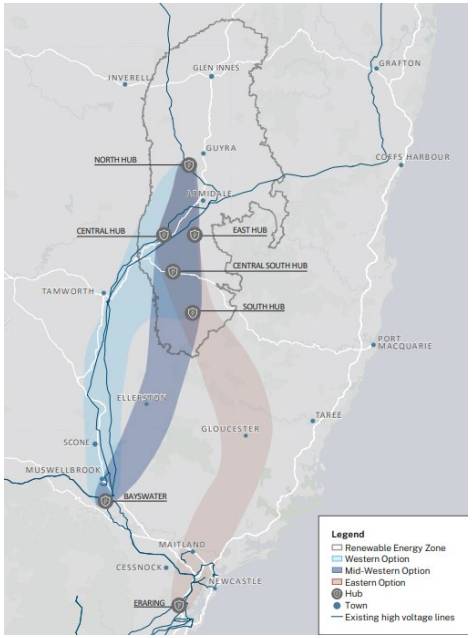
Options development phase	Feasibility phase	Evaluation phase
 Six corridor options identified.	 Refined options to 2 corridors, including the Western corridor and Mid-Western corridor (with an Eastern corridor discontinued due to identified significant constraints).	 Assessed the 2 corridors and progressed the Western corridor as the preferred option.

Figure 2.9. Overview of design development and route selection process during the early planning phase

2.7 Impact avoidance and minimisation

Impact avoidance and minimisation have been key drivers throughout the project's iterative route selection and design process, guided by EnergyCo's planning pillars and aligned with the objective of reducing environmental, social and economic impacts while maximising project benefits. Across all stages, from early planning stage to refinement of the EIS project area, route selection and design decisions have prioritised avoiding sensitive environmental areas, reducing impacts on communities and landholders, and improving constructability outcomes. This has included progressively refining the corridor to reduce its length, footprint and proximity to dwellings, while incorporating stakeholder feedback and the findings of technical investigations to optimise the alignment and infrastructure siting.

Project refinements have reduced impacts to landholders, land use and key industries. Corridor narrowing and realignments have progressively decreased the number of affected landholders and nearby dwellings and avoided the communities of Woolomin and Dungowan. Targeted refinements have sought to reduce impacts to dwellings in response to community concerns in areas such as Rouchel, Gundy, Waverly, Barry and Niangala.

The transmission corridor has been strategically sited to avoid key hubs within the equine CIC, including Scone and areas that are central to the industry's identity and function. Instead, it generally traverses or runs adjacent to lower-order rural roads, including Hunter Road and Rouchel Road, as well as sections parallel to Waverley Road and Timor Crawney Road. Whilst the project area intersects equine CIC land near Gundy, it avoids the key operational areas of the thoroughbred industry in the area.

Biodiversity impact avoidance has also been a key consideration. Early planning avoided high-value areas such as national parks, wetlands and critical habitats, with later refinements further reducing impacts through shortening the corridor, reducing vegetation clearing. Corridor realignment has also avoided the biodiversity offset area associated with Chaffey Dam, the mapped extent of the sensitive karst systems at Timor and Barry (with project elements limited to minor road upgrades at Timor), and associated sensitive habitats including threatened species habitat and watercourses. Broader design measures (for example spanning waterways, retaining habitat corridors, and siting infrastructure in disturbed areas) have further minimised biodiversity impacts.

Similar principles apply to heritage, with a structured avoidance hierarchy ensuring high-value Aboriginal and historical heritage sites are avoided where practicable, supported by no-impact areas and ongoing design refinement to reduce impacts.

Broader route selection decisions, particularly the move to the new study corridor in October 2025 (and now subsequently refined for the project area assessed in this EIS), have improved constructability, reduced steep terrain constraints and construction risks, lowered vehicle movements and environmental disturbance, and enhanced bushfire resilience and aviation safety outcomes. Overall, impact avoidance and minimisation have been a primary driver of the route selection and design refinement process, with ongoing opportunities for further avoidance and minimisation to be considered during detailed design.

Further detail regarding impact avoidance and minimisation measures is provided in Appendix B.

2.8 Alternatives to the project

The project was determined through a series of options assessments and corridor refinements undertaken by EnergyCo where a range of project alternatives including alternative alignments were considered (refer to Section 2.6).

In addition to the range of alternative design options considered, the following alternative project options have been considered:

- Option 1: base case ('do nothing') option
- Option 2: optimisation and modification of existing transmission line infrastructure
- Option 3: provision of new underground transmission infrastructure
- Option 4: provision of new overhead transmission infrastructure (the project)
- Option 5: alternative power sources.

2.8.1 Option 1: The base case 'do nothing' option

The base case option is to 'do nothing' and rely on continued coal-fired power generation, supplemented by current and planned development of renewable energy projects, where these can connect to the existing transmission network.

As outlined in Section 2.1.3, NSW's energy system is undergoing a structural transformation, moving away from reliance on coal-fired generation towards renewable energy generation. The share of coal-fired generation in NSW to the NEM has been declining progressively and is predicted to continue to decline. This reduction is reflective of the staged retirement of coal-fired generation including the permanent closure of Liddell Power Station in April 2023 and the planned closure of NSW's remaining 4 coal-fired generators, with Eraring Power Station scheduled to close by April 2029, Bayswater Power Station and Vales Point B Power Station both expected to close around 2033 and Mount Piper Power Station to retire by 2040. These closures represent the withdrawal of a significant proportion of NSW's existing generation capacity over the coming decades.

Future energy demands will not be met using existing energy generating infrastructure and will instead rely on new low emission energy generation sources to supply energy across the State.

The 'do nothing' option has been rejected as it is inconsistent with Australian and NSW legislative and policy objectives as outlined in Section 2.1 and Section 2.2 and would lose the opportunity for the project to contribute to decarbonising the NEM and providing an affordable and reliable source of renewable energy. As discussed in Section 2.2, the project has been identified as an anticipated project in the 2026 Integrated System Plan (AEMO, 2026b) and a 'Deliver Now' project under the NSW Network Infrastructure Strategy (EnergyCo, 2023).

2.8.2 Option 2: Optimisation and modification of existing infrastructure

2.8.2.1 Use existing transmission lines

The existing 330 kV transmission lines that currently transfer power from Bayswater Power Station to Tamworth and Armidale, and between Armidale, Kempsey and Newcastle, do not have sufficient available capacity to carry the extra power needed to be delivered by the New England REZ.

To provide energy security for the future, additional REZ network infrastructure is required, including 500 kV double circuit transmission lines.

2.8.2.2 Upgrade existing transmission lines

Whilst the option of upgrading existing transmission lines was investigated, it was not considered feasible due to the need for lengthy system outages and for the existing lines to be taken down, easements widened and new structures built. Additionally, this option has a significantly longer line length than other options considered, therefore increasing time, cost and constructability constraints. Even with these upgrades, additional lines would still need to be built as the incremental capacity provided by these upgrades would be insufficient to meet the network capacity requirements of the New England REZ.

2.8.3 Option 3: Undergrounding option

As part of the project design options process, EnergyCo considered installing the transmission lines underground. There are a number of constraints to underground transmission lines, including:

- physical constraints when traversing steep terrain such as ravines and escarpments
- extensive trenching and earthworks, which may not be suitable in certain geology and areas of high biodiversity or cultural value
- restrictions on vegetation growth over the entire easement, meaning agricultural cropping would not be permitted within the easement
- underground cables cost approximately 4 times more than the overhead equivalent for 330 kV lines, and 8 times more for 500 kV lines
- the construction timeframe is substantially longer compared to the overhead equivalent, which extends construction amenity impacts
- fault-finding and repair for underground systems is more challenging and time consuming than for overhead systems, requiring substantial excavation. This can result in prolonged outages and interruptions to the power supply.

Underground transmission lines generally have lower visual impacts, though above ground infrastructure is required at regular intervals along the underground system.

A Select Committee was established by the NSW Government on 13 September 2023 to inquire into and report on the feasibility of undergrounding the transmission infrastructure for renewable energy projects. The report, released in March 2024 found that available evidence generally supports that undergrounding electricity infrastructure is more costly, and that there are concerns from some stakeholders that the cost of undergrounding electricity transmission projects will negatively impact the price of electricity to consumers through flow on effects (NSW Parliament, 2024).

Overhead transmission is proposed as it is seen as best balancing the considerations of cost to consumers, project delivery schedule, construction risk, environmental impact, reliability and transfer capacity. Based on the above factors, locating high voltage transmission lines underground was not considered to be a viable option for this project.

2.8.4 Option 4: Provision of new overhead transmission infrastructure

2.8.4.1 Proposed new infrastructure to deliver 6 GW transfer capacity (the project)

Provision of new overhead transmission infrastructure with a transfer capacity of 6 GW has been identified as the preferred option through the project development process as discussed in Section 2.6 and Appendix B. Overhead transmission infrastructure avoids the longer time frames, greater costs and constructability constraints of underground infrastructure (Option 3) and the potential impacts, and network outages and delays, associated with modifying existing infrastructure (Option 2).

2.8.4.2 Proposed new infrastructure with reduced transfer capacity

There has been feedback from some members of the community and other stakeholders regarding the option of reducing the scale of the New England REZ. A reduced network capacity is not considered a viable alternative to deliver the required generation on the timeline required. The suggestions include:

- reduce the network transfer capacity of the New England REZ to approximately 3 GW: this would leave an energy shortfall in the 2030s and would still require a new transmission line as the existing transmission lines do not have sufficient capacity. This proposal, if adopted, would be more expensive to consumers as the shortfall would likely be replaced by higher cost energy sources
- reduce the network transfer capacity of the New England REZ to approximately 3 GW and upgrade the existing transmission lines: this would be highly disruptive to existing consumers, with such an upgrade requiring a prolonged shutdown of the existing lines
- reduce the network transfer capacity of the New England REZ and use the existing transmission lines: the existing transmission network is already highly constrained and would not have capacity to dispatch additional generation to displace alternative higher cost energy sources.

2.8.5 Option 5: Alternative power sources

EnergyCo has received community feedback suggesting alternative power sources be pursued instead of the project which supports the development of the New England REZ generating renewable energy. Potential alternative power sources that have been raised include coal-fired power stations and nuclear power stations.

NSW's electricity supply has traditionally been heavily reliant on coal-fired power stations, however, many of these are now reaching the end of their technical life. The Australian and NSW Governments have committed to net zero emissions by 2050 and the commissioning of new coal-fired power stations would not contribute towards the achievement of net zero emissions. Furthermore, wind and solar electricity generation can provide cheaper and cleaner energy for the people of NSW while contributing to the achievement of net zero emissions by 2050.

GenCost is CSIRO and AEMO's annual assessment of the current and future costs of building and operating electricity generation, energy storage, and hydrogen production technologies in Australia, and is used to inform energy planning and investment decisions. The GenCost 2025-26 Report (Graham, Hayward and Foster, 2026) concluded that solar and onshore wind, supported by hydro, storage, transmission and either gas or hydrogen (or a combination of both) provide the lowest-cost pathway for Australia's electricity system to efficiently contribute to achieving net zero emissions by 2050. While offshore wind, gas with carbon capture and storage and nuclear technologies were assessed as potential contributors to the future electricity system, they were generally found to result in higher system costs than the least-cost pathway.

EnergyCo recognises there is a conversation about the possibility of nuclear energy contributing to future energy supply in the broader community. Nuclear power development is currently prohibited under both Commonwealth and NSW legislation. As identified in the GenCost 2025-26 Report, it is also more expensive than renewable energy.

A range of social, political, regulatory and technical factors would contribute to a long lead time before any nuclear generation could occur, with at least 15 years to first production from a decision to build nuclear small modular reactors in Australia. Given the longer construction time of a large-scale nuclear plant, if such an option was selected, the total development time would be a few years longer. A 15-year or longer total development time would mean that if a decision to pursue nuclear energy generation in Australia were made in 2026, with political and community support for the required legislative changes, then the first full operation would be no sooner than 2041. This timing would not meet the timing needs of the energy transition.

Nuclear has several additional steps in its pre-construction timeline that other technologies do not have. Nuclear technologies need to undergo more extensive safety and security permitting, nuclear prohibitions would need to be removed at the State and Commonwealth level and safety authorities need to be established.

Given these constraints and timeframes, the project is consistent with the lowest cost path for Australia's electricity system to efficiently contribute to net zero emissions by 2050. Based on timing, the project would be required irrespective of whether or not nuclear energy may become a component of Australia's energy mix in the future.

Other alternatives such as offshore wind would not be available in the timeframe needed for the 12 GW of renewable generation required by 2030 under the Roadmap. While offshore wind may be an important component of NSW's future energy mix, the GenCost 2025–26 Report indicated that offshore wind generally has higher average capital and generation costs than onshore wind (Graham, Hayward and Foster, 2026).

In 2025, the NSW Government released the NSW Renewable Fuel Strategy (DCCEEW, 2025f) which provides the NSW Government's framework for developing a renewable fuels industry that supports the State's net-zero objectives, improves fuel security and assists the decarbonisation of sectors that are difficult to electrify, including heavy transport, aviation, shipping and some industrial processes. The strategy seeks to accelerate the production and uptake of renewable fuels such as sustainable aviation fuel, renewable diesel, biomethane and hydrogen through a coordinated program of investment, policy reform, planning support, infrastructure development and market incentives. The strategy builds on and expands the objectives of the NSW Hydrogen Strategy (DPIE 2021b) which provides a framework to support the development of a commercial hydrogen industry in NSW. Together with REZs, renewable fuels and hydrogen hubs will seek to unlock decarbonisation of the heavy transport sector and support the emergence of new decarbonised industries, such as green steel and ammonia.

As discussed in Section 2.2, the project is consistent with both Australian and NSW government policy and is therefore the proposed option being pursued to support providing clean and reliable electricity to consumers. As noted above, onshore wind and solar are the lowest cost new build electricity generation technologies and these are proposed for the New England REZ. The project therefore supports delivering lower future energy prices to NSW consumers compared to the alternative power sources discussed in this section.

Project description



Section 3

3 Project description

This section describes the key project information for the project that is proposed by EnergyCo. The design, construction, operation, decommissioning and rehabilitation of the project as described in this section forms the basis of the assessment provided in this EIS. The project description is based on the reference design.

As detailed in Section 2, considerable refinements have been made through the route selection and project design process in response to environmental and technical studies, and feedback from landholders, communities and other stakeholders. As the project is currently at the reference design stage, there will be elements of the project that are refined during the detailed design process.

The description of the project and the assessment of its potential impacts have been undertaken in a manner that provides a level of flexibility for future design refinement while allowing for a conservative and thorough impact assessment. Ongoing refinements of the project design and construction method would aim to:

- respond to feedback received from landholders, stakeholders and during public exhibition
- further avoid or reduce environmental and community impacts
- incorporate design improvements or different construction methods where appropriate
- use improved technology or materials where suitable
- deliver better value for money.

3.1 Project overview

The project includes the construction and operation of new high voltage electricity transmission infrastructure that is required to connect energy generation and storage projects within the New England REZ to the existing electricity network.

The project extends from the central area of the New England REZ north of Armidale to the existing Bayswater Power Station near Muswellbrook and comprises the following key features:

- new transmission infrastructure including new dual 500 kV transmission lines and associated infrastructure to connect the New England REZ to the NEM to the south of Muswellbrook NSW, and new 500 kV and 330 kV transmission lines to connect to energy hubs within the New England REZ
- 5 energy hubs to connect future energy generation and storage projects within the New England REZ to the new 500 kV network infrastructure
- a maintenance facility to support the operational requirements of the project

- ancillary development to support the project, including:
  - establishment and/or upgrade of access tracks and upgrades to public roads
  - construction laydown areas
  - workforce accommodation camps
- upgrade and/or augmentation to existing electricity and utility infrastructure
- installation and operation of communications infrastructure and facilities.

The project is illustrated on Figure 3.1 with a project summary provided in Table 3.1. A further detailed project overview is provided on Figure 3.2.

The project description is based on the reference design. The reference design is the initial project design detailing key components and technical parameters for the transmission lines, energy hubs, ancillary infrastructure and access tracks. The reference design will be further refined as the project progresses to the detailed design stage, based on continued landholder feedback, further technical and environmental surveys.

Section 3.2 provides more detail about each of the key components of the project while Section 3.3 provides an overview of the key construction features and activities for the project. Section 3.4 describes the operational and maintenance aspects of the project.

Table 3.1. Project summary

Project element	Summary of the project
Operation	
Transmission lines and towers	High voltage double circuit transmission lines, including: • energy hub connections – single and dual 500 kV and 330 kV transmission lines that connect to each of the energy hubs • bulk corridor – dual 500 kV transmission lines that connect the New England REZ to the NEM at Bayswater Power Station near Muswellbrook. Typical easement widths would be 70 metres for a single 500 kV line, 120 metres for dual 330 kV lines and 140 metres for dual 500 kV lines. Transmission towers would typically be between 45 metres and 75 metres high. Towers would generally be spaced about 450 metres apart; however, this can vary greatly depending on terrain.
Energy hubs	Five energy hubs: • North Hub (incorporating a 330 kV switching station) • Central Hub A (incorporating a 500/330 kV substation) • Central Hub B (incorporating a 500/330 kV substation) • East Hub (incorporating a 330 kV switching station) • Central South Hub (incorporating a 500/330 kV substation). Three of the 5 energy hubs would have a substation where energy exported from renewable energy generation projects (at 330 kV) is aggregated and transformed to 500 kV for export to the project's transmission network and the NEM.

Project element	Summary of the project
	The North and East Hubs would have a 330 kV switching station which would connect energy from renewable energy generation projects (at 330 kV) to the project's 330 kV transmission network. Further details of the energy hubs are provided in Section 3.2.4 and presented in Table 3.2.
Substation extension	Extension and electrical fit out of the existing 500 / 330 kV Bayswater Power Station substation.
Communications infrastructure	The project would include a communications system to provide interconnection between energy hubs and the external network. Communications infrastructure would include fibre optic cabling, optical repeater stations and microwave links.
Maintenance facility	A maintenance facility would be established at Nemingha, Tamworth to support the operational requirements of the project.
Operational footprint	The operational footprint is around 471 hectares. This is the area that would be directly occupied by permanent infrastructure elements of the project based on the reference design such as substations, switching stations, transmission line towers, maintenance facility and other permanent ancillary infrastructure. This footprint excludes transmission line easements.
Operational area	The operational area includes around 4,237 hectares. This area is based on the elements of the reference design that are relevant to the operational phase of the project such as the operational transmission line easement, energy hubs, permanent access tracks, substation extension area, maintenance facility and other permanent ancillary infrastructure. Freehold acquisition would be undertaken for certain permanent infrastructure (for example energy hubs) and easements would be acquired for the transmission lines and access.
Operational workforce	The operational workforce is estimated to be up to 100 personnel consisting of both site and office-based jobs.
Vegetation management	Vegetation within the easement would be maintained to achieve operational and safety requirements. Hazard trees that pose a risk to safe operation of the transmission line by falling onto any associated infrastructure or within safe approach distances, would be removed. Vegetation in the easement and in asset protection zones (APZ) would be managed as needed on a cyclical basis over the life of the project.
Construction	
Project area	The project area is approximately 10,928 hectares. The project area represents the area within which the construction of the project would occur and provides flexibility for the final siting of project infrastructure and disturbance footprint. It includes a generally 250 m corridor along the transmission alignment, additional areas for energy hubs and other project infrastructure including access tracks and road upgrades (refer to Figure 3.2).

Project element	Summary of the project
Construction program	Main construction is planned to commence in 2028 and is expected to take around 6 years to complete. The project would be energised in 2 stages: • Stage 1 would provide 2.4 GW of transfer capacity and would be energised in 2032 • Stage 2 would provide an additional 3.6 GW of transfer capacity and would be energised in 2034.
Disturbance footprint	The disturbance footprint is approximately 3,579 hectares, which includes land proposed to be directly impacted for construction including vegetation clearing. This is the area within the project area that would be affected by the construction of the project, including (but not limited to) transmission towers and lines, energy hubs, maintenance facility, access roads and access tracks, ancillary infrastructure and utility adjustments. Further details on the approach to assessing the project's potential impacts are provided in Section 3.2.1.
Site access and access tracks	Construction of access tracks and intersections with the public road network to provide access for the project as set out in Section 3.2.7.1.
Road upgrades	Upgrades to local roads and key intersections on the construction access routes to facilitate an increase in vehicle movements during construction, including OSOM movements as set out in Section 3.3.6.
Waterway vehicular crossings	Temporary and permanent structures to enable access across waterways and drainage lines.
Utility adjustments and crossings	Utility adjustments and crossings where the new infrastructure would intersect existing utilities. Work may also be required to connect ancillary construction facilities and permanent infrastructure to existing utility services. Utilities which require relocation or crossings include electricity, telecommunication, roads, rail and water.
Water requirements and supply	The anticipated total construction water volume for the project is approximately 2,400 ML. Potable water (around 360 ML) would be sourced from existing water supplies or purchased via vendor. Water would be transported to the project and stored in water tanks. Non-potable water (around 2,040 ML) would be supplied from a range of sources including extraction from surface water and groundwater regulated and unregulated water sources, and reuse of water captured in water management structures including those for erosion and sediment control purposes. Wastewater treatment plants are proposed at workforce accommodation camps. Treated water may be used for dust suppression, subject to meeting water quality criteria. Remaining wastewater or waste from treatment plants would be disposed of at a licenced wastewater facility.

Project element	Summary of the project
Water management	A range of new water management structures such as dams, pipelines and pumping systems, water diversion structures and temporary sediment and erosion control structures would be required to be established to effectively manage water and sediment and erosion control within the project area. These would be installed in accordance with the principles and requirements in *Managing Urban Stormwater – Soils and Construction, Volume 1 (Landcom 2004), Volume 2A (DECC 2008a)* and *2C (DECC 2008b)*, commonly referred to as the 'Blue Book'.
Construction ancillary sites	Construction ancillary sites used to support construction may include: • site offices and with amenities • maintenance facilities • concrete batch plants • crushing grinding and screening plant • helicopter landing pads • high volume laydown • workforce accommodation camps.
Construction workforce	The peak construction workforce is estimated at around 1,400 people.
Construction laydowns	Hardstand areas at energy hubs, workforce accommodation camps and nominated locations within the project area. Used as logistics areas facilitating many of the activities listed in the construction ancillary sites.
Workforce accommodation camps	Five temporary workforce accommodation camps are required for the project, with the sites identified being: • Camp 1 – Inglewood Road, Muswellbrook, or alternative being considered in liaison with Muswellbrook Shire Council, referred to as Camp 1 Alternate • Camp 2 – Waverley Road, Waverly • Camp 3 – Barry Road, Barry • Camp 4 – Central South Hub, Oxley Highway, Walcha Road • Camp 5 – Central Hub A, Glenburnie Road, Kentucky.

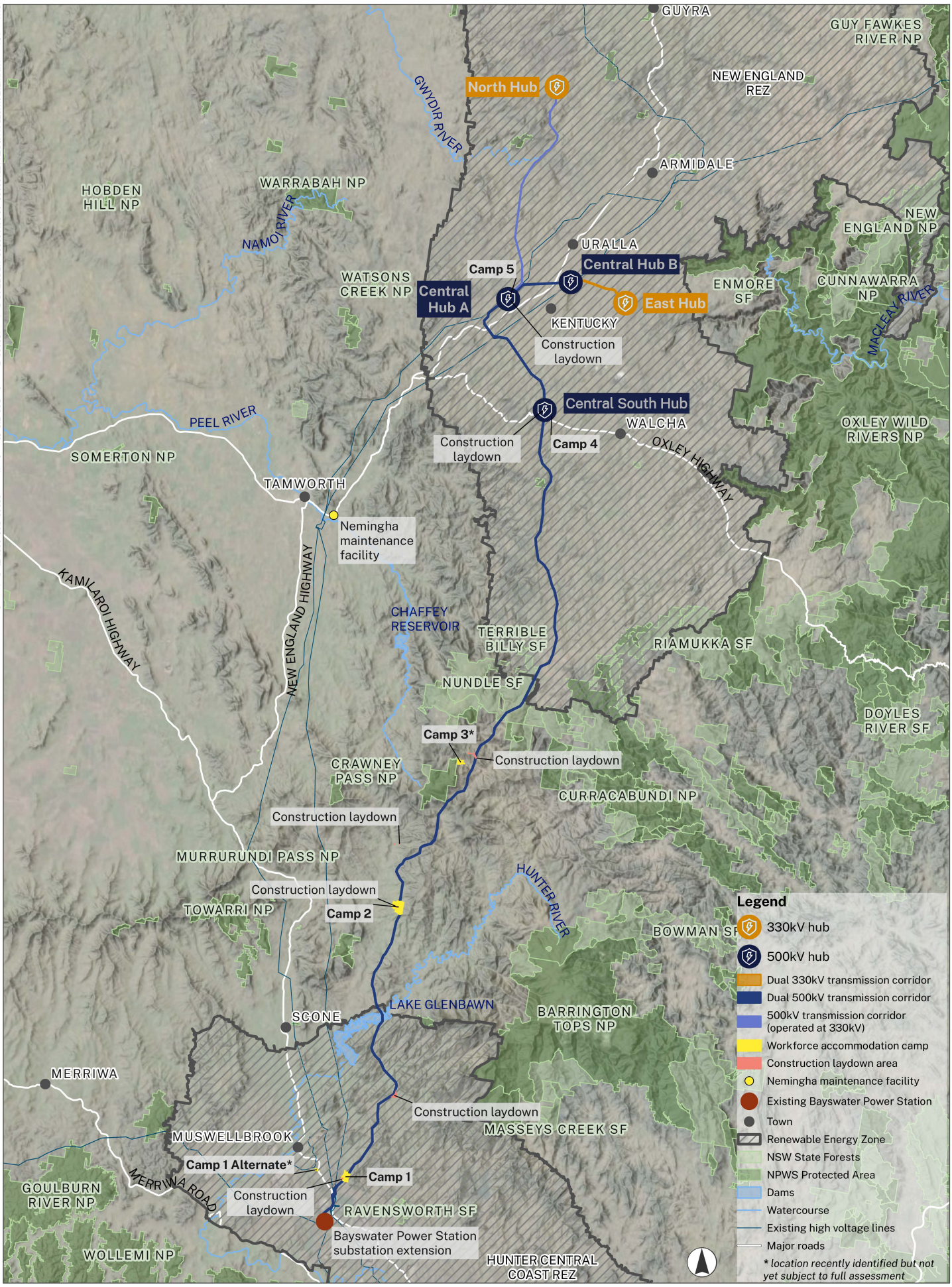


FIGURE 3.1 The project

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

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

0 20 40
Kilometres

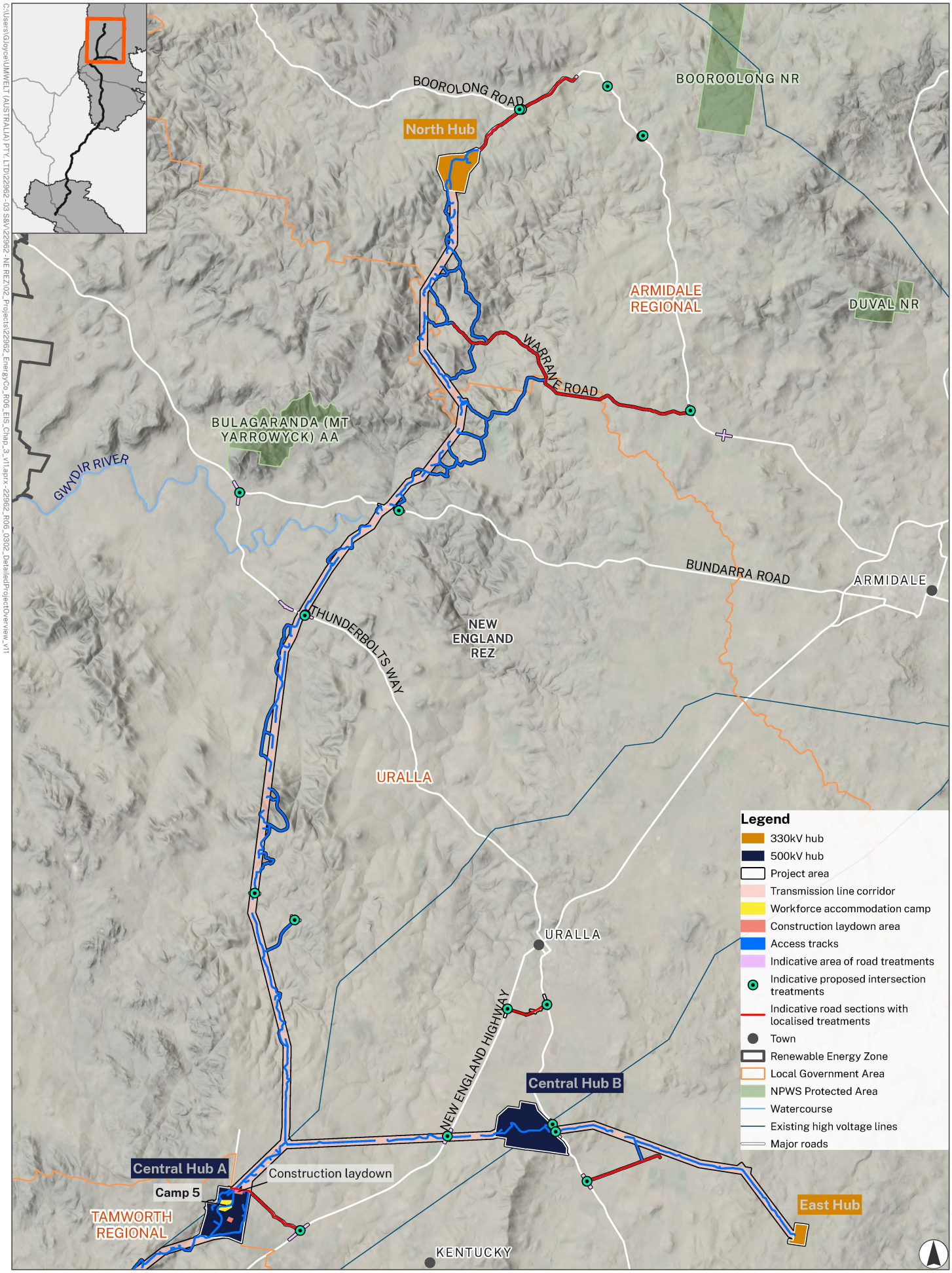


FIGURE 3.2a Detailed project overview (Map 1 of 5)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

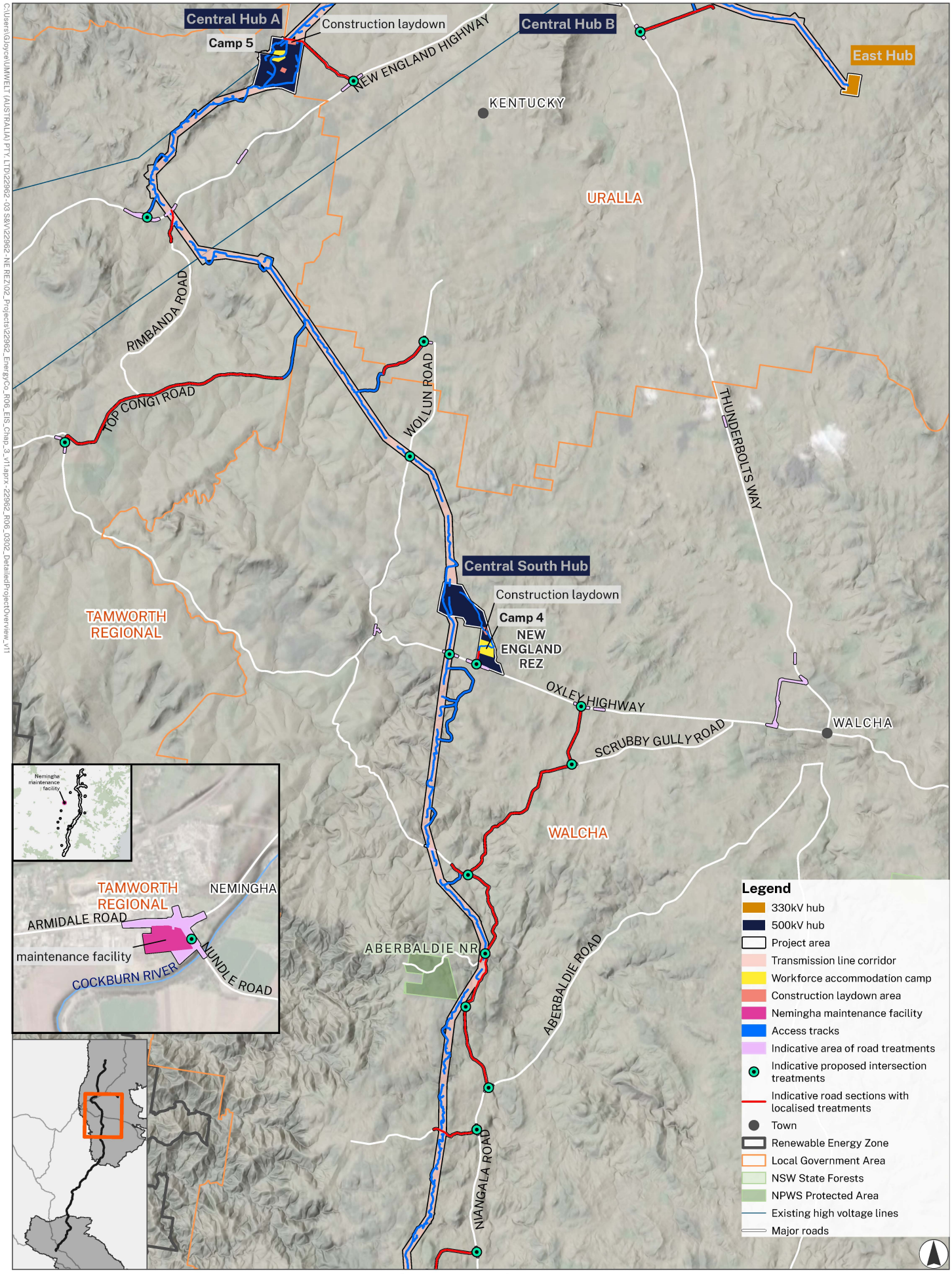


FIGURE 3.2b Detailed project overview (Map 2 of 5)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

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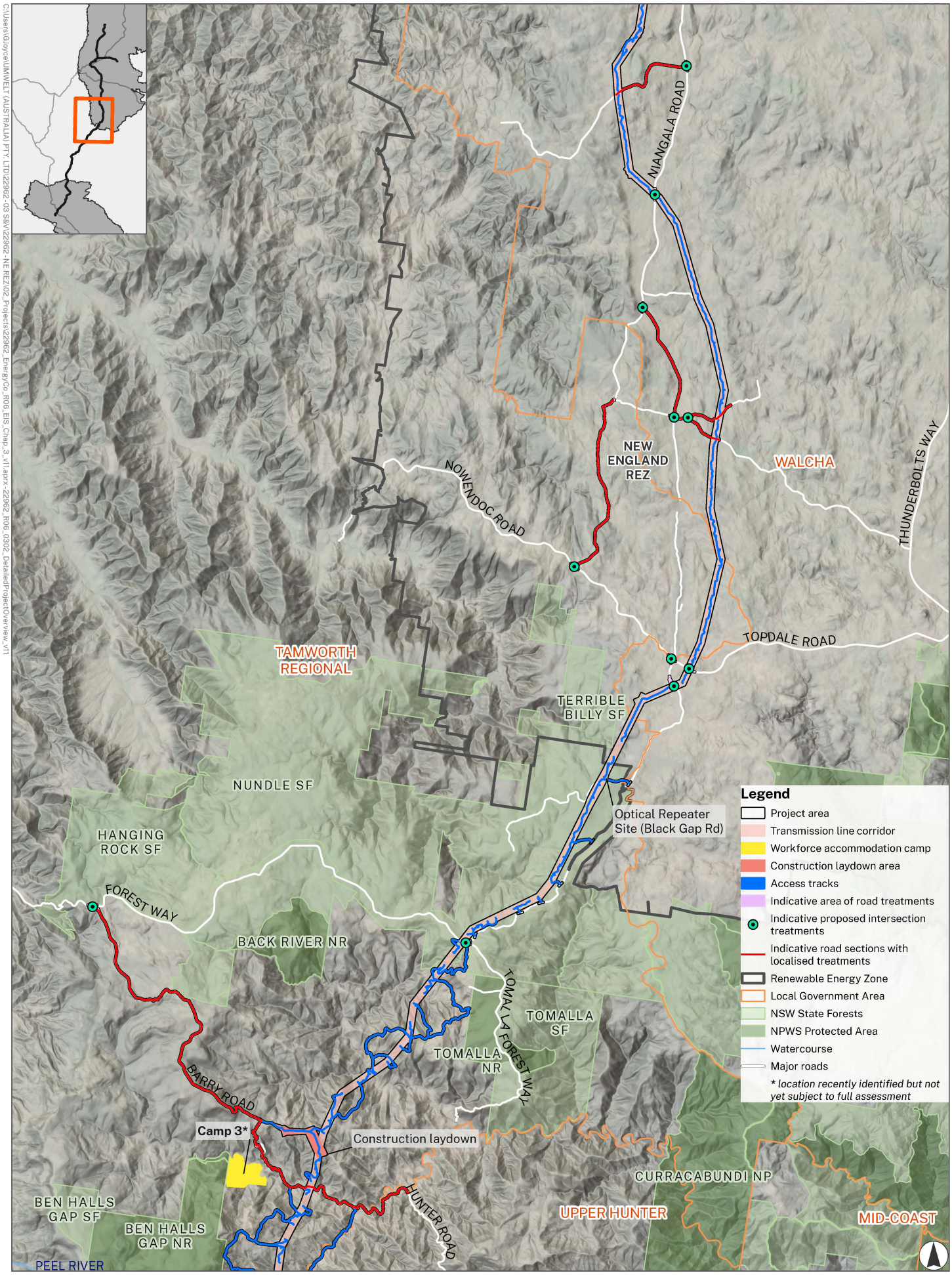


FIGURE 3.2c Detailed project overview (Map 3 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

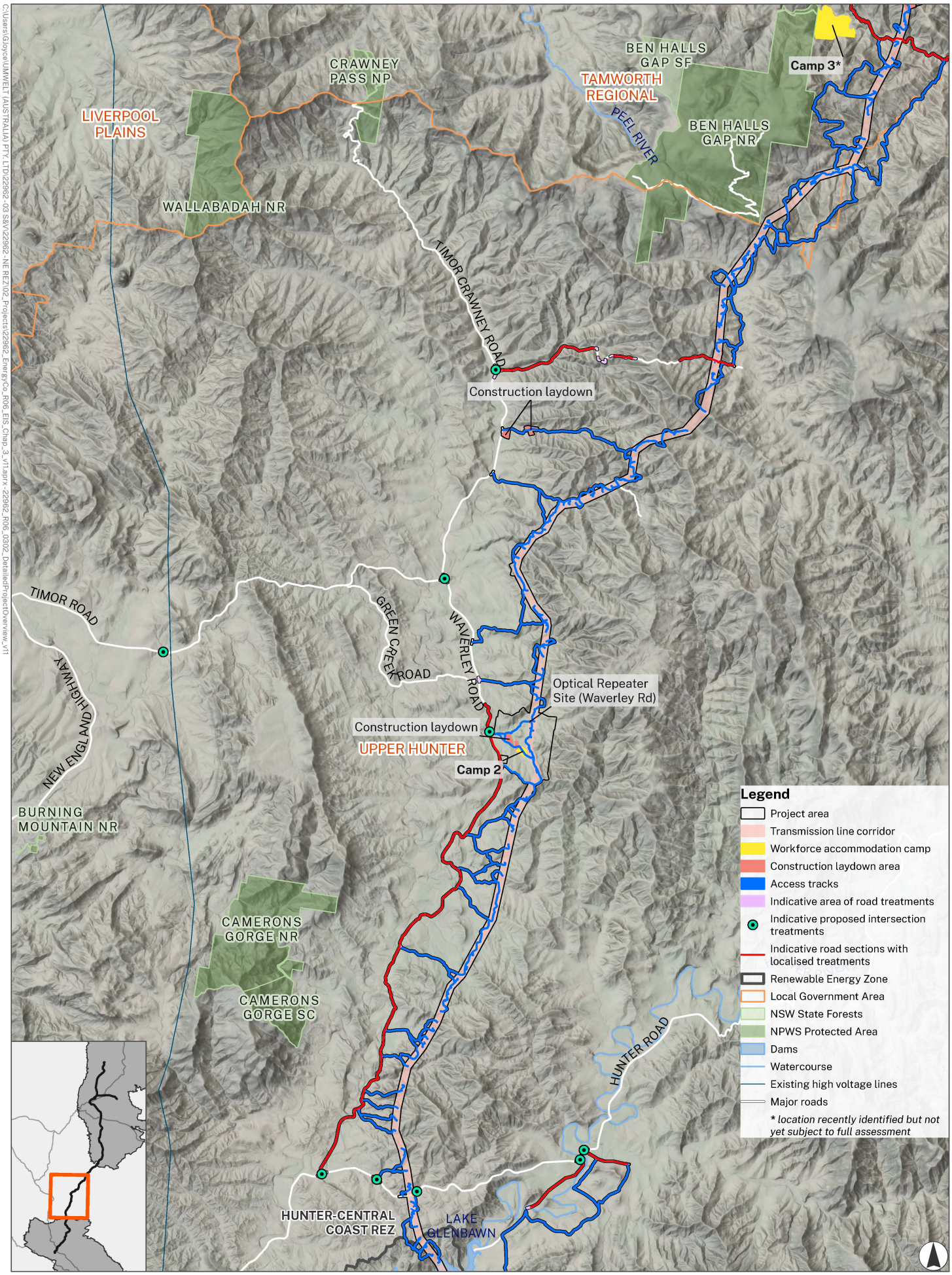


FIGURE 3.2d Detailed project overview (Map 4 of 5)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

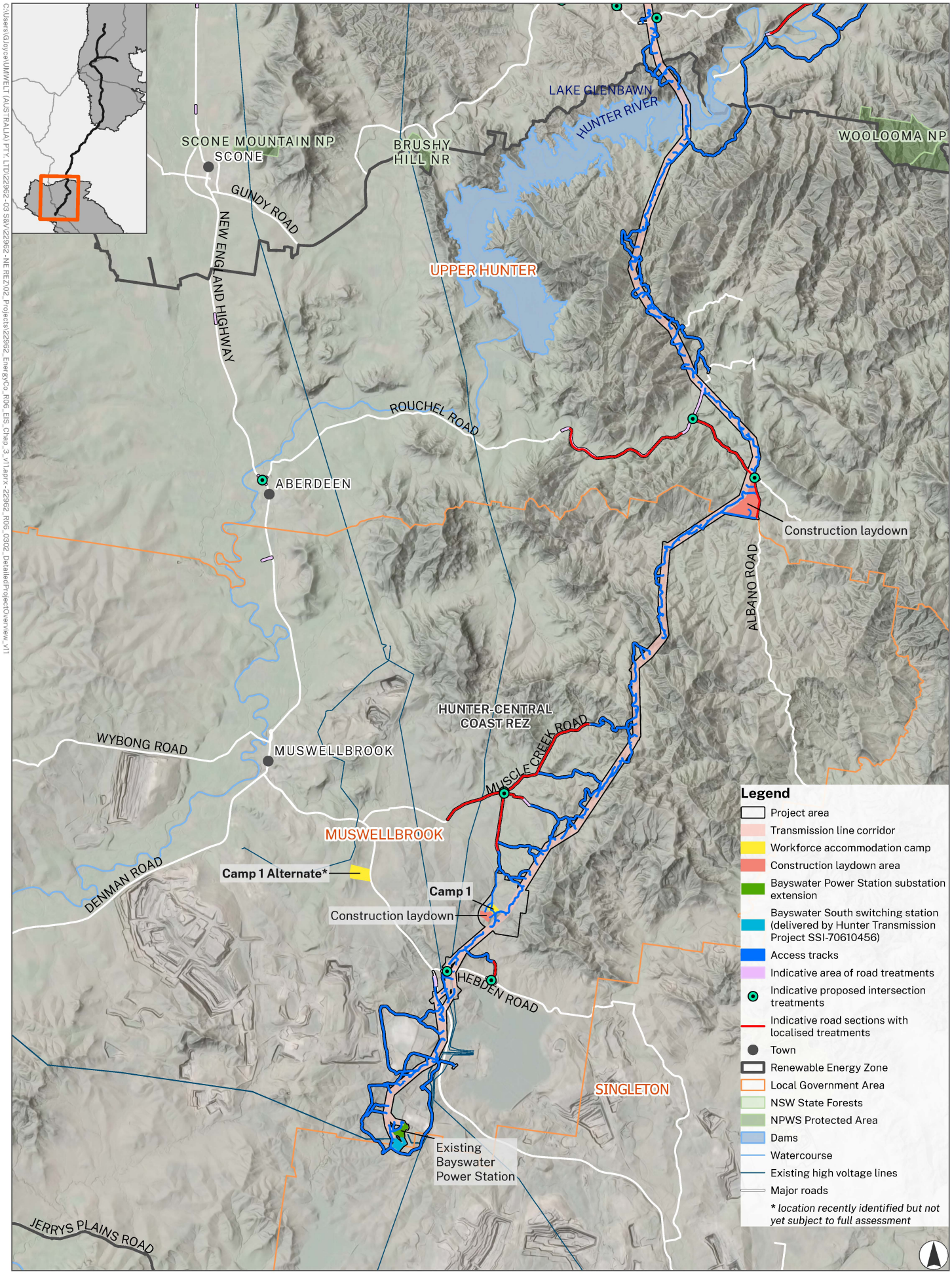


FIGURE 3.2e Detailed project overview (Map 5 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

3.2 Project components

3.2.1 Detailed design and assessment approach overview

The assessments documented in this EIS are based on the project reference design that includes the key components and technical parameters for the project including the transmission lines and towers, energy hubs, ancillary infrastructure and access tracks. The reference design has been used to determine the disturbance footprint, operational area and operational footprint, inform the project area and provide a basis for the environmental assessment of the project.

The project area represents the area within which construction of the project would occur and is generally a 250 metre-wide corridor, with varying sizes at energy hubs and for ancillary infrastructure sites. The project area (refer to Figure 3.2) is a broader area that provides flexibility for the final siting of project infrastructure and the disturbance footprint and within which the final operational easements for the project would be located (generally 120 metres for dual 330 kV transmission lines, 70 metres for single 500 kV transmission lines and 140 metres for dual 500 kV transmission lines). Final siting of project infrastructure and the disturbance footprint within the project area would be confirmed during detailed design, subject to environmental management measures including the avoidance of defined no-impact areas.

Accordingly, the assessment approach adopted for the EIS has been developed to provide a robust assessment of the likely extent and nature of potential impacts of the project, whilst accommodating the necessary flexibility to enable ongoing refinement of project design and construction methodologies for a project of this scale. Further details on the assessment approach adopted for the project in this EIS are provided in Section 6.

Following exhibition of this EIS, should any material changes to the project be identified or required in response to ongoing investigations, submissions on the EIS during the public exhibition phase or in response to landholder feedback, these would be documented and assessed in an Amendment Report and submitted at the same time as the Submissions Report.

Following project determination, any changes developed during the detailed design stage would be assessed for consistency with the approved project as per the process described in Section 6.

3.2.2 Transmission line alignment

The project has been developed through a robust, multi-disciplinary and multi-stage process considering the key principles in DPHI's Transmission Guideline and EnergyCo's key planning pillars and principles (refer to Section 2). Where practicable, the alignment of the transmission lines has been selected to avoid and/or minimise impacts on important environmental, land use and community considerations while seeking to achieve an appropriate balance between environmental, social, property, technical and constructability outcomes.

The transmission line alignment has been divided into 2 sections:

- energy hub connections – single and dual 500 kV and 330 kV transmission lines that connect to each of the energy hubs. This portion of the alignment traverses from North Hub to Central South Hub
- bulk corridor – dual 500 kV transmission lines that connect the New England REZ to the NEM to the south of Muswellbrook. This portion of the alignment traverses from Central South Hub to the Bayswater Power Station substation.

The transmission line alignment is shown on Figure 3.1 and in closer detail on Figure 3.2 with a brief description of each section provided below.

Energy hub connection alignment

The transmission line connecting North Hub to Central Hub A is about 50 kilometres in length and will be built as a single 500 kV line that would be operated at 330 kV, with the ability for 500 kV operations in the future if needed.

From Central Hub A the project splits between an alignment that broadly heads south to Central South Hub, and an eastern alignment that connects to Central Hub B and East Hub.

Between Central Hub A and Central Hub B the project is about 14 kilometres in length and comprises dual 500 kV transmission lines. Continuing east from Central Hub B to East Hub, the project is about 15 kilometres in length and comprises dual 330 kV transmission lines.

From Central Hub A to Central South Hub the project is about 30 kilometres in length and would be dual 500 kV transmission lines.

The energy hub connection alignments would cross existing infrastructure including roads, railway lines, transmission lines, utilities and private infrastructure.

Bulk corridor alignment

The bulk corridor alignment extends from the Central South Hub, just north of the Oxley Highway, in the New England REZ, to substations at Bayswater Power Station. The bulk corridor alignment is about 190 kilometres in length and comprises dual 500 kV transmission lines.

The bulk corridor alignment includes crossing points with numerous items of existing infrastructure including roads, railway lines, transmission lines, utilities and private infrastructure.

3.2.3 Transmission lines and towers

Transmission towers would typically be between 45 metres and 75 metres high. Depending on local circumstances, typical 500 kV transmission towers would be around 65–70 metres and typical 330 kV around 55–60 metres. Towers up to 80 metres in height may be proposed in some instances to minimise impacts to environmentally sensitive areas and for technical constraints such as line crossings.

Transmission line towers are typically spaced between 300 metres and 600 metres apart and on average are currently expected to be spaced about 450 metres apart. Tower spacing can vary greatly based on local design needs and can be up to around 1.3 kilometres based on the terrain or crossing constraints, such as road, rail or watercourses.

The number, location and type(s) of towers required would be confirmed as part of detailed design. However, a disturbance footprint based on the reference design, including the indicative location of towers, has been used as relevant for the assessment in this EIS. The indicative types of transmission towers and easement widths proposed for the 500 kV and 330 kV network infrastructure and assessed in this EIS is provided on Figure 3.3.

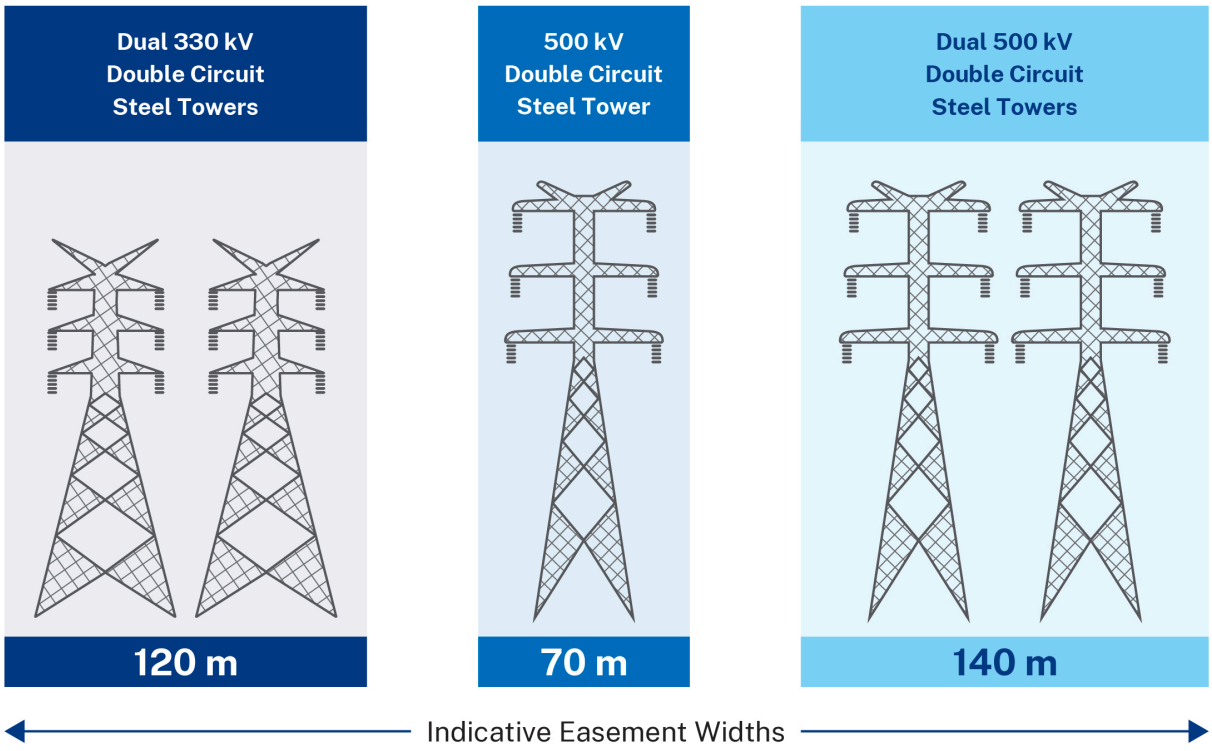


Figure 3.3. Indicative concept design and easements for the transmission line towers

The double circuit 500 kV transmission lines would have 24 phase conductors (also known as cables or wires), 2 earth wires and a designed vertical ground clearance of around 13.5 metres. A double circuit transmission line is 2 independent circuits on the same structure. The double circuit 330 kV transmission lines would have 12 phase conductors, 2 earth wires and a minimum vertical ground clearance of around 9 metres.

Transmission line towers would include communications infrastructure consisting of optical fibre wires which would be located above the conductors or alternately, microwave links.

The 500 kV or 330 kV transmission lines would be supported on a series of transmission line towers. The final location and specification of each transmission tower would be dependent on a range of factors such as distance between each structure, structure loading, transmission line voltage, changes in direction of the transmission line route, local geotechnical conditions, topography and local environmental constraints (such as the need to avoid specific areas of biodiversity value or to span watercourses). The type and arrangement of the transmission towers would continue to be refined as part of the finalisation of the project design.

The transmission tower type for the 500 kV and 330 kV network infrastructure would consist of free-standing steel lattice towers, comprising:

- suspension towers: used to support the transmission conductors (wires/cables). Their primary function is to keep the wires at a safe height above the ground and to support the weight of the cables across long spans. Suspension towers are typically used for straight sections of the transmission line. The 500 kV towers would have a typical tower base footprint of around 20 metres by 20 metres (or around 400 m^2) while for the 330 kV towers this would be slightly smaller at around 15 metres by 15 metres (or around 225 m^2)
- tension towers: used as the anchoring points to connect and apply tension to the conductors. Tension towers are used where there is a change in direction along the transmission line alignment but can also be used between long runs of suspension towers. These towers typically have a wider base than suspension towers, with the 500 kV towers requiring a tower base footprint of around 25 metres by 25 metres (or around 625 m^2) and the 330 kV towers around 20 metres by 20 metres (or around 400 m^2)
- foundations: required to support the transmission towers. Types of foundations used along the transmission line would vary with geotechnical conditions, with standard pile foundations used in normal soils and special pile foundations (for example larger diameter and deeper foundations) in poor soils, floodplains and areas with steep slopes. Smaller diameter anchors may also be utilised in areas of harder rock or difficult access. Details on the construction approach to tower assembly and establishing tower foundations is provided in Section 3.3.9.

Figure 3.4 provides an indicative diagram of transmission line tower components. The final base footprint and required foundation types for the 500 kV and 330 kV towers would be confirmed as part of the detailed design process.

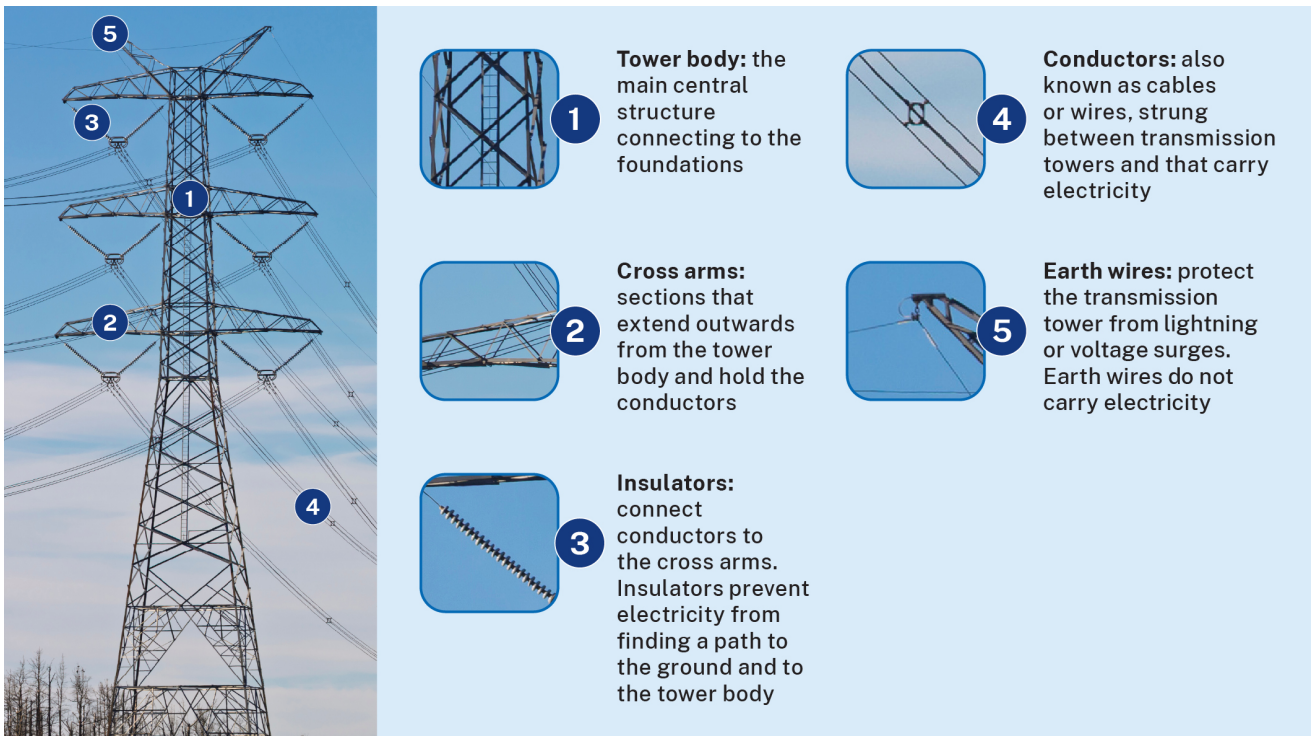


Figure 3.4. Indicative diagram of transmission line tower components

3.2.4 Energy hubs

Energy hubs act as connection points between renewable generator projects and the broader transmission network. Energy hubs collect electricity from solar, wind and storage projects and transfer it to the transmission network. Proposed energy hub siting has been based on engagement with generators and in proximity to areas of high quality renewable energy resources such as wind and solar.

The project includes 5 energy hubs in the New England REZ (refer to Figure 3.1):

- North Hub (330 kV switching station) located about 16 kilometres north west of Armidale
- Central Hub A (500/330 kV substation) located about 16 kilometres south west of Uralla
- Central Hub B (500/330 kV substation) located about 7 kilometres south of Uralla
- East Hub (330 kV switching station) located about 13 kilometres south east of Uralla
- Central South Hub (500/330 kV substation) located about 13 kilometres west of Walcha.

Three of the 5 energy hubs would have a substation where energy exported from renewable energy generation projects (at 330 kV) is aggregated and transformed to 500 kV for export to the project's transmission network and the NEM.

The North and East Hubs would have a 330 kV switching station which would connect energy from renewable energy generation projects (at 330 kV) to the project's 330 kV transmission network. This would be stepped up to 500 kV at the Central Hub A and Central Hub B substations respectively for export at 500 kV to the broader project and NEM transmission networks.

Details of the energy hubs are presented in Table 3.2 and shown on Figure 3.2. Indicative layouts of the energy hubs are shown on Figure 3.5 to Figure 3.9. The final number and configuration of hub components would be confirmed during the detailed design phase.

Table 3.2. Energy hub overview

Energy hub	Description
North Hub	North Hub is located off Romani Road, Boorolong, in Armidale Regional LGA. The North Hub would be a 330 kV switching station designed for 330 kV operations. The energy hub is of sufficient size as not to preclude 500 kV operations in the future; however, this would be subject to a separate approval. Key hub components include a 330 kV switchyard that would provide connections to: • Central Hub A via a 500 kV transmission line (operated at 330 kV) • renewable generation projects. The renewable energy developments are subject to separate approvals. The North Hub would include items such as: • power voltage transformers that would provide the main low voltage supply for auxiliary loads for equipment within the 330 kV switchyard • a range of supporting 330 kV electrical components including harmonic filters, circuit breakers, disconnectors, surge arresters, voltage transformers, current transformers, overhead conductors, busbars, gantries and other high voltage equipment • control and protection systems (including relays, metering and disturbance recorder)

Energy hub	Description
	• communications equipment • office, staff amenities and store facilities • auxiliary services and control buildings to accommodate protection for switchgear, and the control, protection and fixed portions of the secondary systems, such as fire protection, security systems and air conditioning • noise mitigation structures, including buildings and noise walls, if required • hardstand and parking areas. The maximum height of new equipment proposed at the North Hub (outside of transmission towers) is estimated to be around 28 m. Establishment of a permanent site access off Romani Road via Boorolong Road.
Central Hub A	Central Hub A is located off Glenburnie Road, Kentucky, on the border of Tamworth Regional and Uralla Shire LGAs. Key hub components include: • a 500 kV switchyard that would provide connections to: – Central Hub B via a 500 kV double circuit transmission line – Bayswater South 500 kV switching station via a 500 kV double circuit transmission line. • a 500/330 kV transformer yard containing three 500/330 kV 1500 MVA power transformers. The power transformers would also be connected to auxiliary transformers which would provide the main low voltage supply for auxiliary loads for equipment within the Energy Hub • a 330 kV switchyard that would provide connections to: – North Hub via a 500 kV double circuit transmission line (operated at 330 kV) – renewable generation projects. The renewable energy developments are subject to separate approvals. Central Hub A would include items such as: • 2 synchronous condensers, which would provide system stability and reactive support • a range of supporting electrical components including shunt reactors, harmonic filters, circuit breakers, disconnectors, surge arresters, voltage transformers, current transformers, overhead conductors, busbars, gantries and other high voltage equipment • control and protection systems (including relays, metering and disturbance recorder) • communications equipment • office, staff amenities and store facilities • auxiliary services and control buildings to accommodate protection for switchgear, and the control, protection and fixed portions of the secondary systems, such as fire protection, security systems and air conditioning • noise mitigation structures, including buildings and noise walls, if required • hardstand and parking areas. The maximum height of new equipment proposed at Central Hub A is estimated to be around 38 m.

Energy hub	Description
	Access to the energy hub would be provided by a new driveway off Glenburnie Road. Access requires establishment of a Channelised Right and an Auxiliary Left (CHR / AULs) intersection at the Glenburnie Road and New England Highway intersection.
Central Hub B	Central Hub B is located off Thunderbolts Way, Uralla, in Uralla LGA. Key hub components include: • a 500 kV switchyard that would provide connections to: – Central Hub A via a 500 kV double circuit transmission line – Central South Energy Hub via a 500 kV double circuit transmission line • a 500/330 kV transformer yard containing four 500/330 kV 1,500 MVA power transformers. The power transformers would also be connected to auxiliary transformers which would provide the main low voltage supply for auxiliary loads for equipment within the Energy Hub • a 330 kV switchyard that would provide connections to: – East Hub via dual 330 kV double circuit transmission lines – renewable generation projects -the renewable energy developments are subject to separate approvals – Transgrid's 330 kV network. Central Hub B would include items such as: • one synchronous condenser, which would provide system stability and reactive support • a range of supporting electrical components including shunt reactors, harmonic filters, circuit breakers, disconnectors, surge arresters, voltage transformers, current transformers, overhead conductors, busbars, gantries and other high voltage equipment • control and protection systems (including relays, metering and disturbance recorder) • communications equipment • office, staff amenities and store facilities • auxiliary services and control buildings to accommodate protection for switchgear and the control, protection and fixed portions of the secondary systems, such as fire protection, security systems and air conditioning • noise mitigation structures, including buildings and noise walls, if required • hardstand and parking areas. The maximum height of new equipment proposed at Central Hub B is estimated to be around 38 m. Access to the energy hub would be provided via new basic right and basic left intersection arrangement.
East Hub	East Hub is located off Hillview Road, Salisbury Plains, in Uralla LGA. Key hub components include: • a 330 kV switchyard that would provide connections to:

Energy hub	Description
	– Central Hub B via dual 330 kV double circuit transmission lines – renewable generation projects. The renewable energy developments are subject to separate approvals. The East Hub would include items such as: • power voltage transformers that would provide the main low voltage supply for auxiliary loads for equipment within the 330 kV switchyard • a range of supporting 330 kV electrical components including harmonic filters, circuit breakers, disconnectors, surge arresters, voltage transformers, current transformers, overhead conductors, busbars, gantries and other high voltage equipment • control and protection systems (including relays, metering and disturbance recorder) • communications equipment • office, staff amenities and store facilities • auxiliary services and control buildings to accommodate protection for switchgear, and the control, protection and fixed portions of the secondary systems, such as fire protection, security systems and air conditioning • noise mitigation structures, including buildings and noise walls, if required • hardstand and parking areas. Construction access to the energy hub would be provided via Salisbury Plains Road with a new Auxiliary Left (AUL) at the intersection of Salisbury Plains Road and Thunderbolts Way. Operational access would be via a new driveway off Hillview Road. The maximum height of new equipment proposed at East Hub is estimated to be around 28 metres.
Central South Hub	Central South Hub is located off the Oxley Highway, Walcha Road, in Walcha LGA. Key hub components include: • a 500 kV switchyard that would provide connections to: – Central Hub A via a 500 kV double circuit transmission line – Bayswater Power Station 500/330 kV substation via a 500 kV double circuit transmission line • a 500/330 kV transformer containing three 500/330 kV 1,500 MVA power transformers. The power transformers would also be connected to auxiliary transformers which would provide the main low voltage supply for auxiliary loads for equipment within the Energy Hub • a 330 kV switchyard that would provide connections to renewable generation projects. The renewable energy developments are subject to separate approvals. Central South Hub would include items such as: • a range of supporting electrical components including shunt reactors, harmonic filters, circuit breakers, disconnectors, surge arresters, voltage transformers, current transformers, overhead conductors, busbars, gantries and other high voltage equipment • control and protection systems (including relays, metering and disturbance recorder)

Energy hub	Description
	• communications equipment • office, staff amenities and store facilities • auxiliary services and control buildings to accommodate protection for switchgear, and the control, protection and fixed portions of the secondary systems, such as fire protection, security systems and air conditioning • noise mitigation structures, including buildings and noise walls, if required • hardstand and parking areas. The maximum height of new equipment proposed at Central South Hub is estimated to be around 38 metres. Access to the energy hub would be provided by a new Channelised Right and an Auxiliary Left turn (CHR/ AUL) intersection off the Oxley Highway.

The hubs have been designed with layouts to accommodate connection infrastructure from renewable generation projects which are subject to separate planning and approval processes. Details of the key site management infrastructure to be established at each of the energy hubs is described in the following sections.

3.2.4.1 Access roads

For access roads to energy hubs, a 7 metre (minimum) wide sealed road would generally be required to each site. Road drainage provisions to cater for run-off from the road surface would be designed for up to a 10 per cent AEP flood event, where practicable. The energy hubs would be designed to provide adequate parking for construction and operational personnel as well as additional heavy vehicle parking as required.

3.2.4.2 Stormwater and drainage

Drainage infrastructure would be installed as required at each energy hub site to capture and divert runoff from the surrounding catchment away from the project infrastructure. Intercepted runoff would be diverted to existing natural watercourses or overland flow paths using appropriate dispersion/dissipation structures or drainage systems.

Site drainage systems would also be established and maintained at each of the hubs as relevant to collect and discharge stormwater. On-site detention basins would be provided where required to provide slow controlled release to the nearest watercourse.

Drainage structures would be provided to prevent inundation of the substation and switchyard areas under a one per cent Annual Exceedance Probability (AEP) flood event.

Substation and switching station infrastructure would be placed on an impervious surface and would include a bunded oil containment system around transformer yards. Oil containment systems would be isolated from the stormwater drainage collection system to prevent cross-contamination and have a capacity of at least 130 per cent of the largest oil volume within the oil containment system or provide a minimum of 54 kilolitres storage (whichever is greater).

3.2.4.3 Auxiliary power

The project requires the supply of auxiliary power to the energy hubs and workforce accommodation camps. The energy hub auxiliary supply would be supplied by 3 types of supplies:

- grid supply – a supply point connected to the project such as auxiliary transformers connected to the 500/330 kV power transformers or power voltage transformers
- alternative supply – a supply point not reliant on New England REZ network infrastructure to provide an on demand alternating current auxiliary supply, such as a connection to the distribution network or permanently installed diesel generators
- backup supply – a backup supply point that can be used during the failure of both the grid supply and alternative supply points. The backup supply would be made up of permanent diesel generators or a dedicated connection from a mobile generator set.

Potential connection points and transmission routes outside of the project area to supply the energy hubs have not been assessed as part of this EIS as the points and transmission routes are subject to ongoing investigations and design.

Connection to the local distribution network may require the establishment of new or upgraded auxiliary power routes between existing energy infrastructure and project components. This may include the installation of new poles and wires, upgrades to existing distribution lines, and the provision of access for construction and maintenance.

Detailed assessment of connection points and transmission routes would be undertaken, where possible, following exhibition of the EIS and incorporated in the Amendment Report for the project, subject to detailed studies undertaken in consultation with the relevant local network operator. Where further ongoing detailed studies are required in consultation with the relevant local network operator post submission of the Amendment Report and during detailed design, additional environmental assessment would be undertaken. The proposed work would also be assessed to confirm they are consistent with the approved project.

Where feasible, auxiliary power infrastructure would be co-located within or adjacent to existing easements and utility corridors to minimise additional disturbance.

3.2.4.4 Lighting

Operational lighting would be required at the energy hubs for site security and worker safety. Lighting would operate from dusk until dawn, 7 days a week. The external lighting would be installed to maintain an even distribution across the sites. The lighting would be designed to minimise light spill to areas beyond the project area, including potential light spill on passing traffic along local roadways, sensitive receivers and local fauna. Lights would incorporate Light Emitting Diode (LED) technology, mounted on poles or buildings and would be controlled via a daylight sensor.

Exterior lighting would primarily be designed in accordance with Australian and New Zealand Standard AS/NZS 4282:19 *Control of the obtrusive effects of outdoor lighting* (Standards Australia, 2019). Other guidelines that would inform exterior lighting design include the Australian Standard AS1158.3.1:2005 *Lighting for roads and public spaces* (Standards Australia, 2005) and Australian Standard AS2067:2016 *Substations and high voltage installations exceeding 1 kV a.c* (Standards Australia, 2016).

3.2.4.5 Safety and security

A range of safety and security measures would be required to be installed and implemented at the energy hubs which may include:

- safety and information signage
- security fencing on the perimeter of switchyard and transformer yards
- boundary fencing around the extent of energy hub property boundary
- closed circuit television security cameras
- motion sensors
- temperature monitors
- anti-climbing barriers around transmission towers
- firefighting equipment
- maintained APZ.

A requirement for each energy hub is a fire protection zone outside the perimeter security fence lines. An APZ of sufficient width is proposed around the perimeter of each site to achieve a bushfire attack level of BAL 29 in accordance with the NSW RFS Planning for Bush Fire Protection (2019).



FIGURE 3.5 Indicative layout of North Hub

Scale 1:10,000 at A4
GDA2020 MGA Zone 56

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

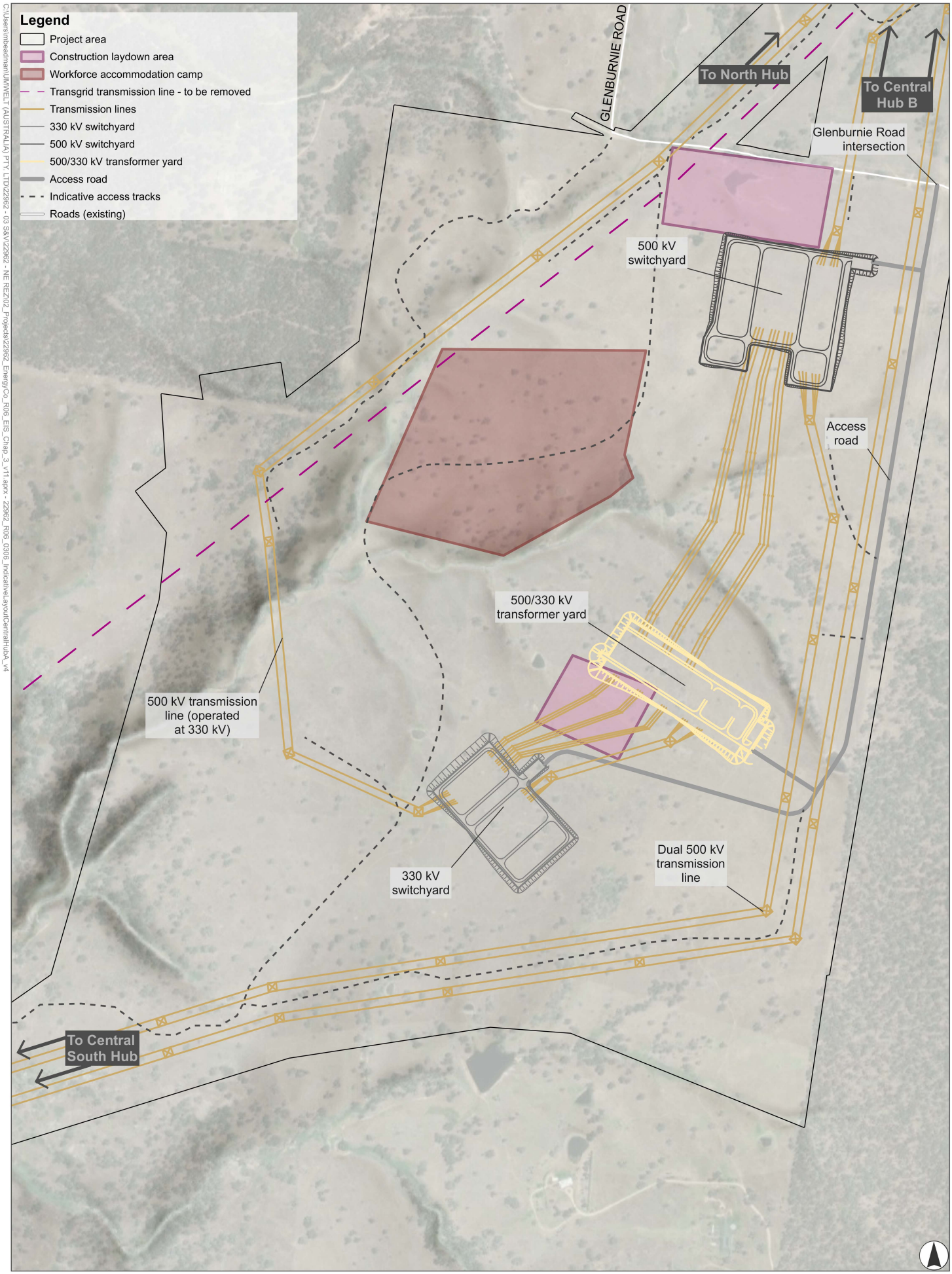


FIGURE 3.6 Indicative layout of Central Hub A

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:11,000 at A4
GDA2020 MGA Zone 56

0 150 300
Meters

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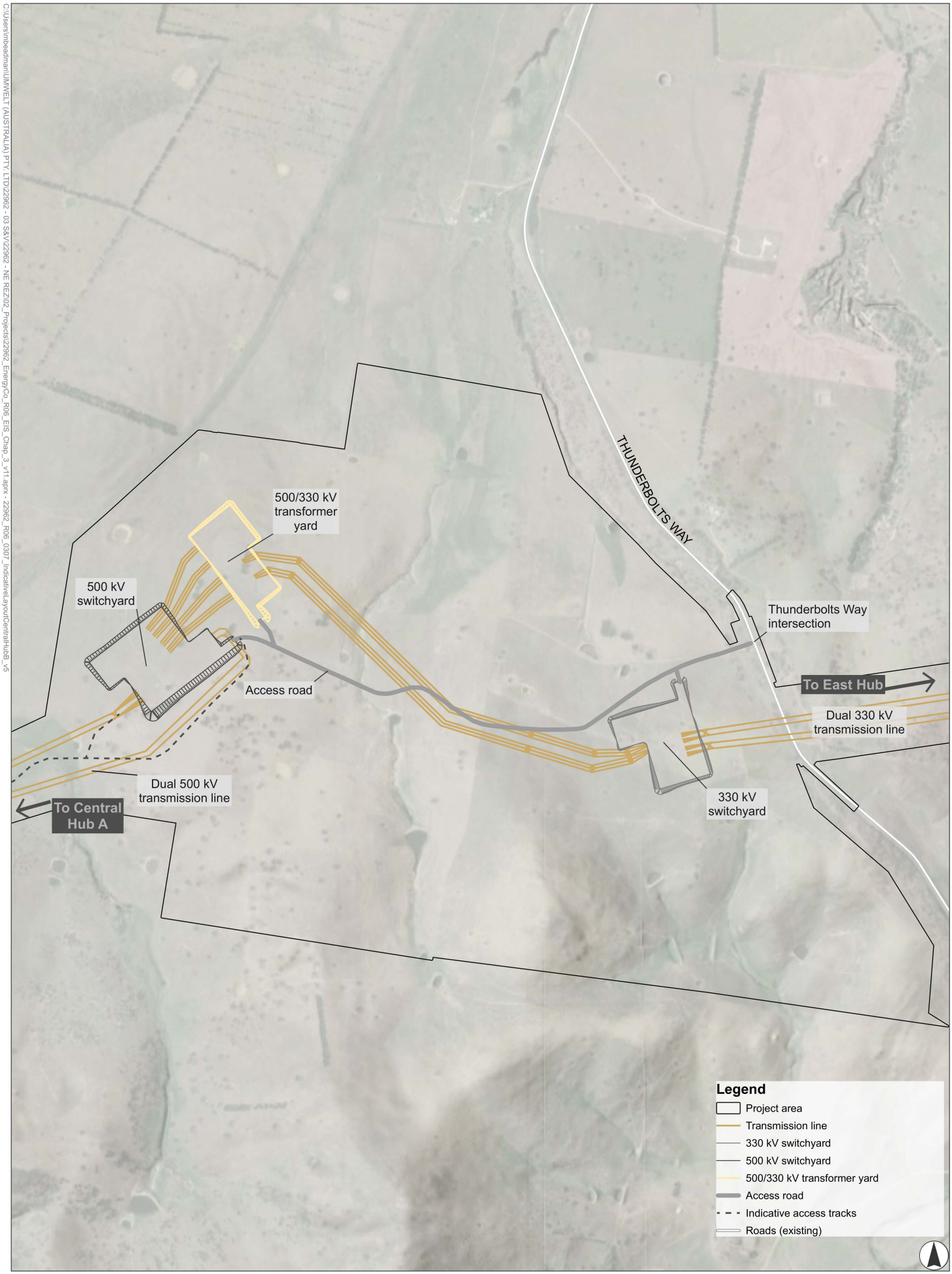


FIGURE 3.7 Indicative layout of Central Hub B

Scale 1:16,000 at A4
GDA2020 MGA Zone 56

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

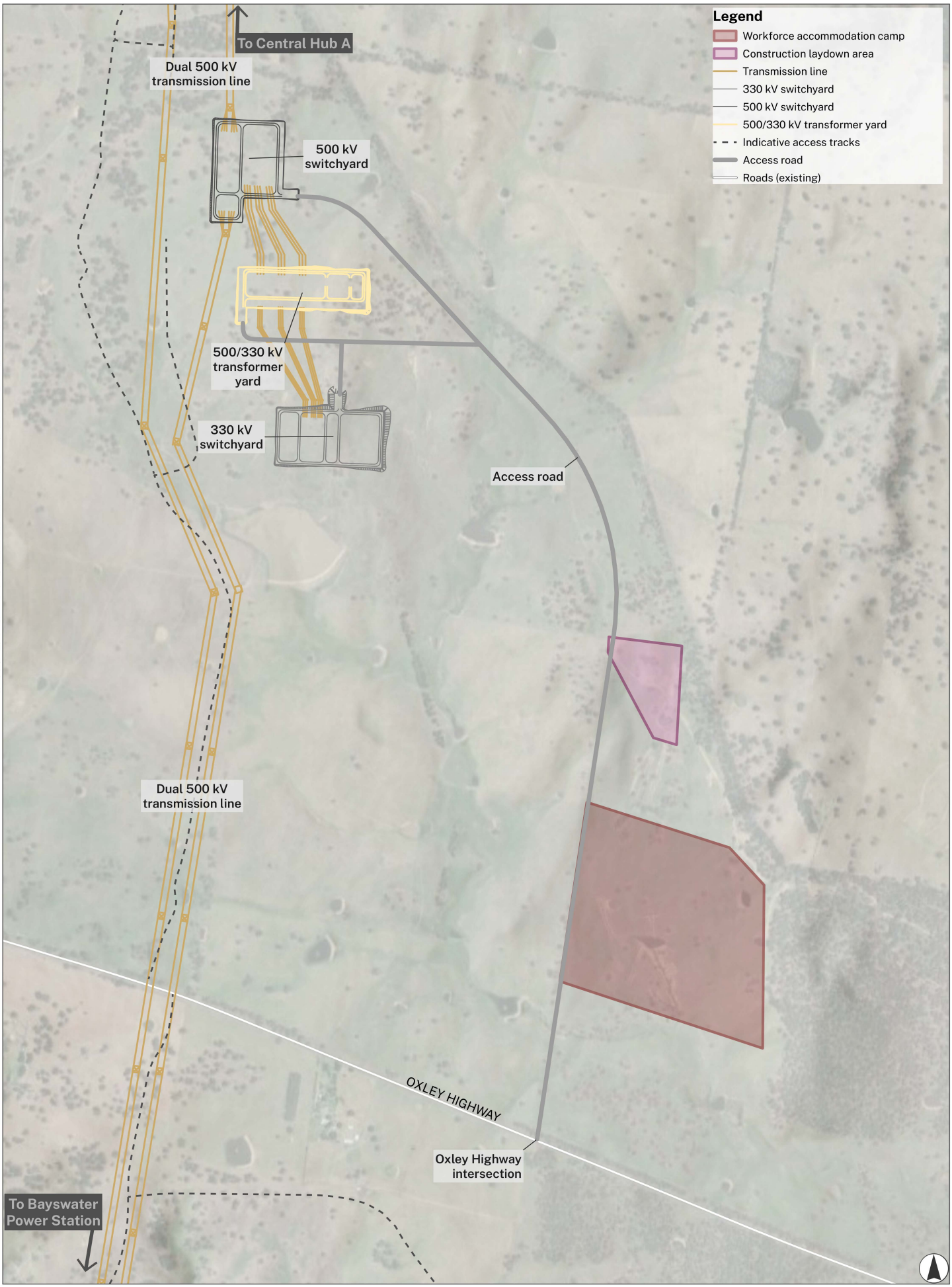


FIGURE 3.8 Indicative layout of Central South Hub

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:15,000 at A4
GDA2020 MGA Zone 56

0 250 500
Meters



FIGURE 3.9 Indicative layout of East Hub

Scale 1:5,000 at A4
GDA2020 MGA Zone 56

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

3.2.5 Bayswater Power Station substation extension

Work is required at Transgrid's existing Bayswater Power Station 500/330 kV substation to connect the project to the NEM. An indicative layout of the substation extension is shown on Figure 3.10. The final configuration would be confirmed during the detailed design phase.

Key work and components include:

- extending the existing Bayswater Power Station 500/ 330 kV substation bench
- installing two new 500 kV bays on the western side of the extended bench[4]
- installation of two 500 kV line shunt reactors and associated enclosures[5]
- installation of a range of supporting high-voltage electrical equipment required for the operation of the substation6
- communications equipment
- control and protection systems (including relays, metering and disturbance recorder)
- auxiliary services and control buildings to accommodate protection for switchgear, and the control, protection and fixed portions of the secondary systems, such as fire protection, security systems and air conditioning.

All civil and structural work required to support the above scope, including but not limited to:

- equipment foundations
- gantries and associated foundations
- cable trenches
- earthing extensions
- drainage/ oil containment
- security fencing and signage
- permanent vehicular access
- hardstand and parking areas.

Transmission lines would connect to the NEM via Bayswater Power Station as follows:

- one of the 500 kV lines would connect to the substation extension (as described above)
- the other 500 kV line would connect to the future proposed Bayswater South switching station that is related development and being developed as part of the Hunter Transmission Project.

[4] Each new 500 kV bay would include equipment for 2 switch bays and one line bay.

[5] One line shunt reactor would be installed for each circuit, together with an associated 500 kV switch bay for each.

[6] Supporting high-voltage equipment includes harmonic filters, circuit breakers, disconnectors, surge arresters, voltage transformers, current transformers, overhead conductors, busbars, gantries, and other high-voltage electrical infrastructure.



FIGURE 3.10 Indicative layout of Bayswater Power Station substation extension

Scale 1:3,500 at A4
GDA2020 MGA Zone 56

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

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3.2.6 Maintenance facility

A maintenance facility is required to support the operation and maintenance of the transmission lines and energy hubs. The proposed facility would be located at the intersection of the New England Highway and Nundle Road in Nemingha.

The maintenance facility would occupy an area of about 1.5 hectares and include:

- an office, staff amenities, training and first aid rooms
- storage shed for substation and switching station spares such as instrument transformers, transformer bushings, relays and space for miscellaneous plant and equipment
- workshop facilities including storage of hydrocarbons and chemicals
- laydown areas for spare parts such as tower components, insulators and cable and related electrical furniture and fittings
- internal road and parking areas
- water storage tanks (including for firefighting purposes)
- firefighting equipment
- a new driveway from Nundle Road to provide access.

The maintenance facility would generally be used during standard working hours, with 24-hour access provided to allow for the use of the facility during an emergency event or incident. Lighting associated with this facility is expected to be limited to security, access and emergency requirements, and would be motion-sensor activated rather than continuously illuminated. Parking would be provided at the maintenance facility for operational personnel.

The maintenance facility building would consist of a two-storey building/shed and the facility would include connections to local electricity, water and wastewater/sewer utilities.

3.2.7 Ancillary infrastructure

3.2.7.1 Permanent site access, road and intersection treatments

The project would require a series of treatments to the public road network to facilitate the safe movement of construction vehicles, including over size and over mass movements, and to provide permanent access points to the project for operational and maintenance activities.

Access to energy hubs, workforce accommodation camps and the maintenance facility from the public road network would be provided by the intersection treatment types as provided in Table 3.3. These proposed intersection treatments are designed in accordance with Austroads *Guide to Traffic Management Part 6 - Intersections, Interchanges and Crossings Management*.

Table 3.3. Proposed intersections

Project element	Location	Treatment type
North Hub	Romani Road, Boorolong	Basic Left at Romani Road and Boorolong Road intersection Driveway at Romani Road site access
Central Hub A	Glenburnie Road, Kentucky	Channelised Right Turn / Auxiliary Left Turn Lane at Glenburnie Road and New England Highway intersection Driveway at Glenburnie Road site access
Central Hub B	Thunderbolts Way, Uralla	Basic Left / Basic Right at Thunderbolts Way site access
East Hub	Hillview Road, Salisbury Plains	Auxiliary Left Turn Lane at Salisbury Plains Road and Thunderbolts Way intersection Driveway at Hillview Road site access
Central South Hub	Oxley Highway, Walcha Road	Channelised Right Turn / Auxiliary Left Turn Lane at Oxley Highway site access
Camp 1	Inglewood Road, Muscle Creek	Basic Right Turn at Muscle Creek Road and Inglewood Road intersection Driveway at Inglewood Road site access
Camp 2	Waverley Road, Waverly	Basic Left / Basic Right at Waverley Road site access
Camp 4	Co-located with Central South Hub, Oxley Highway, Walcha Road	Channelised Right Turn / Auxiliary Left Turn Lane at Oxley Highway site access
Camp 5	Co-located with Central Hub A, Glenburnie Road, Kentucky	Channelised Right Turn / Auxiliary Left Turn Lane at Glenburnie Road and New England Highway intersection Driveway at Glenburnie Road site access
Maintenance facility	Nundle Road, Nemingha	Driveway access

Permanent access from the public road network to the transmission line, via new access points and access tracks are also proposed and assessed as part of the project.

It is proposed that some of the access tracks established during the construction phase to facilitate the movement of vehicles plant, equipment and materials would be retained for the operational and maintenance phase. The requirements to retain or remove access tracks would be determined in consultation with landholders during property access negotiations and ahead of the commencement of operation of the project.

The location of permanent access points to the transmission line, and access tracks are shown on Figure 3.14.

Local road and intersection treatments

Treatments to local roads and key intersections on the construction access routes are proposed following an assessment of the safety, road geometry and performance of the road based on an increase in vehicle movements during construction, including over size and over mass movements.

Figure 3.2 shows the location of the proposed road and intersection treatments, with a list of the proposed work included in Appendix C. A number of road treatments are also required to support the safe and compliant movement of OSOM vehicles and are shown on Figure 3.15. Further discussion of the proposed construction work and methodologies for road and intersection treatments during the construction phase are provided in Section 3.3.6.

3.2.7.2 Communications infrastructure

The project includes communications systems to provide interconnection between the energy hubs and to link to external interfaces with Transgrid and AEMO to form a complete New England REZ network infrastructure communication system.

The communication systems would comprise 3 key elements:

- data and internet to support operation and maintenance staff, which would be established utilising a third-party telecommunication provider connection
- energy hub protection systems communication to enable power resilience to avoid outages and interruptions. This requires a direct, stand-alone, high-performance telecommunication pathway with both main and backup links
- power system data and communication to enable supervisory control and data acquisition (SCADA) for the network operator and AEMO. This requires a direct, stand-alone, high-performance telecommunication pathway with both main and backup links.

The main and back-up telecommunications links required by the substation protection system and power system data would be:

- a primary communication path connecting to AEMO and Transgrid via an optical fibre ground wire mounted on the transmission line towers with optical repeater stations
- a secondary communication path provided via either:
  - optical fibre wires on separate transmission line structures
  - connection to a third party via radio or fibre
  - combination of radio communication via microwave antenna and fibre, and / or
  - underground optical fibre cable.

Fibre optic cabling

Optical fibre ground wires would be installed on 500 kV and 330 kV transmission line towers along the length of the transmission line alignments. Optical repeater stations (which are sometimes called telecommunications huts) are required to amplify the signal where the fibre routes exceed 150 kilometres. Two potential locations are proposed for the optical repeater stations required and have been assessed within the project area, these are at Waverley Road and at Black Gap Road, directly adjacent to the dual 500 kV transmission line alignment (refer to Figure 3.2c and Figure 3.2d). Each optical repeater station requires a typical footprint of around 12 square metres within a 132 square metre compound and connection to a local power supply with solar-battery backup supply.

Microwave links

Where the back-up communications system cannot be provided through the use of optical fibre wires on independent transmission line towers or via connection to a third-party fibre, microwave links would form part of the back-up system. Options proposed for the back-up communications network for the Energy Hubs include:

- North Hub: microwave link to a Telstra tower 8 kilometres to the east on Little Duval Mountain off Exmouth Road, Dumaresq or via an Essential Energy zone substation located around 16 kilometres away at Madgwick Drive, Armidale
- East Hub, Central Hub A, and Central Hub B: microwave link to a Telco at Harnham Hill Mount about 10 kilometres south of Uralla
- Central B Hub: a temporary arrangement may be required between project stages to ensure redundancy requirements are met. This would be confirmed during detailed design
- Central-South Hub: preferred option is via Telstra Site 23 located 4 kilometres to the west at Walcha Road or alternatively at Walcha either via Essential Energy substation 16 kilometres to the east or Telstra Radio Terminal 18 kilometres east.

A microwave antenna at a hub would require a 20 metres by 20 metres fenced area with a dedicated power supply.

3.2.8 Utility adjustments and crossings

Various utilities would require adjustment or crossing to allow for the construction of the project as shown on Figure 3.11. The required adjustments and crossings that have been identified based on the reference design and consultation carried out with all relevant utility providers are outlined in *Appendix C (Schedule of utility adjustments and crossings)* and shown on Figure 3.9. They generally include:

- electricity infrastructure owned by Transgrid, Ausgrid, AGL and Essential Energy
- telecommunications lines owned by NBN, Telstra, Optus, AARNet, Amplitel and TPG
- water mains owned by AGL and various Councils.

Where possible, adjustments / upgrades to existing transmission lines would occur within existing easements. Crossings and hurdle sites would typically require cleared disturbance areas at each side of the hurdle.

Consultation with all relevant utility providers has been carried out throughout the development of the reference design for the project. This has included presentations to utility providers and councils on potential impacts to electricity infrastructure, telecommunications lines and water lines, including any proposed relocations of utilities to minimise potential impacts. Further consultation would be undertaken with utility providers and councils to inform detailed design and confirm the required utility adjustments for the project.

Appendix C and Figure 3.11 provide an overview of the utility adjustments required for the project. Those located within the project area have been assessed as part of this EIS. Some connection works, or any proposed utility protection or relocation works may be required outside the project area. As required, further assessment of these works would be undertaken, where possible, following exhibition of the EIS and incorporated as part of an Amendment Report for the project (subject to detailed studies undertaken in consultation with the relevant utility providers and councils). Where further ongoing detailed studies are required in consultation with the relevant utility providers and councils post submission of the Amendment Report and during detailed design, additional environmental assessment would be undertaken. The proposed work would also be assessed to confirm they are consistent with the approved project.

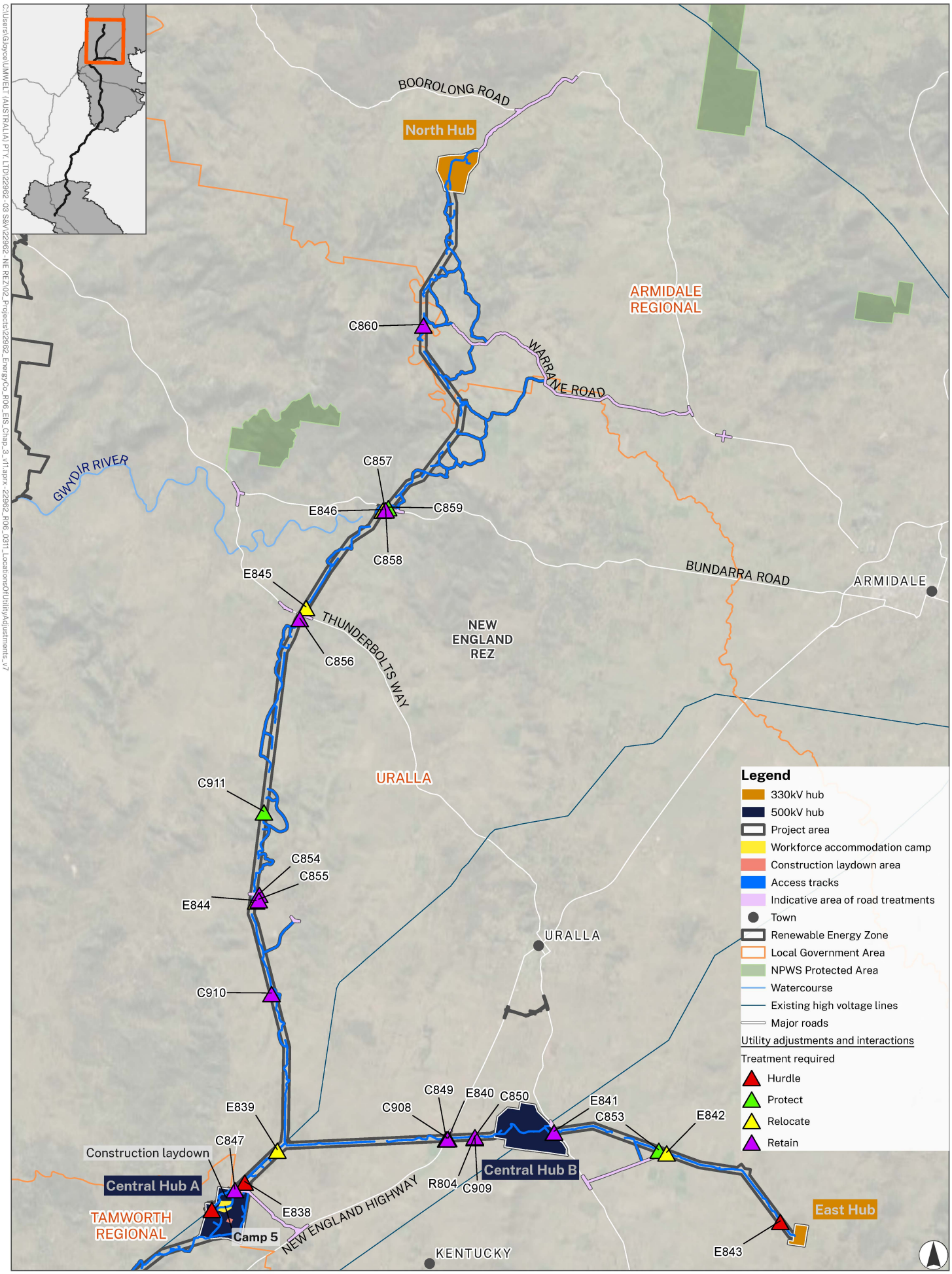


FIGURE 3.11a Locations of utility adjustments and interactions (Map 1 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

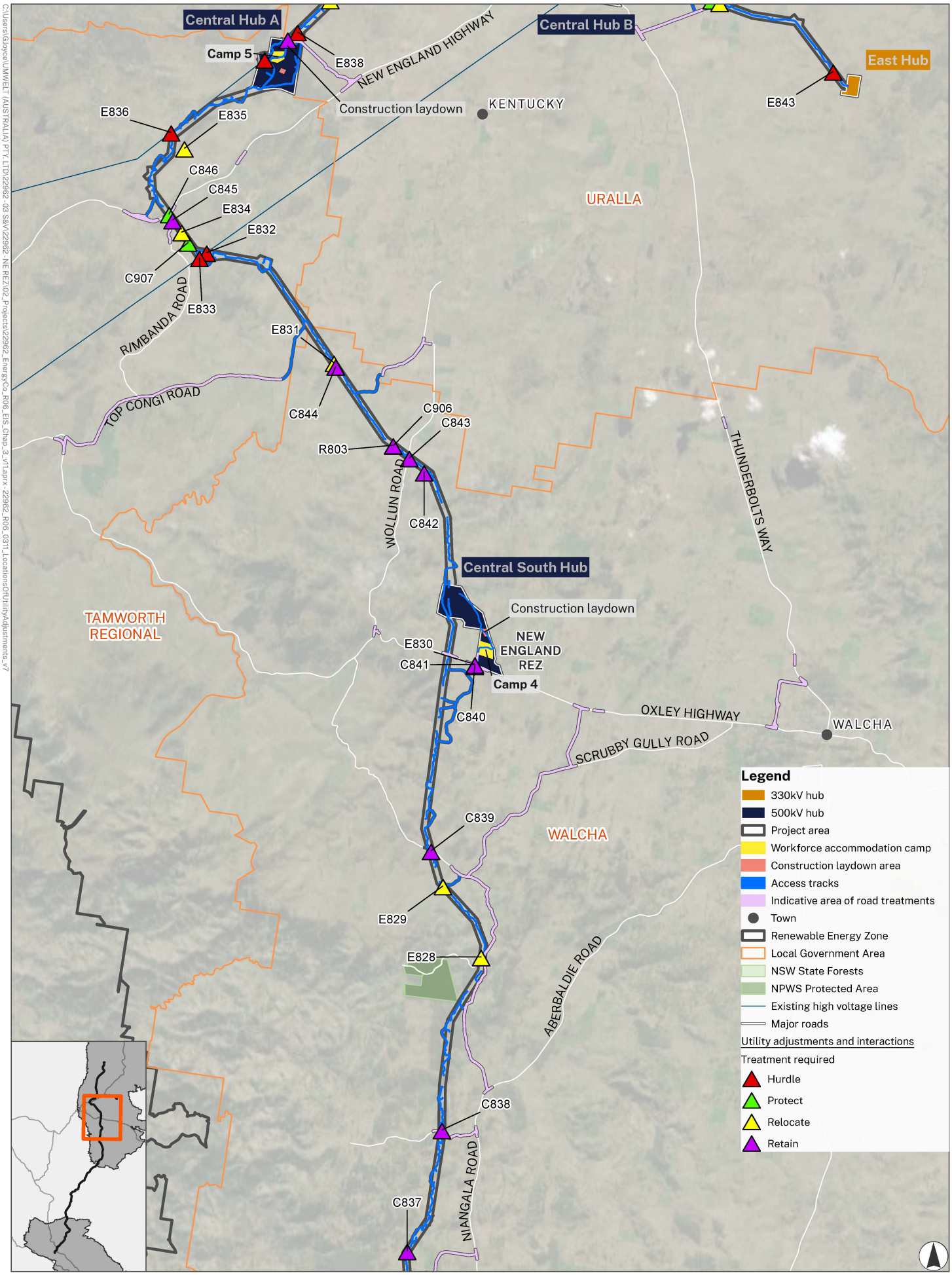


FIGURE 3.11b Locations of utility adjustments and interactions (Map 2 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

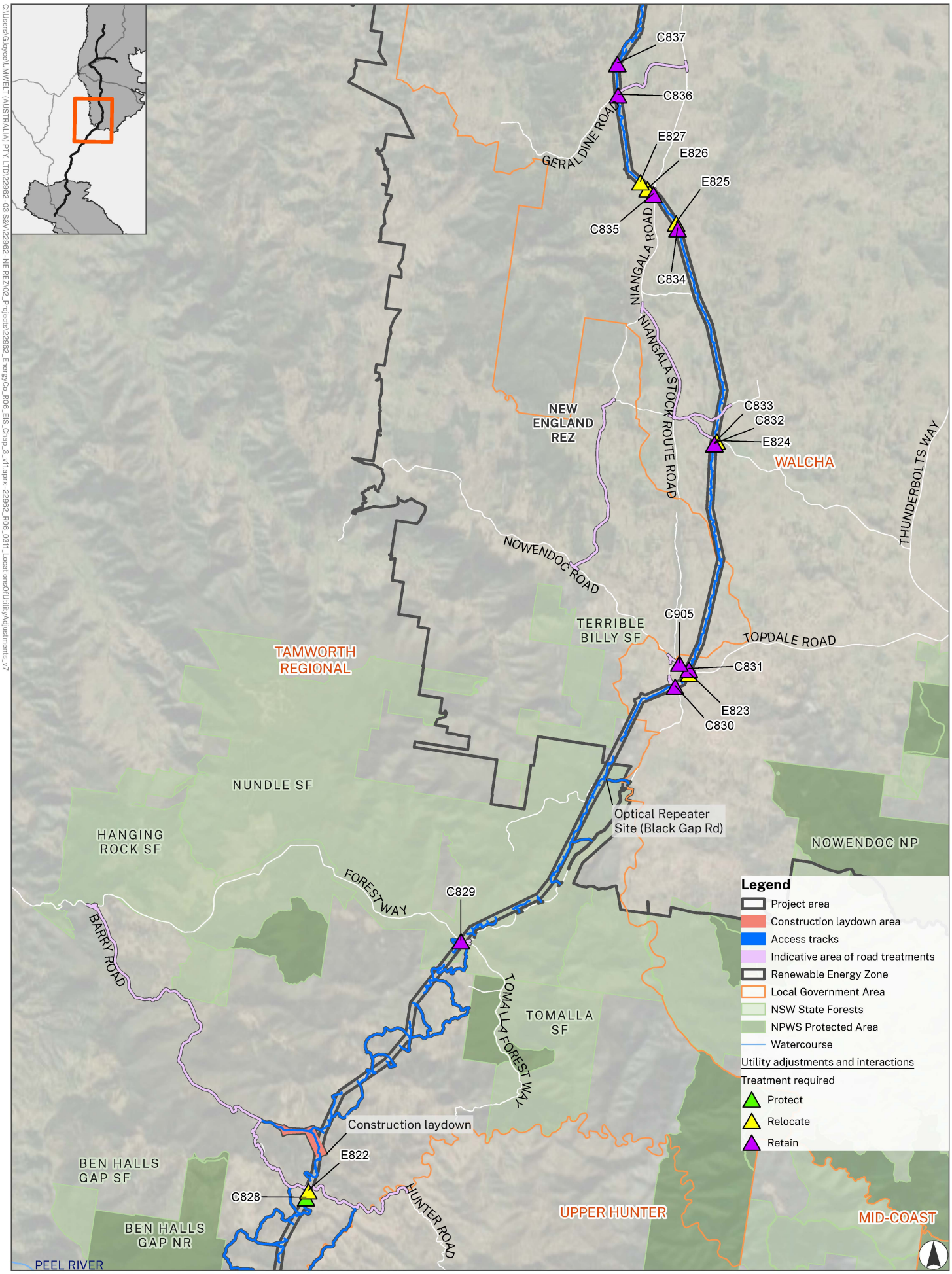


FIGURE 3.11c Locations of utility adjustments and interactions (Map 3 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

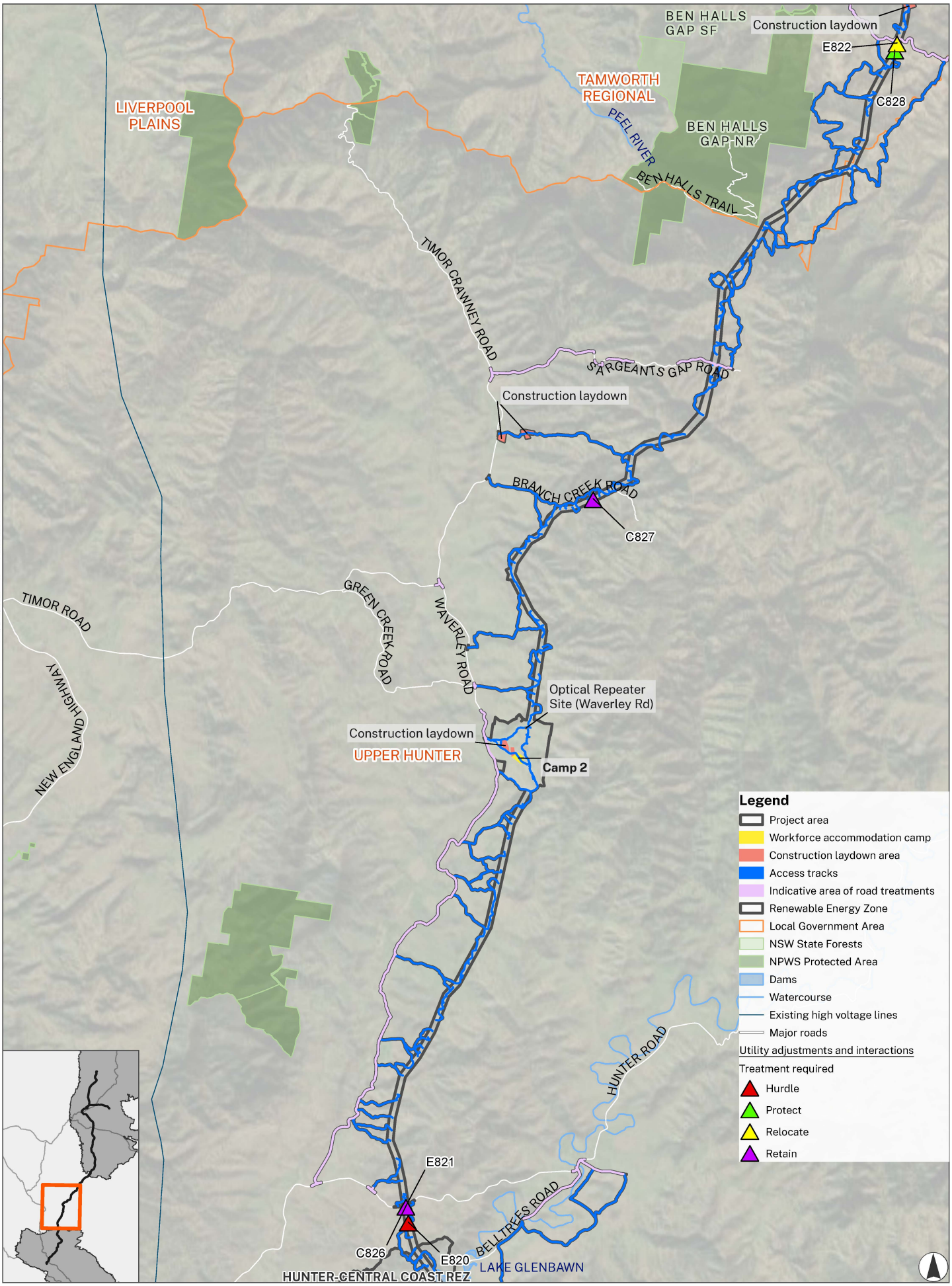


FIGURE 3.11d Locations of utility adjustments and interactions (Map 4 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

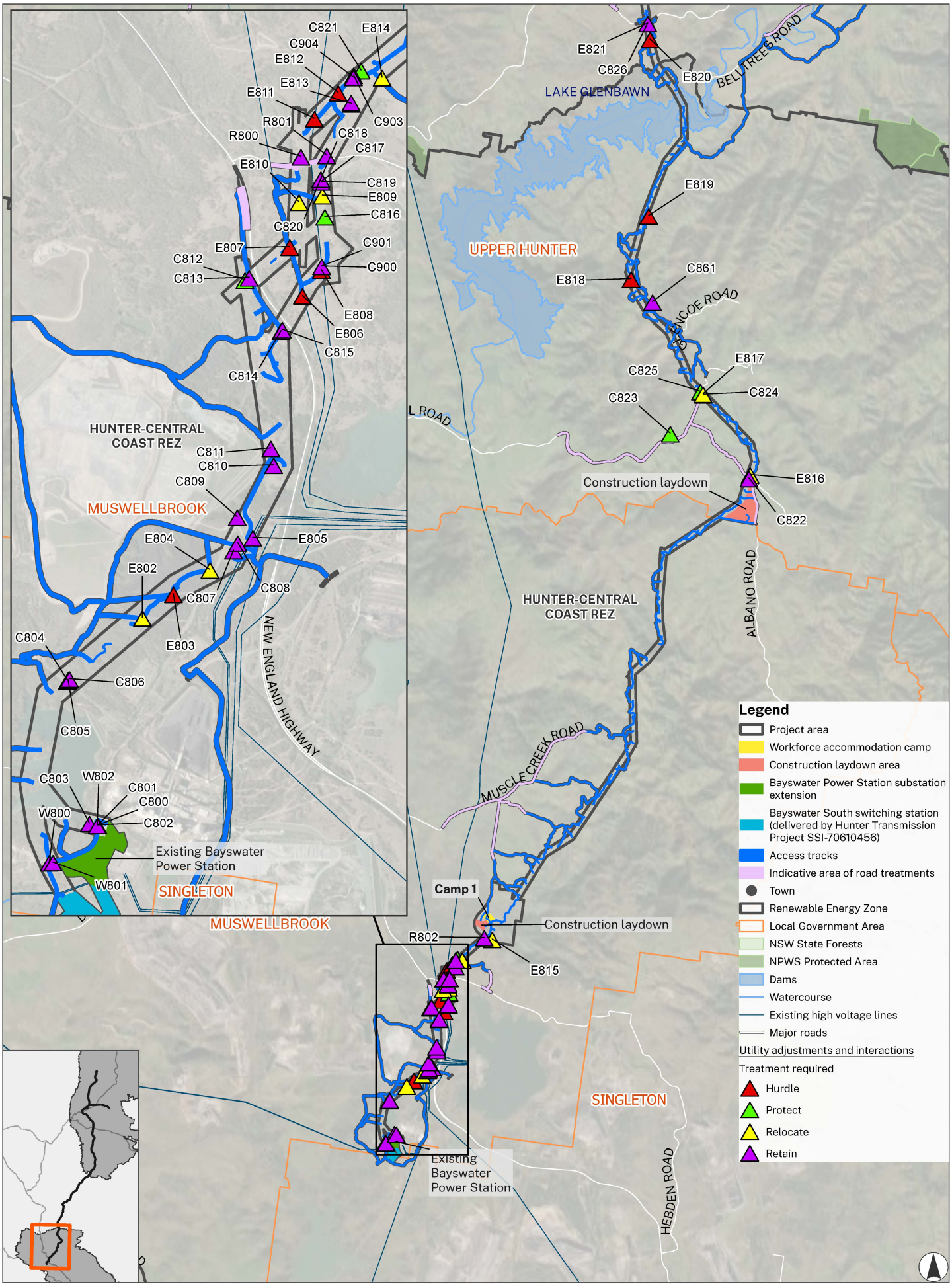


FIGURE 3.11e Locations of utility adjustments and interactions (Map 5 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

3.2.9 Land requirements

3.2.9.1 Easement acquisitions

The project requires access to land for the construction and operation of transmission infrastructure. An easement provides a right of access for the network operator to construct, maintain and operate the transmission infrastructure and other operational assets. While activities such as agriculture and grazing are permitted within transmission line easements, there may be some restrictions for safety and operational reasons.

Where the transmission infrastructure traverses private land, access would be subject to:

- a construction easement for temporary construction access
- a permanent easement for the transmission line alignment, including any access required to support maintenance and operation.

Transmission line easements will preferentially be acquired through an agreement with landholders, or where necessary by compulsory acquisition, both in accordance with the NSW *Land Acquisition (Just Terms) Compensation Act 1991* (Just Terms Act), the Land Acquisition Guide (NSW Government 2014), and the land acquisition reforms announced by the NSW Government in 2016.

Typical permanent easement widths would be:

- 120 metres for dual 330 kV transmission infrastructure
- 70 metres for single 500 kV transmission infrastructure or 140 metres for dual 500 kV lines.

It should be noted that easement widths may vary subject to terrain and tower span with wider easements being acquired in certain locations to accommodate additional conductor 'sway' (that is, the distance the conductor can swing when the wind is blowing).

In addition, wider easements are required at transposition locations where additional towers are required to change the position of phases on the towers. Easements widths would be around 180 metres total (for dual lines) at these locations.

In operation, access to the transmission line easement would be via existing public and private roads and access tracks established as part of the project during construction (refer to Section 3.3.6). Access easements may be required to allow operational access to the transmission line easement from the nearest public road. These access easements would be negotiated with landholders as required. Where access easements are in place, the network operator may install lockable and signed access gates should the landholder not have a suitable nearby access gate. Access for landholders would be maintained and landholder access requirements, such as biosecurity protocols, would be complied with.

3.2.9.2 Freehold acquisitions

Freehold property acquisition would be required for the energy hubs and other permanent and temporary ancillary facilities including the maintenance facility, workforce accommodation camps and Bayswater Power Station substation extension. Table 3.4 provides a summary of the freehold property acquisitions required.

Table 3.4. Freehold land acquired for permanent infrastructure

Project element	Partial / full acquisition	Size (ha) (approximate)
North Hub	Partial	210
Central Hub A	Partial	335
Central Hub B	Full / partial	310
East Hub	Partial	35
Central South Hub	Partial	300
Nemingha maintenance facility	Full	1.5
Bayswater Power Station substation extension	Partial	7.5
	Total	**1,199**

*Comprises of multiple owners, some will be acquired in full and the others only partial. These are the approximate areas of land acquisition and should not be equated to the size of the infrastructure.

Table 3.5. Additional freehold land acquired

Project element	Partial / full acquisition	Size (ha) (approximate)
Camp 1	Full	300
Camp 2	Full	780
Ancillary site, laydown on Timor Crawney Road	Full	165
Ancillary site, laydown near Albano Road, north-east of Muswellbrook	Full	210
	Total	**1,455**

*Comprises of multiple owners, some will be acquired in full and the others only partial. These are the approximate areas of land acquisition and should not be equated to the size of the infrastructure.

Acquisitions of all interests in land would be carried out in consultation with the relevant landholder in accordance with the requirements of the Just Terms Act and preferably resolved by negotiated agreement.

3.3 Construction

3.3.1 Construction overview

Construction of the project would be undertaken using a sequenced approach from early 2028, with multiple work fronts operating concurrently across different geographical areas.

Prior to the commencement of main construction work, a Construction Environmental Management Plan (CEMP) would be prepared as an overarching document to guide the implementation of environmental management and mitigation measures for the project during the construction phase. The CEMP is planned to be in addition to the issue specific management plans (as identified and discussed in the relevant technical sections) and would outline the environmental management framework for the construction phase of the project and detail how the management and mitigation measures from this EIS (summarised in Section 25) would be implemented.

It is proposed that pre-construction minor work and enabling work would occur prior to the approval of management plans required by the project approval (refer to Section 3.3.4). This is proposed to allow the timely commencement of construction by progressing enabling work shortly after project determination. Appropriate management and mitigation measures as outlined in this EIS would be implemented for these activities.

Construction activities would generally comprise the following:

- construction of access tracks and road treatments (staged to align with the transmission line construction)
- construction of workforce accommodation camps
- bulk earthwork, including excavation, formation of work areas and materials processing (such as blasting, concrete batch plants, trenching, under boring, crushing and screening)
- transmission line construction, staged along the alignment
- energy hub construction, staged across the identified sites
- Bayswater Power Station substation extension
- stringing of transmission and communication lines
- construction of supporting infrastructure and buildings
- testing and energisation
- demobilisation and rehabilitation.

3.3.1.1 Exempt activities

Pursuant to Schedule 5, clause 40(5)(a)–(d) of the State Environmental Planning Policy (Planning Systems) 2021 (NSW) investigations and associated minor work undertaken to inform the design and assessment of the project are not classified as development. These activities include surveys, environmental and geotechnical investigations, test drilling and excavations, temporary access tracks and ancillary site facilities to allow for the carrying out of those tests. Under Chapter 2, Division 4 of State Environmental Planning Policy (Transport and Infrastructure) 2021, investigations (including geotechnical and other testing and surveys) relating to proposed development or for the purposes of infrastructure system development or determining the safety or condition of

infrastructure, are exempt development if they carried out by or on behalf of a public authority, and provided certain criteria are met. Accordingly, these activities are not part of the proposed development described and assessed in this EIS, including the pre-construction minor works or enabling works, and are managed separately through EnergyCo's Environment Impact Review process.

3.3.2 Construction program

Construction of the project is expected to occur over an indicative period of approximately 6 years, commencing in 2028 with early activities focused on enabling work and progressing through staged construction of transmission infrastructure and associated facilities. Enabling work would commence prior to the main construction period and rehabilitation work may continue after.

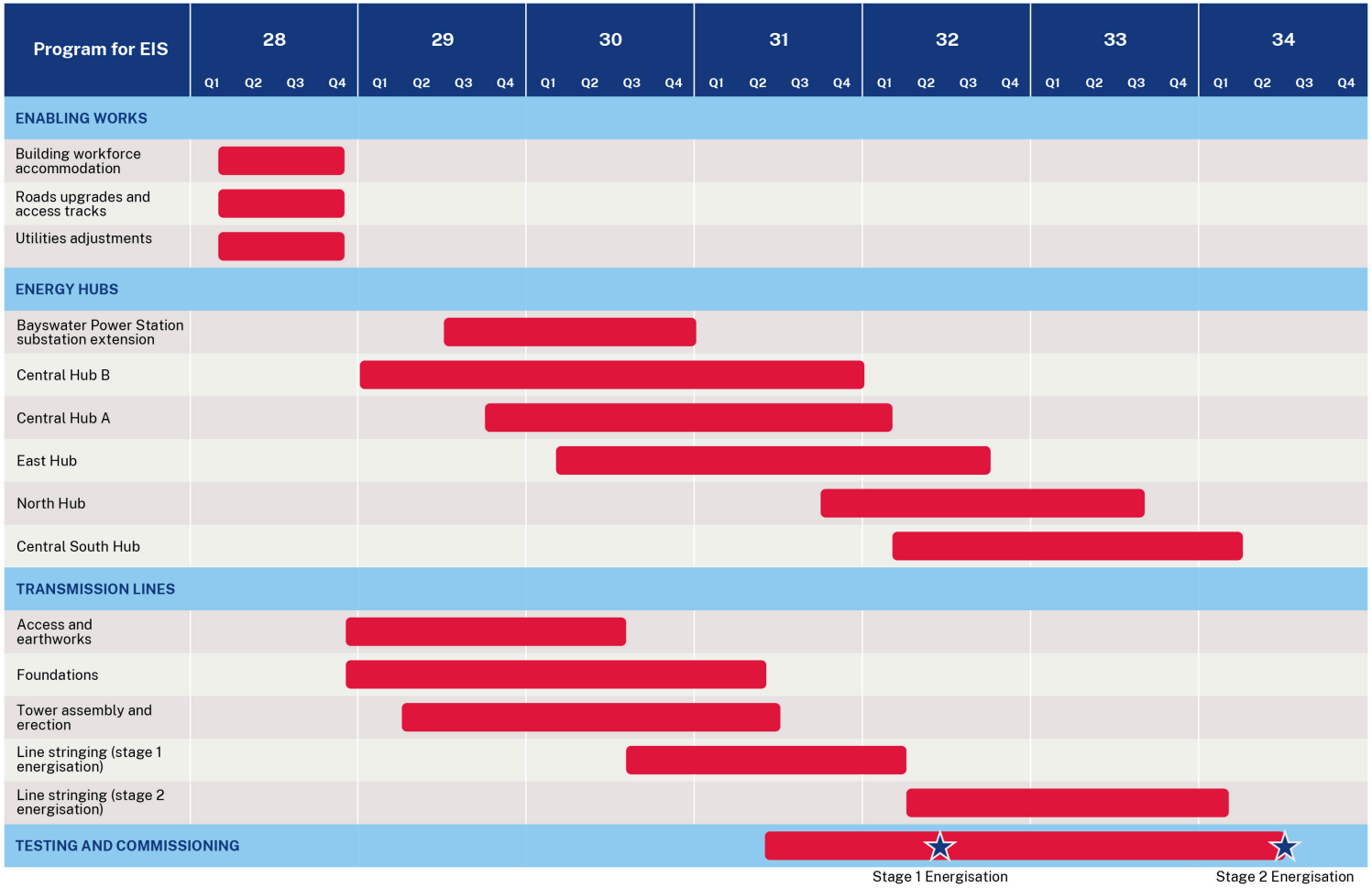
Construction activities would be sequenced to optimise efficiency, with concurrent work occurring along different sections of the transmission line alignment and at energy hub locations. At any one time, construction activities are expected to be undertaken at multiple locations across the project area.

The project would be energised in 2 stages. Stage 1 would provide approximately 2.4 GW of transfer capacity and is expected to be energised in 2032. Stage 2 would deliver an additional 3.6 GW of capacity, bringing total transfer capacity to 6 GW, with full energisation expected by 2034.

Demobilisation and rehabilitation of areas disturbed by construction activities would occur progressively where practicable, with all remaining areas not required for operations to be rehabilitated at the completion of the construction work program.

An indicative construction program and staging is shown on Figure 3.12. The construction program would continue to be refined during detailed design and in consultation with construction contractors.

Indicative Construction Program



Whilst the initial phase of enabling works is shown separately above, enabling works would continue for the duration of construction as each new work area is commenced.

Figure 3.12. Indicative construction program

3.3.3 Construction hours and workforce

3.3.3.1 Construction hours

Construction of the project would generally be carried out during recommended standard hours as defined by the *Interim Construction Noise Guideline* (NSW Department of Environment and Climate Change (DECC) 2009)) (ICNG):

- Monday to Friday between 7:00 am and 6:00 pm
- Saturday between 8:00 am and 1:00 pm
- no work on Sundays or public holidays.

Workforce accommodation camps would be operational 24 hours per day, 7 days per week.

3.3.3.2 Out-of-hours work

If there are no sensitive receivers that would be impacted by the construction work in a given location, or in agreement with affected stakeholders, the construction hours could be extended beyond standard hours. Extended work hours would increase construction productivity and reduce overall duration. Areas where these extended construction hours could potentially be implemented based on the distance of construction work from sensitive receivers are outlined further in the noise and vibration impact assessment (refer to Section 16 and Technical Report 9).

Some activities may be required outside of the project standard hours of work for safety, technical or public infrastructure operational reasons (for example, to minimise utility or traffic disruptions).

Work outside the project standard hours of work may include (but not be limited to):

- transmission line construction at crossings of a road or railway
- work where a road occupancy licence (or similar) is required, depending on licence conditions
- transmission line cutover and commissioning
- the delivery of equipment or materials outside standard hours requested by police or other authorities for safety reasons due to their size such as the delivery of transformer and reactor units
- utility adjustment, relocations or modifications
- connection of the new assets to existing assets under outage conditions
- work requiring continuous operation that take longer than standard hours, for example oil filling of substation equipment, or large concrete pours
- emergency work to avoid the loss of lives and/or property and/or to prevent environmental harm
- work timed to correlate with system planning outages
- situations where agreement is reached with affected sensitive receivers
- activities that do not generate noise that exceeds the applicable noise management level at any sensitive receiver.

During detailed design and further construction planning, a program would be determined to identify the required out of hours work periods (including dates and durations).

Where sensitive receivers are noise affected during extended construction hours (that is, where construction noise is above the noise management level (refer to Section 16), and the work cannot be undertaken during standard work hours, mitigation measures would be implemented through an out of hours work protocol.

Except for emergencies, construction work would be carried out in accordance with the out-of-hours work protocol and would not take place without prior notification to stakeholders in accordance with the protocol, which would be documented within the noise, vibration and blast management plan.

3.3.3.3 Construction workforce

Workforce numbers would vary depending on the phase of construction and associated activities. During peak construction activities, it is expected that up to 1,400 personnel would be on site at any one time.

EnergyCo has estimated the construction workforce based on the current reference design, indicative project schedule and contemporary project examples. This estimate would be finalised as the detailed design process progresses.

Depending on skills and availability, the construction workforce may be sourced locally, regionally, interstate or from overseas, if required. It is planned that most workers not local to the area would be housed in the temporary workforce accommodation camps.

3.3.4 Pre-construction and enabling work

Pre-construction minor work

To facilitate the commencement of construction a range of pre-construction minor work would be carried out. Pre-construction minor work includes activities that have a low environmental impact, that would be carried out with standard environmental controls and would not require approval of a CEMP, or specialist environmental management plan. These include the following:

- installation of environmental protection measures, fencing, and monitoring equipment
- property acquisition adjustment work to modify property boundaries, access arrangements, and local services, ensuring the continued privacy, access, safety, and amenity of adjacent residents and landholders prior to construction. This work may include the installation or modification of boundary fencing, gates, driveways, property access points, stock management infrastructure, mailboxes, and minor utility relocations or adjustments
- archaeological test excavations undertaken in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010a), and archaeological monitoring where required
- archaeological or cultural heritage salvage work undertaken in accordance with an approved heritage management strategy or salvage program
- property maintenance of properties acquired for the project including inspection, security, and minor maintenance work to existing buildings and structures required for project purposes or retained until construction commences. Such work may include temporary repairs, weatherproofing, security measures, and utility disconnection or reconnection

- grading and maintenance of existing access tracks, and minor adjustments to existing services and utilities required to support the activities listed above
- minor vegetation clearing or vegetation translocation required to facilitate the activities listed above, provided the work does not affect biodiversity values requiring offsetting. Such clearing may include the removal or trimming of individual trees, exotic vegetation, shrubs, and groundcover within previously disturbed areas. Clearing would avoid hollow-bearing trees, threatened species, threatened ecological communities, riparian vegetation associated with named waterways, and other areas requiring specialist environmental management
- activities that do not adversely impact heritage items, other than those associated with the archaeological investigations and salvage activities described above
- other low-impact activities determined by the Environmental Representative to have only minor environmental and community impacts.

Enabling work

Separate to pre-construction minor work, enabling work is activities that would also occur early in the overall construction program. Enabling work would be of minor or low impact, and typically not involve impact to features of high environmental or heritage significance or result in significant amenity impacts to nearby receivers. Enabling work would be defined in an Enabling Works Management Plan, which would incorporate applicable traffic management measures, and would include the following activities:

- site establishment and the operation of construction ancillary facilities and site offices designated in the EIS, including excavations, surface preparation, site access points and utility connections
- site establishment of workforce accommodation camps identified in the EIS
- establishment of new access tracks for enabling work and minor adjustments to existing access tracks and road treatments in the Enabling Works Management Plan.

Site establishment and operation of construction ancillary facilities and site offices

This includes low impact work required to establish construction ancillary facilities to support project delivery. Construction ancillary facilities would be located within predominantly cleared and generally level areas where possible to minimise the extent of new disturbance. Work may include establishment of site access, fencing, environmental controls, temporary utilities, parking, laydown areas and other activities required to prepare the site for construction.

This scope also includes low impact work required to establish temporary site offices and associated facilities to support project delivery. Work may include temporary office buildings, amenities, parking, storage containers, temporary power, water and communications, security fencing and environmental controls. In this phase, site offices would be established within existing cleared areas.

Site establishment of the temporary workforce accommodation camps

The workforce accommodation camp sites have generally been selected on existing agricultural land that contain cleared and previously disturbed areas suitable for undertaking enabling work in a low impact manner. The locations have been informed by the EIS investigations to utilise areas with lower environmental constraints and minimise the need for vegetation clearing, earthwork and other disturbance during the early stages of the project.

Enabling works would include construction or upgrade of site access points and localised widening of roads or localised pavement strengthening (as required), minor drainage work, fencing, installation of security infrastructure, environmental protection measures, construction of parking areas, utility connections, installation of accommodation buildings and other activities required to prepare the sites for occupation. Activities would include minor vegetation trimming, removal of shrubs, exotic vegetation or small trees, installation of utilities within existing easements or across cleared land to connect to existing services, and minor earthwork that can be managed using standard erosion and sediment control measures.

Enabling work does not include activities that trigger the requirement for implementation of the CEMP or other specialist environmental management plans.

Minor adjustments to existing access tracks and road treatments

Localised construction and upgrade of minor access tracks include low impact work to establish or improve access to project sites and work areas. This would include a series of early stage localised widening of existing roads, pavement repairs, resealing, minor drainage improvements, culvert replacement or adjustment, installation or upgrade of property access points, and formalisation and upgrade of intersections to improve turning path and visibility. This work would be undertaken within existing road corridors and previously disturbed areas and would avoid vegetation clearing that would affect biodiversity values and requiring offsetting, impacts to Aboriginal cultural heritage, work within permanent waterways, night work, or other activities that trigger the requirement for specialist environmental management plans prior to construction.

3.3.5 Workforce accommodation camps

The project workforce would be accommodated across 5 workforce accommodation camps in locations near to the transmission corridor and energy hubs. The workforce accommodation camps would be constructed early as part of enabling work and are required to be used for temporary housing and associated living facilities to house the construction workforce for the duration of construction. Five workforce accommodation camps sites have been identified. The locations for workforce accommodation camps are indicatively shown on Figure 3.1 and include:

- Camp 1 – Inglewood Road, Muswellbrook (or a recently identified potential alternative location for Camp 1 (identified as Camp 1 Alternate) on New England Highway, Muswellbrook)
- Camp 2 – Waverley Road, Waverly
- Camp 3 – Barry Road, Barry (recently identified)
- Camp 4 – Central South Hub, Oxley Highway, Walcha Road
- Camp 5 – Central Hub A, Glenburnie Road, Kentucky.

The location of Camp 3 has only recently been identified for the project, despite ongoing investigations over an extended period. In May 2026, a potential option for this camp was identified in the Barry locality. EnergyCo has commenced discussions with the landholder on the investigation and potential acquisition of this property for use as an accommodation camp. The camp location was identified after completion of the majority of technical studies prepared for the EIS, therefore has not been assessed in detail as part of this EIS. Detailed assessment of the proposed location for Camp 3 will be undertaken following exhibition of the EIS and included in an Amendment Report.

Through ongoing engagement with Muswellbrook Shire Council, a possible alternative location for Camp 1 has been identified (Camp 1 Alternate). EnergyCo is currently investigating the site in consultation with Council. Detailed assessment of the proposed alternate location for Camp 1 will also be undertaken following exhibition of the EIS and included in an Amendment Report.

The 5-camp strategy for the project has been developed based on the scale of the project and consultation with relevant stakeholders and management of other site constraints such as flooding and hazards/risks. Feedback from relevant councils and construction specialists will continue to be used to refine the approach to temporary workforce accommodation for the project. The capacity allowance at each location is relative to the construction activities required over the construction program and assumes Camps 1–3 (located along the bulk corridor) would each accommodate around 320 workers each while Camps 4 and 5 (located at Central South Hub and Central Hub A) would each accommodate around 550 workers.

The provision of temporary workforce accommodation at these construction ancillary sites would reduce the need for the main construction workforce to seek rental or short-term accommodation solutions in local areas with more constrained housing options. This is aimed at reducing the potential for the project to lead to higher rental prices during the construction period. As such, temporary workforce accommodation has been proposed to house the main construction workforce during peak construction periods.

Some workers may be required to be housed in short-term accommodation locally prior to the establishment of temporary workforce accommodation camps, however, this is anticipated to be during enabling work within the construction program and is not anticipated to lead to material impacts on local housing affordability or access.

In addition, the project is committed to the inclusion of local construction workforce where practicable so that a proportion of the total construction workforce would reside locally. Further details on temporary workforce accommodation and potential impacts on the housing market are included in Section 10.

The following facilities would typically be provided at workforce accommodation camps with an indicative layout illustrated on Figure 3.13:

- demountable accommodation and office buildings
- workforce amenities, including food and catering, laundry, gymnasium, bathroom and first aid facilities with onsite health practitioners for the workforce
- utilities, including telecommunication services, electricity and water (including water treatment plant)
- dedicated car parking area and helicopter landing pad
- construction laydown area and maintenance / storage sheds
- waste and recycling compound
- diesel generators, solar panels
- secure perimeter fencing and security.

Workforce accommodation camps constructed for the project would be removed on completion of construction.

3.3.5.1 Construction workforce parking

Sufficient parking for light and heavy vehicles would be provided within the project area during construction of the project.

Workforce accommodation camp sites have been selected to generally limit travel time to construction sites to around 45 minutes. Workers would be transported to work sites from the workforce accommodation camps via four-wheel drive light commercial vehicles, crew trucks, and shuttle buses.

Construction parking requirements are all accommodated within the project area, with parking for the construction workforce provided within the construction ancillary sites and workforce accommodation camps.

The layout below is indicative only and based on a typical workforce accommodation camp constructed for major infrastructure projects in NSW.

Legend

1. Main Entry / Security
2. Parking
3. Accommodation Units
4. Amenities / Laundry
5. Recreation, Dining & Kitchen
6. Administration / Office
7. First Aid
8. Waste & Recycling Compound
9. Maintenance / Storage
10. Water Tanks (Potable)
11. Wastewater Treatment Plant
12. Construction / Laydown Area
13. Helipad

Features

- Lighting throughout for safety and security
- Secure perimeter fencing and controlled access

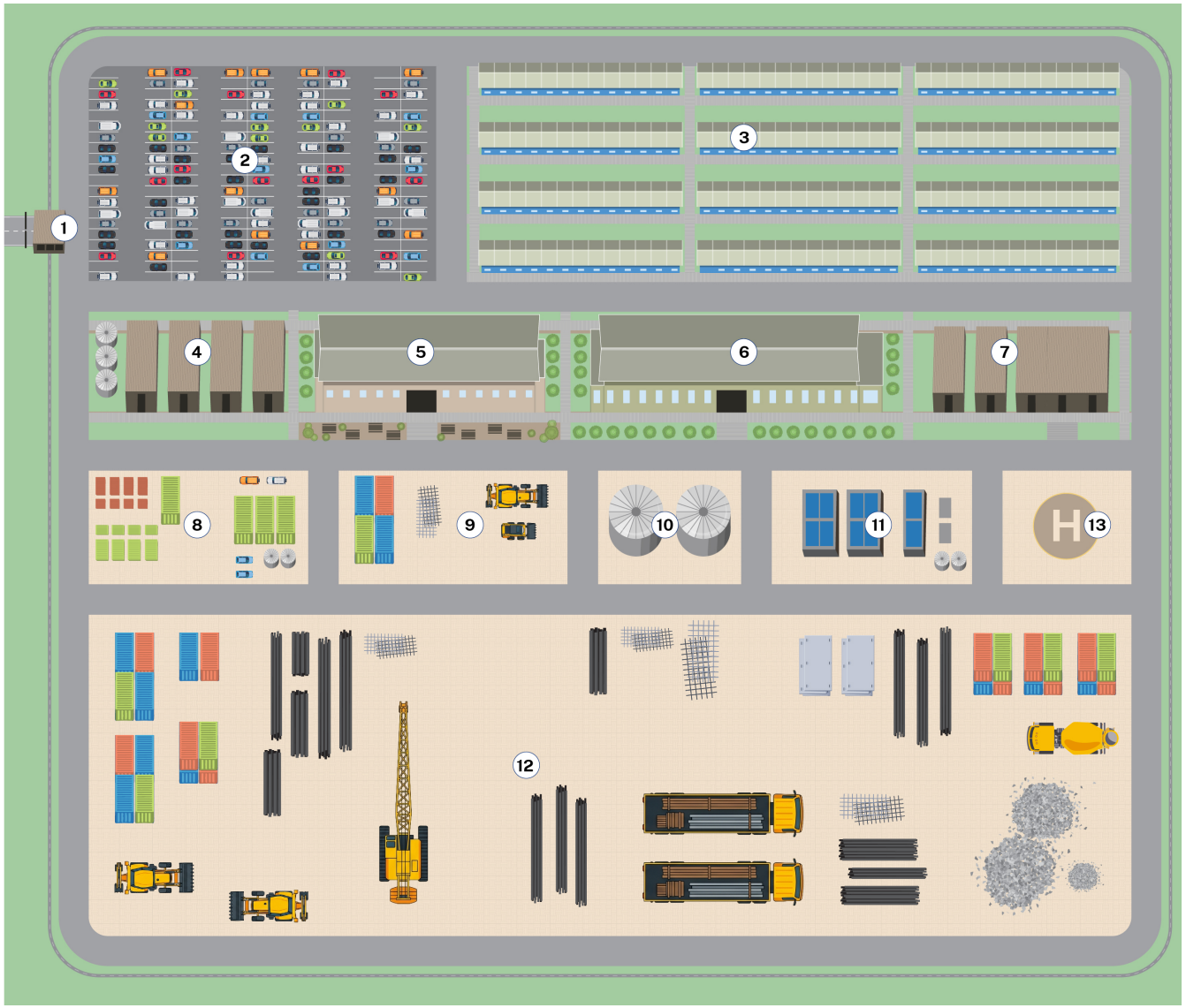


Figure 3.13. Indicative workforce accommodation camp and construction laydown layout

3.3.6 Construction transport routes and road treatments

3.3.6.1 Construction vehicle routes and movements

Construction vehicles would transport equipment, materials, waste and spoil, as well as workers.

Larger volumes of heavy vehicles would be required during main construction work associated with the transmission line and energy hubs. Heavy vehicles would mainly be associated with the delivery of materials to the project area including laydown areas and construction ancillary sites, including from the Newcastle Logistics Precinct which is intended to be used for deliveries associated with construction of the project.

Based on the reference design, key access routes proposed to be used during construction of the project were identified and are shown on Figure 3.13. Some movements, such as local workers travelling from their places of residences or accommodation, and specific deliveries or movements would occur outside of these routes, however, the identified routes are the primary routes to be used during construction.

Light vehicle movements would generally be associated with workers travelling from nearby towns (local workforce and enabling activities) and to and from individual work sites. Vehicle movements for most workers would generally start from the workforce accommodation sites. Table 3.6 provides a summary of the estimated traffic movements generated by the project during peak construction between the workforce accommodation camps and work fronts. It represents the worst-case scenario impact of the project, as it considers the maximum hourly movements generated to/from each respective site during peak hour and during the peak of construction. In addition, there is also traffic associated with the movement of vehicles between towns and work sites. Estimates of these traffic movements are provided in Table 3.7.

Further discussion of the expected construction vehicle movements for construction of the project is provided in Section 14 and Technical Report 7.

Table 3.6. Daily vehicle movements from workforce accommodation camps and work sites during peak construction period

Vehicle type	Camp 1	Camp 2	Camp 3	Camp 4	Camp 5	Total
Camp workforce (light vehicle)	44	106	70	70	148	438
Camp workforce (heavy vehicle)	18	46	30	30	64	188
Construction (light vehicle)	222	272	318	364	700	1,876
Construction (heavy vehicle)	102	102	102	102	404	812
Total	**386**	**526**	**520**	**566**	**1,316**	**3,314**

Table 3.7. Daily vehicle movements from towns to workforce accommodation camps and work sites during peak construction period

Vehicle type	Armidale	Tamworth	Scone	Muswellbrook	Total
Light vehicles	26	158	26	44	254
Heavy vehicles	20	40	20	20	100
Total	46	198	46	64	354

In summary, as identified in Table 3.6 and Table 3.7, the estimated traffic movements are expected to peak in late 2030, with estimated peak daily movements of up to 2,568 light vehicles, 188 shuttle bus and 912 heavy vehicle (total of 3,668 peak daily movements). Prior to and after this, traffic movements associated with early construction phase and post peak construction phase would be less.

3.3.6.2 Over size and over mass haulage routes

A number of high risk over size and over mass (OSOM) movements would be required for the main construction work at Central A, Central B and Central South energy hubs and Bayswater Power Station substation extension work (for example for transformer, reactor and synchronous condenser transport). An OSOM movement is classified as high risk in NSW based on factors such as the vehicle combination length, height, and front and/or rear overhand (further information is provided in Section 14 and Technical Report 7).

Most high risk OSOM deliveries are expected to originate from the Port of Newcastle (including from the Newcastle Logistics Precinct which is intended to be used for deliveries associated with construction of the project) and travel to the energy hubs and the Bayswater Power Station substation extension site via the New England Highway. High risk OSOM deliveries are those that exceed certain vehicle dimensions, mass or route characteristics as defined by TfNSW and therefore require specific management measures. Final OSOM vehicle configurations and delivery schedules would be confirmed through the relevant regulatory approval processes, undertaken in consultation with TfNSW, the National Heavy Vehicle Regulator and the applicable local councils. The indicative total high risk OSOM vehicle movements for the duration of the project are listed in Table 3.8.

Based on the current scope, in the order of around 53 high risk OSOM movements are anticipated in total. This estimate is based on the assumed equipment configuration at the time of this assessment. The final number of OSOM movements may vary depending on detailed material selection, equipment specifications and transport logistics confirmed during later stages of design and procurement.

The proposed OSOM access routes to be used during construction of the project are shown on Figure 3.15.

Table 3.8. Indicative high risk OSOM vehicle movements during construction

Component	No. of one-way OSOM vehicle trips
1500 MVA 500/330 kV power transformers	30
500 kV line shunt reactors	10
330 kV phase shifting transformers	8
Synchronous condensers	5

3.3.6.3 Road and intersection treatments

As described in the sections above, the construction of the project would utilise various public roads as construction routes for the movement of the workforce, equipment, materials and supplies. In several locations along the construction routes, treatments are proposed to facilitate the proposed construction traffic volumes and delivery of OSOM equipment or construction material and ensure public road safety.

Appendix C provides a summary of the road treatments proposed as part of the project, which include a range treatments from minor pavement works, local road widening to permanent intersection upgrades.

Further details of all road treatments and required access intersections are provided in Section 14 and Technical Report 7.

The final design of treatments to the existing public road network would be confirmed in consultation with the relevant road authorities and would also be informed by detailed OSOM vehicle selection and consultation with TfNSW and the National Heavy Vehicle Regulator (NHVR).

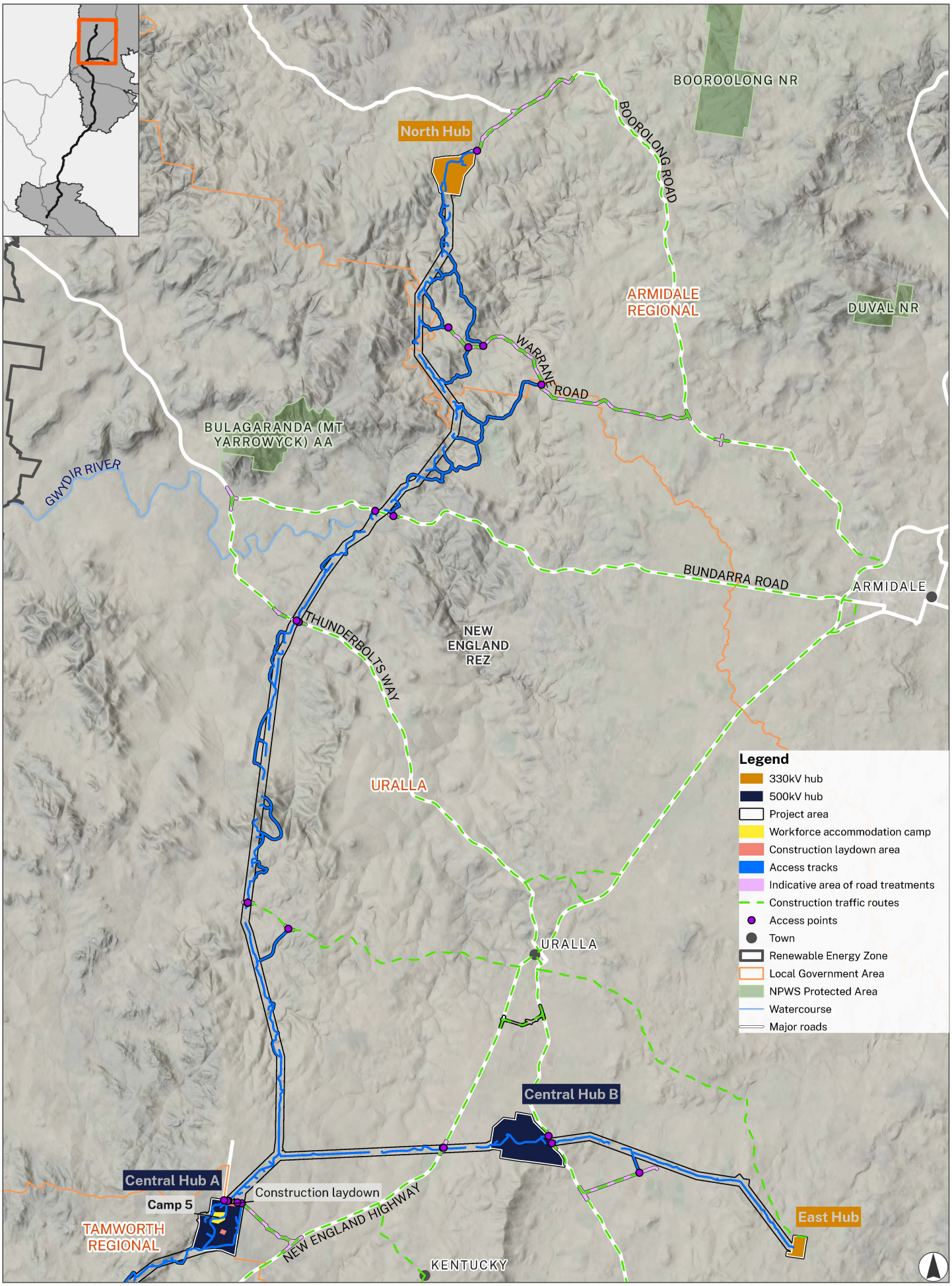


FIGURE 3.14a Proposed construction traffic haulage routes overview (Map 1 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

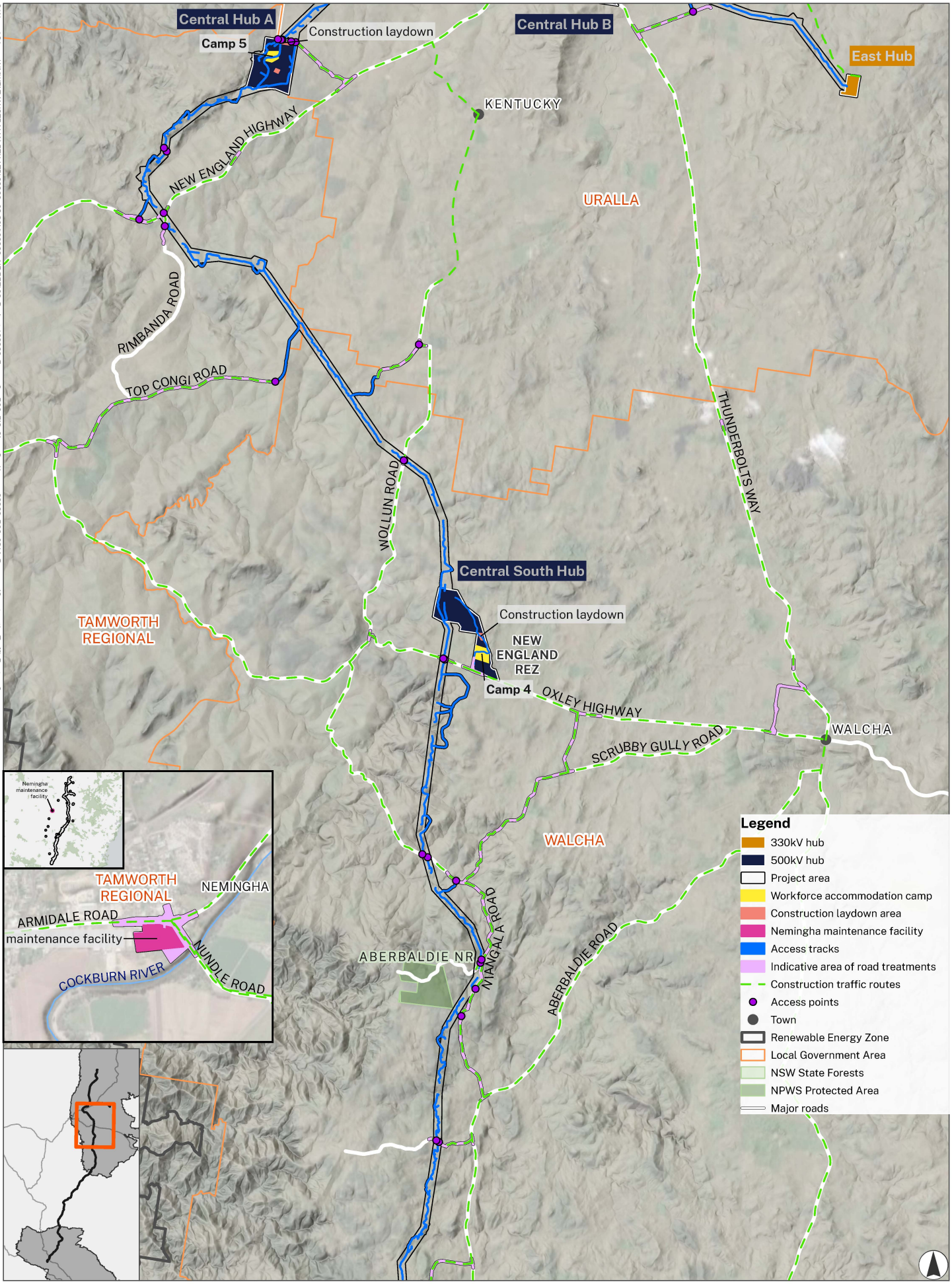


FIGURE 3.14b Proposed construction traffic haulage routes overview (Map 2 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

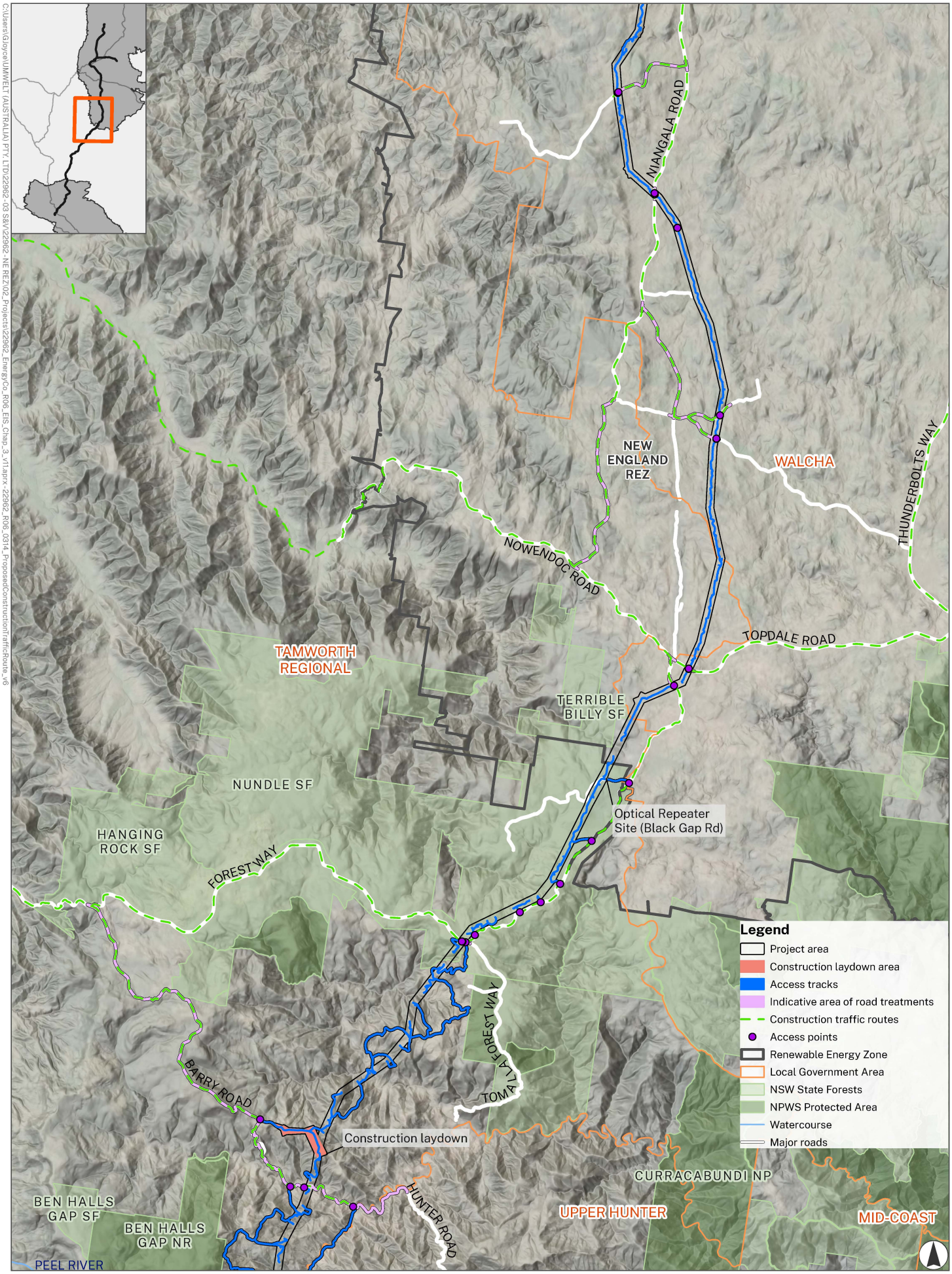


FIGURE 3.14c Proposed construction traffic haulage routes overview (Map 3 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

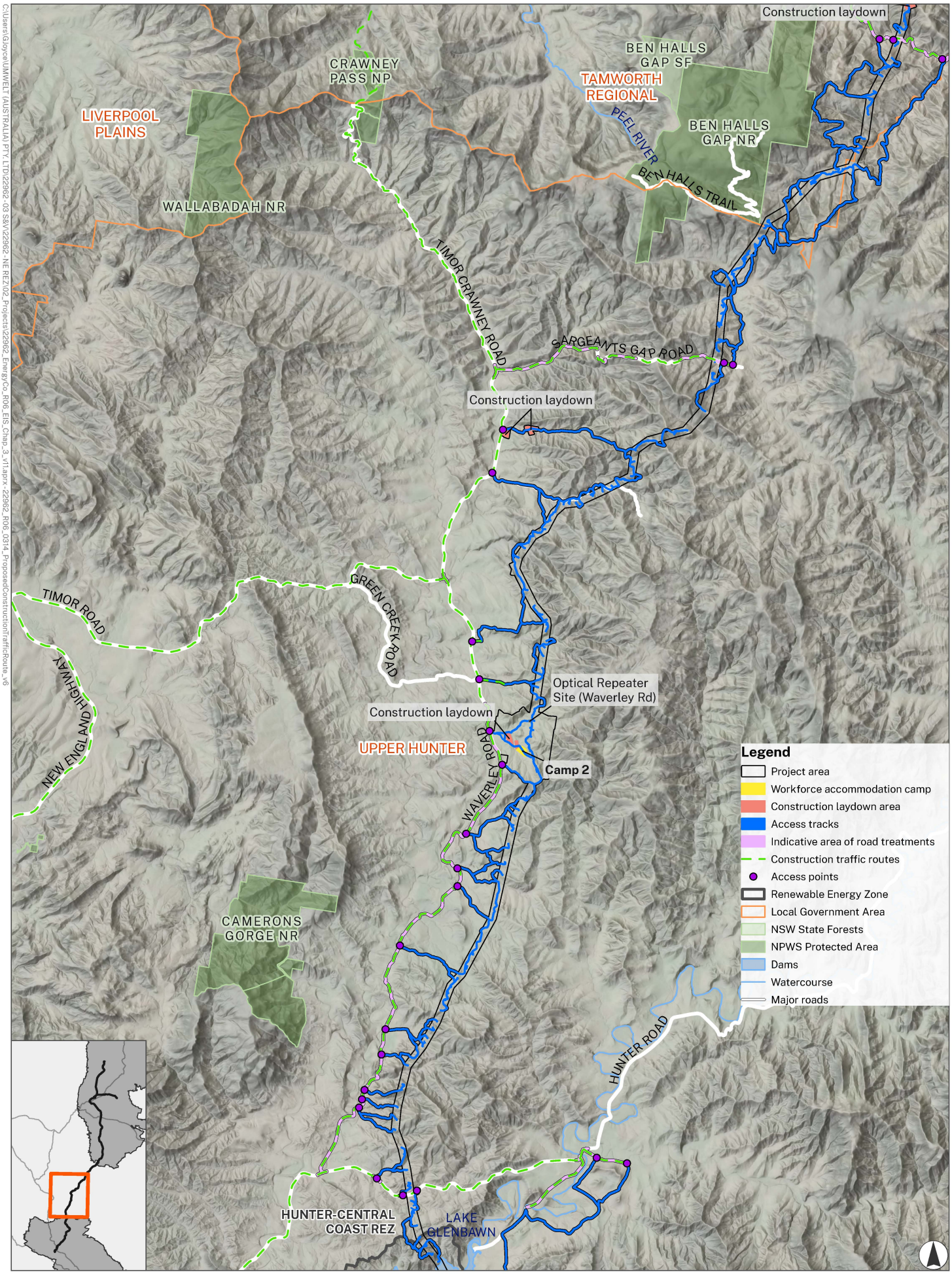


FIGURE 3.14d Proposed construction traffic haulage routes overview (Map 4 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

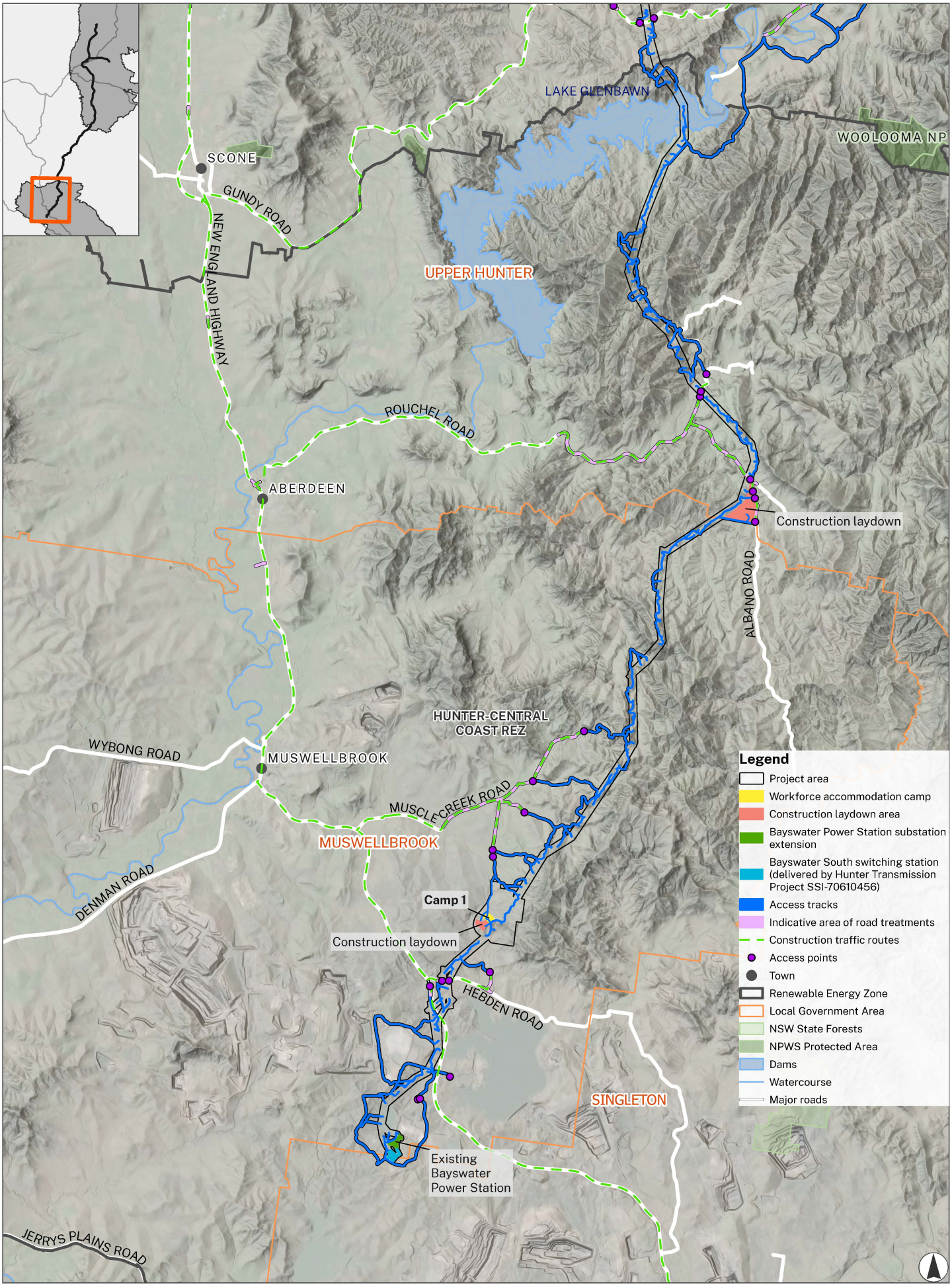


FIGURE 3.14e Proposed construction traffic haulage routes overview (Map 5 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

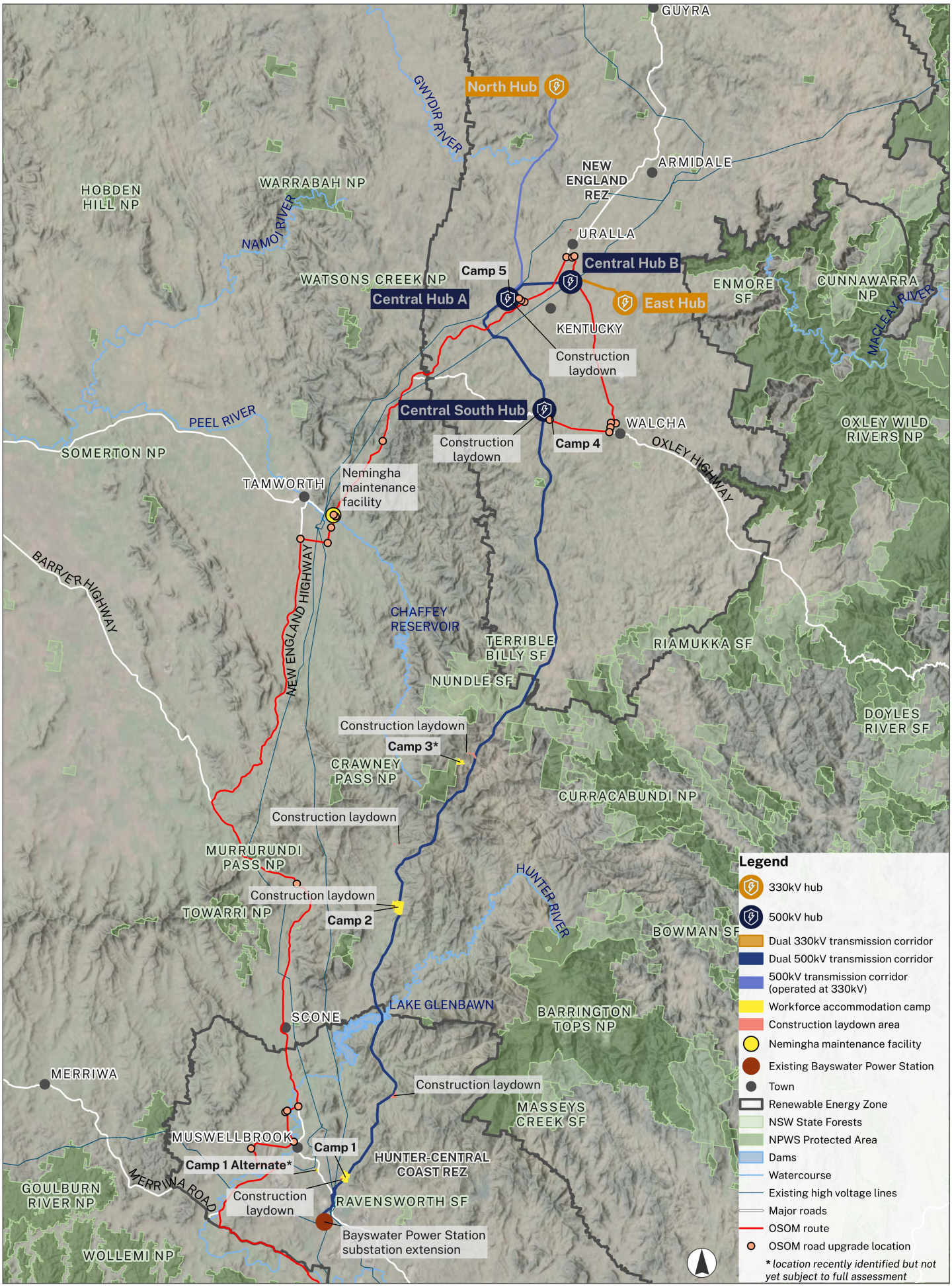


FIGURE 3.15 Proposed construction over size over mass routes overview

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

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

3.3.7 Utility adjustments and crossings

As described in Section 3.2.8, construction of the transmission line would require adjustments and/or crossings of existing infrastructure and crossing of watercourses along the alignment. These infrastructure adjustments and/or crossings include existing transmission and distribution lines, roads, rail lines and pipelines as listed in Appendix C. At these locations, utilities would either be relocated as required during construction of the project to avoid or minimise impacts from earthwork and other construction activities or temporary crossing or "hurdle" sites would be established to facilitate safe stringing of conductors and protect existing infrastructure.

Where practicable and subject to asset owner consultation, distribution lines would be 'undergrounded' for the width of the new transmission line easement (that is, from new or existing poles at the edge or just beyond the new easement). This would allow for safe, unimpeded access for construction and operation of the transmission line.

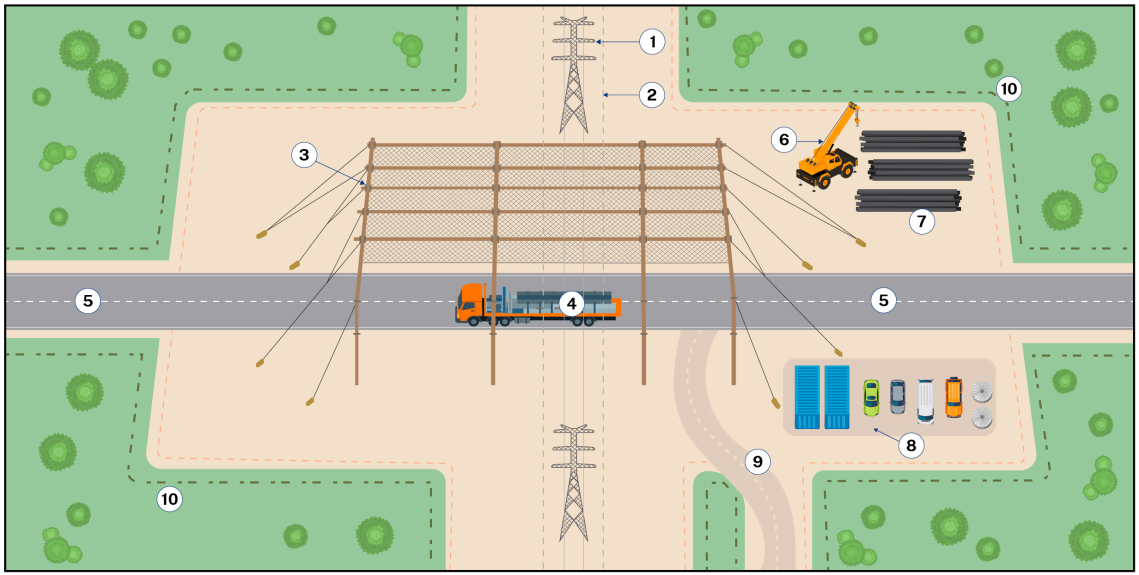
The project transmission lines would cross existing transmission, sub-transmission and distribution lines at multiple locations throughout the project area (refer to Figure 3.11 and Appendix C). A range of construction methods would be used depending on the voltage and configuration of the existing lines. Hurdle sites typically require additional space on either side of the crossing to accommodate temporary structures and equipment used to span the existing asset. This may include the use of cranes to support existing conductors for higher voltage crossings, and the use of hurdles, including rope and net systems, to protect lower voltage lines during stringing. An indicative arrangement for a hurdle site is illustrated on Figure 3.16.

The new transmission lines would also cross roads, rail lines and watercourses. In these locations, aerial methods such as drones or helicopters would typically be used to install a pilot line across the crossing, allowing conductors to then be pulled and strung between towers within the stringing section. Where required, additional measures such as hurdles or crane support may be used to maintain clearances and protect underlying infrastructure.

Stringing work over roads would require traffic management measures and may be undertaken outside of peak traffic periods or during planned road closures. These activities would be carried out in consultation with the relevant road authorities and would be subject to applicable approvals, including road occupancy licences where required.

Stringing work across rail lines would be undertaken in consultation with the relevant rail authority and are likely to occur during planned maintenance windows or scheduled shutdown periods to avoid disruption to rail services.

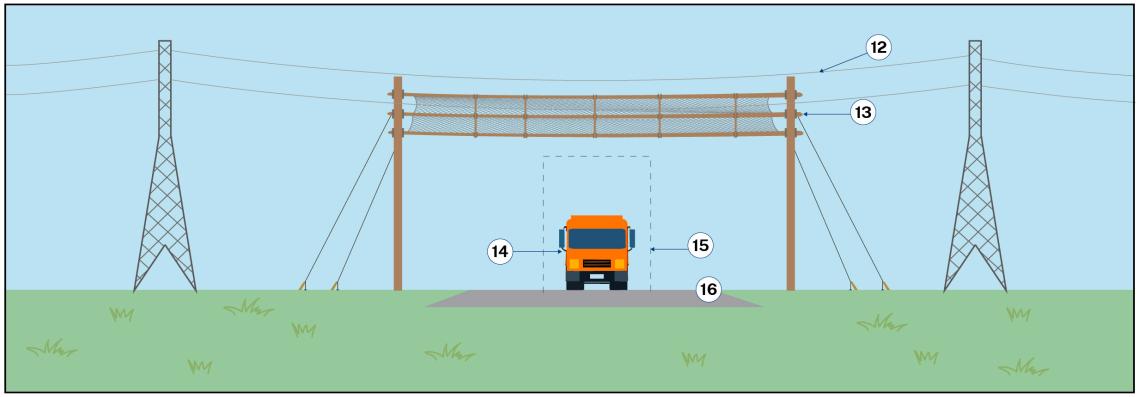
The transmission line would also cross numerous watercourses and riparian corridors along the alignment. Stringing across these areas would typically use aerial methods to install pilot lines and minimise disturbance within the waterway.



Legend

1. Transmission tower
2. Transmision easement
3. Temporary hurdle structure
4. Transport vehicle
5. Existing road
6. Crane / lifting equipment
7. Construction laydown area
8. Work compound / equipment storage
9. Temporary access track
10. Environmental controls (e.g. sediment fencing)

- Indicative work area / clearing
- Environmental controls
- Transmission line corridor (indicative)



12. Existing transmission conductors
13. Temporary hurdle structure
14. Transport vehicle
15. Clearance envelope (indicative)
16. Existing road surface

Notes

Indicative hurdle site used during construction to facilitate the safe movement of oversize plant and equipment beneath transmission conductors.

Layout, dimensions and equipment requirements would vary depending on the crossing location, delivery requirements and detailed design.

There are many styles of hurdle design. Actual hurdle will likely vary

Figure 3.16. Indicative hurdle site

3.3.8 Access track construction

Access tracks are required across the project area to provide access from the public road network to tower sites, energy hubs and other construction work areas. Approximately 580 kilometres of access tracks are required to support construction and operation of the project.

Access tracks would be used during both the construction and operational phases and would be designed and built to accommodate the movement of large construction equipment such as mobile cranes, trucks and concrete agitator. The anticipated list of plant to be used for construction is provided in Section 3.3.13.3. These access tracks would be unsealed.

The indicative access track network proposed seeks to provide efficient access to work fronts while, where practicable, avoiding environmental constraints and minimising vegetation clearing. In developing the access track network, preference has been given to the use of existing roads, farm tracks and previously disturbed areas where practicable.

Some of the access tracks proposed would require upgrades to existing tracks to accommodate construction vehicles and machinery. The upgrades required would vary depending on the condition of individual tracks but would generally provide for access widths of up to approximately 4 metres and accommodate construction vehicles such as semi-trailers. Where existing tracks do not provide suitable access, or where terrain constraints prevent access along the transmission line corridor, new access tracks would be constructed.

The indicative track layout has also sought, where practicable, to avoid steep slopes, waterways and other identified constraints, and to achieve a practicable balance between access requirements, stormwater management and cut to fill earthwork.

A disturbance footprint based on the reference design, including access tracks, has been used as relevant for the assessment in this EIS. The final disturbance footprint associated with access tracks would be confirmed during detailed design. Key factors influencing the extent of disturbance associated with access tracks include terrain and slope, landholder consultation, geotechnical conditions, drainage requirements and constructability considerations. In steeper or more constrained areas, additional disturbance would typically be required to accommodate safe access, including wider track formations, cut and fill batters and localised realignments.

Individual land use needs have been considered in the design of access tracks to enable the landholder's continued use of the land, as well as to minimise the overall environmental impacts. The requirements to retain or remove access tracks would be determined in consultation with landholders during property access negotiations and ahead of the commencement of operation of the project.

Further consultation with landholders would be undertaken during detailed design to ensure access arrangements are responsive to existing land use needs and property operations. As a result, the final access track layout may change from that assessed in this EIS and where required these changes would be considered via a consistency assessment.

Table 3.9 further describes the access track requirements for the construction of the project which are also shown on Figure 3.14. The full extent of work for the upgrade of existing access tracks and the construction of new access tracks would be confirmed as part of detailed design.

Table 3.9. Proposed access track requirements

Access track / road	Description
Existing tracks	Existing tracks include well-established tracks on private property or those maintained by an authority other than council (for example FCNSW, AGL, Transgrid or other authority). Some existing access tracks may require maintenance activities or upgrades, such as widening, work to improve gradients, resurfacing or grading, installation of water crossings or drainage work. Vegetation removal and pruning/trimming may be required in some locations where vegetation may be considered a hazard. Where pruning/trimming is required, it would be undertaken to avoid impacts on the long-term viability of the vegetation where practicable. Other existing access tracks may require upgrades for safety and suitability. These tracks typically consist of unsealed property access tracks of varying conditions, from well-established sections to rarely used, and some may require substantial upgrade. The total disturbance width would generally be up to 10 metres, with some limited areas (for example steep terrain, passing bays) requiring a clearing width of up to 20 metres for batters and in limited areas up to 30 metres.
New tracks	The locations of new access tracks have generally been selected to get from existing tracks to work areas while minimising environmental and property impacts. New tracks have generally been designed to include being along fence lines, using movement paths preferred by landholders (where known), and going through existing property gates, where practicable. Establishing the new tracks would typically include earthwork, grading, drainage work and construction of watercourse crossings. Fill material may be imported to provide a suitable capping material. To establish the new tracks, vegetation clearing or pruning/trimming may be required. The total clearing width would generally be up to 10 m, with some areas (for example steep terrain, passing bays) requiring a clearing width of up to 20 m and in limited areas up to 30 metres.

3.3.8.1 Waterway crossings

Construction of access tracks would require crossings of waterways to enable safe and continuous access along the transmission line alignment and to associated work areas. Based on the reference design assessed in this EIS, approximately 130 waterway crossings have been identified across the project area. These include a combination of named waterways and lower order drainage lines.

The design and construction of waterway crossings would be responsive to the type and characteristics of each waterway. For smaller and ephemeral waterways, including Strahler stream order 1 and 2 channels that do not typically support permanent aquatic habitat, crossings may be designed as floodable structures such as rock armoured crossings or low-level weirs, where appropriate. For higher order waterways, or those that support aquatic habitat including fish passage, crossings will be designed in accordance with Why Do Fish Need to Cross the Road? Fish Passage Requirements for Watercourse Crossings (Fairfull and Witheridge, 2003) and the Policy and Guidelines for Fish Habitat Conservation and Management (DPI, 2013b).

Existing bridges, causeways and river crossings will be utilised where possible to avoid the need for new instream structures. Where new crossings are unavoidable, they will be designed to maintain fish passage and minimise impacts on natural flow regimes. All temporary crossings will be removed and rehabilitated following the completion of construction activities unless otherwise agreed with landholders.

All waterway crossings would be designed on a case by case basis during detailed design, taking into account hydrology, geomorphology, ecological values and construction requirements. Appropriate controls would be implemented to minimise impacts to waterway banks and beds, manage erosion and sediment risks, and avoid adverse impacts to downstream flows and water quality.

Construction of waterway crossings may require the temporary diversion or isolation of water flows to enable work to be undertaken in dry or controlled conditions. These measures would be implemented to minimise disturbance to creek beds and banks and to prevent sediment mobilisation and downstream water quality impacts. Any temporary work within waterways would be undertaken in accordance with relevant guidelines and environmental management plans and where they do not form part of the permanent design, would be removed and rehabilitated following completion of construction work, subject to consultation with the landholder.

3.3.8.2 Stormwater management

Access tracks would generally comprise unsealed surfaces and would be designed, constructed and maintained to ensure stability and minimise the potential for erosion and sediment generation during construction.

Track design would incorporate appropriate drainage and erosion control measures to manage surface water runoff and maintain stable conditions. This includes controlling the flow of water to avoid concentration, directing runoff away from disturbed areas, and ensuring flows remain below erosive levels. Measures may include sheet flow arrangements, cross-fall grading, berms, table drains, cross-drains and stabilised outlets with energy dissipation structures.

The design and management of access tracks would be designed and constructed following in Managing Urban Stormwater: Soils and Construction – Volume 2C (Unsealed Roads) (DECC, 2008), including minimising disturbance, managing runoff through stable drainage systems, and progressively implementing erosion and sediment controls.

Where required, additional measures such as surface stabilisation, erosion control treatments and routine maintenance would be implemented to manage track condition. This may include regrading, repair of erosion features and reinstatement of drainage structures following rainfall events or periods of intensive use.

3.3.9 Vegetation clearing

Clearing and grubbing is the process of removing woody vegetation and trees within approved disturbance areas to enable construction activities.

Clearing during construction would be undertaken in both construction areas for project infrastructure (for example where permanent and temporary project infrastructure would be built, including for temporary construction areas and facilities and any associated APZs) and for initial clearing of transmission line easements. In easements, the objective is to remove vegetation to maintain appropriate electrical safety clearances to the transmission lines and manage bushfire risk to the infrastructure. For the purposes of assessment, the project has assessed an electrical safety clearance of 10 metres between vegetation and the lowest conductor sag. In practice, this means that in some areas all vegetation except for the groundcover and small shrubs would be removed.

In some areas where there is greater ground clearance, more vegetation would remain whilst still providing the necessary hazard management, and in some areas no clearing would be required (for example in a valley between 2 towers). Clearing in easements requires ongoing maintenance as discussed in Section 3.4.1.

The disturbance footprint represents an indicative clearing envelope developed from the reference design to inform impact assessment and establish clearing limits. The project components and their clearing requirements which have been included in the disturbance footprint are provided in Table 3.10. This approach, as illustrated on Figure 3.17, identifies the quantum of clearing required for the project and provides a basis for assessing potential impacts, whilst recognising that the specific locations of vegetation clearing may change during detailed design as the alignment, access arrangements and infrastructure layout are refined. The final clearing footprint would therefore be confirmed during detailed design and construction planning but would be managed so that remains within the assessed clearing limit that would be expected to be formalised as part of the project approval.

Clearing would be undertaken as a staged process, with removal of non-hollow bearing vegetation occurring first, followed by hollow bearing trees where required. Pre-clearing surveys would be undertaken to confirm clearing extents and identify flora and fauna features requiring specific management, consistent with the approach outlined in Section 7.

The extent of clearing would vary depending on the construction activity and location. Full clearing would be required in areas such as tower pads, energy hubs, stringing sites and access tracks where ground disturbance is necessary to support construction. In other areas, partial clearing may be undertaken to retain low growing vegetation where it does not conflict with construction or operational requirements. Figure 3.18 provides a conceptual representation of the application of full and partial clearing. In some areas, such as steep terrain where there is greater ground clearance, more vegetation would remain and in some situations no vegetation clearing would be required (refer to Figure 3.19).

In addition to cleared areas (full and partial clearing areas), access may be required through some parts of the project area that are not required to be cleared for light vehicles or on foot. In these locations, access would be managed to avoid or minimise ground disturbance and vegetation removal where practicable.

A range of clearing methods may be used depending on site conditions, including the use of machinery or manual techniques where required. The approach to clearing would be responsive to vegetation type and density, terrain, access constraints and proximity to sensitive areas.

For clearing of the easements, hazard/high risk trees located inside and outside the transmission line easement would also be removed. Hazard/high risk trees are defined as any tree or part of a tree that if it were to fall would infringe on the vegetation clearance requirements at maximum conductor sag of the transmission lines. All hazard/high risk trees confirmed as posing a risk to the corridor would be removed in accordance with the assessed clearing limits. Figure 3.20 provides a conceptual representation of the requirements for removal of hazard trees. Figure 3.21 provides a conceptual representation of the requirements for vegetation removal mid easement (cross sectional example).

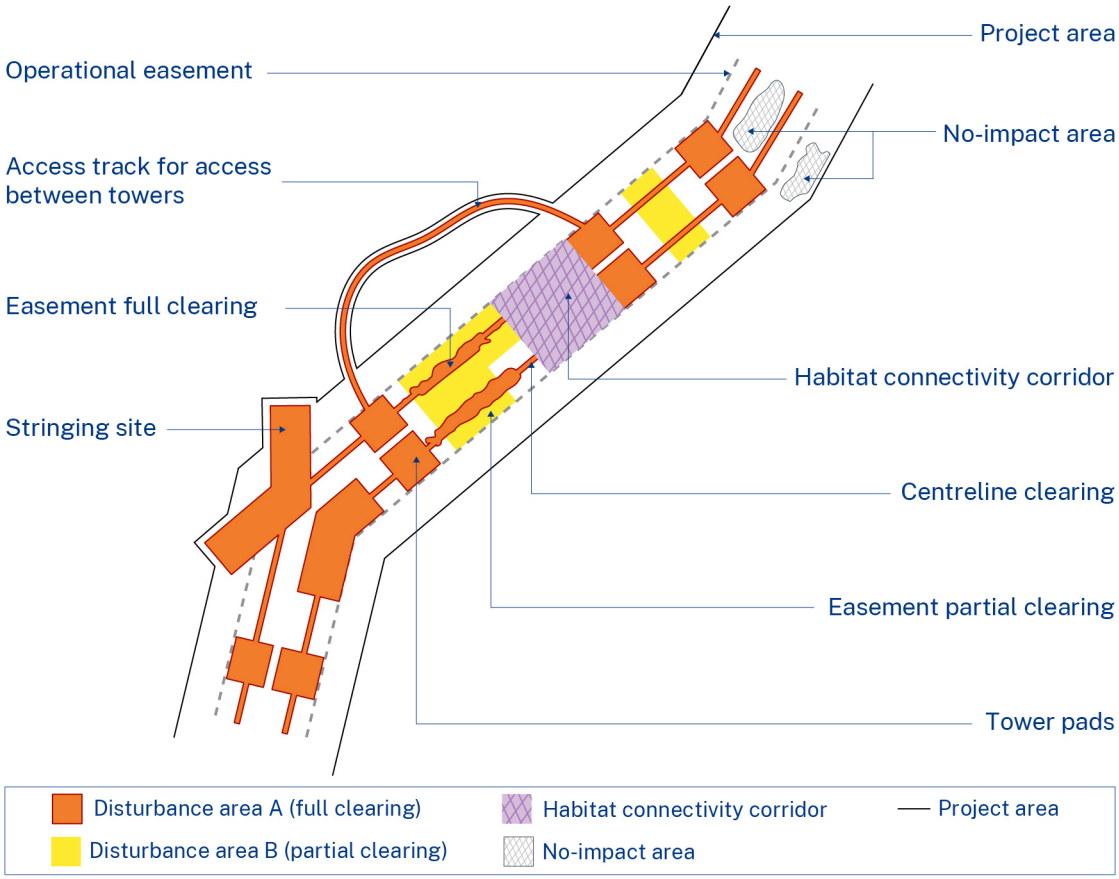
Vegetation material generated during clearing would be managed in accordance with a hierarchy that prioritises reuse and recycling and as determined in consultation with the landholder. Where practicable, timber would be reused or recycled, including for off-site uses. Vegetation material may also be repurposed on site for habitat structures or rehabilitation activities. Off-site removal of vegetation would be undertaken where required due to site constraints or landholder requirements.

Stumps would generally be retained in situ to minimise additional ground disturbance, except where removal is required to facilitate construction activities or avoid conflict with infrastructure. Landholder consultation would also be required on the management of stumps where they potentially inhibit ongoing activities.

Table 3.10. Vegetation clearing requirement during construction

Project Components	Requirements
Transmission towers	Construction of transmission towers would require vegetation removal for the following: • establishment of tower pads – which would require a cleared area of around 70 metres by 70 metres for the construction of each structure in most instances, with larger construction benches of up to 100 metres by 70 metres in steep terrain • stringing sites – which would require a cleared area of around 60 metres by 100 metres per line. These may be mid span and on easement or off easement where a direction change of the transmission line occurs. Complete removal of vegetation would typically be required within these areas to facilitate safe access and use of construction vehicles, plant and equipment.
Transmission line easement	Vegetation clearing within the transmission line easement would require the removal of vegetation that exceeds vegetation clearance requirements (assessed as 10 metres below the conductors under maximum operating line conditions). In other areas of the easement, partial clearing may be undertaken to retain low growing vegetation where it does not conflict with the 10 metres safe approach distance. There would be no clearing in no impact areas or habitat connectivity corridors, which are further described in Section 7.

Project Components	Requirements
Hazard tree	There may be a requirement for the selective removal, trimming or lopping of trees adjacent to the transmission line easement where these trees pose a risk of damage to the transmission lines and structures in the event of tree fall.
Energy hubs and substation extension	Areas required for the construction of the proposed energy hubs including associated access roads and APZs would require full vegetation clearing. Vegetation clearing is also proposed as part of the extension of the Bayswater substation.
Access tracks	Construction of new access tracks would require full vegetation clearing. The total clearing width would generally be up to 10 metres, with some limited areas (for example steep terrain, passing bays) requiring a clearing width of up to 20 metres for batters and in limited areas up to 30 metres. Upgraded tracks may require vegetation clearing, to achieve the same total width as new access tracks, for widening/formation work or where vegetation may be considered a safety hazard. Existing tracks/roads of a suitable width and condition would not require vegetation clearing.
Construction ancillary sites (including workforce accommodation)	The areas required for the construction ancillary sites, including the workforce accommodation camps, construction laydowns, and stringing sites would require vegetation clearing. Construction support sites were selected based on a preference for previously disturbed/cleared areas.



The construction easement for the project is equivalent to the project area and would provide a right of access for the network operator for the construction of the project.

Figure 3.17. Indicative vegetation clearing approach

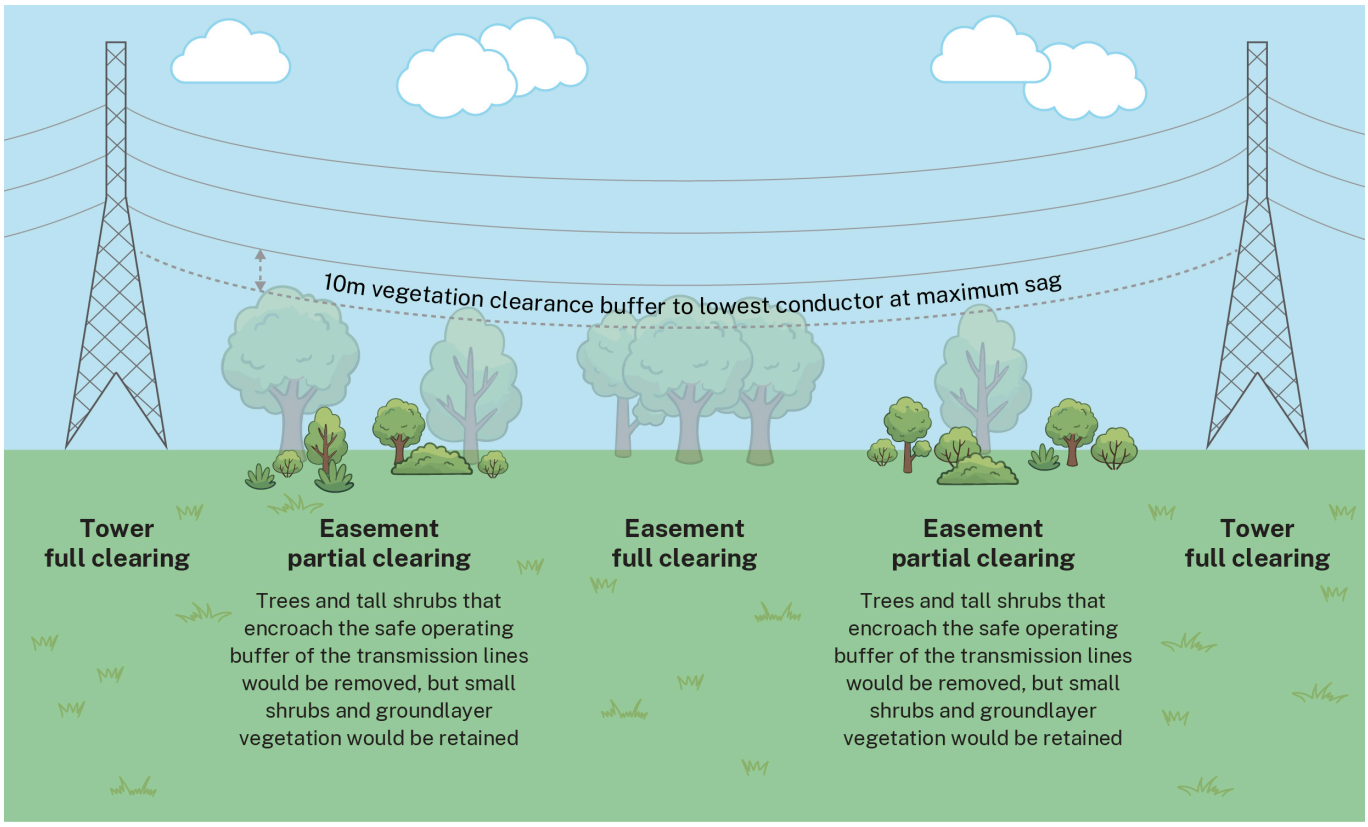


Figure 3.18. Conceptual diagram of full and partial vegetation clearing zones

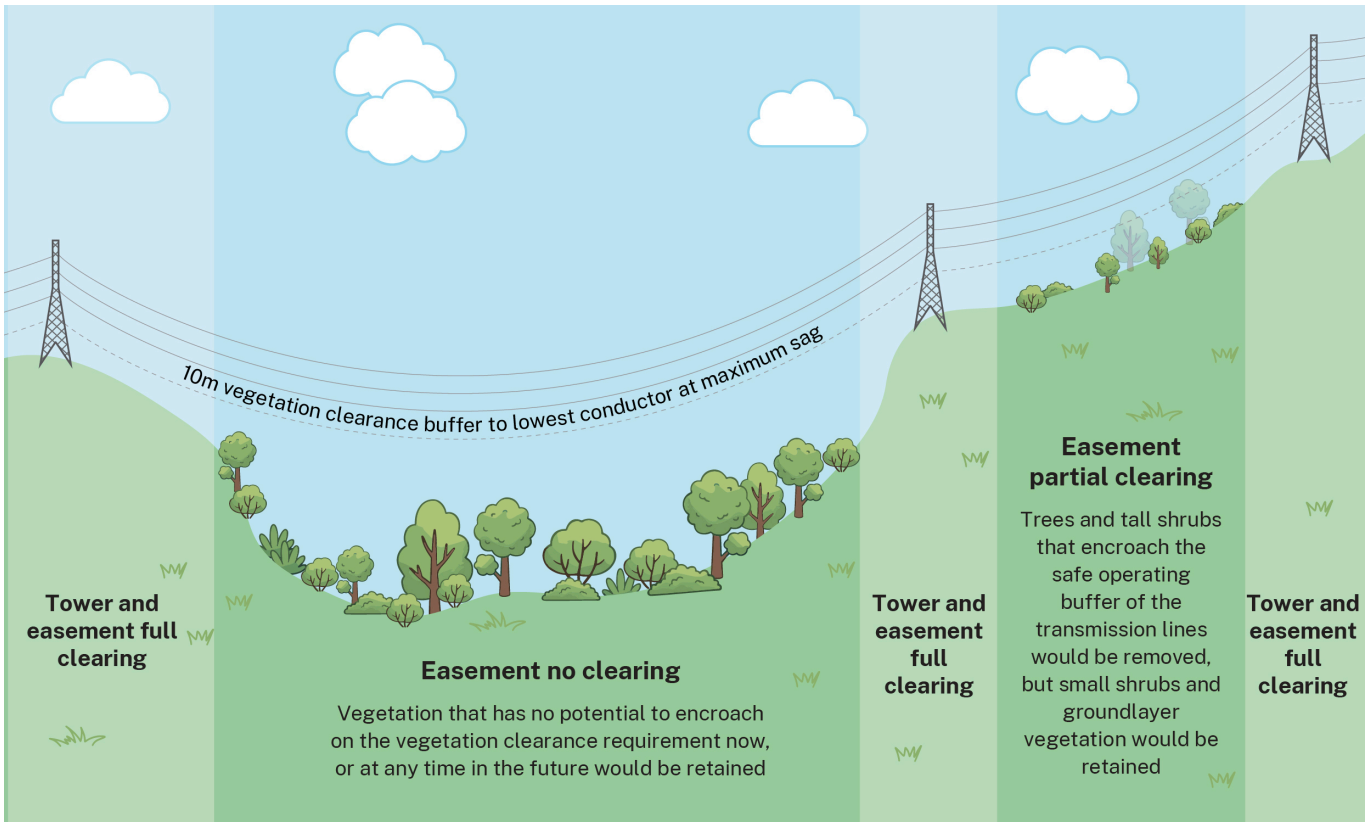


Figure 3.19. Conceptual diagram of no vegetation clearing zones

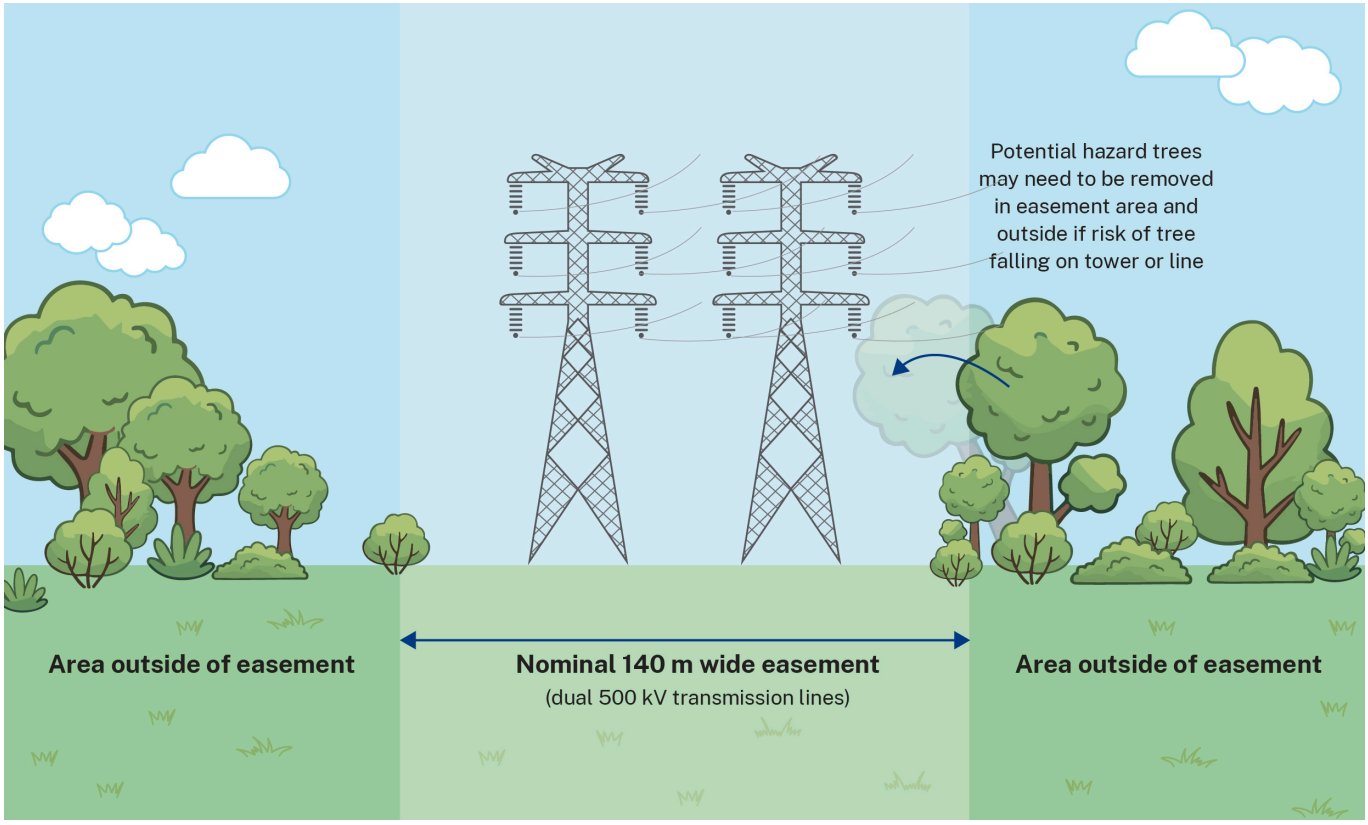


Figure 3.20. Conceptual cross sections diagram of vegetation clearing at tower sites and the requirement to remove hazard trees

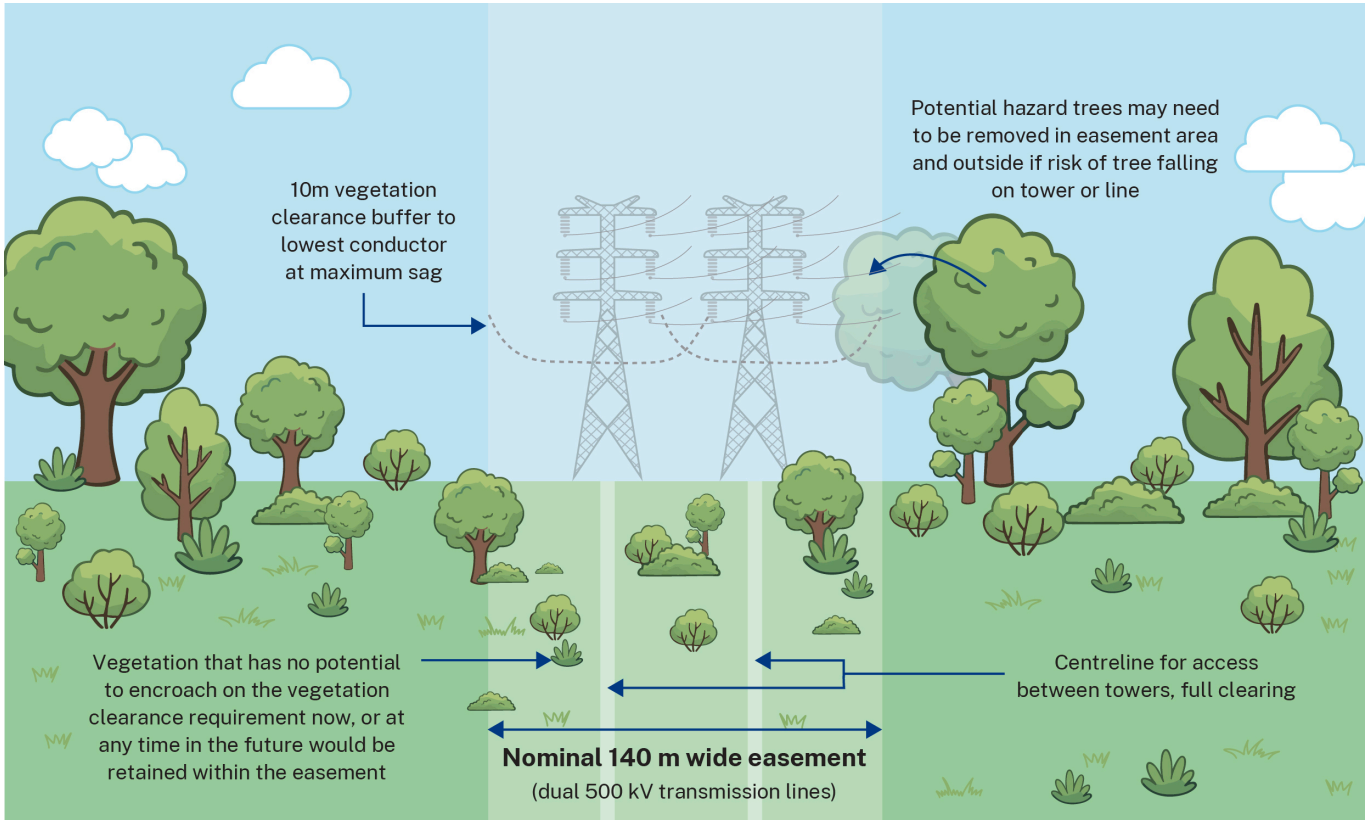


Figure 3.21. Conceptual cross sectional diagram of vegetation clearing – mid easement example

3.3.10 Transmission tower construction

3.3.10.1 Establishment of tower foundations

Transmission tower construction requires the establishment of a tower working area or a 'tower pad' and associated staging area at each tower location. These work areas provide safe access for personnel, storage of materials and operation of plant and equipment.

At each tower site, earthwork would be undertaken to form a level working area suitable for construction activities. This includes access for heavy plant such as piling and drilling rigs, cranes, concrete trucks and delivery vehicles. It has been assumed that an area around 70 metres by 70 metres around each transmission line tower (around 4,900 m^2) would be cleared of vegetation to enable construction to be undertaken. In some instances where terrain is more challenging, a 70 metres by 100 metres footprint may be required.

The tower pads would be site specific and optimised during detailed design. While the optimum approach would be a large flat site, given the project terrain, many sites would require terracing, with 2 or more flat benches to create safe useable areas to work from. Tower foundations would be constructed based on site-specific geotechnical conditions (to be assessed as relevant for each location to inform the construction approach) and the type of tower structure. Construction of foundations would involve excavation or drilling, placement of reinforcement and delivery and placement of concrete.

The construction of tower foundations may require multiple plant mobilisations and would be undertaken progressively along the alignment.

Where rock is encountered at or near the surface and cannot be excavated using conventional mechanical methods, controlled blasting may be required to facilitate foundation construction. The need for blasting would be determined during detailed design following geotechnical investigation.

Blasting, where required, would be undertaken in accordance with relevant standards and management plans, with appropriate controls implemented to manage potential impacts such as vibration, noise, air quality and fly rock. The extent and location of blasting would be minimised where practicable and would be subject to site-specific geotechnical assessment and a blast design to meet relevant blast criteria for any nearby sensitive receivers or structures.

3.3.10.2 Assembly and erection of towers

Tower construction involves the assembly and erection of the steel lattice tower above the completed foundations.

Steel tower components would be delivered to site using a range of vehicle types depending on access conditions. This may include helicopters in areas of challenging access. Components would typically be assembled into sections on the ground within the staging area, before being lifted into position using cranes or other lifting equipment.

Erection of the tower would occur progressively, with sections installed and fixed into place until the full structure is completed.

In areas of constrained or steep terrain, alternative construction approaches may be required, including the use of smaller plant or aerial support (for example helicopters) to assist with placement of tower components.

3.3.10.3 Stringing of transmission lines

Following completion of tower erection, conductor stringing would be undertaken to install transmission lines between the towers.

Installation of pilot lines would be undertaken within defined stringing sections using methods suited to the terrain and access conditions. This may include ground-based methods, such as pulling lines beneath tower arms by tractor (or similar), or aerial methods using helicopters or drones, particularly in areas of constrained access or where aerial installation would reduce environmental disturbance. These initial lines would then be progressively replaced with heavier pilot wires and conductors capable of supporting the final transmission loads.

Stringing sites would be located as required within the project area and used for the preparation, assembly and operation of stringing equipment to connect the transmission line to the towers. These sites require sufficient space for equipment, materials and safe operation, and would be located to optimise constructability while minimising stress on tower structures. To connect the transmission line, stringing sites may be positioned along the transmission corridor:

- where there are angles in the line over 30 degrees
- where there are large elevation changes
- where towers are either side of a major crossing such as a road, rail line or river
- at distances generally not exceeding 6 kilometres to 8 kilometres.

In some locations, including areas with changes in alignment or constrained access, stringing sites may be offset from the easement.

Stringing operations would involve the use of specialised equipment, including winches, tensioners and conductor drums, to pull and control conductors between towers. Equipment and materials would be delivered to site using a range of vehicles depending on access conditions.

Once conductors are installed, tensioning would be undertaken to achieve the required design profile. This would be followed by installation of fixtures and fittings such as insulators and associated hardware to secure the conductors in place. Stringing activities would then progress along the alignment.

In sections where the proposed transmission line is located near existing energised transmission infrastructure, additional safety and construction controls would be required to manage induced voltage and current. This may include the use of temporary earthing systems.

3.3.11 Energy hubs

Initial construction work at each hub site would include site establishment, erosion and sediment controls, clearing, demolition where required, and preparation of the site to form construction benches and working areas. This would be followed by bulk earthwork, including cut and fill operations to achieve required platform levels, as well as construction of internal access roads. The energy hub construction sites would also accommodate construction ancillary facilities required to support construction activities including construction laydown areas.

Where required, engineered fill and pavement materials would be imported and compacted to achieve suitable formation levels and support construction activities. Drainage infrastructure would be established to manage stormwater runoff across the site, as well as dedicated systems for transformer oil containment and separation. Stormwater management may include the use of existing farm dams (where appropriate) or purpose-built detention basins to manage flows and quality prior to release to surrounding waterways.

Excavation work would be undertaken for installation of underground services, including cable containment systems such as trenches and pits. Detailed excavation or piling work would also be undertaken for structural footings, along with installation of electrical earthing systems across the site.

Construction would then progress to civil, structural and electrical installation work, including foundations for electrical equipment, installation of plant and equipment, and associated infrastructure.

The layout of roads, drainage and infrastructure within each hub would be confirmed during detailed design, taking into account topography, drainage requirements and site-specific constraints.

3.3.12 Construction ancillary sites

Construction ancillary sites are locations established to support construction activities where personnel, plant, equipment and materials are concentrated for extended periods. Due to the nature and intensity of activities undertaken at these locations, ancillary sites have the potential to result in greater environmental and social impacts than routine construction activities and therefore require additional assessment, siting and mitigation. Ancillary sites are intended to include temporary construction work areas established as construction progresses, which are managed through the CEMP and associated management plans.

Construction ancillary sites typically comprise site offices and amenities, maintenance facilities, concrete batch plants, crushing, grinding and screening, helicopter landing pads and high volume laydown areas. The indicative laydown areas shown on Figure 3.2 have been strategically located where the public road network interfaces with the project area and permanent access tracks. These sites are intended to support the efficient receipt, storage and distribution of construction materials and equipment. In the southern portion of the project, the laydown areas function primarily as logistics and staging areas, while the hub sites in the northern portion of the project perform a similar role in supporting construction activities.

3.3.12.1 Crushing and grinding and screening plant

Materials processing sites would be established as temporary construction areas where materials may be stockpiled, processed and dispatched to support work along the alignment. These sites would be within the project area and may include activities crushing, grinding and screening to produce materials required for access tracks, tower pads and other construction infrastructure.

Materials would be delivered to these sites, processed as required, and then transported to tower sites, access tracks and other work areas.

The location and layout of these sites would be determined in accordance with the ancillary facilities location protocol as provided below in Section 3.3.12.2, which applies a risk-based approach to avoid or minimise impacts on sensitive receivers, environmental values and existing land uses.

These sites would be temporary in nature and would be rehabilitated following completion of construction activities.

3.3.12.2 Location assessment protocol

As required, additional construction ancillary sites may be located at suitable sites anywhere within the project area subject to the location assessment protocol developed for this project as described below. The location assessment protocol would apply a set of environmental, social and constructability criteria to guide site selection and minimise impacts, while maintaining flexibility for construction.

Key considerations which would be applied through this protocol include:

- avoidance of waterways and maintenance of appropriate setbacks based on stream order and waterway type
- separation distances from sensitive receivers, including dwellings, community facilities and specialised land uses
- where sensitive receivers are nearby, consider the noise assessment outcomes to confirm acceptability based on the specific work proposed
- management of potential impacts associated with noise, vibration, light spill and air quality through appropriate siting and mitigation measures
- use of existing access or locations that can be accessed without introducing additional impacts beyond those assessed in the EIS
- minimisation of vegetation clearing and consistency with the project clearing limits, with clearing contained within the project area.
- avoidance of environmentally sensitive areas, including threatened ecological communities, threatened species, heritage sites and other protected features
- consideration of land use and property impacts, including consultation with landholders and management of potential impacts to existing operations
- avoidance of flood prone land where practicable and consideration of flood immunity requirements
- provision of sufficient area to safely accommodate construction activities and materials handling.

The application of this protocol enables the identification of suitable ancillary site locations within the project area, while allowing refinement during detailed design. The final locations would be confirmed during detailed design and documented in the CEMP.

3.3.13 Resources and materials

3.3.13.1 Water requirements and supply

It is estimated that a total of around 2,400 megalitres of water would be required for the construction of the project. This includes approximately 360 megalitres of potable water that would be required for amenities at the construction ancillary sites and workforce accommodation camps, as well as for concrete batching activities. Non-potable water sources would be prioritised for the remaining 2040 megalitres of water demand for construction activities.

A summary of the required water volumes and estimated water demand for key construction activities is provided in Table 3.11.

Table 3.11. Construction water estimates

Construction activity	Water type	Total water demand (ML)
Workforce personnel	Potable	340
Concrete manufacture & supply	Potable	20
Water cart (such as for dust suppression, earthwork.)	Non-potable	1751
Biosecurity wash stations	Non-potable	17
Workforce accommodation camp general maintenance	Non-potable	272
Total		**2,400**

The project area is situated across multiple regulated and unregulated river and groundwater Water Sharing Plans (WSPs) across the Gwydir, Namoi, Macleay and Hunter catchments. Construction water demand would be sourced across these catchments, reducing reliance on any individual water resource. Potential water sources include harvested runoff (in accordance with applicable harvestable rights provisions under the WM Act), surface water and groundwater sources, water supplied under agreements with willing landholders using existing licensed entitlements, and potable water supplies from local councils, commercial suppliers and imported water, with sourcing determined based on availability, supply reliability, proximity to work areas and regulatory requirements.

To minimise pressure on regional water resources, the proposed water sourcing strategy prioritises harvestable rights water, rainwater from roofs of buildings, reuse of construction water and treated wastewater (subject to meeting applicable water quality criteria), entering into agreements with willing landholders to supply water using existing licensed allocations, extracting water from surface water sources, extraction of groundwater sources, followed by imported to site by water truck.

Potable water would be sourced through agreements with willing local councils and commercial water suppliers, subject to availability and supply capacity. To date, EnergyCo has engaged with councils, AGL and WaterNSW regarding potential potable and non-potable water supply options.

For land subject to acquisition by EnergyCo for the project (for example energy hubs, workforce accommodation camps and construction laydown areas), dams are proposed to be constructed as needed within the project area in accordance with the applicable harvestable rights provisions of the WM Act to capture non potable water for use during construction.

A combination of these water sources would be required to meet the total potable and non-potable water demand for the project. Further investigation into the feasibility of each of the water sources and preferred options would be undertaken during detailed design and construction planning, in consultation with commercial suppliers and local councils.

Under Schedule 4 of the Water Management (General) Regulation 2025, certain exemptions from water access licences apply to public authorities (such as EnergyCo), including taking water that occurs in connection with the construction of essential infrastructure (including electricity generation, transmission and distribution) (refer to clause 4 of Schedule 4). In this regard EnergyCo may take water for construction purposes from water sources across the project area in accordance with a protocol developed as part of the project Soil and Water Management Plan.

Water would be transported from water sources via tanker truck, or piped, and used immediately within the project area and/or stored in storage tanks within construction ancillary sites. Traffic volumes associated with the transport of water have been considered and form part of the traffic impact assessment provided in Section 14 and Technical Report 7.

Further information regarding water supply is provided in Section 18 and Technical Report 14 as well as Section 19 and Technical Report 16.

3.3.13.2 Plant and equipment

During construction the following plant and equipment (or similar) would be required:

- air compressors
- backhoes
- bulldozers
- buses
- boom lift
- cable tensioner/puller
- cable hauling winch
- cable drum stands
- chainsaws
- concrete batch plants
- concrete agitator
- concrete vibrator
- concrete pump
- cranes (various sizes)
- crushing plants
- drill and blast and associated support plant/equipment
- drones
- dump trucks
- elevated work platform
- excavators (various sizes)
- explosives for blasting
- flatbed trucks
- forklift
- fuel trucks
- generators
- graders
- helicopter and associated support plant/equipment
- knuckle boom elevated work platform
- mulcher
- piling rigs
- plate compactor
- pneumatic jackhammers
- rigid tippers
- rollers
- scrapers
- screening plants
- semi-trailers
- skid steer/positrack loaders
- telehandler
- tilt tray trucks
- transport trucks and trailers
- trench roller
- trenchers
- under boring equipment
- watercarts

3.3.13.3 Fuel and materials

The estimated quantity and indicative sources of the fuel and materials required to construct the project is provided in Table 3.12.

Table 3.12. Estimated quantities and source of fuel and materials used for construction

Construction materials required	Estimate quantities during construction	Potential source
Fuel (equipment and vehicles)		
Diesel	11.9 million litres	New England and Hunter regions
Petrol	680,000 litres	New England and Hunter regions
Materials – transmission towers & line		
Reinforcement	9,000 tonnes	Newcastle and Sydney
Concrete	76,000 cubic metres	Existing sources and onsite batch plants
Steelwork	79,000 tonnes	Overseas via Port of Newcastle
Conductors	42,500 tonnes	Overseas via Port of Newcastle
Quarry products	1,250,000 cubic metres	Hunter Region and New England
Timber	4,000 tonnes	Hunter Region and New England
Materials – Energy hubs		
Quarry products	39,000 cubic metres	Hunter Region and New England
Concrete	73,000 cubic metres	Hunter Region and New England
Steelwork	8,300 tonnes	Overseas via Port of Newcastle
Spray seal - bituminous materials	2,000 square metres	Newcastle
Ancillary infrastructure		
Quarry products	445,000 cubic metres	Hunter Region and New England
Concrete	850 cubic metres	Hunter Region and New England
Spray seal – bituminous materials	13,300 square metres	Newcastle

3.3.14 Testing and commissioning

The pre-commissioning process would commence in the final stages of construction. Pre-commissioning is required to ensure construction has been undertaken in accordance with the design and statutory requirements and that the constructed project elements are safe to operate.

Key activities undertaken during pre-commissioning include:

- testing and commissioning of the equipment at the energy hubs, maintenance facility and substations
- point to point testing of the connections of the transmission lines, energy hubs, maintenance facility and substations
- earthing testing
- high voltage testing
- high voltage equipment operational checks
- connection to the existing NSW transmission network
- protection, control, and metering system and communication system testing
- operational readiness and safety checks.

Following all testing, operational readiness checks and connection of the project, the commissioning of the project would commence. Commissioning is planned to start a year prior to the commencement of operation and would be a staged process. This would include:

- connecting the project to the existing NSW transmission network at the Bayswater substation
- commissioning of the energy hubs
- energisation of the transmission lines
- end to end testing of communication and control systems
- audible noise, thermographic imaging and EMF testing.

3.4 Operations and maintenance

During operation, the transmission lines and towers, energy hubs and connection points would be inspected by field staff and contractors on a regular basis and subject to maintenance activities. Other operational activities in the event of an emergency would also occur as required. These activities would be completed by the future network operator.

3.4.1 Transmission line maintenance

Regular maintenance activities would be required for the transmission line during operation. Maintenance activities would include:

- managing vegetation in and around the transmission line easement to maintain appropriate electrical safety clearances to the transmission lines

- regularly inspecting all network infrastructure (via ground and air), that would typically involve:
  - annual aerial inspection of the transmission lines, easements, vegetation and access tracks as part of seasonal bushfire prevention surveys
  - ground based light detection and ranging (LiDAR) and thermographic inspection of lines
  - vehicle-based patrol of access tracks and roads, and ground-based asset inspections including foundation inspections. This would typically involve 2 to 3 maintenance crews driving light vehicles along the easement (accessed from public roads and access tracks), inspecting each transmission line tower from the ground and by personnel climbing the tower
  - maintenance of transmission lines to address defects identified from inspections, using a light vehicle(s), an elevated work platform and a medium sized truck involving multiple maintenance crews to rectify any defects found from routine inspections
  - earth testing at each line structure.
- undertaking fault and emergency response (unplanned maintenance) should an unplanned outage occur (for example through a weather event or other failure of infrastructure). This would typically involve ad hoc fault and emergency fly over(s) to assess infrastructure condition and would occur as required. The number of maintenance personnel and/or crews required to repair any damaged infrastructure would depend on the extent of repairs required.

3.4.1.1 Vegetation management

Vegetation within the operational area and easements would be maintained to ensure ongoing electrical safety clearances to the transmission lines and to manage bushfire risk to the infrastructure. This would typically be a minimum cleared area of at least 10 metres from maximum conductor sag of the transmission line conductor to the vegetation and ongoing vegetation clearances within APZs.

Hazard trees would be managed following the process outlined for the construction phase (refer to Section 3.3.9). Any additional hazard/high risk trees identified during operational maintenance as posing a risk to the corridor would be removed in accordance with the assessed clearing budget.

3.4.2 Energy hub maintenance

Regular maintenance activities would be required at the energy hubs during operation. Maintenance activities would include:

- maintaining vegetation around the perimeter of the energy hubs (the APZ) to protect the hub infrastructure from bushfire
- regularly testing and servicing the electrical equipment and battery systems
- undertaking fault and emergency response (unplanned maintenance) should an unplanned outage occur fixing, replacing or upgrading components of the switching station to extend its life.

Maintenance activities would continue at the extended substation in line with the current maintenance program undertaken at the Bayswater substation.

3.4.3 Access for operation and maintenance

Access to the transmission line easement and related infrastructure during the operational phase would be facilitated through existing public and private roads, supplemented by the access tracks established during construction.

Continued use of both upgraded and newly created tracks would be necessary for ongoing asset maintenance. Most routine maintenance can be conducted using light vehicles within the easement; however, repairs and upgrades may require access for larger vehicles. Access track maintenance, including vegetation maintenance, would be conducted according to operational needs, supporting continued access within the transmission line easement and associated infrastructure. Vegetation management would include clearing of vegetation from tracks and trimming trees presenting a fall-in risk to ensure safe vehicle passage.

3.4.4 Operational workforce

The operational workforce is estimated to be up to 100 personnel consisting of both site and office-based jobs.

EnergyCo has estimated the operational workforce based on the current reference design and contemporary project examples. This estimate would be finalised as the detailed design process progresses.

3.5 Decommissioning and rehabilitation

Prior to the completion of construction, temporary areas used to support the construction of the project, such as construction ancillary sites (including workforce accommodation camps), laydown areas and stringing sites, would be decommissioned and rehabilitated as required. Pre-condition assessments of the sites of these temporary facilities would be undertaken to determine the existing condition of assets, infrastructure, utilities and the general condition of the land. This would inform requirements for rehabilitation within property management plans established with landholders.

Access tracks established for the project but not required for the operational phase would, in consultation with relevant landholders, either be retained for their continued use or be decommissioned and disturbed areas rehabilitated to the pre-existing land use or agreed condition.

Following construction, the life of the project is anticipated to be around 50 years and potentially beyond this with regular maintenance and upgrades. If required, decommissioning and rehabilitation would occur over a period of around 2 years. A detailed decommissioning and rehabilitation plan would be prepared prior to decommissioning of the project.

Statutory context



Section 4

4 Statutory context

This section outlines the relevant environmental and planning statutory requirements for the project. It identifies the statutory pathway under which planning approval for the project is being sought, who the approval authority is under both State and Commonwealth legislation, other environmental and planning approvals required, and those that are not required due to the project being CSSI. Mandatory matters for consideration are also discussed. Further detail on environmental and planning statutory matters and how they apply to the project is presented in Appendix D.

4.1 Approval pathway

The EP&A Act is the principal legislation regulating the environmental impact assessment and approval process for development in NSW. Section 5.13 of the EP&A Act provides for the declaration of CSSI which is infrastructure that is deemed to be essential to the State for economic, social or environmental reasons. The project was declared CSSI on 27 June 2024. The Minister for Planning and Public Spaces is the approval authority for the project under section 5.14 of the EP&A Act.

The project was determined to be a controlled action under the Commonwealth EPBC Act on 16 March 2026 and therefore requires approval from the Commonwealth Minister for the Environment and Water under the EPBC Act. In accordance with the NSW Assessment Bilateral Agreement between NSW and the Commonwealth governments, DPHI will undertake an assessment of impacts on Matters of National Environmental Significance under the EPBC Act on behalf of the Commonwealth as part of its detailed assessment of the project.

A summary of the overall environment and planning assessment and approval process for the project under State and Commonwealth requirements is shown on Figure 4.1.

4.2 CSSI declaration

The project is listed in Schedule 5, section 40 of *State Environmental Planning Policy (Planning Systems) 2021* (Planning Systems SEPP) and is therefore declared to be CSSI. The declaration identifies the components that make up the New England REZ transmission project. The components of the CSSI declaration that make up the project assessed in this EIS are identified in Table 4.1. Other components of the CSSI declaration may form part of future applications or a separate planning approval.

The CSSI declaration also includes certain ancillary development but excludes certain identified development. Development that is identified as being excluded is subject to its own planning assessment and approval requirements.

A detailed description of the project components assessed in this EIS is provided in Section 3.

Table 4.1. Project components included in the CSSI declaration

CSSI component	CSSI declaration	The project (this EIS)	Future applications*
Transmission lines	✓	✓	
Future additional transmission lines	✓		✓
Energy hubs	✓	✓	
Future additional energy hub	✓		✓
Generator connections	✓		✓
Existing electricity infrastructure	✓	✓	✓
Roads and tracks	✓	✓	✓
Communications infrastructure	✓	✓	✓
Temporary construction infrastructure, including accommodation, compounds, laydown areas, concrete batch plants	✓	✓	✓

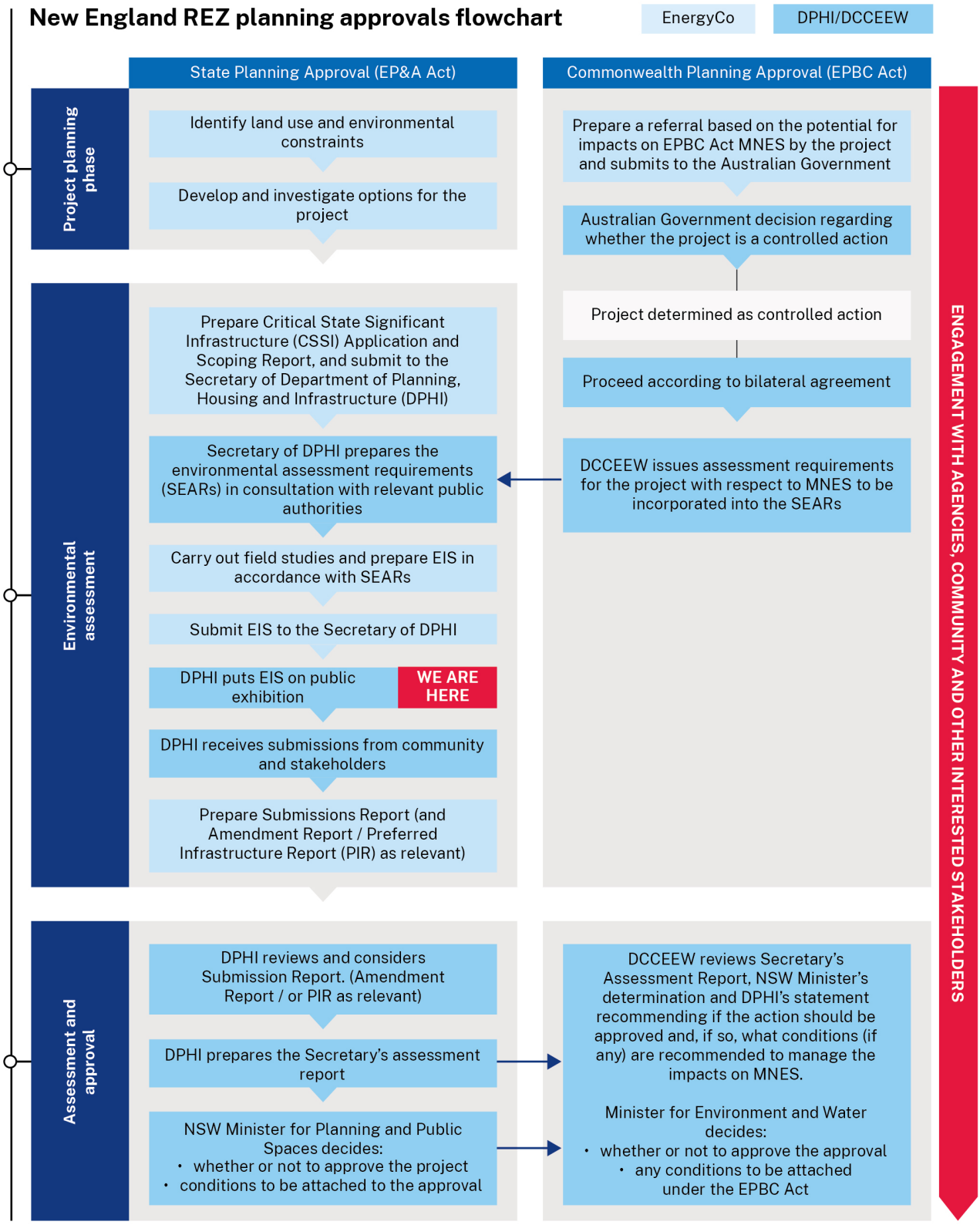
** Subject to separate planning approval under the provisions of the EP&A Act.*

Where a component is marked against both 'the project (this EIS)' and 'future applications', the current EIS assesses the parts of that component required for this project, while other component elements may be subject to separate future approval processes, that is the project has roads and tracks and future applications are also likely to have roads and tracks.

As noted in Section 1.4, Port to REZ road upgrades are subject to separate approval and do not form part of the CSSI declaration.

4.3 Statutory requirements

A summary of the key environmental and planning statutory requirements for the project is outlined in Table 4.2. Further information regarding statutory requirements and how they have been addressed is provided in Appendix D.



- DPHI: NSW Department of Planning, Housing and Infrastructure
- DCCEEW: Department of Climate Change, Energy, the Environment and Water

Figure 4.1. Assessment and approval process

Table 4.2. Summary of statutory requirements

Aspect	Relevant legislation	Requirements
Power to grant approval – NSW	EP&A Act	On 27 June 2024 the project was declared CSSI under section 5.13 of the EP&A Act by virtue of section 2.15 and Schedule 5, section 40 of the Planning Systems SEPP. As CSSI, the project is subject to the requirements of Part 5, Division 5.2 of the EP&A Act. In accordance with section 5.14 of the EP&A Act, the Minister for Planning and Public Spaces is the approval authority.
Power to grant approval – Commonwealth	EPBC Act	The project was determined to be a 'controlled action' under section 75 of the EPBC Act on 16 March 2026 due to the potential for impact on the following Matters of National Environmental Significance (MNES): • listed threatened species and communities (sections 18 and 18A of the EPBC Act). As a 'controlled action', the project requires approval from the Commonwealth Minister for the Environment and Water under section 130(1) and section 133(1) of the EPBC Act and will be assessed under the Bilateral Agreement between the Commonwealth and NSW governments.
Permissibility	*State Environmental Planning Policy (Transport and Infrastructure) 2021* (Transport and Infrastructure SEPP) Planning Systems SEPP EP&A Act	The Transport and Infrastructure SEPP sets out the permissibility of infrastructure development. Section 2.44 permits development for the purpose of electricity transmission or distribution network, to be carried out by or on behalf of an electricity supply authority or public authority without consent on any land, except in select circumstances where development is proposed on land reserved or acquired under the NPW Act. EnergyCo is a public authority as defined in section 1.4(1) of the EP&A Act as it is a statutory body constituted under the *Energy and Utilities Administration Act 1987*. The project area does not contain any land reserved or acquired under the NPW Act. Further, under section 2.15 of the Planning Systems SEPP the declaration of the project as CSSI has the effect that the project may be carried out without development consent under Part 4 of the EP&A Act. As development that is permissible without consent, and also development that is declared to be CSSI, the project is assessed and determined under Part 5, Division 5.2 of the EP&A Act. In accordance with Part 5, Division 5.2 of the EP&A Act, this EIS has been prepared for the CSSI application with the Minister for Planning and Public Spaces being the approval authority under section 5.14 of the EP&A Act.

Aspect	Relevant legislation	Requirements
Other approvals – legislation that must be applied consistently	EP&A Act *Roads Act 1993* (Roads Act) *Protection of the Environment Operations Act 1997* (POEO Act)	Section 5.24 of the EP&A Act identifies that certain approvals cannot be refused if necessary for carrying out approved SSI/CSSI and that any required approval is to be substantially consistent with the project approval. Approvals relevant to the project include: • under section 138 of the Roads Act, consent is required from the relevant roads authority for the erection of a structure, or the carrying out of work in, on or over a road, or the digging up or disturbance of the surface of a road, however, under clause 5(2) of Schedule 2 of the Roads Act, EnergyCo, as a public authority, is only required to obtain this consent in relation to classified (that is, State or regional) roads and Crown roads, and not local (that is, Council) roads. • depending on the construction methodology and materials volumes, certain construction activities may be classified as a scheduled activity triggering the requirement for an environment protection licence (EPL) under the POEO Act (for example crushing, grinding or separating works or helicopter-related activities). Further detail is provided in Appendix D.
Other approvals – approvals that are not required	EP&A Act	Under section 5.23(1) of the EP&A Act, certain approvals, which may otherwise be required, are not required for SSI/CSSI. The approvals that are relevant to the project that are not required are: • a permit under sections 201, 205 or 219 of the Fisheries Management Act 1994 (FM Act) • an approval under Part 4, or an excavation permit under section 139 of the *Heritage Act 1977* (Heritage Act) • an Aboriginal heritage impact permit (AHIP) under section 90 of the NPW Act • a bushfire safety authority under section 100B of the *Rural Fires Act 1997* • a water use approval under section 89, a water management work approval under section 90, or an activity approval (other than aquifer interference approvals) under section 91 of the *Water Management Act 2000.*
Other approvals – NSW	*Crown Land Management Act 2016* *Water Management Act 2000*	The project is likely to require several other approvals to meet NSW legislative requirements. The final approval requirements will be dependent on the final design, consultation and construction methodology outcomes which are not currently finalised. Potential approval requirements are identified below with details of how these have been considered for the project provided in Appendix D:

Aspect	Relevant legislation	Requirements
	National Parks and Wildlife Act 1974 *Biodiversity Conservation Act 2016* *Local Government Act 1993*	• establishment of easements on Crown land in accordance with the Crown Land Management Act 2016. Any dealings with Crown land will also need to address Native Title requirements and any pending Aboriginal land claims over the subject land. • a water access licence (WAL) to take water in accordance with the *Water Management Act 2000*, unless an exemption applies under Schedule 4 of the Water Management (General) Regulation 2025. Schedule 4 provides exemptions from the requirement to hold a WAL in certain circumstances, including for public authorities (such as EnergyCo), or persons acting on their behalf, taking water in connection with the construction of essential infrastructure (including electricity generation, transmission and distribution). • any relevant approvals under the NPW Act / BC Act for works in, or changes to wildlife refuges or biodiversity stewardship sites. The project impacts on an area subject to a wildlife refuge agreement at Lake Glenbawn. Under section 18 of the Biodiversity Conservation (Savings and Transitional) Regulation 2017, a reference to a wildlife refuge under section 68 of the NPW Act is to be read as a reference to land to which a wildlife refuge agreement under Division 4 of Part 5 of the BC Act applies. Section 5.32 of the BC Act provides that a public authority (such as EnergyCo) must not, without the consent of the Minister for the Environment and without having given notice to the landholder, carry out development within a wildlife refuge. • Access tracks for the project also intercept a biodiversity stewardship site (Gundy Mountain BSA, BS0268) which has been formally executed under the BC Act (the transmission corridor portion of the project area within the property is not within the executed BSA). As is the case with wildlife refuges, section 5.16 of the BC Act provides that a public authority must not, without the consent of the Minister for the Environment and without having given notice to the landholder, carry out development within a stewardship site. The Minister for the Environment may only provide consent in certain circumstances, including development that is for an essential public purpose or for a purpose of special significance to the State. As CSSI, the project has been identified as critical for the State of NSW. • approval from the relevant local council for the installation and operation of an on-site sewage management system (such as a septic tank or composting toilet) in accordance with section 68 of the *Local Government Act 1993*. Further consideration of NSW legislation that may trigger secondary approval requirements, or impose additional obligations (including consultation requirements) with respect to the project is provided in Appendix D.

Aspect	Relevant legislation	Requirements
Other approvals – Commonwealth	*Native Title Act 1993*	A small section of the project area related to public road upgrades intersects with an existing native title claim, being 'NC2011/006 – Gomeroi People'. As of 2 July 2026, this claim has not been determined. EnergyCo will address any relevant requirements relating to native title as the project progresses.
Pre-conditions to exercising the power to grant approval	Various	A summary of all relevant NSW statutory requirements for the project and where these have been addressed in the EIS is provided in Appendix D.
Mandatory matters for consideration	EP&A Act EPBC Act	Mandatory matters for consideration by the NSW Minister for Planning and Public Spaces in deciding whether to grant approval of the project include: this EIS, a future Submissions Report and potentially an Amendment Report (if required), the recommendations from the Planning Secretary's Environmental Assessment Report and any advice from the Minister for Energy and Climate Change (as the Minister with portfolio responsibility for EnergyCo). The Commonwealth Minister for the Environment and Water will consider DPHI's Environmental Assessment Report and determine whether to approve the action and if so, on what conditions. Section 5.22 of the EP&A Act provides that environmental planning instruments (EPIs), such as Local Environmental Plans (LEPs) and certain State Environmental Planning Policy (SEPPs), do not apply to CSSI projects. Notwithstanding, as a matter of good practice and for completeness in addressing environmental impacts, a summary of key EPIs and how the relevant objectives, criteria and assessment requirements in these EPIs have been addressed in the EIS is provided in Appendix D.

Stakeholder engagement



5

Section

5 Stakeholder engagement

This section outlines how EnergyCo has engaged with the community and stakeholders throughout the planning and design of the project. It described the activities that were completed, the feedback received, how that feedback has been incorporated into the design of the project and considered in the assessments undertaken as part of this EIS. It also describes how EnergyCo plans to engage during subsequent stages of the project.

As detailed in Section 2.6, stakeholder feedback has been a key consideration in the project development process and in response to the feedback received and the outcomes of technical and design investigations, EnergyCo has made several material changes to the project design.

The stakeholder engagement process is ongoing, with the objective of minimising impacts and maximising positive benefits of the project where feasible through the detailed design and implementation of the project.

5.1 Engagement approach

Stakeholder engagement and community participation is critical to the successful planning, development, construction and operation of the project. To achieve this, EnergyCo has undertaken a comprehensive engagement program with landholders, local councils, Aboriginal and Torres Strait Islander people and communities, community groups and other stakeholders to ensure that communities where the project is located have a say, are informed and are able to participate in the planning and development of the project.

Implementation of engagement started in June 2023 with the project's announcement and will continue over the life of the project.

The engagement undertaken by EnergyCo has been guided by the project's Community and Stakeholder Engagement Plan (CSEP). The CSEP is regularly reviewed and updated as needed to ensure the information included is up-to-date and the engagement approach is adjusted to suit any changes to the project and stakeholders. The CSEP identifies EnergyCo's commitments to:

- implementing a transparent, meaningful and inclusive approach to working with communities and stakeholders who are directly and indirectly affected by the project
- enabling stakeholder participation throughout the project development process in a manner that is clear and transparent and ensures stakeholders understand how their feedback will be used
- providing sufficient and timely information to enable communities and stakeholders to give informed feedback
- tailoring engagement and communications to consider different stakeholder needs and expectations.

EnergyCo's EIS engagement program was developed and undertaken to meet the suite of legislative and policy requirements for the project which include:

- The project SEARs.
- NSW Government's Regional Communities Consultation Guide (2025)
- Undertaking Engagement Guidelines for State Significant Projects (DPHI, 2026b)
- Quality Assurance Standard for Community and Stakeholder Engagement (International Association for Public Participation (IAP2), 2015)
- Clean Energy Council Community Engagement Guidelines for Building Powerlines for Renewable Energy Developments: A guide for proponents, landholders and communities (CEC, 2018a)
- Property Acquisition Standards (NSW Government, 2019)
- First Nations Guidelines: increasing income and employment opportunities from electricity infrastructure projects (NSW Office of Energy and Climate Change, 2022).
- Transmission Guideline (NSW Government, 2024a)
- Social Impact Assessment Guideline (DPHI, 2026d)
- Community Engagement Guidelines for Building Powerlines for Renewable Energy (Clean Energy Council, 2018b).

5.1.1 Engagement objectives

EnergyCo is committed to ongoing, open and inclusive engagement and objectives have been developed to ensure engagement activities achieve this.

The key engagement objectives for the project are to:

- provide clear, consistent and timely information to the community and stakeholders about the progress of the project and the broader New England REZ, including opportunities to provide feedback
- inform interested and affected communities and stakeholders about the project and its potential impacts
- ensure community and stakeholder feedback informs the project development process, including the EIS
- maximise engagement by using a wide range of communication tools and activities
- actively encourage community participation and make information easily accessible
- proactively communicate about community benefits and initiatives
- respond to enquiries, complaints and requests for information in a timely manner
- effectively manage expectations of the community and stakeholders in relation to project impacts, including cumulative impacts from the project and renewable generation projects
- promote the benefits the project will bring to local communities
- establish EnergyCo as the point of contact for the project and the REZ as a whole
- build community and stakeholder confidence in EnergyCo, the project and the REZ
- promote the project in the broader context of the NSW Electricity Infrastructure Roadmap (NSW Department of Planning and Environment, 2020).

5.2 Key stakeholders

As described in Section 5.1, EnergyCo has prepared and implemented a CSEP for the project to guide engagement with all relevant stakeholders with an interest in the project, and those directly and indirectly affected by it. Key stakeholder groups that have been engaged in relation to the project development and as part of the EIS are detailed in Table 5.1.

Table 5.1. Key stakeholders

Stakeholder group	Key stakeholders
Landholders and local communities	• Residents and landholders within the project area and those that were within the previously considered corridors for the project • Residents and landholders located in proximity to the project area • Wider communities that are hosting renewable energy infrastructure • Broader community members in the regions relevant to the project and the New England REZ • Community and stakeholder groups and organisations • New England REZ Community Reference Groups (CRGs).
Aboriginal and Torres Strait Islander stakeholders	• Local Aboriginal Land Councils (LALCs) – within the New England REZ and throughout the project area • Northern NSW Aboriginal Land Council (NSWALC) Regional Forum participants • Traditional Custodians throughout the project area • Gomeroi people Native Title Claimants • Government agencies representing Aboriginal and Torres Strait Islander people • Aboriginal and Torres Strait Islander organisations and groups • Aboriginal and Torres Strait Islander people in the area • Registered Aboriginal Parties (RAPs).
Special interest groups	**Landholder interest groups including:** • Batting 4 Boorolong • Dungowan Creek Alliance • Friends of Kentucky Action Group • Hills of Gold Preservation Inc. • Protect the Valley Upper Hunter / Upper Hunter Responsible Infrastructure Group (UHRIG) • Responsible Energy Development for New England (RED4NE) • Rouchel Brook Action Group • Salisbury Plains Action Group (SPAG) • Save our Scenery Bendemeer • Stop the Spin Hunter Valley

Stakeholder group	Key stakeholders
	• Valley Alliance • Voice for Walcha • Walcha High Country Guardians • Wallabadah Community Association. **Key stakeholder groups including:** • Centre for Policy Development • Community Power Agency • Denman Aberdeen Muswellbrook Scone Healthy Environment Group • Farmers for Climate Action (Walcha) • Hunter Thoroughbred Breeders Association • McCully's Gap Rehabilitation Sustainability Community Group • Minerals Council of Australia • Newcastle and Hunter Valley Speleological Society • New England Biodiversity Reference Group • New England Climate Action Group • New England Vision 2030 Institute • NSW Farmers Association • RE Alliance • Sustainable Living Armidale • Local Business Chambers/Chambers of Commerce and Industry • Regional Development Australia • Sustainable Living Armidale • Glen Innes Resources Advisory Committee • Z Net Uralla. **Community & Service Groups including:** • Apex • Country Women's Association branches • Inner Wheel • Landcare groups • Lions Clubs • Local environmental groups • Men's Sheds • Muswellbrook Toastmasters • Probus • Ratepayer and Community associations • Rotary Clubs • VIEW Clubs.

Stakeholder group	Key stakeholders
Elected representatives	• Federal Minister for Climate Change and Energy • Federal Minister for Environment and Water • Federal Member for New England • Federal Member for Hunter • NSW Minister for Climate Change, Energy, Environment and Heritage • NSW Member for Northern Tablelands • NSW Member for Tamworth • NSW Member for Upper Hunter.
Local government	• Armidale Regional Council • Uralla Shire Council • Tamworth Regional Council • Walcha Council • Liverpool Plains Shire Council • Upper Hunter Shire Council • Muswellbrook Shire Council • Singleton Council • Glenn Innes Severn Shire Council (not in project area) • Inverell Shire Council (not in project area) • Tenterfield Council (not in project area).
Commonwealth and NSW Government agencies	• Australian Government Department of Climate Change, Energy, the Environment and Water • Australian Government Department of Defence • NSW DPHI and its relevant divisions (including Planning and Crown Lands) • NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) and its relevant divisions and groups (including Biodiversity Conservation Trust (BCT), Conservation Programs, Heritage and Regulation Group (CPHR), Heritage NSW, Water Group, National Parks and Wildlife Service (NPWS) including Karst Management Advisory Committee, Environment Protection Authority (NSW EPA)) • Transport for NSW (TfNSW) • Water NSW • Department of Regional NSW • NSW Department of Primary Industries and Regional Development (DPIRD) and its relevant divisions (including Agriculture, Fisheries, Local Land Services (LLS), NSW Resources) • NSW Rural Fire Service (RFS) • NSW Fire and Rescue • Forestry Corporation of NSW (FCNSW)

Stakeholder group	Key stakeholders
	• NSW State Emergency Services (SES) • NSW Telco Authority • Subsidence Advisory NSW • Dam Safety NSW • Air Services Australia • Civil Aviation Safety Authority (CASA) • Australian Rail Track Corporation (ARTC).
Energy industry	• Australian Energy Market Operator (AEMO) • Consumer Trustee (AusEnergy Services) • Australian Energy Regulator • Australian Energy Market Commission • Australian Energy Infrastructure Commissioner • Energy Security Board • Australian Renewable Energy Agency • Australian Energy Council • Clean Energy Council • Energy Consumers Australia • Transgrid • AGL Macquarie • Santos • Next Economy.
Resources industry	• Exploration licence holders • Quarry operators.
Service providers	Employment and training • Electricity Infrastructure Jobs Advocate • Renewable Energy Sector Board • New England TAFE • University of New England • Training providers and associations.
Business and industry groups	• Business chambers • Hunter Regional Development Australia • Northern Inland Regional Development Australia.

Stakeholder group	Key stakeholders
Generators and service providers	• Developers of generation and storage projects • Transgrid (transmission network service provider) • Ausgrid (distribution network service provider) • Essential Energy (distribution network service provider) • Other existing utility, infrastructure and service providers in the region.
Project delivery partners	• Proponents for the network operator package and related industry and commercial stakeholders.
Media	• Local and regional media outlets, including ABC New England North West, Prime 7 New England, NBN News, The Land, Northern Daily Leader, ABC Upper Hunter, Armidale Express, New England Times, Muswellbrook Chronicle, Newcastle Herald.
General public	• Members of the public who may be impacted by or interested in the project.

5.3 Working groups and forums

5.3.1 Community reference groups

In December 2024, 2 CRGs were established for the project to represent communities related to the project area:

- North CRG: to represent communities within the New England REZ boundary.
- South CRG: to represent communities between the New England REZ boundary and the southern end of the project at Bayswater Power Station near Muswellbrook.

CRG meetings are scheduled to take place quarterly, with additional meetings held for project milestones, or at the request of members.

The CRGs provide an open forum for discussion between EnergyCo, the community and key stakeholders to provide project information and gather community feedback. The groups play a critical role to foster transparent and regular communication, enabling EnergyCo to work with the community to address challenges and maximise community benefits.

The objectives of the CRG are to:

- establish good working relationships and promote information-sharing between EnergyCo, local community representatives and key stakeholders
- provide CRG members with visibility of the project and enable them to share project information via their networks
- keep members informed about project activities, key milestones and opportunities to provide feedback
- provide an avenue for EnergyCo to seek community and stakeholder input on project matters
- allow community members to seek information from EnergyCo and provide feedback.

The CRG consists of:

- an Independent Chairperson who acts as the convenor, facilitator, mediator and advisor for the CRG. The Independent Chairperson acts independently and impartially and is the key point of contact between the CRG and EnergyCo
- community representatives who are current residents and/or landholders in the REZ
- representatives from local community or stakeholder groups.

In addition, representatives from local councils and LALCs (refer to Table 5.1) are invited to participate in the CRG. It is at these organisations' discretion if they nominate a representative to attend the CRG meetings.

There have been 18 CRG meetings held (as of August 2026), with future meetings to be held quarterly with dates and times agreed upon by group members.

5.3.2 Generator interface meetings

To coordinate the development and location of generation projects within the New England REZ and their potential to connect to the project in the future, EnergyCo has established and conducted ongoing interface meetings with representatives from relevant proposed renewable energy generation projects within the REZ.

5.4 Engagement undertaken to date

5.4.1 Overview

EnergyCo began engaging with communities and stakeholders on the New England REZ following the draft declaration exhibition period for the REZ which was held between October and November 2021. This initial engagement informed minor adjustments to the REZ geographical area in response to proponent and community feedback. The New England REZ was formally declared by the NSW Minister for Energy and Environment in December 2021.

EnergyCo commenced engagement regarding the project in June 2023 with the announcement of the project. Since this time, EnergyCo has carried out engagement with a broad range of stakeholders to inform various aspects of the project and broader New England REZ. A timeline of key community and stakeholder engagement undertaken for the project to date is provided on Figure 5.1.

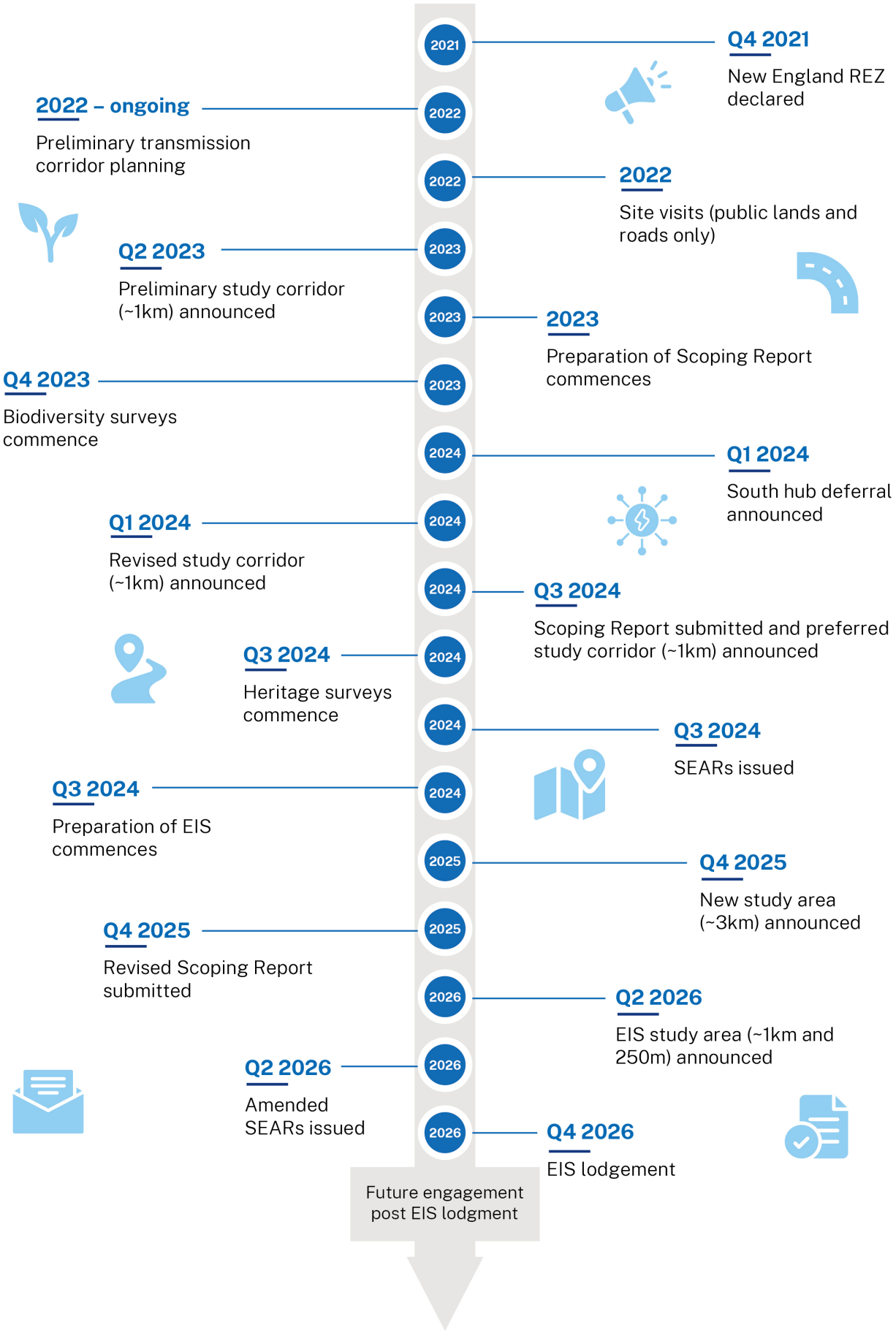


Figure 5.1. Timeframe of key New England REZ and project milestones and stakeholder engagement

5.4.2 Summary of engagement activities

A summary of the engagement activities completed to end of August 2026, including the mechanisms used to engage with stakeholders, is provided for each relevant project phase in the following sections.

5.4.2.1 Overarching New England REZ and project engagement

As the infrastructure planner, EnergyCo is responsible for planning and coordinating development within the New England REZ as well as carrying out the planning and design of the project. It is imperative that EnergyCo coordinates and undertakes extensive engagement with the local community and key stakeholders.

Table 5.2 provides a summary of the overarching engagement activities that EnergyCo is implementing to keep the community and stakeholders informed and seek their input and feedback on the New England REZ and the project (as of August 2026).

Table 5.2. Overarching and ongoing New England REZ and project engagement

Activity	Description
Project phone number and email address	A dedicated email address and phone number have been designated to receive and respond to enquiries and complaints from the community and interested stakeholders. These contact details are included on all communications (letters, e-newsletters, etc) and the project website. Phone: 1800 061 114 (9 am to 5 pm, Monday to Friday, with a voicemail function outside these hours) Email: nerez@energyco.nsw.gov.au
Project website	The EnergyCo project website (energyco.nsw.gov.au) provides information on the project background and need (including details about the New England REZ), how the community can get involved, community engagement that has been carried out and links to project documents (including project updates, frequently asked questions (FAQs) and fact sheets). The project webpage is updated regularly as new information becomes available.
Interactive map	EnergyCo hosts an interactive map at energyco.nsw.gov.au/ne-rez-map. The map is searchable by address and is a visual tool for property owners and community members to contextualise the project as it relates to their location. The interactive map also includes key features of the New England REZ such as proposed energy hub locations, the location of generator projects in the REZ, the existing high voltage network and property boundaries.
Engagement portal	This portal hosts all the information featured on the EnergyCo project website (including project background, current information and all project documents) but is a more interactive experience for interested community members to learn about the project. Community surveys and recorded webinars are also hosted on this platform.

Activity	Description
E-newsletters	Regular project updates and opportunities for engagement are distributed via the project's community email list which currently has more than 1,700 subscribers.
Landholder engagement	Ongoing direct engagement has been carried out with landholders to inform the development of the project, including technical and environmental surveys. Dedicated Place Manager and Property Manager roles are established for each directly affected landholder as central points of contact to facilitate information sharing, land access and property related engagement. Where requested by landholders, EnergyCo has facilitated face-to-face small group meetings held with directly affected landholders on localised concerns or issues relevant to the community in that area. The land acquisition process was initiated in March 2026 with opening letters issued for the energy hubs, workforce accommodation camps, and laydown areas. Opening letters for transmission easements and associated transmission infrastructure began in August 2026.
Stakeholder meetings and briefings	Regular briefings have been carried out with key stakeholders including local councils, elected representatives, agencies and interest groups to provide project updates and discuss topics of concern, including strategies to manage cumulative impacts and for the delivery of community benefits. EnergyCo holds regular briefings with key stakeholders including potential generator projects, local councils, government agencies and elected representatives. This includes engagement with NSW and Commonwealth agencies, which was undertaken throughout the preparation of technical assessments and the EIS, including discussions on assessment approaches, findings and outcomes and to receive feedback from agencies.
Community information sessions	At key project milestones and announcements EnergyCo has held community information sessions (CISs) within key regional areas near to the project area to provide information on the project and allow community members to meet the project team and ask questions. EnergyCo has held 48 information sessions (3 included a town hall session), attended by around 1,500 people. These have been effective in reaching a large number of local community and other stakeholders. Details of specific community information sessions held to date are provided in the following sections.
Stakeholder management database	Records of all stakeholder correspondence have been maintained in the project's stakeholder management database.

Activity	Description
Field work notifications	Sixteen notifications of field investigation work have been provided to landholders in the vicinity of where field work has been carried out between April 2024 and August 2026, including survey, geotechnical and environmental investigations to inform the EIS and design for the project. These are also published on the project website. These notifications are in addition to direct notifications and land access agreements/requests with individual landholders.
Project overviews and updates	• August 2022 – provided an overview of the New England REZ, EnergyCo roles and responsibilities and how community can engage with the project. • May 2023 – provided an overview of the New England REZ. • December 2023 – provided an overview of how the preliminary study corridor was chosen and provided an update on project status. • January 2024 – provided an update on the deferral of South hub and commencement of field investigations. • March 2024 – provided information on the revised study corridor, information on upcoming community information sessions and next steps. • July 2024 – provided information on the scoping report and the CSSI declaration, upcoming community information sessions, field investigations and the SIA. • October 2024 - provided an update on project progress and corridor refinement, including changes informed by community feedback and ongoing planning, investigations and engagement activities. • April 2025 – provided an overview of bushfire management, social impact assessment, transport, biodiversity assessments and community engagement. • October 2025 – update on the new study area (including information on why the change was required), upcoming community information sessions and an update on the energy hubs. • May 2026 – provided an update on the Port to REZ project.
Fact sheets and FAQs	Fact sheet and FAQ documents are released to the public to support engagement periods and where there may be interest in or confusion about a topic. In addition to being published on the website, these documents are distributed via e-newsletters and hardcopies are available at information sessions. As of August 2026, the following fact sheets and FAQ documents have been published: • Managing bushfire risk (July 2024) • Transporting energy equipment to the REZ (April 2025) • Aboriginal cultural heritage investigations – FAQ (May 2025) • Coordinating generation and storage in the REZ (August 2025) • Generation and storage consultation paper – FAQ (August 2025)

Activity	Description
	• How a renewable energy zone works (August 2025) • Electric and magnetic fields (October 2025) • Environmental assessments (October 2025) • Energy hubs (October 2025) • Field investigations (October 2025) • Moving to a new study area (October 2025) • Working with the community (October 2025) • Community information session summary (November 2025) • Planning approval process (December 2025) • Regional Major Infrastructure Studies fact sheet (December 2025) • Corridor refinement fact sheet for landholders (April 2026) • Anthrax management and biosecurity fact sheet (April 2026) • Managing impacts to koalas (April 2026) • Transporting energy equipment to the REZ – FAQ (April 2026) • Draft access scheme (July 2026) • Generator storage consultation (August 2026).
Reports	Reports on specific subjects are released to the public where there may be interest in or confusion about a topic. Reports are published on the website, and stakeholders are notified by phone call/email or e-news. Reports published as of August 2026 are: • Assessment of the Aberbaldie-Niangala travelling stock reserve route report (August 2024) • Bulk corridor design refinement report (November 2025) • Feedback report (collected during revised corridor engagement period) (April 2026) • Community needs and priorities survey report (August 2026).
Feedback forms	Feedback forms have been available in-person at the community information sessions, pop up events and other engagement periods as well as online for a month following the sessions for attendees to register their interest in receiving project updates and provide written feedback on the project.
Stalls at community events and local spaces	EnergyCo has regularly attended and staffed information stalls at community events and local spaces, such as local shows, markets, large regional events and shopping centres. Attendance at local events is published on the project website and included in e-newsletters. As of August 2026, EnergyCo has spent 57 days at 41 regional events or locations across the LGAs the project area intersects.

Activity	Description
REZ Mobile Office Program	In early 2026 EnergyCo assessed engagement levels at community events (such as community markets or local shows). The assessment found that attendance at some events resulted in low numbers of interactions with stakeholders. In response to this, EnergyCo adjusted its strategy to continue to attend community events where stakeholder interest was high but to focus on a new REZ Mobile Office (RMO) program. RMOs would consist of staff regularly spending a day in a local space (for example council offices, libraries) where community members can drop in at any time throughout the day and speak to staff. RMO dates and locations are published on the project website, included in e-newsletters and targeted updates. The RMO program began in June 2026, with 10 RMOs in June and August 2026. These RMOs were in Muswellbrook, Scone, Nundle, Armidale, Uralla and Walcha. The RMO program is expected to continue to the end of 2026, when a re-assessment of the effectiveness of this activity will determine if the program continues in 2027. Early feedback from RMO's show that while stakeholders aren't attending RMO's in large numbers, they are spending a considerable amount of time with staff while there, allowing for high-quality, in-depth engagement.
Social media	Provision of project information with social media users via EnergyCo's LinkedIn page, including advertising of community information sessions and other engagement events.
Webinars	Webinars are held to provide an opportunity for stakeholders to hear information from subject matter experts outside of attending information sessions. Webinars held so far include: • 25 November 2025 - during consultation on the new study area, providing an overview of key findings in EnergyCo's Bulk Corridor Design Refinement Report and how the community can continue to provide input as planning progresses • 10 June 2026 - property experts discussing the valuation, acquisition and the compensation process • 14 July 2026 – two webinars were held providing information on the Draft New England REZ Access Scheme Declaration. One webinar was tailored towards community, the other to industry • 3 August 2026 – information on the CEBP consultation period and how stakeholders can provide feedback. Future proposed topics include transmission infrastructure and the EIS. Webinar dates and registration details are published on the project website, included in e-newsletters and updates issued to landholders and stakeholders. They are also recorded and published on the engagement portal.

5.4.2.2 Preliminary study corridor

In June 2023, EnergyCo released a preliminary study corridor for the project for further investigation and engagement with landholders, communities and key stakeholders. At this time, EnergyCo began directly engaging with landholders in the preliminary study corridor to understand local sentiment for hosting transmission infrastructure and identify opportunities and constraints for the project.

Table 5.3 provides a summary of the engagement activities and mechanisms that were delivered as part of the engagement on the preliminary study corridor. Issues raised by stakeholders during these engagement activities can be found in Appendix E.

Table 5.3. Preliminary study corridor engagement

Activity	Description
Project update	A project update newsletter dated May 2023 was published on EnergyCo's website. The project update was used to provide background information on the New England REZ and the network infrastructure project, inform people on the preliminary study corridor and next steps, including information on key engagement periods.
Landholder engagement	Contact was attempted with landholders within the preliminary study corridor, initially via doorknocking, phone calls and letters. During engagement attempts were made to contact 204 landholders through: • 20 doorknocks • 510 phone calls • 30 direct mail letters. Once initial contact was made, Place Managers regularly contacted landholders via email, phone calls and meetings.
Stakeholder engagement	Councils, MPs, industry stakeholders, Aboriginal and Torres Strait Islander stakeholders, community groups and other key stakeholders were notified by their respective EnergyCo relationship manager.
Website update	Updated project information was uploaded to EnergyCo's website.
Community information sessions	Fourteen community information sessions were held across Armidale, Uralla, Walcha, Dungowan, Murrurundi, Scone, and Muswellbrook in June and July 2023. There were approximately 200 attendees across the 14 sessions.

5.4.2.3 Revised study corridor

In March 2024, EnergyCo released a revised study corridor for the project, which incorporated several changes in response to ongoing engagement and field investigations.

Table 5.4 provides a summary of the engagement activities and mechanisms that were delivered as part of the engagement on the revised study corridor. Issues raised by stakeholders during these engagement activities can be found in Appendix E.

Table 5.4. Revised study corridor engagement

Activity	Description
Project update	A project update newsletter was published on EnergyCo's website in March 2024. It was distributed via letterbox distribution to approximately 30,000 properties in the revised study corridor area. The project update was used to provide an update on the revised study corridor and next steps, including information on key engagement periods.
Landholder engagement	Contact was attempted with landholders within the revised study corridor, initially via doorknocking, phone calls and letters. During initial engagement, attempts were made to contact 200 landholders through doorknocks, phone calls, and direct mail letters. Once initial contact was made, Place Managers regularly contacted landholders via email, phone calls and meetings.
Stakeholder engagement	Councils, MPs, industry stakeholders, Aboriginal and Torres Strait Islander stakeholders, community groups and other key stakeholders were notified by their respective EnergyCo relationship manager.
Website update	Updated project information was uploaded to EnergyCo's website.
Animation	As result of feedback received from Woolomin community members, 2 animations were developed to help visualise what transmission lines would look like from Woolomin – shown with and without vegetation. The animations were published on the project website and the EnergyCo YouTube page.
E-newsletter	An e-newsletter was sent to about 1,200 registered community members and key stakeholders on 24 April 2024.
Community information sessions	In March 2024, 3 drop-in information sessions were held for community members to meet the project team and ask questions about the revised study corridor. These were attended by around 148 individuals. The sessions were held at local venues in Armidale, Tamworth and Muswellbrook. An additional session in Woolomin in May 2024 was held to share information on the revised study corridor with the broader community and was attended by35 people.

5.4.2.4 Preferred study corridor

In July 2024, EnergyCo submitted a scoping report (2024 Scoping Report) based on a preferred study corridor to DPHI to support a request for SEARs. The preferred study corridor was largely the same as the revised study corridor but with some minor amendments. Information sessions were held so people could learn more about the project, speak to the team and ask questions. Information session venues included Muswellbrook, Murrurundi, Tamworth, Woolomin, Uralla and Armidale.

Table 5.5 provides a summary of the engagement activities and mechanisms that were delivered as part of the 2024 Scoping Report release. Issues raised by stakeholders during these engagement activities can be found in Appendix E.

Table 5.5. 2024 Scoping Report release engagement

Activity	Description
Project update	In July 2024, a project update newsletter was published on EnergyCo's website and distributed via letterbox distribution to properties in the area. The project update was used to inform people about the release of the 2024 Scoping Report and invite them to attend EnergyCo's upcoming community information sessions in the region.
Landholder engagement	Landholders were directly informed of the scoping report lodgement through calls, emails and meetings.
Stakeholder engagement	Councils, MPs, industry stakeholders, Aboriginal and Torres Strait Islander stakeholders, community groups and other key stakeholders were notified by their respective EnergyCo relationship manager.
Website update	Updated project information was uploaded to EnergyCo's website.
E-newsletter	An e-newsletter was sent to about 1,150 registered community members and key stakeholders on 31 July 2024.
Community information sessions	Eight drop-in information sessions were held at local venues in Armidale, Tamworth, Walcha, Scone, Murrurundi, Woolomin, Uralla and Muswellbrook in August and September 2024 to align with the release of the scoping report. There were approximately 276 attendees across the sessions.

5.4.2.5 New study area

In October 2025, EnergyCo announced a new 3 kilometre-wide study area between Muswellbrook and the central south hub near Walcha. Following extensive engagement with the community on the revised study corridor (as detailed in Section 5.4.2.3) EnergyCo undertook further field investigations and design work on the project and identified a new study area to the east of the previous corridor which took into consideration the feedback provided. The new study area offered an improved design, providing better outcomes for bushfire management, as well as improved constructability outcomes due to flatter terrain. The new study corridor for the project (inclusive of the 3 kilometre-wide new study area) was detailed in the revised scoping report released in December 2025.

As part of this announced change EnergyCo provided the community the opportunity to review the new study area and make submissions during the engagement period as part of the Have Your Say process that ran between October 2025 to December 2025. This feedback provided valuable insight and input from the community to inform how the new study area was then refined to a 1 kilometre area. During this period, 481 submissions were received. The project area (as described and assessed in the EIS) was subsequently announced in April 2026 as an outcome of this engagement process.

Table 5.6 provides a summary of the engagement activities and mechanisms that were delivered as part of the engagement on the new study area and EIS project area. Issues raised by stakeholders during these engagement activities can be found in Appendix E.

Table 5.6. New study area engagement

Activity	Description
Landholder engagement	EnergyCo contacted landholders affected by the corridor update, including: • around 100 landholders who were in the new study area (3 kilometre-wide) • around 50 existing landholders who were still within the new study area, but the location of the corridor had moved within their property • around 40 existing landholders unimpacted by the change (north of the Central South Hub and from McCullys Gap to Bayswater Power Station) • around 10 re-engaged landholders • around 100 landholders who were no longer impacted by the project • around 300 individualised letters were issued to landholders. EnergyCo endeavoured to contact all impacted landholders prior to the new study area being publicly announced. Initial contact was made via phone call and email if contact details were available, or by doorknock in instances where direct contact could not be made through other methods (around 30 properties were doorknocked). Since the announcement, there have been around 150 landholder meetings held. Following initial contact, Place and Property Managers have maintained regular contact with landholders via email, phone calls and meetings.
Project update	A project update newsletter was published on EnergyCo's website in October 2025. It was distributed via letterbox distribution to around 48,500 properties in the new study area in October 2025. The project update provided information associated with the change in study area and the reasons behind the change, updates on the energy hubs, next steps and details of planned community information sessions. Copies were also made available at various locations in the region including local post offices and council chambers. The update was provided to landholders via email as part of an information pack with a tailored letter from 2 October 2025. Hard copies were posted to landholders where email addresses were not available.
Stakeholder engagement	Councils, MPs, industry stakeholders, CRGs, Aboriginal and Torres Strait Islander stakeholders, community groups and other key stakeholders were notified by their respective EnergyCo relationship manager. During this contact more detailed briefings were offered to these stakeholders, with 62 briefings being held in the weeks following the announcement.
Website and engagement portal updates	Updated project information was uploaded to the project website and engagement portal, and the interactive map was updated.
Animation	An animation was developed to help contextualise the new study area within the region, including size and scope of the update. The animation was published on the project website and engagement portal, provided to media outlets and promoted through an ad campaign on the NSW DCCEEW Facebook page.

Activity	Description
E-newsletter	An e-newsletter was sent to about 1,500 registered community members and key stakeholders on 2 October 2025. Additional information and reminders about the community information sessions were sent on 30 October, 4 November and 18 November 2025. Further information, including reminder emails about the engagement period and to notify of the extension, was sent on 18 November and 1 December 2025. Information on the update was also included in EnergyCo's Powering NSW e-newsletter on 23 October and 27 November 2025.
Community information sessions	Twelve information sessions were held for community members to meet the project team and ask questions related to the new study area. These were attended by around 845 individuals. The sessions were held at local venues in Walcha, Scone, Nundle, Gundy, Armidale, Tamworth, Timor, Uralla, Guyra and Muswellbrook. Members of EnergyCo's senior leadership presented at sessions in Gundy (5 November 2025) and Walcha (11 November 2025) to provide an update on the project, followed by an interactive Q&A session.
Online webinar	An online webinar was held on 25 November 2025 and attended by 65 people. The webinar discussed some of the key findings in EnergyCo's Bulk Corridor Design Refinement Report, including how firefighting constraints and construction challenges in the revised study corridor were assessed. The webinar also covered the next stage of the corridor refinement and how landholders and the community can continue to provide input as planning progresses.
Media release	A media release was distributed on 1 October 2025 to journalists from local and regional media outlets to announce the new study area and its benefits, engagement period, publicise the community information sessions and encourage the community to provide feedback.
Advertisements	Print, radio and digital advertising was carried out between 13 and 28 October 2025 via local and regional media outlets and included details of the corridor update, 'have your say' period and upcoming information sessions.
Revised scoping report	EnergyCo lodged a revised scoping report based on the new 3 km study area with DPHI in December 2025. The report considered the updated route for the 500 kV transmission corridor between Muswellbrook and Walcha, as well as changes to the energy hub arrangements announced in October 2025. Stakeholders were notified by an e-newsletter issued on 22 December 2025 to around 1,500 registered members.
Community feedback report	In April 2026 EnergyCo released a report responding to feedback received during the 'have your say' engagement on the new study area. This was uploaded to the website, an e-newsletter was issued (on 9 April 2026 to around 1,600 recipients) and respondents were issued a personal email to inform them of this release.

5.4.2.6 EIS corridor

The EIS corridor (which now forms the project area as described and assessed in the EIS) was announced in April 2026.

Table 5.7 provides a summary of the engagement activities and mechanisms that were delivered as part of the engagement on the new study area and EIS project area. Issues raised by stakeholders during these engagement activities can be found in Appendix E.

Table 5.7. EIS corridor engagement

Activity	Description
Landholder engagement	EnergyCo contacted landholders to provide the 250 m EIS corridor, including around: • 127 existing landholders who were within the 250 m EIS corridor • 157 landholders who remained in the 1 km corridor but were not within the 250 m EIS corridor • 42 landholders who were no longer impacted by the project. EnergyCo endeavoured to contact all impacted landholders prior to the 1 km corridor being publicly announced. Initial contact was made via phone call and email if contact details were available, with formal letters being issued after initial contact. A total of 206 individualised letters were issued to landholders.
Stakeholder engagement	Councils, MPs, industry stakeholders, CRGs, Aboriginal and Torres Strait Islander stakeholders, community groups and other key stakeholders were notified by their respective EnergyCo relationship manager.
E-newsletter	An e-newsletter was sent to about 1,600 registered community members and key stakeholders on 1 May 2026.
Media release	A media release was distributed on 1 May 2026 to local and regional media outlets to announce the 1 km corridor.
Website and engagement portal updates	Updated project information was uploaded to EnergyCo's website and engagement portal, and the interactive map was updated.

5.4.2.7 Social Impact Assessment engagement

EnergyCo's Social Impact Assessment (SIA) consultant Umwelt has completed specific engagement to inform the SIA, in addition to utilising engagement data from the project engagement including engagement carried out for the Regional Major Infrastructure Studies (described in Section 5.4.2.8). Initially this engagement commenced in June 2023 following announcement of the project and involved attendance at EnergyCo led community information sessions and engagement forums, with the information gathered used to inform the 2024 scoping report. Targeted SIA engagement was also undertaken in 2 rounds being:

- Round 1: February – March 2025 (on the revised study corridor)
- Round 2: February – April 2026 (on the new study area).

Two online surveys were also implemented to capture direct feedback and to track community response to project changes over time with the first online survey administered from April to July 2025 and the second from April to May 2026.

Table 5.8 provides a summary of the engagement activities and mechanisms that were delivered as part of the engagement on the SIA.

Table 5.8. SIA project engagement

Activity	Description
Interviews	Forty-six face to face, phone and online interviews were conducted across 2 rounds of engagement, round 1 being between February–March 2025 and round 2 February – April 2026 to invite further feedback about the project. The engagement included interviews with councils, community organisations, Aboriginal and Torres Strait Islander organisations and public services (emergency, health, education and training services).
Aboriginal and Torres Strait Islander meetings	In February 2026 targeted engagement was undertaken with Aboriginal and Torres Strait Islander organisations, individuals and groups to understand potential social impacts and opportunities relating to the project.
Online survey (2025)	In April 2025 landholders within the preferred study corridor were invited to provide feedback via an online SIA survey hosted on the project's engagement portal. The online survey invite was distributed to easement affected landholders, landholders neighbouring the project, and the broader community. A total of 532 responses to the 2025 online survey were received between April to July 2025. Further details on engagement for the SIA is provided in Section 10.
Online survey (2026)	In April 2026 landholders within the 3 km study area were invited to provide feedback via an online social impact assessment survey hosted on the project's portal. The online survey to invite feedback about the project was distributed to landholders that were since identified as being within the 250 m EIS corridor, landholders neighbouring the project, and was subsequently shared amongst the broader community. A total of 90 responses to the 2026 online survey were received between April–May 2026. Further details on engagement for the SIA is provided in Section 10.
Computer assisted telephone interview (CATI) survey (referred to as phone survey)	A CATI survey was implemented in March-April 2026 and was used to obtain a representative sample of the broader community's views on the project across the LGAs that the project intersects and particularly including residents in the localities likely to experience changes due to the proposed siting of project infrastructure. A total of 600 responses were received.

5.4.2.8 Regional major infrastructure studies

EnergyCo prepared a suite of Regional Major Infrastructure Studies covering workforce accommodation, training and skills, local supply chain, waste management and circular economy, and water and wastewater security. These studies provided a point-in-time analysis of potential impacts and opportunities associated with major renewable and non-renewable infrastructure projects in the New England region. Armidale Regional, Glen Innes Severn, Inverell Shire, Liverpool Plains Shire, Muswellbrook Shire, Tamworth Regional, Tenterfield Shire, Upper Hunter Shire, Uralla Shire and Walcha councils were given access to the draft studies in September 2025, ahead of their public release in December 2025, at which point the community was invited to provide feedback on the findings through a Regional Major Infrastructure Studies 'have your say' public survey.

The engagement carried out for the Regional Major Infrastructure Studies is documented in the EIS for completeness. However, as identified in Section 2.3.2, EnergyCo is working closely with agency delivery partners, councils and industry stakeholders as part of the regional coordination forums to identify practical solutions to regional impacts and opportunities.

Table 5.9 provides a summary of the engagement activities and mechanisms that were delivered as part of the engagement on the Regional Major Infrastructure Studies and survey.

Table 5.9. Regional Major Infrastructure Studies engagement

Activity	Description
Meetings and workshops	EnergyCo held 20 pre-development and planning meetings with councils, followed by 9 in-region half-day workshops attended by councils, and 2 Indigenous specific workshops. This engagement was complemented by ongoing information sharing, via formal requests for information, during study development to support and refine the empirical data sets used in the studies. Monthly interface meetings between EnergyCo and council staff continued throughout the development of the studies, providing a forum for discussion on various topics, including priority issues for REZ delivery. During development of the studies, EnergyCo also met with and interviewed a number of renewable energy proponents and industry stakeholders to gather information and refine the underlying data sets.
Community survey	Landholders were directly informed about the survey through calls and emails. Around 40 community groups were sent emails in December 2025 notifying them about the survey and requesting their input. A reminder email was sent to groups that hadn't completed the survey (around 22) in March 2026. Meetings were held with community groups and the CRGs during the engagement period which included reminders to complete the survey.
Website update	The studies, fact sheet and link to engagement portal were uploaded to EnergyCo's website.
New England REZ network infrastructure project engagement portal	The portal was launched in conjunction with the studies and survey to provide a more interactive experience. The portal included the studies, FAQs and the online survey, along with project contact information.

Activity	Description
E-newsletter	An e-newsletter was sent on 10 December 2025 to about 1,500 registered community members and key stakeholders informing them of the release of the studies and the survey. Reminders were included in e-newsletters sent on 22 December 2025 and 12 February 2026.
Community events	EnergyCo had information stalls at 2 community events during this engagement period, Armidale Show and Upper Hunter Show, where community members were encouraged to complete the survey. Around 84 individuals spoke to EnergyCo staff at these events.
Advertisements	The release of the studies and online survey were advertised during December 2025 and January 2026 in local and regional media.
Consultation summary report	A consultation summary report was published in August 2026, with stakeholders notified by e-newsletter.

5.4.2.8.1 Regional Major Infrastructure Studies survey

To coincide with the release of the Regional Major Infrastructure Studies, EnergyCo invited the community to share feedback through a survey on priority topics for New England REZ delivery. The findings from this survey will be used in conjunction with the EIS studies to help EnergyCo focus efforts where they are needed most and respond to challenges and opportunities as the REZ is developed. The survey was open from December 2025 to April 2026. In addition to the survey, SECNewgate was engaged to undertake a quantitative survey (online research panel and telephone interviews), asking participants the same questions as the open survey. A total of 399 responses were collected (217 online survey respondents, 182 through the quantitative survey).

Written submissions on the Regional Major Infrastructure Studies were also captured in the Community Survey Report.

Key survey findings included:

- nearly 90 per cent of participants said they live in the REZ
- around 75 per cent respondents who completed the online survey had read the studies.

The responses identified priority areas to the community for opportunities and initiatives. Key findings of are summarised in Table 5.10.

Table 5.10. Summary of Regional Major Infrastructure survey feedback

Topic	Key findings
Most critical local services in local communities	• Medical or crisis services, followed by homes to rent were the top priorities. • These were closely followed by Police and emergency services and homes to purchase.
Most important benefits to prioritise for local community	• Health services and road upgrades was considered the most important benefit.

Topic	Key findings
Housing and accommodation	• The availability of homes to rent was considered of the highest importance, closely followed by homes to buy.
Roads and transport	• The quality of major roads to hold construction traffic and large pieces of equipment was considered most critical of the options.
Managing water	• The 2 options provided (availability of water to users and more demand on drinking water (investing in water infrastructure)) were both high priority concerns, considered extremely important with 95-99 per cent of respondents considering each option extremely important.
Local suppliers	• Support for local businesses to access REZ opportunities was considered the most important of the options.
Waste management	• Finding markets for the reuse and recycling of items and regional waste disposal and recycling facilities were considered equally important.

5.4.2.9 Community and Employment Benefit Program

In May 2026, the Minister for Energy, Environment and Heritage announced an initial $60 million investment through the CEPB to deliver local infrastructure, services and employment opportunities as part of the New England REZ. On 24 July 2026 a consultation period to inform how the CEBP is designed and delivered began, including an online survey and community information sessions. This consultation remained open until 18 September 2026. A summary of the consultation undertaken and feedback provided will be released in late 2026.

Table 5.11 provides a summary of the engagement activities and mechanisms that were delivered as part of the engagement on the CEBP.

Table 5.11. Summary of CEBP engagement

Activity	Description
Stakeholder engagement	Councils, landholders, MPs, CRGs, Aboriginal and Torres Strait Islander stakeholders, community groups and other key stakeholders were notified by their respective EnergyCo relationship manager. EnergyCo provided briefings on the CEBP consultation period to Armidale, Tamworth, Walcha, Uralla, Muswellbrook, Upper Hunter, Glen Innes Severn and Inverell Councils, as well as the CRGs, community groups by request and Aboriginal and Torres Strait Islander stakeholders. EnergyCo also spoke with the community about the program at a number of community events including AgQuip, Tamworth Show and New England REZ mobile offices in Walcha, Uralla, Invergowie, Tamworth, Muswellbrook and Scone.
Website and engagement portal updates	Updated project information was uploaded to the project website and engagement portal.

Activity	Description
E-newsletter	An e-newsletter was sent to about 1,700 registered community members and key stakeholders on 24 July 2026. A reminder about community information sessions and the survey was sent on 17 August 2026, with another expected to be sent prior to consultation closing.
Community information sessions	Ten information sessions were held for community members to meet the project team, ask questions and provide their feedback on the CEBP design and delivery. Eight were held during August 2026, at Armidale, Walcha, Uralla and Tamworth, attended by around 70 individuals. Two information sessions were held on 8 September 2026 at Glen Innes and 9 September 2026 at Inverell.
Community survey	An online survey was developed to seek feedback on the design and delivery of the CEBP. EnergyCo provided in-person assistance to complete the survey at all community events held during the consultation period
Stakeholder workshops	Stakeholder workshops were held with the CRGs sand a number of Aboriginal and Torres Strait Islander stakeholders in August and September 2026 to provide a deeper discussion on local priorities.
Online webinar	An online webinar was held on 3 August 2026, discussing the CEBP, the purpose of the consultation and how stakeholders can contribute. A recording is available on the New England REZ project webpage.
Media release	A media release was distributed on 24 July 2026 to journalists from local and regional media outlets to announce the CEPB consultation period, publicise the community information sessions and encourage the community to provide feedback.
Advertisements	Print and digital advertisements were placed in a number of local newspapers to increase awareness of the consultation period. This included Uralla Wordsworth, Northern Daily Leader, Armidale Express, Apsley Advocate, New England Times, Glen Innes Examiner and Inverell Times.

5.4.3 Community engagement

As outlined in Section 5.4.2, EnergyCo has undertaken extensive engagement with landholders, local communities and key stakeholders to help inform the development and refinement of the project and to understand issues of importance to the community to be addressed in the EIS. Community and landholder sentiment has formed a critical part of the project development process to date and will continue as EnergyCo makes further refinements as part of the detailed design process.

In summary, community engagement activities have included:

- establishment of 2 CRGs (North and South) with 18 meetings held to date
- community information sessions to coincide with project updates – 48 held to date (including 3 town hall style sessions)
- information stalls at community events, including local shows, markets and large regional events
- provision of project information and updates via a range of channels including website, social media, newsletters and project overview documents
- media advertisements to promote community events or project updates
- one-on-one meetings with community groups
- project phone number and email address to facilitate inquiries to EnergyCo
- community feedback reports to summarise issues raised during engagement
- ongoing meetings with and provision of information to property owners directly affected by the project
- engagement to support the SIA including attendance by at select EnergyCo led community information sessions and forums, interviews, phone and online surveys.

Figure 5.2 provides an overview of community engagement activities that have been undertaken across the project area across all project phases from June 2023 to August 2026, illustrating the spatial distribution of community engagement.

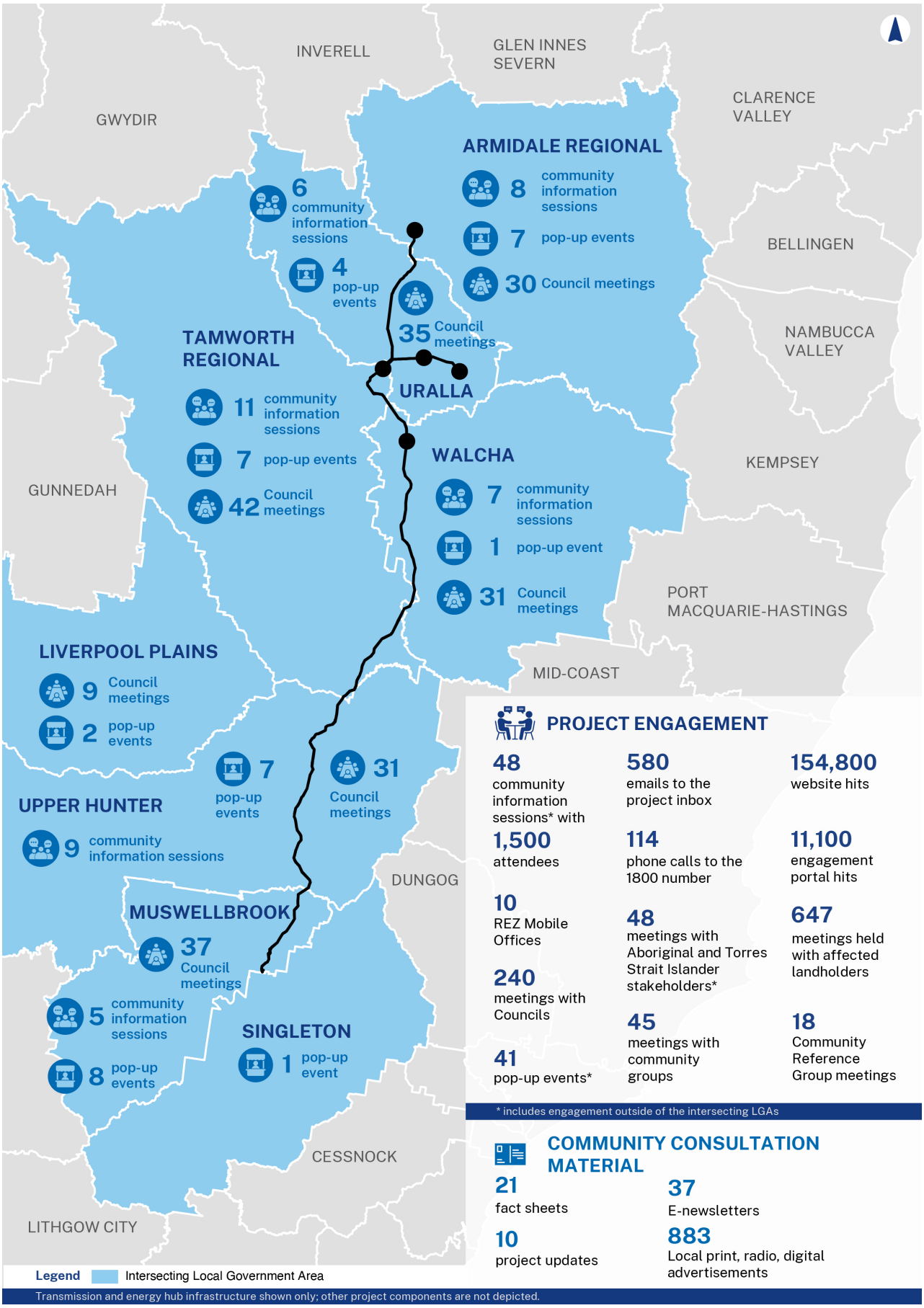


Figure 5.2. Summary of project engagement activities

5.4.3.1 Special interest groups

A range of special interest groups have been consulted with across the life of the project, including landholder interest groups, climate and biodiversity specific groups, and agricultural specific groups. The Social Impact Assessment provides further detail to the mechanisms of engagement with all key stakeholders, including semi-structured interviews for special interest groups, and online surveys, computer assisted telephone surveys, and community information sessions for landholders including those involved in landholder interest groups.

5.4.3.2 Mining and exploration stakeholders

Correspondence has been provided to impacted exploration licence holders regarding potential impacts to exploration activities, however, as of mid-August 2026 no responses have been received.

5.4.4 Agency engagement

EnergyCo has coordinated engagement with Australian government agencies and NSW State government agencies, centralised in a dedicated planning and environment team. Engagement with agencies has surrounded project updates, technical discussions, and assessment timeframes.

EnergyCo has engaged with 29 Australian Government and State Government agencies with around 125 agency meetings since mid-2024 until August 2026.

Some State government agencies focus on key areas such as DPHI, TfNSW, CPHR and Heritage NSW. These agencies have all participated in a regular series of meetings leading to the lodgement of the EIS. Notably, collaboration with CPHR has included a regular series of full day workshops to agree on approaches to biodiversity-based issues and inform the Biodiversity Development Assessment Report.

Other listed Australian government and State government agencies have had regular engagement with EnergyCo as appropriate, and a briefing on the 1 kilometre-wide corridor refinement in May 2026 was offered to all agencies, alongside written correspondence and project material.

5.4.5 Council engagement

EnergyCo has adopted a proactive and structured approach to engagement with councils across the New England REZ and project area, working closely in seeking to align project delivery with local priorities and community needs. Engagement has been coordinated through a dedicated council engagement team, ensuring a consistent and responsive interface with local government.

EnergyCo has entered into funding agreements with several councils to ensure they are appropriately resourced for the New England REZ development, allowing councils to more readily participate in the engagement and planning for REZ-related activities across their LGAs. These funding agreements also provide councils with opportunities to further develop projects and initiatives across their LGAs where they might intersect with REZ-related activities, for example engineering assessments, field surveys and third party subject matter expertise support.

Since mid-2023, there have been around 240 meetings with councils comprising regular interface meetings, workshops and formal briefings. A range of issues have been discussed at these forums, including project updates, cumulative impacts and legacy opportunities. These formal engagements are complemented by ad-hoc communications where required.

As outlined in Section 5.4.2.8 a series of Regional Major Infrastructure Studies were undertaken and subsequently publicly released in December 2025. Councils were engaged in the development of the studies, including the provision of data for assets and programs owned or operated by council, attendance at in-region face to face workshops, and coordination with other key stakeholders (for example Chambers of Commerce). EnergyCo also provided councils with briefings on the outcomes and key findings of the studies.

A Regional Steering Committee has also been established to strengthen and govern relationships between local and state government agencies, providing a forum to progress regional solutions to regional challenges as a result of the development of the New England REZ.

5.4.6 Aboriginal cultural heritage engagement

Aboriginal cultural heritage engagement recognises the right of Aboriginal peoples to participate directly in decisions affecting their cultural heritage. It is a critical process for identifying and assessing the significance of Aboriginal heritage values and for determining appropriate strategies to avoid or mitigate potential impacts. The purpose of engagement for the project was to ensure that Aboriginal knowledge informs both assessment and management outcomes.

Aboriginal cultural heritage engagement was undertaken with 99 RAPs in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010a) with a summary of the key engagement activities and outcomes provided in Section 8 and Technical Report 2.

Aboriginal cultural heritage engagement with the RAPs as part of the Aboriginal cultural heritage assessment commenced in November 2023. This included the notification process to identify relevant Aboriginal parties (via public notices and emails to LALCs in the project area and government agencies) and then distribution of invitations to all the identified Aboriginal Parties inviting them to register. The outcome of this process was the confirmation of the project's RAPs. The RAPs have been engaged with on an ongoing basis since 2023 including project design, methodology for the Aboriginal cultural heritage assessment, fieldwork planning and involvement, and cultural knowledge sharing to inform the project cultural values assessment.

Documented correspondence was supplemented by 2 rounds of face-to-face Aboriginal Focus Group meetings with RAPs across Armidale, Tamworth and Muswellbrook.

In October 2025, following announcement of the new study area further engagement with the RAPs was undertaken. This included re-running the notification process to identify any additional Registered Aboriginal Parties that would like to be registered on the project (particularly regarding the new areas covered by the study area). Since October 2025 engagement with the RAPs has included project updates, sharing the methodology for the Aboriginal cultural heritage assessment, fieldwork planning and involvement and cultural knowledge sharing to inform the project cultural values assessment. In June 2026, the draft Aboriginal Cultural Heritage Assessment was provided to all RAPs for review and comment with the input received being considered and addressed in the final Aboriginal Cultural Heritage Assessment as provided in Technical Report 2 in this EIS.

Aboriginal knowledge holder consultation was also undertaken for the Aboriginal cultural values mapping which informed the Cultural Values Assessment (CVA) for the project. This engagement was undertaken by anthropologist Dr Philip Clarke. The Aboriginal cultural values mapping aimed to identify and understand both tangible and intangible cultural heritage values associated with the project area and its surrounds. This involved a series of interviews and meetings with Aboriginal cultural knowledge holders. The Aboriginal cultural values mapping outcomes is provided as part of Technical Report 2.

5.4.7 How the feedback has been used

The feedback and suggestions received from the community and stakeholders have been considered in combination with engineering, environmental and social studies, to further refine the project and inform this EIS. Community and landholder feedback has formed a key role in the initial development and refinement of the project. Appendix E provides further details of the feedback provided by the community and government stakeholders and where this has been addressed in the EIS.

5.5 Key engagement outcomes

This section provides a summary of the feedback received and issues raised during community, government and other stakeholder engagement. Further information is provided in Appendix E.

5.5.1 Project sentiment

Overall, attitudes towards the project are highly divided. This was one of the key questions asked in the phone and online surveys that were undertaken as part of the SIA (refer to Section 5.4.2.7). Survey findings showing the overall community attitude to the project are illustrated on Figure 5.3 and indicate that while a reasonable proportion of respondents are supportive of, or can tolerate the project, more respondents express strong opposition. Acceptance appears to be location based rather than demographic, with higher levels of support evident in larger regional centres (particularly Armidale) and markedly lower acceptance in smaller rural communities, most notably Walcha.

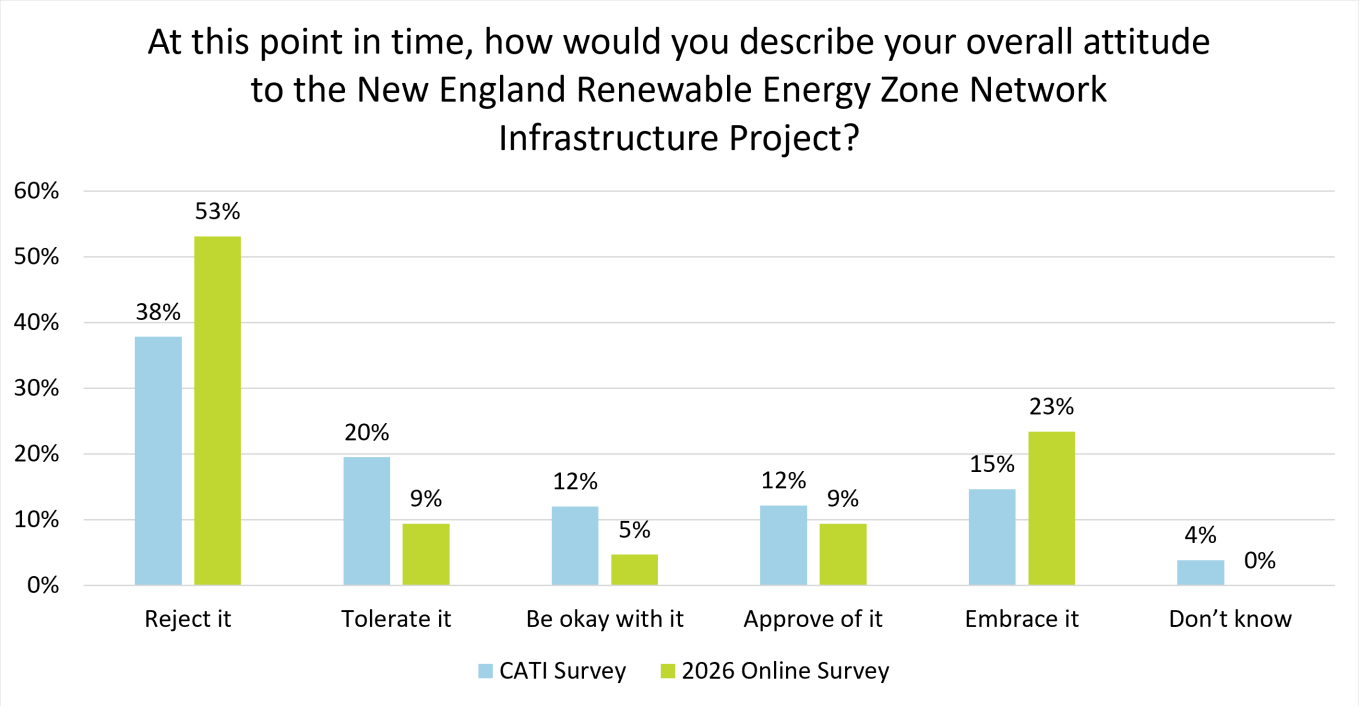


Figure 5.3. Community attitudes to the project – comparison of survey results

5.5.2 Community key issues

The key issues raised by the community regarding the project including issues raised by easement affected landholders, proximal landholders and broader community stakeholders (including community and special interest groups) are summarised in Table 5.12. A list of issues raised by stakeholders is provided in Appendix E.

Table 5.12. Key issues raised by the community

Category	Issue summary	How the issue has been addressed	Section addressed
Project design and alternatives	Inability to influence the project in a meaningful way due to concerns the project is progressing too quickly.	Ongoing stakeholder engagement has been undertaken throughout project development, including targeted engagement with affected landholders, community groups and stakeholders to provide opportunities for ongoing input, with feedback documented and considered alongside technical studies and to inform design refinement. Stakeholder feedback has resulted in a number of changes to the project design.	Section 2 (Strategic context) Appendix B Route Options and Avoidance Paper Section 5 (Stakeholder engagement) Appendix E Engagement Outcomes
Project design and alternatives	Concerns about project planning approach including comments that the design appears entirely desktop. Concerns about the design not being supported by meaningful on-ground assessment and engagement. The need for certainty on project design to allow landholders to plan appropriately.	Project planning and design have been informed by a combination of field investigations, technical assessments and ongoing engagement with landholders and stakeholders. Feedback on feasibility, constraints and local conditions has informed corridor refinement and the identification of the EIS project area. EnergyCo has communicated design updates and next steps through project updates, community information sessions and direct landholder engagement to support understanding of project progression and timing.	Section 2 (Strategic context) Appendix B Route Options and Avoidance Paper

Category	Issue summary	How the issue has been addressed	Section addressed
Project design and alternatives	Concerns about the lack of transparency of the route selection process including: • the transparency of route assessment criteria to determine the corridor • transparency regarding other route options considered. Community group proposed preferred routes including: • Aberbaldie-Niangala travelling stock reserve route • co-locating with existing transmission lines • Western 330 kV route option • New England Highway • objection to transmission lines near Walcha.	Detailed multi-disciplinary assessments (engineering, environmental and social) have been undertaken to inform route selection. Community and easement affected landholder feedback, including suggested alternatives, has been considered and incorporated where feasible into corridor refinement. EnergyCo has summarised this work in the Route options and avoidance paper which is included as Appendix B to the EIS.	Section 2 (Strategic context) Appendix B Route Options and Avoidance Paper Appendix E Engagement outcomes
Project design and alternatives	Constraints affecting the revised corridor making it unsuitable, including: • weather conditions • terrain and elevation • access tracks and local roads • geology and ground conditions.	Engineering, environmental and constructability assessments have been undertaken to understand constraints associated with terrain, geology, access and weather conditions. These constraints have been considered in the route selection process and informed iterative design refinement, including the transition from the revised study corridor to the EIS project area. Mitigation measures and construction planning controls have been identified to manage residual constraints.	Section 2 (Strategic context) Appendix B Route Options and Avoidance Paper

Category	Issue summary	How the issue has been addressed	Section addressed
Project design and alternatives	Inability to influence route selection and design.	Community and landholder feedback has been actively sought and considered throughout the project design process. This feedback has informed corridor refinement and design changes where feasible. Ongoing engagement provides further opportunities for input during detailed design.	Section 2 (Strategic context) Appendix B Route Options and Avoidance Paper
Project design and alternatives	Justification of hub locations (that is, Central South Hub).	The location of energy hubs has been informed by multi-disciplinary technical assessments (including network requirements, environmental constraints and constructability) and stakeholder feedback. Requirements for energy hubs, such as Central South Hub, and changes to hub arrangements have been made and communicated through project updates and engagement activities. This has included the relocation of the North Hub and associated adjustment to the connecting transmission corridor which has resulted in reduced impact to farms and private property and well as areas of environmental and heritage significance, and co-location with a generator development (proposed wind farm).	Section 2 (Strategic context) Appendix B Route Options and Avoidance Paper

Category	Issue summary	How the issue has been addressed	Section addressed
Project design and alternatives	Undergrounding vs overhead lines. Use of existing transmission infrastructure.	As part of the project design options process, EnergyCo considered installing the transmission lines underground. This identified that there are a number of constraints to underground transmission lines. Further to this a Select Committee was established by the NSW Government on 13 September 2023 to inquire into and report on the feasibility of undergrounding the transmission infrastructure for renewable energy projects. The report, released in March 2024 found that available evidence generally supports that undergrounding electricity infrastructure is more costly, and that there are concerns from some stakeholders that the cost of undergrounding electricity transmission projects will negatively impact the price of electricity to consumers through flow on effects (NSW Parliament, 2024). Upgrades to the existing 330 kV transmission lines was excluded as an option due to a number of constraints, including high construction impacts, power outages and increased impacts to regional centres along the existing route.	Section 2 (Strategic context)

Category	Issue summary	How the issue has been addressed	Section addressed
Project justification	The cost of the project including: • cost and impact of revising the corridor • cost of changing the route.	Project changes, including corridor refinement, have been informed by a balanced consideration of community feedback, technical constraints and constructability, including consideration of costs. EnergyCo meets its statutory reporting obligations by publishing relevant financial and project information, including REZ cost data, in its Annual Reports. These reports are publicly available and provide transparent detail on project expenditure, delivery progress and associated costs.	Section 2: Strategic context Section 26: Project justification and conclusion
Engagement	Dissatisfaction with community engagement approach, information transparency and responsiveness including: • ongoing requests for EnergyCo CEO or Ministers to attend meetings • community information session location choice and style (that is, feedback that some community members prefer town hall style forums) • lack of circulation of print media, particularly in areas with limited internet and TV reception. Conversely also concerns associated with print media due to cost and efficiency • time taken to receive a response from EnergyCo/periods of time with no contact from EnergyCo • concerns about the quality of information presented on project maps.	Implementation of EnergyCo's CSEP and engagement program as identified above, including a broad range of engagement mechanisms and approaches. The approach to engagement has evolved in response to stakeholder feedback with differing mechanisms used over time to seek to improve engagement effectiveness and meet community preferences, where practicable.	Section 5 (Stakeholder Engagement)

Category	Issue summary	How the issue has been addressed	Section addressed
Engagement	Consultation fatigue due to concurrent developments, as well as ongoing EnergyCo engagement.	Engagement activities have been refined over time to respond to stakeholder feedback, including diversification of engagement formats (for example REZ mobile offices, webinars, targeted briefings) and improved coordination of messaging. Efforts have been made to streamline engagement and provide clear, timely information to reduce duplication and fatigue.	Section 5 (Stakeholder engagement)
Economic, environmental and social impacts	Concerns about traffic and transport impacts including: • increased traffic movements resulting in congestion on local and regional roads • damage to local road infrastructure • existing poor road conditions exacerbated by additional construction traffic, leading to further deterioration • overall safety of local road networks for humans and livestock movement • suitability of local roads for heavy vehicle movements, including narrow and winding roads.	Detailed assessment of traffic and transport impacts undertaken to identify impacts and appropriate mitigation measures. Road upgrades proposed for key intersection and localised sections of roads to improve road conditions and make them suitable for use as part of the project. These upgrades would also benefit other road users. Mitigation measures will be implemented to minimise traffic impacts (including traffic management plans, heavy vehicle routes, road maintenance and construction traffic management controls).	Section 14 (Traffic and transport) Technical Report 7– Traffic and Transport Assessment

Category	Issue summary	How the issue has been addressed	Section addressed
Economic, environmental and social impacts	Concerns about property value being impacted by the project including inability to sell. Concerns about loss of income due to impacts on agricultural use including loss of private airstrips. Potential loss of income due to conflicts of the project with generator project placement (that is, wind turbines).	Implementation of land acquisition and compensation frameworks, including the Just Terms Act and Strategic Benefit Payments Scheme. Plain language materials have been provided to explain entitlements and processes to affected landholders. Provided access to the Property Acquisition Support Line for easement affected landholders and other impacted parties.	Section 12 (Land use and property) Section 10 (Social) Section 17.2 (Aviation) Technical Report 4– Social Impact Assessment
Economic, environmental and social impacts	Concerns about the compensation process: • inadequacy of compensation payment • compensation process is too complicated • no payments for nearby landholders • desire to see compensation for time spent discussing the project with EnergyCo • need for transparency associated with Strategic Benefit Payment Scheme • acquisition timeline and compulsory acquisition.	Implementation of land acquisition and compensation frameworks, including the Just Terms Act and Strategic Benefit Payments Scheme. Plain language materials have been provided to explain entitlements and processes to affected landholders. Provided access to the Property Acquisition Support Line for easement affected landholders and other impacted parties.	Section 12 (Land use and property) Section 10 (Social) Technical Report 4– Social Impact Assessment

Category	Issue summary	How the issue has been addressed	Section addressed
Economic, environmental and social impacts	Biodiversity - Impacts on local ecosystems, biodiversity values and threatened species including: • impacts on wedgetail eagle, bell's turtle, koalas, platypus, white-bellied sea eagle, regent honey eaters • clearing of native vegetation • impacts on aquatic ecology and biodiversity • interest in hosting biodiversity offsets.	Detailed assessment of biodiversity undertaken to avoid and minimise impacts where practicable. Project design to minimise biodiversity impacts. Mitigation measures will be implemented during construction (including final siting of the transmission line infrastructure and work sites, preclearing surveys, retention of habitat features and establishment of biodiversity exclusion zones), supported by biodiversity offsetting of residual impacts in accordance with the Biodiversity Offset Scheme.	Section 7 (Biodiversity) Technical Report 1 – Biodiversity development assessment report Section 2 (Strategic context) Appendix B Route Options and Avoidance Paper
Economic, environmental and social impacts	Concerns about bushfire risk including: • increase bushfire risk associated with project infrastructure • inability to adequately fight fires and respond to emergency situations • concern about impacts on aerial fire fighting including water take from dams • infrastructure contributing to increased risk of fires starting • presence of project infrastructure making bushfires more dangerous and complex • need for ongoing collaboration with emergency services (including RFS) and landholders.	Detailed assessments of bushfire risks have been undertaken both as part of the options assessments and as part of project design to avoid and minimise impacts. Engagement with relevant bushfire related stakeholders including RFS and aerial fire fighting contractors. This resulted in material changes being made to the alignment including the changes made from the preferred study corridor to the EIS study area (refer to Section 5.4.2.5). Adjusted project design to ensure access to Chaffey Dam and Lake Glenbawn for firefighting purposes is maintained. The bushfire assessment has identified mitigation measures that will be implemented as part of the project.	Section 2 (Strategic context) Appendix B Route Options and Avoidance Paper Section 17.2 (Aviation) Section 17.3 (Bushfire) Technical Report 12 – Bushfire impact assessment Technical Report 11 – Aviation impact assessment

Category	Issue summary	How the issue has been addressed	Section addressed
Economic, environmental and social impacts	Visual impacts – Changes to the existing rural amenity and local landscape including from residences.	Design of the project to maximise distances between residences and project infrastructure, including avoidance of towns, villages and areas with more numerous residences. Use of topography for screening. Detailed assessment of landscape and visual amenity impacts including photomontages from both residences and public viewing locations. Mitigation measures will be implemented to further reduce impacts (including final siting of transmission infrastructure and retention and enhancement of vegetation screening).	Section 11 (Landscape character and visual) Technical Report 5 - Landscape character and visual impact assessment
Economic, environmental and social impacts	Concerns about impacts on water including: • impacts on ground and surface water supply associated with construction of the project and the workforce accommodation camps • changes in water flows due to impacts to waterways and the natural lay of the land associated with road and easement development • impacts to water quality.	Detailed assessment of potential ground and surface water impacts have been completed for the project as part of the EIS. This has included an assessment of the water requirements for the project with consideration of available water supplies and the regulatory framework applying across the relevant Water Sharing Plans. Mitigation measures will be implemented through design and construction management to avoid and minimise changes to water flows.	Section 18 (surface water) Technical Report 14 – surface water Section 19 (Groundwater) Technical Report 16 – Ground water

Category	Issue summary	How the issue has been addressed	Section addressed
Economic, environmental and social impacts	Impacts on accommodation providers due to increased demand and limited availability.	Project design includes provision of workforce accommodation camps and measures to reduce demand on local services. Regional major infrastructure studies undertaken to understand accommodation challenges in the area. An SIA has been undertaken assess potential impacts on local services and accommodation and identify appropriate mitigation measures.	Section 10 (Social) Technical Report 4 – Social Impact Assessment
Economic, environmental and social impacts	Impacts on local emergency and health services due to increased demand and existing limited capacity.	The project would include dedicated health practitioners at each of the workforce accommodation camps, to reduce the increase demand on existing services. Potential impacts on emergency and health services have been assessed as part of the SIA.	Section 10 (Social) Technical Report 4 – Social Impact Assessment
Economic, environmental and social impacts	Concerns about impacts on private agriculture agricultural operations including: • loss of income due to disruptions • impacts on livestock movement • impacts on aerial spraying • biosecurity risks, including the ability to meet biosecurity and quality assurance program requirements	EnergyCo's route selection process sought to identify and avoid various existing land uses including intensive agriculture and established horse studs. A detailed assessment of the potential impacts of the project on agricultural operations has been completed for the project. This included an assessment of biosecurity risks, aerial spraying, and productivity impacts.	Section 2 (Strategic context) Section 13 (Agriculture) Technical report 6 – Agriculture Impact Assessment

Category	Issue summary	How the issue has been addressed	Section addressed
	• risks associated with the presence of anthrax • damage to property associated with construction (that is, fences, stock yards, bores) • UHF and drone signal interference • worker and animal safety during construction. Concerns about impacts on high value agricultural land for example BSAL. Concerns about impacts on Equine Critical Industry Cluster.	A separate assessment examined the potential project risks for an area near Rouchel where a historical anthrax outbreak occurred. The transmission corridor has been strategically sited to avoid key hubs within the Equine CIC, including Scone and areas that are central to the industry's identify and function. Mitigation measures will be implemented to reduce impacts (including working with property owners within the project area to prepare and implement property management plans, final siting of project infrastructure and ongoing communication with easement affected landholders during construction to minimise impacts). Published plain language fact sheets have been provided to support understanding of coexistence with infrastructure. Land use impacts are considered as part of the compensation process for easement affected landholders, with site-specific impacts on productivity, operations and on-farm assets informing compensation outcomes.	

Category	Issue summary	How the issue has been addressed	Section addressed
Economic, environmental and social impacts	Concern about noise associated with construction activities, including: • helicopter movements • increased traffic movements. Noise associated with the operation of workforce accommodation camps.	A detailed noise and vibration assessment has been completed for the project assessing noise and vibration impacts, including noise associated traffic movements, workforce accommodation camps and helicopters, along with other project noise sources. Mitigation measures will be implemented to reduce and manage noise impacts.	Section 16 (Noise and vibration) Technical Report 9 – Noise and Vibration Assessment
Economic, environmental and social impacts	Social – Mental health concerns associated with project uncertainty and presence.	Implementation of the Enhanced Mental Health Support Program to provide targeted support to landholders experiencing stress and anxiety. The SIA includes an assessment of potential mental health and wellbeing impacts. Mitigation measures and management approaches have been identified to minimise impacts and support community wellbeing (including the continued implementation of the Enhanced Mental Health Support Program).	Section 10 (Social) Technical Report 4 – Social Impact Assessment
Economic, environmental and social impacts	Concerns about electromagnetic fields (EMF), including concerns regarding potential human and livestock health risks.	Appropriate project design to meet relevant standard with a focus on prudent avoidance of EMF impacts through design. An EMF assessment has been undertaken as part of the EIS. Community information about EMF including the provision of plain language factsheets outlining applicable standards and safety thresholds.	Section 17.4 (EMF) Technical Report 13 – EMF Assessment

Category	Issue summary	How the issue has been addressed	Section addressed
Economic, environmental and social impacts	Concerns about potential impacts to air quality during construction.	A detailed air quality assessment has been completed for the project.	Section 20 (Air quality) Technical Report 17 – Air quality impact assessment
Economic, environmental and social impacts	Impacts to environmentally sensitive areas, including: • karst cave systems • National parks and forests.	Avoidance of national parks and other reserves protected under the *National Parks and Wildlife Act 1974*. Changes made to project alignment to avoid karst areas. Engagement with relevant authorities including Forestry Corporation of NSW and NSW National Parks and Wildlife Service Karst Management Advisory Committee and the Newcastle and Hunter Valley Speleological Society.	Section 2 (Strategic context)
Economic, environmental and social impacts	Concerns about impacts on Aboriginal cultural heritage, including sites and cultural values. Access to Country.	Aboriginal cultural heritage and cultural values assessment have been undertaken in engagement with Aboriginal stakeholders including the RAPs. Project design changes and no impact areas have minimised impacts, with mitigation measures developed where impacts cannot be avoided.	Section 8 (Aboriginal cultural heritage) Technical Report 2 – Aboriginal Cultural Heritage Assessment

Category	Issue summary	How the issue has been addressed	Section addressed
Economic, environmental and social impacts	Concerns about impacts on historic heritage buildings and items.	A detailed historic heritage assessment has been undertaken to identify and assess potential impacts. Mitigation measures have been developed, including avoidance where feasible and identification of no impact areas. Management strategies developed where impacts cannot be avoided.	Section 9 (Historic heritage) Technical Report 3 – Historic Heritage Assessment
Economic, environmental and social impacts	Cumulative impacts associated with generator projects in the New England REZ and Hunter REZ.	A cumulative impact assessment has been undertaken as part of this EIS. Controls have been described in this EIS to mitigate. Ongoing coordination with generation proponents, councils and agencies has informed mitigation strategies to manage cumulative effects. Regional Major Infrastructure Studies have been undertaken to identify regional challenges and opportunities. Through regional coordination forums, EnergyCo is working with government agencies, councils and industry stakeholders to identify practical solutions to regional impacts and opportunities.	Section 5 (Stakeholder engagement) Appendix E Engagement Outcomes Section 24 (Cumulative impacts)
Broader issues (outside the scope of the project)	Broader energy policy, including: • preference for nuclear energy and upgrades to existing coal power plants • REZ planning, including preference for reduced capacity of the REZ • cost of electricity.	These issues are being addressed at a broader REZ and State policy level. Ongoing communication outlines the role of the project within the Roadmap.	Section 2 (Strategic context)

Category	Issue summary	How the issue has been addressed	Section addressed
Broader issues (outside the scope of the project)	Unequal distribution of funds associated with regional benefit sharing programs.	Community benefit concerns are being addressed through the development of the CEBP and broader REZ initiatives. Ongoing engagement with stakeholders is informing the distribution and prioritisation of benefits.	N/A
Broader issues (outside the scope of the project)	Development of a train line between Armidale and Queensland to facilitate movement of equipment.	This suggestion has been recorded as part of stakeholder feedback and considered in the context of broader regional infrastructure planning. Transport solutions associated with the project are assessed through the EIS traffic and transport assessment and coordinated with relevant agencies and broader REZ initiatives where applicable.	Section 5.4.2.8
Broader issues (outside the scope of the project)	Illegal clearing of vegetation by landholders.	This issue is outside the direct scope of the project and is managed under relevant legislative and regulatory frameworks. Information regarding vegetation management requirements has been communicated to stakeholders where relevant.	N/A
Broader issues (outside the scope of the project)	Impacts of generator projects including: • project locations • planning and engagement processes • noise and visual amenity • impacts on livestock • ongoing community opposition and requests to prohibit generation projects connecting to the new network linked to community objections.	Concerns relating to generator projects are being addressed through broader REZ planning processes and coordination between EnergyCo and generation proponents, however, these generator projects are outside the scope of the project. The EIS includes a cumulative impact assessment, and ongoing engagement is undertaken to coordinate development and manage cumulative effects.	Section 24 (Cumulative impacts)

Category	Issue summary	How the issue has been addressed	Section addressed
Broader issues (outside the scope of the project)	Port to REZ including: • alternative route suggestions • concerns about lack of investigations (both on the proposed route to determine suitability and of alternate routes) • road capacity and load limits (width and height) • road safety (human and livestock).	Port to REZ is being progressed as a separate but related initiative. Engagement and investigations for this project are being undertaken independently, with coordination across projects to ensure consistency in transport planning and stakeholder communication.	N/A

5.5.3 Local council

Feedback from local council stakeholders is summarised in Table 5.13, with further information provided in Appendix E (Engagement outcomes).

Table 5.13. Key outcomes of local council engagement

Category	Issue summary	How it's been addressed	Section addressed
Strategic Context	Cumulative impacts – Concerns around cumulative impacts of multiple projects on roads, housing, services, environment and communities; requires coordinated regional planning and sequencing.	Regional Major Infrastructure Studies undertaken. Ongoing coordination with councils, government agencies and generator proponents.	Section 2.4 (Roadmap coordination and benefits) Section 5 (Stakeholder engagement) Appendix E Section 24 (Cumulative impacts)
Project design and alternatives	Route selection and landholder impacts – Concerns about transmission alignment through private land; need for route optimisation to reduce environmental, visual and landholder impacts.	Detailed multi-disciplinary assessments (engineering, environmental and social) have been undertaken to inform route selection. Community and easement affected landholder feedback, including suggested alternatives, has been considered and incorporated where feasible into corridor refinement. EnergyCo has summarised this work in the Route options and avoidance paper which is included as Appendix B to the EIS.	Section 2 (Strategic context) Appendix B

Category	Issue summary	How it's been addressed	Section addressed
Economic, environmental and social impacts	Road and traffic impacts – Concerns around heavy vehicle movements on local roads, bridges and haulage routes; request for detailed Traffic Impact Assessment, road upgrades, maintenance agreements and safety management.	Ongoing engagement with councils about proposed construction routes, traffic movements and proposed road upgrades and the design of these works, and road maintenance. Detailed assessment of traffic and transport impacts undertaken to identify impacts and appropriate mitigation measures. Road upgrades proposed for key intersections and localised sections of roads to improve road conditions and make them suitable for use as part of the project. These upgrades will also benefit other road users. Mitigation measures will be implemented to minimise traffic impacts (including traffic management plans, time of day restrictions, heavy vehicle routes, road maintenance and construction traffic management controls).	Section 14 (Traffic and transport) Technical Report 7 – Traffic and Transport Assessment
Economic, environmental and social impacts	Housing and workforce - Insufficient local housing for construction workforce; need for a coordinated, region-wide workforce accommodation strategy with long-term benefits and demand management.	Regional Major Infrastructure Studies, including the Workforce Accommodation Study that considers accommodation demands and capacity. SIA also assesses housing demand and capacity for the project. Project design includes provision for workforce accommodation camps.	Section 10 (Social) Technical Report 4 – Social Impact Assessment

Category	Issue summary	How it's been addressed	Section addressed
Economic, environmental and social impacts	Social infrastructure impacts - Population influx expected to strain health, emergency services, education, waste and local infrastructure; need for comprehensive social impact assessment and mitigation.	Regional Major Infrastructure Studies undertaken, including training and skills, workforce accommodation, water and wastewater security, waste management and circular economy and local supply chains. Detailed SIA has been undertaken to identify potential impacts on services.	Section 10 (Social) Technical Report 4– Social Impact Assessment
Economic, environmental and social impacts	Impacts on vegetation, wildlife corridors, threatened species and conservation areas; need for avoidance of high-value areas and locally based offset strategies.	Detailed biodiversity assessment has been undertaken as part of EIS. Project design has been refined to avoid and minimise impacts where feasible, with residual impacts addressed through biodiversity offsets in accordance with the Biodiversity Offset Scheme.	Section 7 (Biodiversity) Technical Report 1 – Biodiversity development assessment report
Economic, environmental and social impacts	Water demand and supply - quantification of construction and accommodation water demand; risks to local supply and requirement for sustainable sourcing.	Water assessments completed as part of the EIS have been undertaken to quantify water demand associated with construction and workforce accommodation. Mitigation measures include identification of sustainable water sources and management strategies to minimise pressure on local supplies.	Section 18 (Surface water) Technical Report 14 – Surface water Section 19 (Groundwater) Technical Report 16 – Groundwater

Category	Issue summary	How it's been addressed	Section addressed
Economic, environmental and social impacts	Community benefits & local procurement - Expectation of clear benefit-sharing frameworks, local procurement targets, employment opportunities and alignment with council policies.	Establishment of the CEBP, supported by Regional Major Infrastructure Studies and ongoing engagement with councils and stakeholders aimed at maximising local employment, procurement opportunities and long-term regional benefits. The project would include local procurement and employment targets.	Section 10 (Social) Technical Report 4– Social Impact Assessment
Economic, environmental and social impacts	Local infrastructure and legacy outcomes - Pressure on local infrastructure (roads, services); expectation that projects deliver lasting legacy infrastructure and upgrades benefiting communities.	Engagement with councils and regional stakeholders has informed identification of infrastructure pressures and opportunities. Regional Major Infrastructure Studies and project planning consider upgrades and legacy outcomes, with ongoing coordination to align project delivery with local priorities and regional development initiatives. As outlined in section 2.4, through regional coordination forums, EnergyCo is working with government agencies, councils and industry stakeholders to identify practical solutions to regional impacts and opportunities.	Section 10 (Social) Section 14 (Traffic and transport) Technical Report 7– Traffic and Transport Assessment

5.5.4 Government agency

Feedback from government agency stakeholders is summarised in Table 5.14, with further information provided in Appendix E.

Table 5.14. Key outcomes of government agency engagement

Category	Issue summary	How it's been addressed	Section addressed
Biodiversity	Impact on threatened species and SAII entities, impact on aquatic species, remote assessment of biodiversity in inaccessible lands, and effective mitigation measures.	The Biodiversity Development Assessment Report assesses the expected impacts on threatened species including aquatic species, and SAII entities. It also details the methods of assessment including through remote assessment methods and planned mitigation measures.	Section 7 (Biodiversity) Technical Report 1 – Biodiversity Development Assessment Report
Aviation	Consideration of aerial firefighting and pest control impacts, consideration of scheduled activities including helicopter movements, and consideration of any intersection with restricted airspace.	Aerial firefighting is considered in both the assessment of aviation and bushfire impacts.	Section 17.2 (Aviation) and Section 17.3 (Bushfire) Technical Report 11 – Aviation Impact Assessment Technical Report 12 – Bushfire Risk Assessment
Social	Capturing community sentiment authentically over a large project area.	Engagement with communities is detailed throughout the Social Impact Assessment, which captures the array of methods and a summary of responses provided by communities across the project area.	Section 10 (Social) Technical Report 4 – Social Impact Assessment
Engagement	Authentic engagement with key stakeholders.	This section details the engagement that has been undertaken with key stakeholders including community, landholders, councils, special interest groups and government agencies.	Section 5 (Stakeholder engagement) (this section)

Category	Issue summary	How it's been addressed	Section addressed
Traffic and Transport	Consideration of cumulative impacts, clarity between the project and other REZ road upgrades such as the Port to REZ project, consultation with TfNSW on temporary mitigation measures, relevant guidelines and standards met.	The Traffic and Transport Impact Assessment considers cumulative impacts and articulates the road upgrades required for the project, rather than for the Port to REZ project. EnergyCo is in regular communication with TfNSW and ensures to meet applicable standards and guidelines.	Section 14 (Traffic and Transport) Technical Report 7 – Traffic and Transport Impact Assessment
Aboriginal Heritage	Effective communication with key stakeholders, and prioritised avoidance of Aboriginal heritage sites.	The Aboriginal Cultural Heritage Assessment details the assessment and avoidance measures taken regarding Aboriginal heritage sites. Engagement is also detailed for relevant stakeholders, including RAPs within this technical report.	Section 8 (Aboriginal Heritage) Technical Report 2 – Aboriginal Cultural Heritage Assessment
Agriculture	Consideration of impact on aerial agricultural activities.	The location of airstrips used for aerial agriculture business and impacts of the project on aerial activities is provided in the Aviation Impact Assessment.	Section 13 (Agriculture) Section 17.2 (Aviation) Technical Report 11 – Aviation Impact Assessment
Waste	Consideration of cumulative waste generation.	EnergyCo is currently consulting with local councils, generators and other stakeholders including waste management providers to identify suitable waste management facilities, haulage routes and waste stream destinations for the project and for the broader New England REZ.	Section 23 (Waste) Section 24 (Cumulative impacts)
Air quality	Consideration of diesel generator use.	Diesel equipment and machinery is considered in the assessment of exhaust emissions.	Section 20 (Air Quality) Technical Report 17 –Air Quality Impact Assessment

Category	Issue summary	How it's been addressed	Section addressed
Bushfire	Consideration of impact on hazard reduction burns and firefighting.	The assessment of bushfire risks considers impacts on firefighting operations.	Section 17.3 (Bushfire) Technical Report 12 – Bushfire Risk Assessment
Flooding	Consideration of accurate climate change modelling, afflux assessment and emergency evacuation methods.	The flooding report considers assessment of afflux, emergency evacuation methods and climate change modelling.	Section 18 (Surface water and flooding) Technical Report 15 – Flooding
Groundwater	Consideration of quality of groundwater yields.	The Groundwater Impact Assessment includes the assessment of groundwater levels, quality and groundwater users and quantification of construction water demand and supply requirements.	Section 19 (Groundwater) Technical Report 16 – Groundwater
Water sourcing	Detailed consideration of where water is sourced, with understanding to the needs of local Councils.	The project would use water in accordance with water sharing plans and the Water Management Act. Groundwater may be used as a source of non-potable water during construction. Non-potable water would be required for activities such as civil works, dust suppression, equipment washdown and general site maintenance.	Section 18 (Surface water and flooding) Section 19 (Groundwater) Technical Report 15 – Surface water Technical Report 16 – Groundwater

5.6 Future engagement

5.6.1 Engagement approach

EnergyCo is committed to engaging with landholders, the community and stakeholders throughout all project stages and to building and maintaining strong relationships within the communities where the proposed transmission infrastructure will be located.

Engagement on specific issues and opportunities relevant to the project will continue following lodgement of the EIS for exhibition, in accordance with Undertaking Engagement Guidelines for State Significant Projects (DPHI, 2026b). This will include community information sessions during the EIS exhibition period to allow community members to discuss aspects of the EIS with the project team.

The overarching engagement activities that EnergyCo has established and maintain as described in Section 5.4.2.1 will continue during further design development, the preparation of the Submissions Report and the ongoing project assessment process. These mechanisms will be complemented with further direct community and stakeholder engagement activities focused on:

- providing information and project updates at key stages
- engagement with affected landholders and community groups about the project and key design decisions that may impact them
- engagement and coordination with generation projects in the New England REZ, particularly around project interfaces and in relation to cumulative impacts
- engagement with regulatory agencies during preparation of the Submissions Report to ensure a complete and robust Submissions Report.

5.6.2 EIS exhibition

This EIS will be publicly exhibited for a period of no less than 28 days in accordance with the requirements of Schedule 1 of the EP&A Act. During the exhibition period, community and government agency stakeholders can review the EIS and make a written submission to DPHI for consideration in the assessment and determination of the project.

The EIS will be made publicly available through DPHI's Major Projects portal New England REZ Transmission Project | Planning Portal. Submissions on the EIS can be made through the Major Projects Portal.

EnergyCo will undertake ongoing stakeholder engagement activities during the EIS exhibition period which will include:

- meetings with stakeholders including landholders, community members, special interest groups and government agencies
- community information sessions
- digital EIS available on EnergyCo's project website: New England REZ network infrastructure project | EnergyCo.

This engagement would be supported by:

- EIS overview and fact sheets
- project website update
- engagement portal update
- postcard
- local radio and newspaper advertising
- e-newsletter
- media release
- display information for use in community information sessions and pop-up events.

5.6.2.1 Interactive map

An interactive map is available on the project's engagement portal. This provides an online tool to show the project and other geographical information about the project and explore the key outcomes of the EIS through interactive mapping. The interactive map allows viewers to:

- relate the project to the broader geographic context
- view up-to-date information about the project
- identify the transmission alignment in relation to their properties
- view information about generation projects in the New England REZ
- understand proposed road projects (upgrades and detours) that are not included in the EIS (such as the Port to REZ road upgrades)
- use specialised tools for retrieving information.

5.6.3 Further engagement during assessment period

Post EIS exhibition, engagement activities will be undertaken to support the assessment period prior to project determination. This engagement may include:

- ongoing engagement with stakeholders including landholders, councils, community members, special interest groups and government agencies
- project updates and e-newsletter updates
- REZ mobile offices (subject to review at the end of 2026) and stalls at community events.

5.6.4 Construction and operation phase engagement

EnergyCo will continue to engage with stakeholders, including community and government stakeholders post the determination of the project in accordance with the requirements of the planning approval conditions, should the project be approved.

A network operator will be appointed by EnergyCo following the competitive tender process. The network operator will be responsible for the design, construction and operation of the project. Once appointed, the network operator would be responsible for compliance with the project's planning approval and all project related engagement with communities and stakeholders during construction and operation. EnergyCo will continue to undertake ongoing engagement relating to the broader New England REZ.

The purpose of ongoing engagement will include to:

- keep the community and other stakeholders informed of project activities and status
- facilitate two-way sharing of information through the receipt of feedback from stakeholders and provision of project responses to matters raised.

Assessment approach



Section 6

6 Assessment approach

This section describes the assessment approach adopted for this EIS to provide a robust assessment of the extent and nature of potential impacts of the project, whilst accommodating the flexibility necessary to enable ongoing refinement of project design and construction methodologies for a project of this scale.

Detailed methodologies for individual technical assessments and any key assumptions or limitations of the approaches taken are provided in the relevant environmental assessment sections (refer to Section 7 to Section 24) and associated technical reports accompanying this EIS. For all studies, where limitations exist or key assumptions are required, the precautionary principle has been considered so that study findings are conservative and robust and avoid underestimating potential environmental risks or impacts.

6.1 Environmental risk assessment

A review of the environmental and social matters relevant to the project was conducted as part of the Revised Scoping Report (EnergyCo, 2025) to determine which issues needed to be assessed as part of the EIS and the level of assessment required. The review was undertaken with reference to the categories of assessment matters identified by the State significant infrastructure guidelines – preparing a scoping report (DPIE, 2022).

As part of the scoping report process, the potential project issues were separated into 'Key Issues' and 'Other Matters', as presented in the Revised Scoping Report (EnergyCo, 2025). Key issues are issues where there is a reasonable likelihood that the project will have a material impact and detailed assessment is required to fully understand such impacts and identify project-specific mitigation. Other matters are issues which are not of particular concern and are unlikely to have a material impact and/or the measures to manage the impacts are well understood and routinely used on similar projects.

The scoping process identified a range of issues that required further detailed assessment as part of the EIS. Based on this process, the identified key issues include biodiversity, Aboriginal heritage, historical heritage, social, visual amenity, land use and property, agriculture, traffic and transport and cumulative impacts, but also identified a range of other issues and risks to be considered in this EIS.

To build on the issues scoping process an environmental risk assessment was also undertaken for the project (refer to Appendix A). This qualitative risk assessment was prepared having regard to the principles of AS ISO 31000:2018 Risk Management Guidelines and identifies the key risks and issues that may arise as part of the development of the project. The risks identified in the risk assessment have been subject to assessment as part of this EIS and appropriate management and mitigation measures have been developed to address these risks, where relevant.

6.2 Overview of assessment areas used in the assessment of impacts

The assessment of impacts presented in this EIS has been informed by a series of different areas associated with the project that have been defined to appropriately characterise the potential impacts of the project. The use of different areas in the assessments ensures both flexibility for subsequent design refinement and a rigorous assessment of potential impacts.

The areas used are discussed in detail in the following sections, and in summary include:

- project area: is the area within which the construction and operation of the project would occur and is the basis of impact assessment for most of the technical assessments in this EIS. This area is larger than the area where physical works would occur to provide flexibility for the siting of the project and provides a conservative assessment of impact
- study areas: have been defined by each technical assessment and generally encompass a broader area than the area within which project impacts may occur and vary geographically between technical assessments to support comprehensive evaluation of potential impacts
- disturbance footprint: is a more refined area where direct impacts would occur based on the reference design. That is, where construction works would be undertaken, vegetation cleared and infrastructure constructed. The disturbance footprint is located within and is smaller than the project area
- operational footprint: is the area that would be occupied by permanent project infrastructure based on the reference design, but excludes the operational easements
- operational area: is the area that would be affected by the project during operations, including both the permanent operational infrastructure and easements
- reference design: the initial project design detailing key components and technical parameters for the transmission lines, energy hubs and ancillary infrastructure and access tracks. The reference design is the basis of the project area and disturbance footprint.

Each technical assessment considers the above areas as relevant to assess the impacts that may occur, as described in the following sections.

6.3 Project area

The project area is 10,928 hectares and represents the area within which the construction and operation of the project would occur and is generally a 250 metre-wide corridor along the transmission lines, with varying areas at energy hubs and for ancillary infrastructure sites. The project area (refer to Figure 3.2) is a broader area that provides flexibility for the final siting of project infrastructure and disturbance footprint and within which the final easements for the project would be located (generally 120 metres for dual 330 kV transmission lines, 70 metres for a single 500 kV transmission line and 140 metres for dual 500 kV transmission lines). As described in Section 3, approval is sought for final siting of project infrastructure and the disturbance footprint to move within the project area subject to recommended environmental management measures and the avoidance of defined no-impact areas.

The general approach adopted for this EIS has been to conservatively assume that any location within the project area could potentially be subject to impacts, unless defined as a no-impact area. No-impact areas are areas within or proximate to the project area in which no disturbance is proposed to occur, and are designated to avoid areas of environmental, cultural, social or ecological sensitivity. No-impact areas are defined in the relevant technical assessments (refer to Section 7 to Section 24). Such an approach ensures both flexibility for subsequent design refinement and a rigorous assessment of potential impacts, representing conservative 'worst-case' scenarios.

6.4 Disturbance footprint

The disturbance footprint sits within the project area and is an estimation of the likely magnitude of the area that would be directly impacted by the construction of the project, including but not limited to transmission towers and easement clearing, the energy hubs, workforce accommodation camps and laydown areas, access tracks, public road works and ancillary sites and infrastructure. The disturbance footprint has been used to inform the impact assessment in this EIS and will be finalised as part of the detailed design and project implementation process.

The disturbance footprint includes around 3,579 hectares of land that would be disturbed during the construction of the project. This includes:

- around 3,144 hectares of land where full vegetation clearing would be undertaken. This includes clearing for transmission line towers, pads and easements, stringing sites, access tracks, ancillary infrastructure, energy hubs, substations and switching stations. This area is referred to as disturbance area A in the biodiversity assessment.
- around 435 hectares of land where partial vegetation clearing would be undertaken. Partial clearing relates to the removal of overstorey vegetation within transmission line easements where it has the potential to exceed the clearance heights established for the project. Whilst the clearance zone would ultimately be determined by the network operator, EnergyCo has reviewed existing NSW practices, and for the purposes of the EIS, has applied a 10 metre clearance between vegetation and the lowest transmission line conductor at maximum sag. Partial impacts therefore result in the removal of trees and shrubs that encroach the 10 metre clearance zone, while ground layer vegetation and habitat features are retained. This area is referred to as disturbance area B in the biodiversity assessment.

The conceptual approach to vegetation clearing for the project is illustrated on Figure 3.17 and described further in Section 3.3.9, and is also discussed in Section 7 and Technical Report 1 as it applies to the BDAR.

6.4.1 Use of disturbance footprint in assessment of impacts

As discussed in Section 6.3, the broader project area has been used as the basis of impact assessment for many of the technical assessments for this EIS. For certain issues, the disturbance footprint (which lies within and is smaller than the project area) has been used to inform the impact assessment to more accurately define the extent of impacts for those particular issues.

The disturbance footprint has been used in the following assessments:

- biodiversity: to more accurately estimate vegetation clearance and related biodiversity impacts. This approach enables a more accurate assessment of the project whilst contextualising the likely scale of potential impacts within the broader project area (refer to Section 6.3). Using this method helps prevent overestimating biodiversity impacts. For additional details on how the disturbance footprint has been applied, refer to Section 7 and Technical Report 1.
- land use and property: to more accurately estimate and contextualise the likely extent of direct impact and temporary restrictions to land use and property during construction (refer to Section 12).
- agriculture and economic assessments: to more accurately estimate the impacts on agricultural land and associated economic impacts, the agricultural and economic assessments consider the portion of the disturbance footprint associated with the construction of project elements (that is, the construction of transmission towers, the energy hubs and substation expansion, workforce accommodation camps and laydown areas, access tracks, public road works and ancillary sites and infrastructure, and excluding easement clearing). This area is 2,580 hectares of which 2,233 hectares is currently used for agriculture, and has been used to contextualise the likely area that would (at some stage) be directly impacted and or temporarily restricted from its current agricultural use and the associated likely economic impacts (refer to Section 13 and Technical Report 6 (agriculture) and Section 15 and Technical Report 8 (economic)).
- bushfire: the assessment has considered the disturbance footprint at the energy hubs and construction ancillary sites to determine Asset Protection Zones (APZs) during construction. For additional details on how the disturbance footprint has been applied, refer to Section 17 and Technical Report 12.
- surface water: to more accurately identify and contextualise potential impacts on surface water resources, the assessment considers the disturbance footprint to identify waterway crossings, waterfront land interactions and potential impacts to hydrology, geomorphology and harvestable rights (refer to Section 18 and Technical Report 14).

6.5 Operational area

The operational area includes around 4,237 hectares of land within the project area. This area is based on the elements of the reference design that are relevant to the operational phase of the project such as the operational transmission line easement, energy hubs, permanent access tracks, substation extension area, maintenance facility and other permanent ancillary infrastructure. This area has been defined to provide more refined estimates of the amount of land that would be affected by the project during operation.

6.5.1 Use of operational area in assessment of impacts

The land use and property assessment in Section 12 considers the operational area of the project including the easements, to assess operational impacts on land use.

6.6 Operational footprint

The operational footprint is contained within the operational area and includes around 471 hectares of land and is an estimate of the area that would be directly occupied by permanent infrastructure elements of the project based on the reference design such as substations, switching stations, transmission line towers, maintenance facility and other permanent ancillary infrastructure. This footprint excludes transmission line easements, which would generally remain available for continued land use.

6.6.1 Use of operational footprint in assessment of impacts

To more accurately estimate the impacts to land use and property, Section 12 considers the operational footprint to contextualise the likely extent of permanent impacts during operations.

The agriculture assessment and economic assessment also consider the operational footprint for direct impacts to agricultural land associated with the area permanently occupied by project infrastructure.

For additional details on how the operational footprint has been applied, refer to Section 13 and Technical Report 6 for agriculture and Section 15 and Technical Report 8 for the economic assessment.

The bushfire assessment has also considered the operational footprint at the energy hubs to determine APZs during operation to accommodate the permanent operational infrastructure (refer to Section 17 and Technical Report 12).

6.7 Reference design

This EIS is based on the project's reference design. The reference design is the initial project design detailing key components and technical parameters for the transmission lines, energy hubs and ancillary infrastructure and access tracks that is described in Section 3 of this EIS. The reference design has been used to determine the disturbance footprint, operational area and operational footprint, inform the project area and provide a basis for the environmental assessment of the project. The reference design will be further refined based on continued landholder feedback, further technical and environmental surveys and as the project progresses to the detailed design stage.

A corridor approach to the transmission line alignment, based on the reference design, has been adopted to define the project area and thereby allow flexibility for tower placement during detailed design. Indicative tower locations based on the reference design have been used by relevant technical assessments as required, notably in the landscape and visual assessment to enable more detailed analysis.

6.8 Inaccessible area assessments

Field surveys and site inspections were undertaken for a number of the technical assessments supporting this EIS, including biodiversity, Aboriginal heritage, historical heritage, landscape and visual, soils and agriculture, contamination and noise and vibration. Due to land access and other restrictions, the full extent of the project area has not been subject to field surveys to date. To inform the relevant impact assessments for areas where field surveys could not be undertaken, alternative assessment methodologies have been adopted in consideration of relevant policy or guideline requirements. Where relevant, available regional data (for example regional vegetation mapping) has been used to inform the assessment. Detailed engagement has been undertaken with relevant government agencies regarding the assessment of inaccessible areas as part of this EIS.

Further field surveys are planned for the parts of the project area where land access is not currently available as access becomes available. Where additional field surveys are able to be undertaken prior to approval, this information will be presented in the Submissions Report to be prepared following exhibition of the EIS.

The extent of and approach to assessment of inaccessible areas is discussed within the relevant environmental assessment sections of this EIS (refer to Section 7 to Section 24) and associated technical reports.

6.9 Sensitive receivers

For this EIS, a sensitive receiver refers to a place where people are likely to live such as homes and accommodation facilities, as well as other sensitive locations such as schools, hospitals and places of worship. The assessment also considers places such as workplaces and public recreation areas. To identify relevant sensitive receivers for the EIS and technical assessments, aerial imagery was reviewed, supported by government databases and targeted field verification. Sensitive receivers are shown on Figure 6.1.

Given the scale of the project and limited access to some properties, it is possible that some locations identified in the EIS as dwellings may be other structures (for example sheds), and vice versa. As further information becomes available, the relevant assessments will accordingly be refined within the Submissions Report and Amendment Report as relevant. This includes consideration of a recently identified sensitive receiver within the project area south of Nundle State Forest (previously thought to be a shed), which was identified during recent engagement with the landholder. This sensitive receiver will be assessed within the Submissions Report / Amendment Report.

Certain studies require sensitive receivers to be defined based on additional guidelines, such as the:

- Transmission Guideline (DPHI, 2024a)
- Transmission Guideline: Technical Supplement for Landscape Character and Visual Assessment (DPHI, 2025), specifically for assessing the visual impact on private dwellings
- Interim Construction Noise Guideline (DECC, 2009) for noise and vibration assessment.

These guidelines have been considered in the relevant assessments as part of this EIS.

6.10 Recently identified ancillary sites

The location of workforce accommodation Camp 3 has only recently been identified for the project, following ongoing investigations over an extended period. In May 2026, a potential option for this camp was identified in the Barry locality. EnergyCo has commenced discussions with the landholder regarding the further investigation and potential acquisition of this property. Section 3 of the EIS provides an overview of this recently identified camp location.

The Camp 3 location was identified after the completion of the majority of technical studies prepared for this EIS, and therefore has not been assessed as part of this EIS with the exception of the following targeted assessment:

- the traffic and transport assessment includes quantitative consideration of potential traffic and transport impacts associated with Camp 3 within the general vicinity of Barry (refer to Technical Report 7)
- the noise and vibration assessment includes qualitative consideration of potential noise impacts associated with Camp 3 within the general vicinity of Barry (refer to Technical Report 9)
- a high-level preliminary desktop assessment and a site inspection to identify potential for Aboriginal cultural heritage values (refer to Section 8)
- a high-level preliminary desktop assessment and a site inspection to identify potential biodiversity values (refer to Section 7).

Detailed assessment of the proposed location for Camp 3 will be undertaken following exhibition of the EIS and included in the Submissions Report and Amendment Report, as relevant.

Through ongoing engagement with Muswellbrook Shire Council, a possible alternative location for Camp 1 has also been identified (referred to as Camp 1 Alternate). EnergyCo is currently investigating the site in consultation with Council. Section 3 in the EIS provides an overview of this recently identified camp location. The Camp 1 Alternate location was identified after completion of the majority of technical studies prepared for the EIS, and therefore has not been assessed as part of this EIS with the exception of the following targeted assessment:

- a high-level preliminary desktop assessment and a site inspection to identify potential for Aboriginal cultural heritage values (refer to Section 8)
- a high-level preliminary desktop assessment and a site inspection to identify potential for biodiversity values (refer to Section 7).

Detailed assessment of the proposed location for Camp 1 Alternate will be undertaken following exhibition of the EIS and included in the Submissions Report and Amendment Report, as relevant.

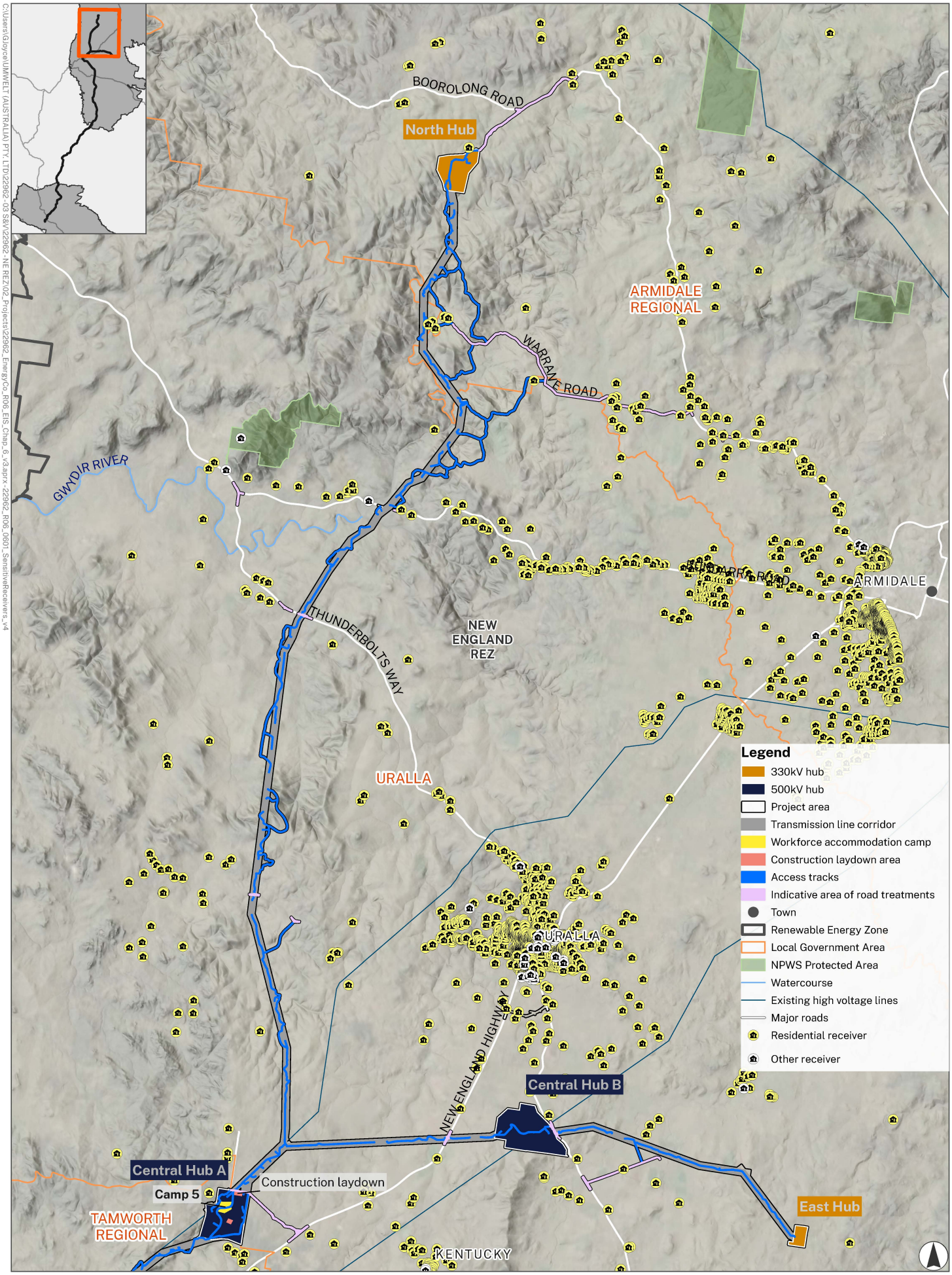


FIGURE 6.1a Sensitive receivers considered in the EIS (Map 1 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

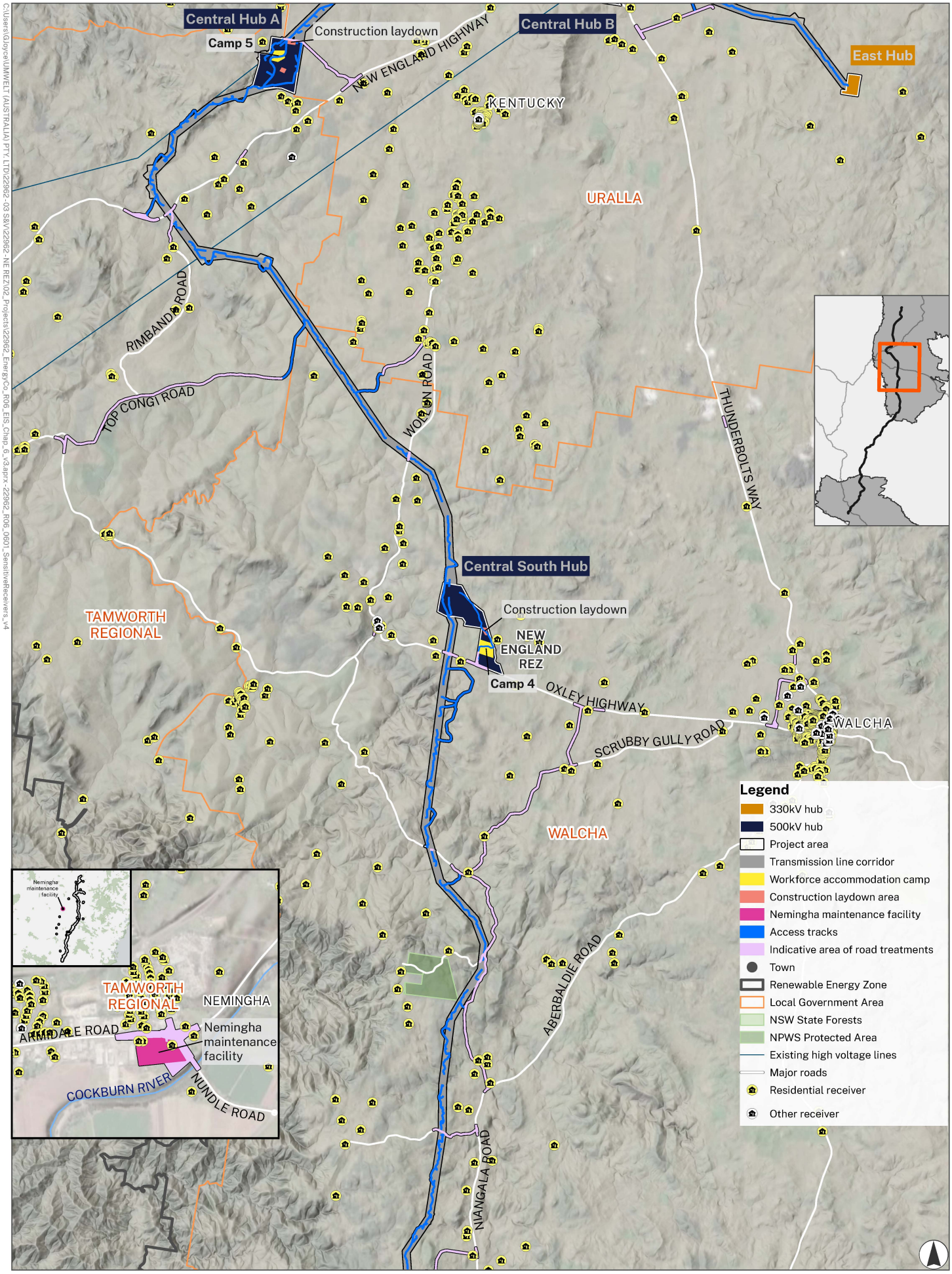


FIGURE 6.1b Sensitive receivers considered in the EIS (Map 2 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

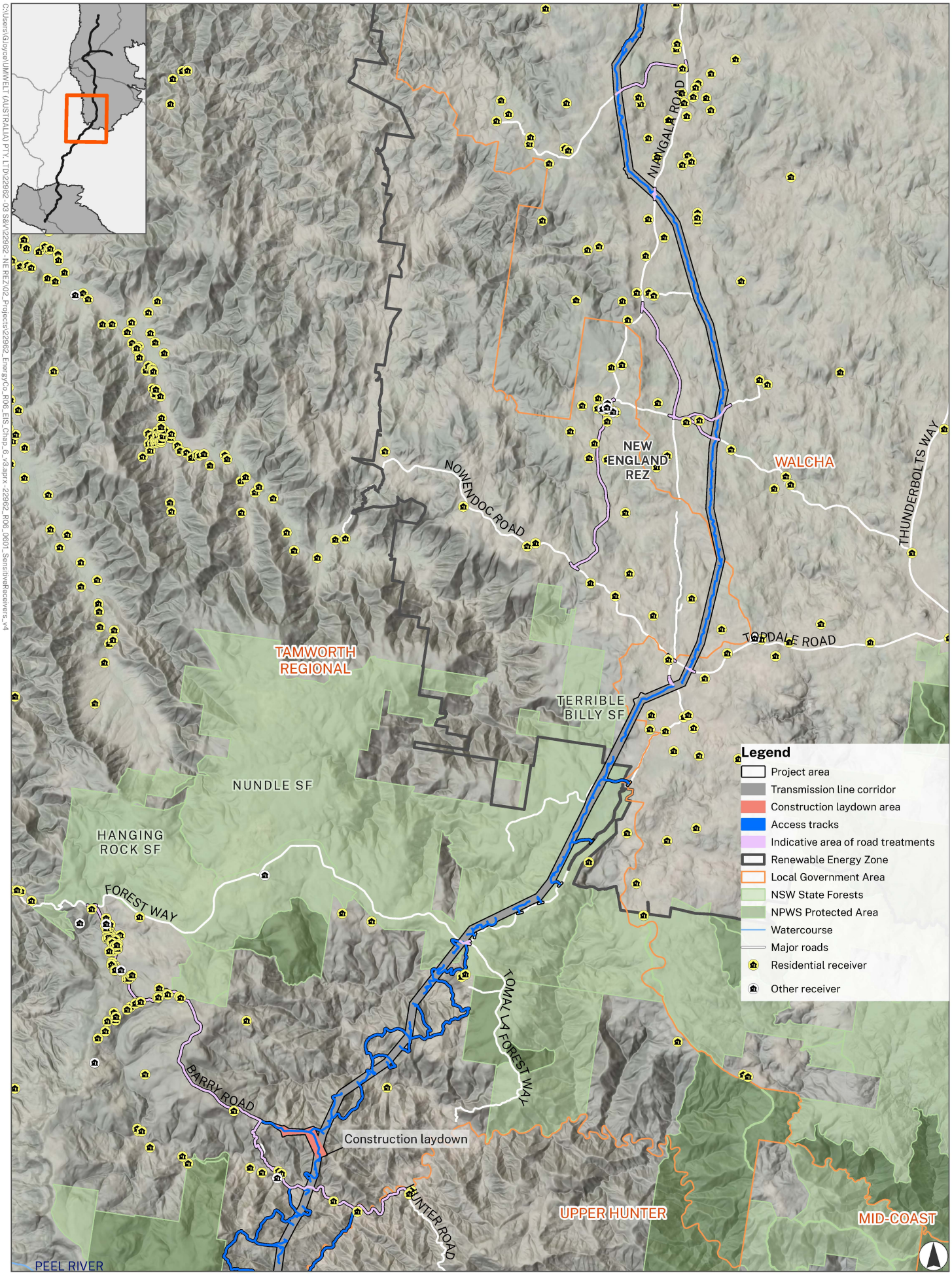


FIGURE 6.1c Sensitive receivers considered in the EIS (Map 3 of 5)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

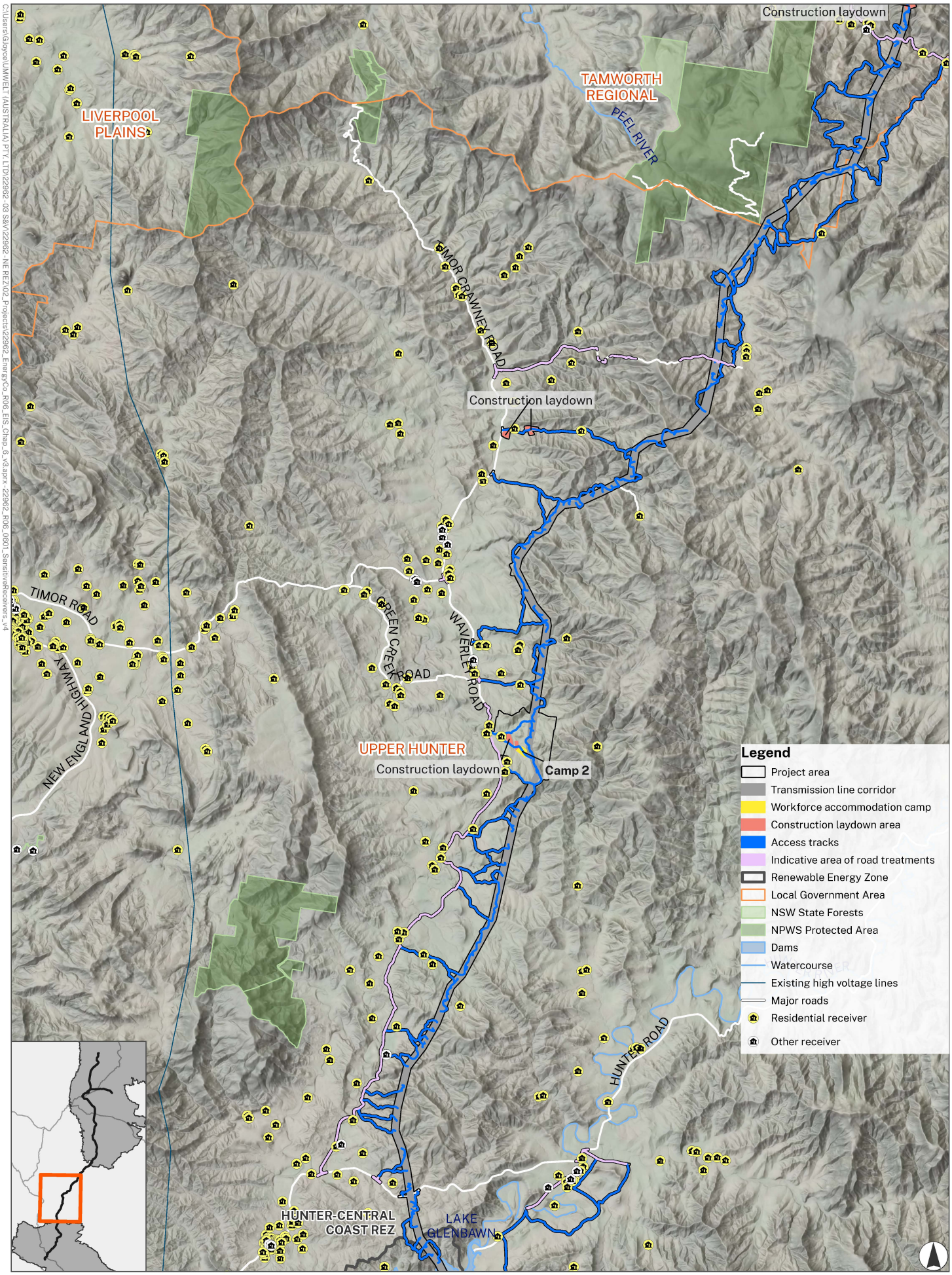


FIGURE 6.1d Sensitive receivers considered in the EIS (Map 4 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

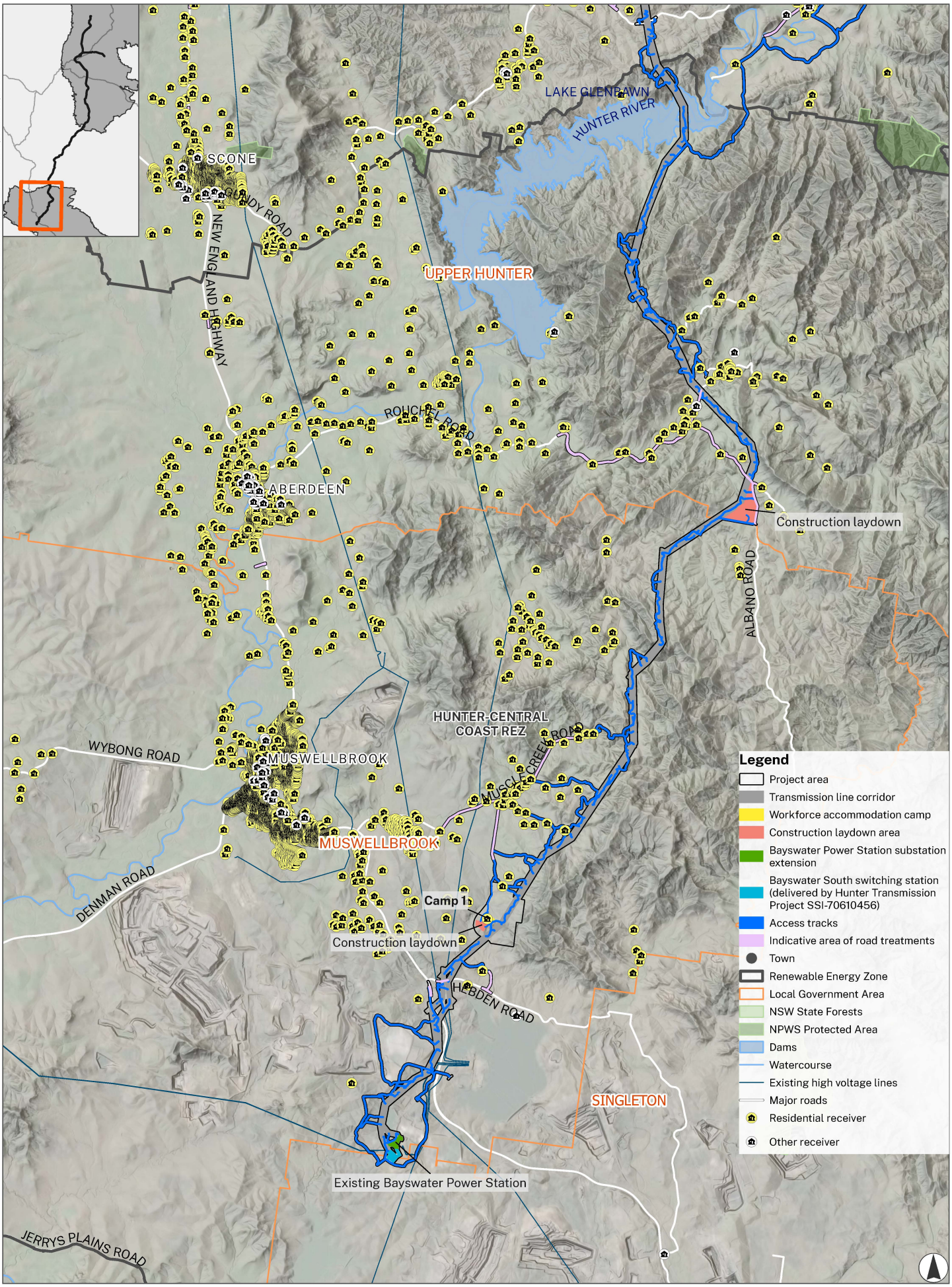


FIGURE 6.1e Sensitive receivers considered in the EIS (Map 5 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Biodiversity



Section 7

7 Biodiversity

This section provides the key findings of the assessment undertaken to identify the potential impacts of the project on biodiversity, and the mitigation and management measures proposed to avoid, minimise, manage and offset these impacts.

In addition to requiring biodiversity assessment under NSW legislation, the project has been determined to be a controlled action (2025/10405) under the EPBC Act due to the potential for significant impacts to Commonwealth listed threatened species and communities and will be assessed under the Bilateral Agreement between the Commonwealth and NSW governments.

The Biodiversity Development Assessment Report (BDAR) prepared by Umwelt is provided in full in Technical Report 1.

7.1 Assessment approach

The biodiversity assessment has been undertaken in accordance with the Biodiversity Assessment Method (BAM), with outcomes documented in the BDAR (refer to Technical Report 1). Field surveys and assessment methods were also guided by relevant industry standards and survey guidelines.

The assessment was also prepared with reference to the SEARs as detailed in Appendix A.

The section considers issues raised in engagement with community stakeholders and relevant regulatory authorities including CPHR and the Commonwealth DCCEEW relating to biodiversity (refer to Section 5) including impacts on biodiversity values, loss or modification of native vegetation and fauna habitat, impacts to threatened species and ecological communities, species of local and regional significance.

7.1.1 Biodiversity study areas

In accordance with the BAM, the BDAR included an assessment of biodiversity values for the following areas:

- project area: this area defines the extent within which project infrastructure may be located and allows flexibility for final siting of project infrastructure and the disturbance footprint. Final siting of the infrastructure and disturbance footprint may move within the assessed project area subject to recommended environmental management measures and avoidance of identified no-impact areas
- disturbance footprint: based on the reference design, the disturbance footprint is an estimation of the likely magnitude of the area that would be directly impacted by the construction of the project. The disturbance footprint is synonymous with the subject land in the BDAR (with the BAM requiring use of specific terminology). For the purposes of the biodiversity assessment, the disturbance footprint comprises of 2 types of disturbance;

disturbance area A and disturbance area B. Definitions of these disturbance areas are provided in Section 7.1.5

- assessment area: includes a 500 metre buffer either side of the centreline of the linear components of the project area and a 1,500 metre buffer of non-linear components of the project area
- locality: includes a 30 kilometre-wide corridor centred on the project area.

7.1.2 Consultation

Consultation was undertaken throughout the project to inform the biodiversity assessment approach, survey design and project refinement. Consultation was primarily undertaken with CPHR, with additional engagement of relevant stakeholders to inform the assessment and development of the project. Consultation with CPHR commenced in early 2024 with regular meetings, generally monthly, and moving to weekly meetings, intensive workshops and site visits from late 2025 and during 2026, to facilitate optimal collaboration in the technical delivery of the BDAR.

Survey and assessment approaches were progressed through ongoing consultation to support robust and defensible biodiversity outcomes. Feedback from CPHR and other stakeholders was incorporated into survey planning, data collection and impact assessment, and informed design refinement for the project, including avoidance and minimisation of impacts where practicable.

Formal advice and endorsements were also sought from CPHR during preparation of the BDAR (refer to Technical Report 1) to support delivery of the assessment and ensure that regulatory stakeholder input was appropriately considered and integrated into survey design and assessment outcomes.

7.1.3 Desktop assessment

A desktop assessment was undertaken to identify the biodiversity values and the extent and condition of landscape features within the project area, biodiversity assessment area and locality.

Information sources used in the desktop assessment included publicly available State and regional biodiversity datasets and mapping, LiDAR, aerial imagery and relevant literature. These sources were used to characterise the existing environment and inform identification of biodiversity values.

Information on local biodiversity values was also gathered from existing publicly available BDARs and other relevant ecological studies undertaken in the region, with particular consideration given to areas previously assessed within or adjacent to the project area.

Further detail on the data sources, databases and survey guidelines applied in the desktop assessment is provided in Section 1.7 of the BDAR (refer to Technical Report 1).

7.1.4 Field surveys

Accessible land

In accordance with the BAM, a variety of survey methods were used to identify native vegetation, Plant Community Types (PCTs), Threatened Ecological Communities (TECs) and threatened flora and fauna species across the project area.

Between September 2023 and July 2026, seasonal biodiversity surveys were undertaken and included the following methodologies:

- initial site stratification, preliminary investigation of biodiversity values and vegetation mapping
- BAM plot surveys (vegetation composition, structure and function)
- rapid data plots (floristics)
- targeted surveys for threatened flora, including two-phase grid-based systematic surveys
- incidental threatened flora surveys
- fauna habitat assessment
- targeted surveys for threatened fauna, including placement of remote camera and acoustic recorders, thermal drone surveys, spotlighting, call-playback, diurnal bird surveys, rock-turning and reptile searches
- opportunistic threatened fauna surveys.

Between September 2023 and October 2025, surveys were carried out across approximately 10,293 hectares, including areas within the current project area and previous alignments. Following the announcement of a new study corridor between the Central South Hub and Bayswater Power Station in October 2025, a proportion of the ecological survey effort previously completed fell outside the current project area. This survey data still provides valuable information about the biodiversity values in the region surrounding the project area.

Further ecological surveys of the current project area were undertaken from November 2025 and are ongoing. The current project area covers approximately 10,928 hectares, of which approximately 54 per cent has been subject to biodiversity survey to date. Land access limitations have prevented survey for the remaining area to date, however, survey work is ongoing where access is available.

The survey and assessment methods employed in accessible areas of the project area have been designed to align with the requirements of the BAM and relevant survey guidelines, determined in consultation with CPHR.

Inaccessible land

Where ecological surveys of the project area could not be completed due to access restrictions, a precautionary approach to the identification and assessment of biodiversity values on that land has been applied, in consultation with CPHR, including:

- bespoke assessment approaches to determine the presence, absence and distribution of candidate species in inaccessible land, including procuring species expert advice, undertaking literature review, remote sensing, and a review of reference population characteristics
- development of a bespoke roadside vantage point assessment method
- refinement of the State Vegetation Type Mapping (SVTM)
- assumed presence of candidate flora and fauna species.

The integration of field survey data, precautionary assessment, expert input and remote sensing has enabled a comprehensive assessment of biodiversity values across the project area. This is further supported by the extensive survey data collected from previous corridor alignments, which informs the broader regional biodiversity context. This precautionary approach likely overestimates the extent of biodiversity impacts of the project, and additional survey is likely to result in overall predicted biodiversity impacts reducing.

7.1.5 Approach to impact assessment

As outlined in Section 3, construction and operation of the different project elements would result in varying levels of physical disturbance.

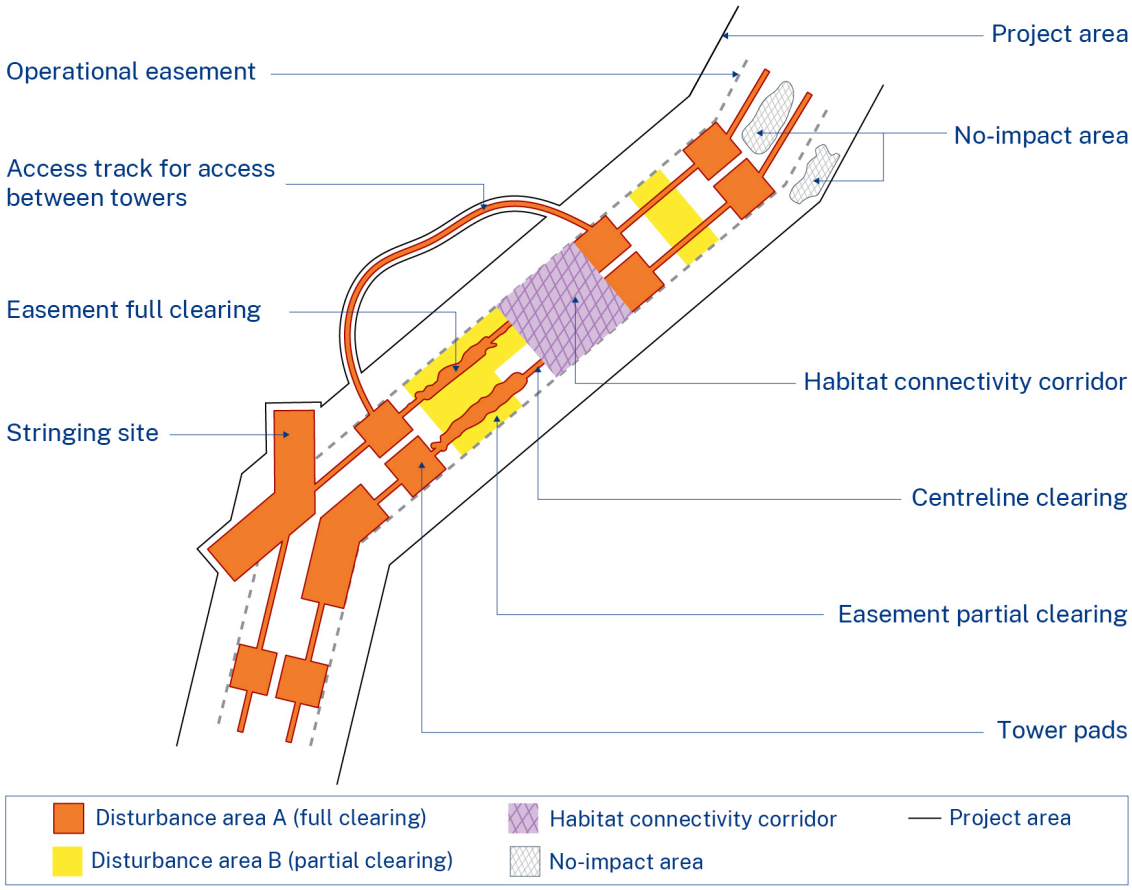
The disturbance footprint categories used in the BDAR to assess biodiversity impacts are outlined in Table 7.1 and illustrated on Figure 7.1. The total disturbance footprint for the project covers 3,579 hectares. These categories enable a more detailed assessment of impacts by aligning disturbance levels with the likely intensity of vegetation removal and habitat modification.

The conceptual approach to vegetation clearing for the project is illustrated in Figure 7.1 and described further in Section 3.3.9.

Table 7.1. Vegetation disturbance area categories

Disturbance footprint area category	Definition	Area (hectares)
Disturbance area A	All vegetation strata within disturbance area A would be removed to facilitate the construction of the project. This includes clearing for transmission line towers and pads, stringing sites, access tracks, ancillary infrastructure, energy hubs, substations and switching stations. Disturbance area A includes a 4 m-wide centreline access track along the length of the project area, and areas within the transmission easement where all vegetation strata would be removed.	3,144
Disturbance area B	Areas within the disturbance footprint where partial clearing would be undertaken. Partial clearing relates to the removal of overstory vegetation, where it has the potential to exceed the clearance heights established for the project. The clearance zone would ultimately be determined by the network operator. EnergyCo has reviewed existing NSW practices, and for the purposes of the EIS, has applied a 10 m clearance between vegetation and the lowest conductor at maximum sag. Partial impacts in disturbance area B therefore result in the removal of trees and shrubs that encroach the 10 m clearance zone, while groundlayer vegetation and habitat features are retained.	435
Total		**3,579**

Further detail on the methodology and application of disturbance footprint categories to the biodiversity assessment is provided in the BDAR (refer to Technical Report 1).



The construction easement for the project is equivalent to the project area and would provide a right of access for the network operator for the construction of the project.

Figure 7.1. Approach to clearing during construction

7.1.6 Biodiversity credit calculations

The BAM Calculator (BAM-C) uses survey data to determine the number and type of biodiversity credits required to offset project impacts. Native vegetation is assessed as ecosystem credits, while threatened species are classified in accordance with the BAM as:

- ecosystem credit species (predicted): species where the likelihood of occurrence and habitat can be reliably predicted from vegetation types and landscape features
- species credit species: species that cannot be reliably predicted from habitat alone and require targeted assessment
- dual credit species: species that may be assessed as both ecosystem and species credits depending on the nature of the impact.

The number of ecosystem credits required to offset impacts on native vegetation are dependent not only on the area of vegetation impacted, but also the condition of the vegetation impacted. The condition of native vegetation is highly variable across the project area ranging from low condition grassland in grazed and modified agricultural land to good condition fully-structured vegetation with a high diversity of flora species. Higher condition native vegetation generates a larger number of ecosystem credits than lower condition vegetation.

For PCTs mapped within inaccessible land, as a precautionary approach, the vegetation condition has been assumed to be at benchmark condition (that is the highest possible condition for use in credit generation).

7.2 Existing environment

7.2.1 Landscape features

The project area intersects 4 IBRA bioregions (including New England Tablelands, Nandewar, NSW North Coast and Sydney Basin) and 10 IBRA subregions. It also intersects 17 NSW (Mitchell) landscapes, which define recurring patterns of geology, landform and vegetation at a regional scale and provide a consistent framework for describing ecological variation. The Moonbi–Walcha Granites, Niangala Plateau and Scone–Gloucester Foothills forms the dominant landscape units, collectively accounting for over half of the project area. The landscape is characterised by the elevated terrain of the Great Dividing Range and associated ridgelines, slopes and valleys, which influence drainage patterns and habitat connectivity across the region. These landscape features all contribute to the varying patterns of biodiversity across the project area.

The project traverses catchments associated with the Gwydir, Macleay, Namoi, Manning and Hunter rivers. The Gwydir and Namoi rivers originate on the western slopes of the Great Dividing Range and form part of the Murray–Darling Basin, while the Macleay, Manning and Hunter rivers flow east to the Pacific Ocean (Engeny, 2026). These systems provide key hydrological linkages and support aquatic and riparian habitats.

Field surveys in accessible areas recorded a range of geological habitat features, including areas of surface rock, rocky outcrops, loose rock and boulder fields. Karst landscapes are also found in the project area, associated with the Timor Caves system. Additional karst features have been identified within the broader locality, including the Barry karst area, which comprises smaller and less well-mapped cave systems. These karst features are considered part of a broader ecological network supporting cave-dependent fauna, including microbats and invertebrate communities. These systems are recognised as highly sensitive due to their ecological, geological and hydrological values.

The New England Tablelands and Hunter Valley are characterised by agricultural (primarily grazing) land that has been largely cleared of native vegetation on the flats and foothills, with intact native vegetation retained on upper slopes and ridgetops.

The project traverses one broad and relatively contiguous landscape scale habitat corridor; a Climate Change Corridor for North East NSW, which is significant for wildlife adaptation to climate change. This corridor provides connectivity between dry and moist forest habitats across the Great Dividing Range, including those contained within Nundle State Forest, Tomalla Nature Reserve, Tomalla State Forest, Black River Nature Reserve, Ben Halls Gap National Park, Ben Halls Gap Nature Reserve, Nowendoc National Park and Tuggolo State Forest.

Fragmented or partially cleared areas can also contribute to overall landscape connectivity (Scotts, 2003), as smaller habitat patches or scattered paddock trees provide connectivity and can function as corridors for mobile species, particularly those willing to cross expanses of cleared land.

Despite intersecting several rivers and a large number of lower order watercourses, no Ramsar-listed or nationally important wetlands occur within the project area or are expected to be directly impacted. The nearest wetland of significance is Mother of Ducks Lagoon in Guyra, NSW, located approximately 10 kilometres northeast of the northern extent of the project area. There are no Areas of Outstanding Biodiversity Value as mapped by the NSW Government within the project area.

7.2.2 Native vegetation

Native vegetation occurs over the majority of the project area, including a relatively even mix of timbered vegetation and grassland communities. Areas not supporting native vegetation are largely associated with existing disturbance (for example infrastructure, roads, dams and cultivated land) and consistent with the BAM, do not require further biodiversity assessment.

Native vegetation has been classified into 7 vegetation formations including:

- wet sclerophyll forests (grassy sub-formation)
- rainforests
- grassy woodlands
- dry sclerophyll forests (shrub/grass sub-formation)
- dry sclerophyll forests (shrubby sub-formation)
- freshwater wetlands
- forested wetlands.

As shown in Table 7.4, 45 PCTs have been mapped across the project area, occurring in a range of condition states from relatively intact native vegetation to vegetation that has been extensively modified by existing land use and disturbance. This diversity of PCTs reflects the broad landscapes across the project area, transitioning from the Hunter Valley floor to the New England plateau.

7.2.3 Threatened ecological communities

A number of TECs occur within the project area, with approximately 5,381.95 hectares of native vegetation within the project area corresponding to 8 NSW TECs listed under the BC Act. Of this 3,684.23 hectares also meets the definitions of 4 Commonwealth TECs listed under the EPBC Act.

These TECs and their extent are provided in Table 7.2 for BC Act-listed communities and Table 7.3 for EPBC Act-listed communities, with their distribution shown on Figure 7.2 and Figure 7.3 respectively.

Table 7.2. BC Act listed threatened ecological communities within the project area

Threatened ecological community	BC Act status	Total area (ha)
Carex Sedgeland of the New England Tableland, Nandewar, Brigalow Belt South and NSW North Coast Bioregions[2]	E	3.14
Central Hunter Grey Box — Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions	E	213.99
Central Hunter Ironbark — Spotted Gum — Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions	E	290.60
Hunter Valley Vine Thicket in the NSW North Coast and Sydney Basin Bioregions[2]	E	7.46
Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions[2]	E	1.64
New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion	CE	372.23
Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion	E	51.74
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions	CE	4,441.13

Note

[1] E= Endangered, CE= Critically Endangered

[2] PCTs within inaccessible areas have been derived from NSW Government mapping. TEC allocation in these areas is based on PCT association and has not been verified through field assessment.

[3] Totals may not add precisely due to rounding of individual values.

Table 7.3. EPBC Act listed threatened ecological communities within the project area

Threatened ecological community	EPBC Act status	Total area (ha)
Central Hunter Valley eucalypt forest and woodland	CE	533.49
New England Peppermint (*Eucalyptus nova-anglica*) Grassy Woodlands	CE	372.23
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions[2]	E	2.59
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	CE	2,775.91

Note

[1] E= Endangered, CE= Critically Endangered

[2] PCTs within inaccessible areas have been derived from NSW Government mapping. TEC allocation in these areas is based on PCT association and has not been verified through field assessment.

[3] Totals may not add precisely due to rounding of individual values.

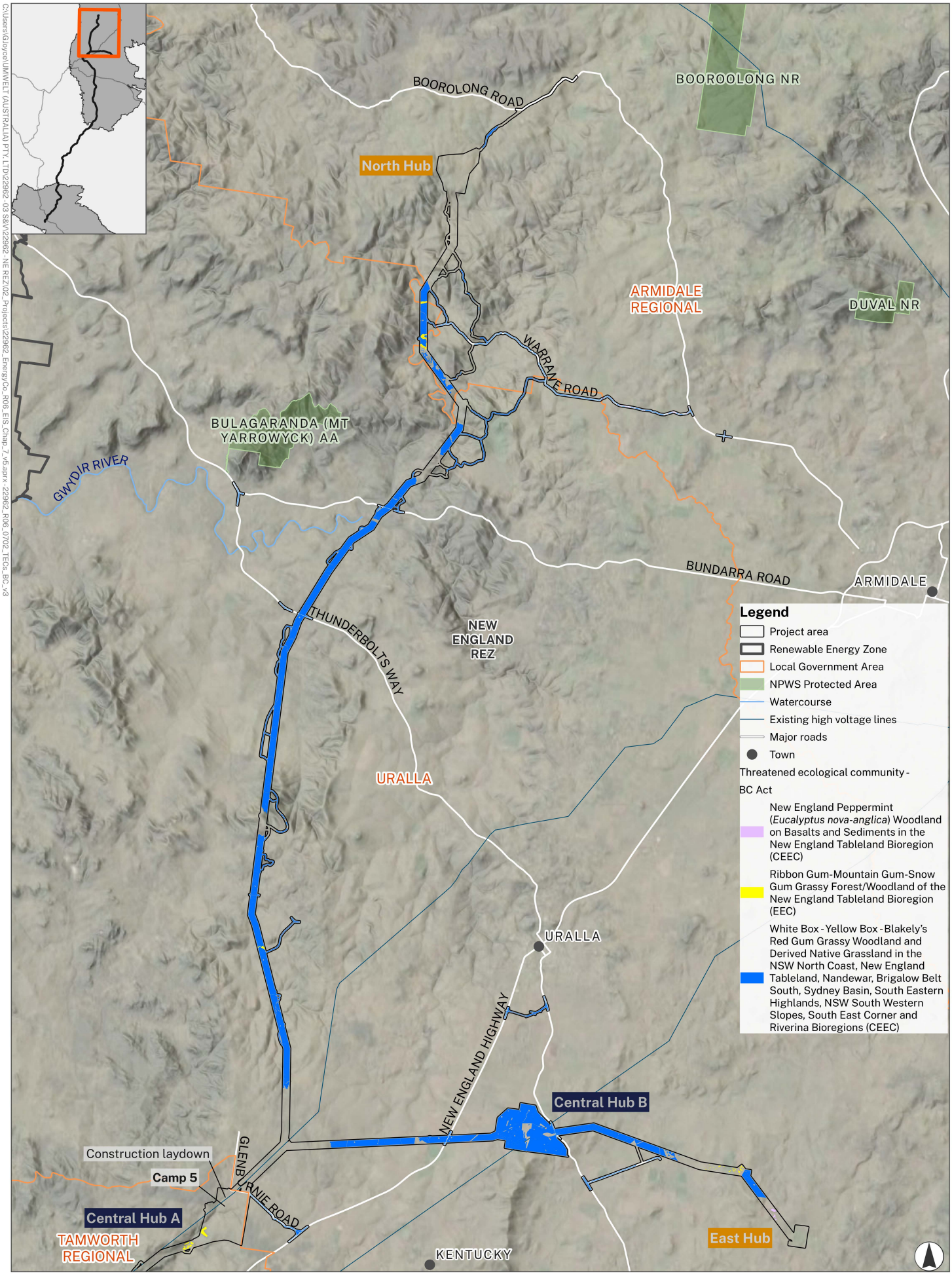


FIGURE 7.2a Threatened ecological communities - BC Act (Map 1 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

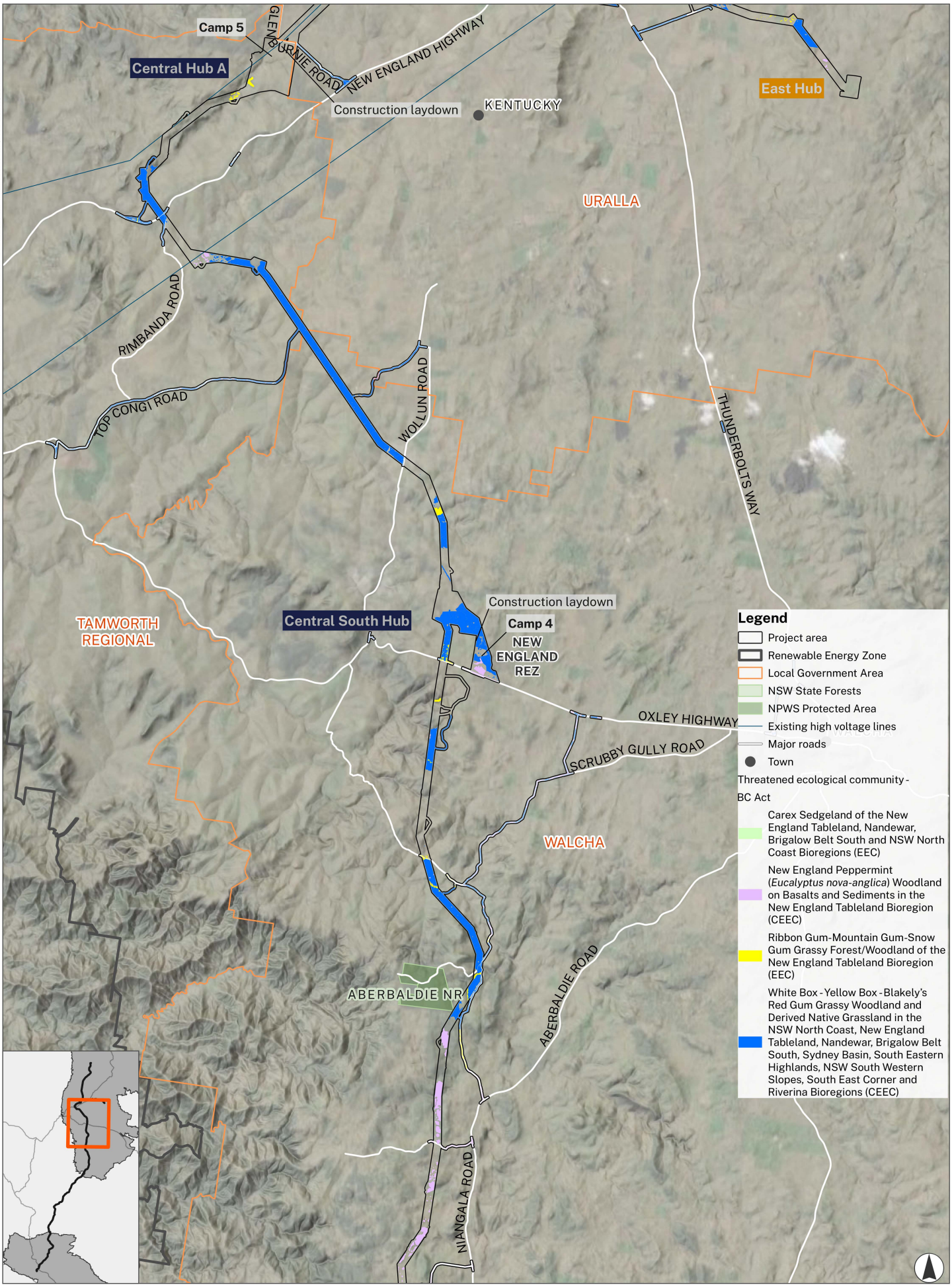


FIGURE 7.2b Threatened ecological communities - BC Act (Map 2 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

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Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

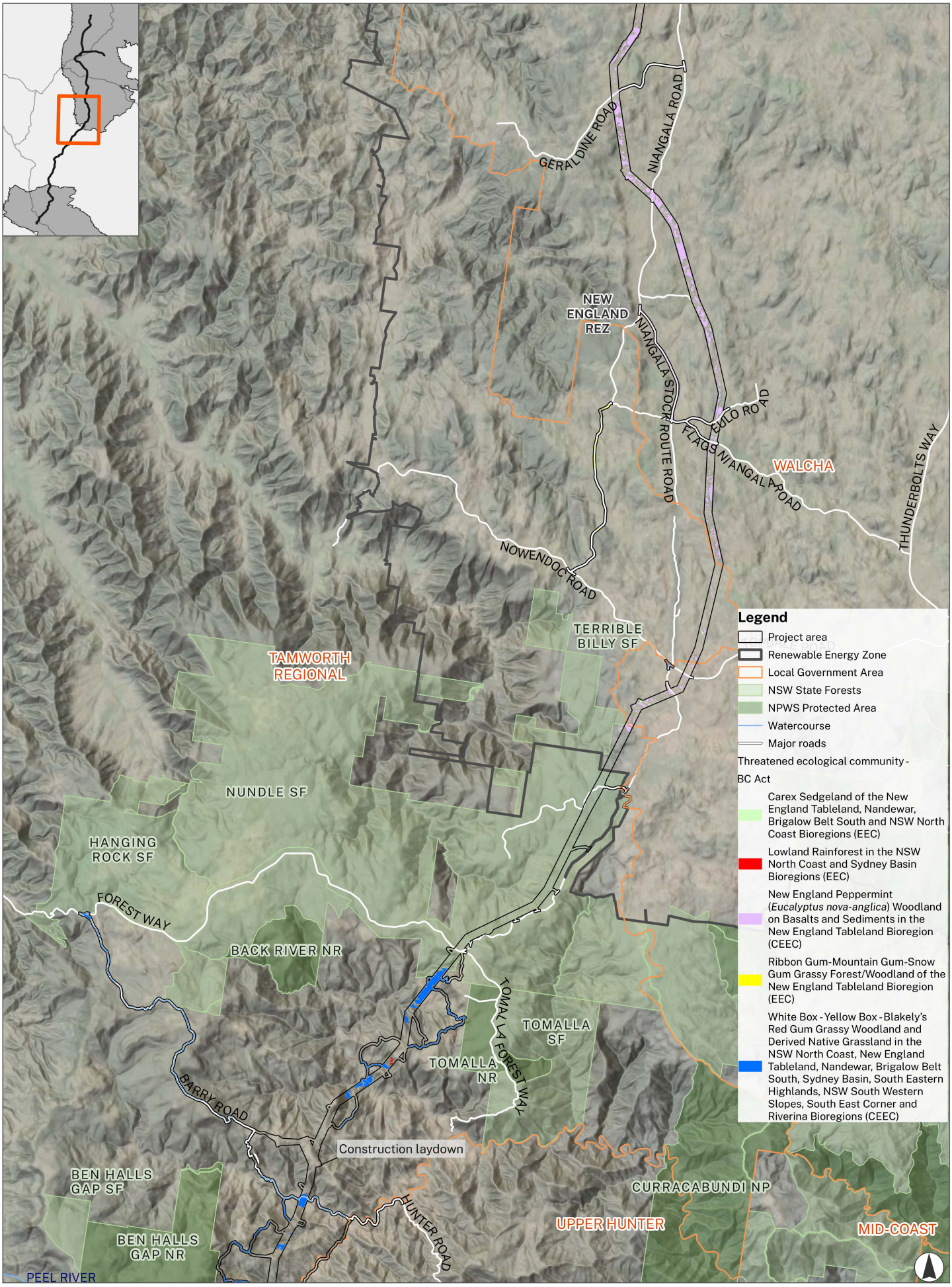


FIGURE 7.2c Threatened ecological communities - BC Act (Map 3 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

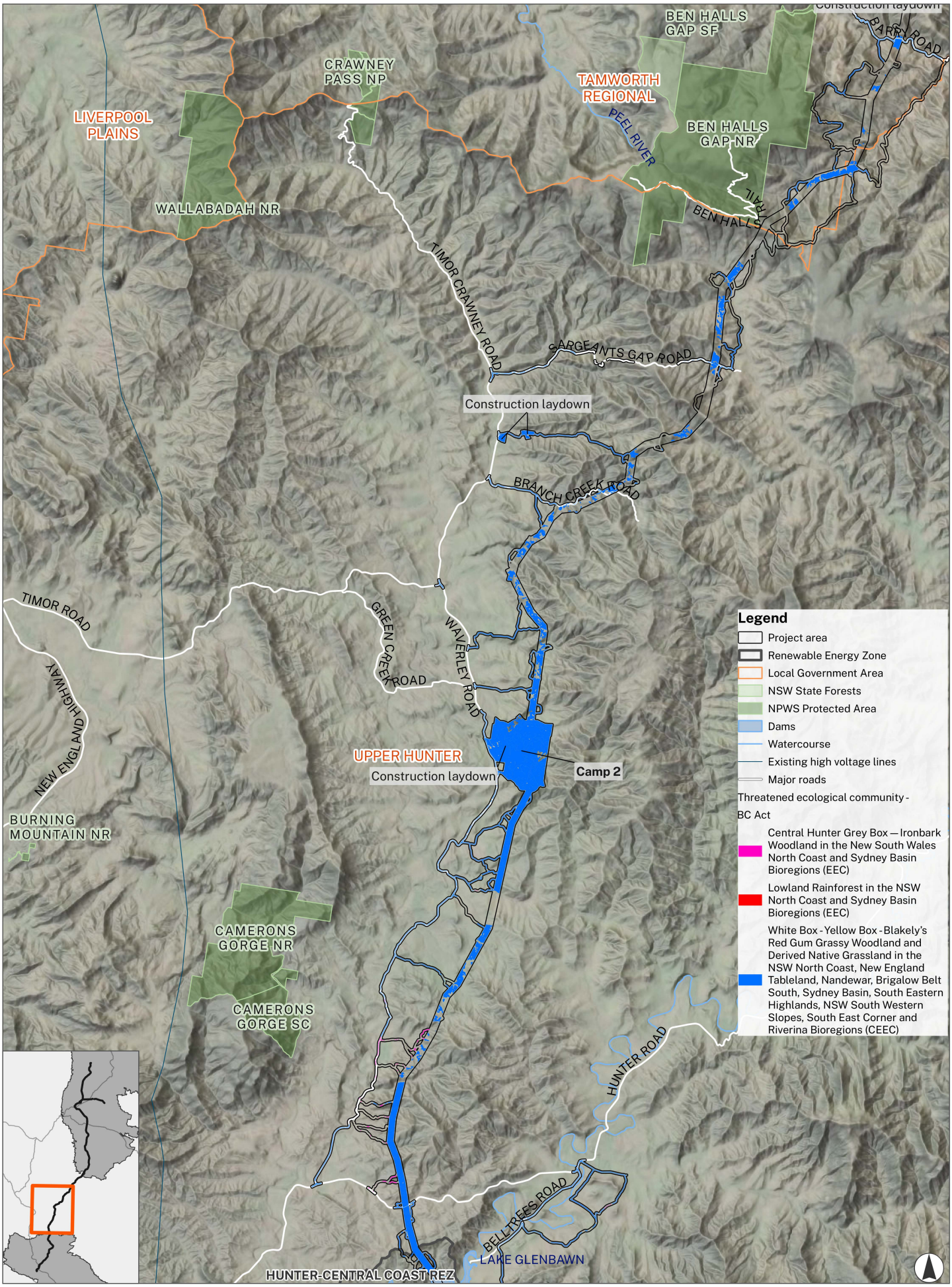


FIGURE 7.2d Threatened ecological communities - BC Act (Map 4 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

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Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

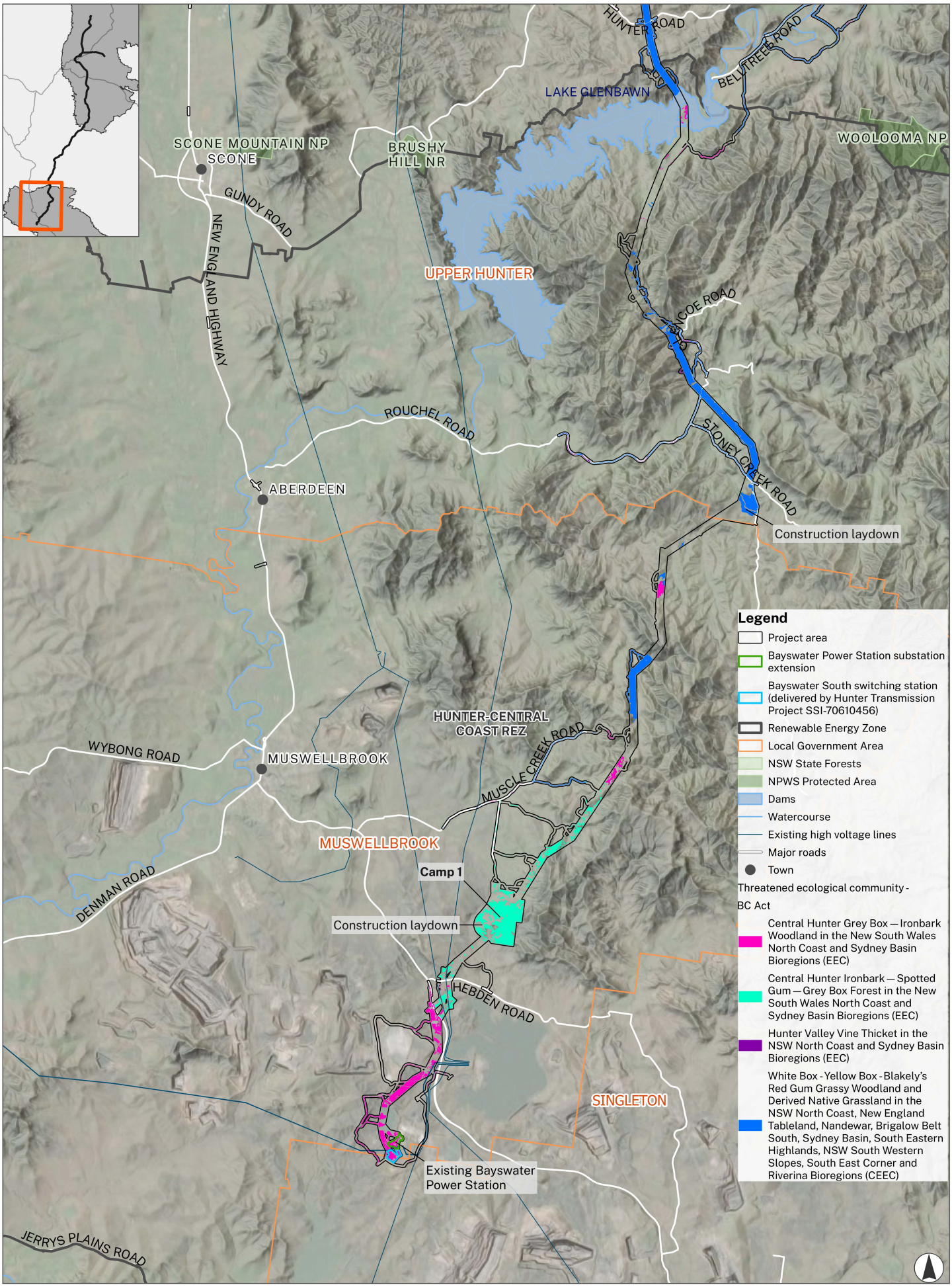


FIGURE 7.2e Threatened ecological communities - BC Act (Map 5 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

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Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

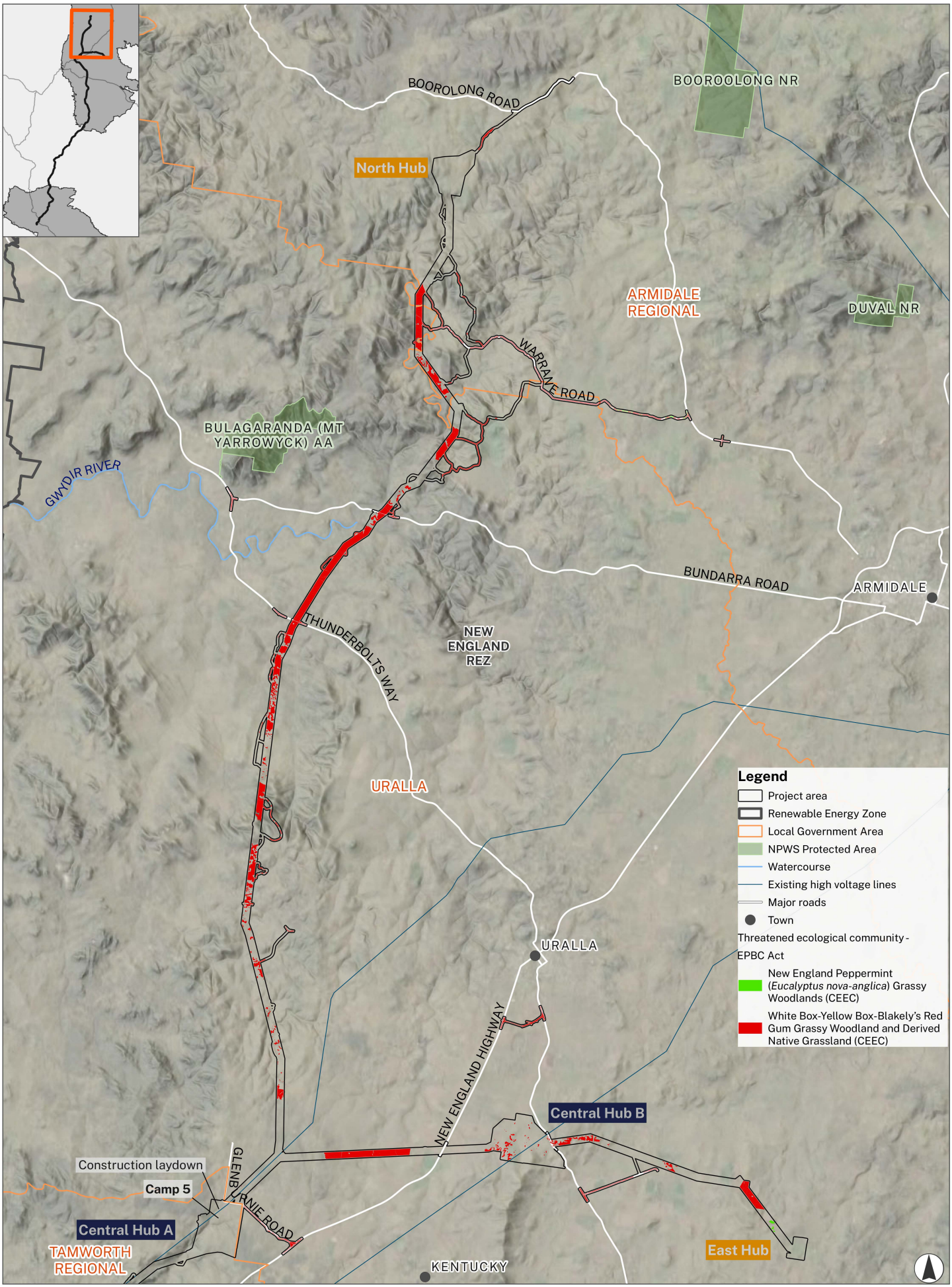


FIGURE 7.3a Threatened ecological communities - EPBC Act (Map 1 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

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Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

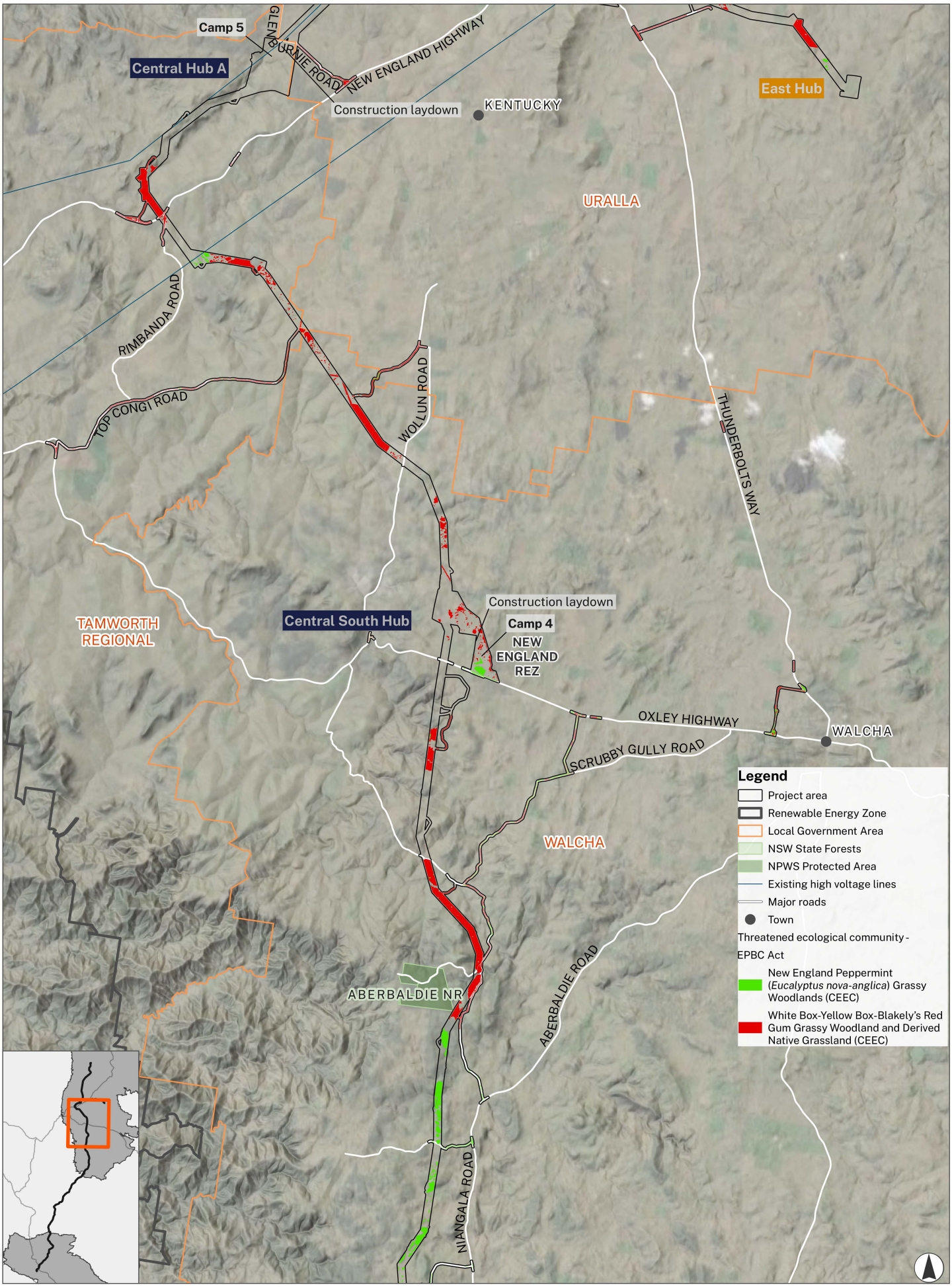


FIGURE 7.3b Threatened ecological communities - EPBC Act (Map 2 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

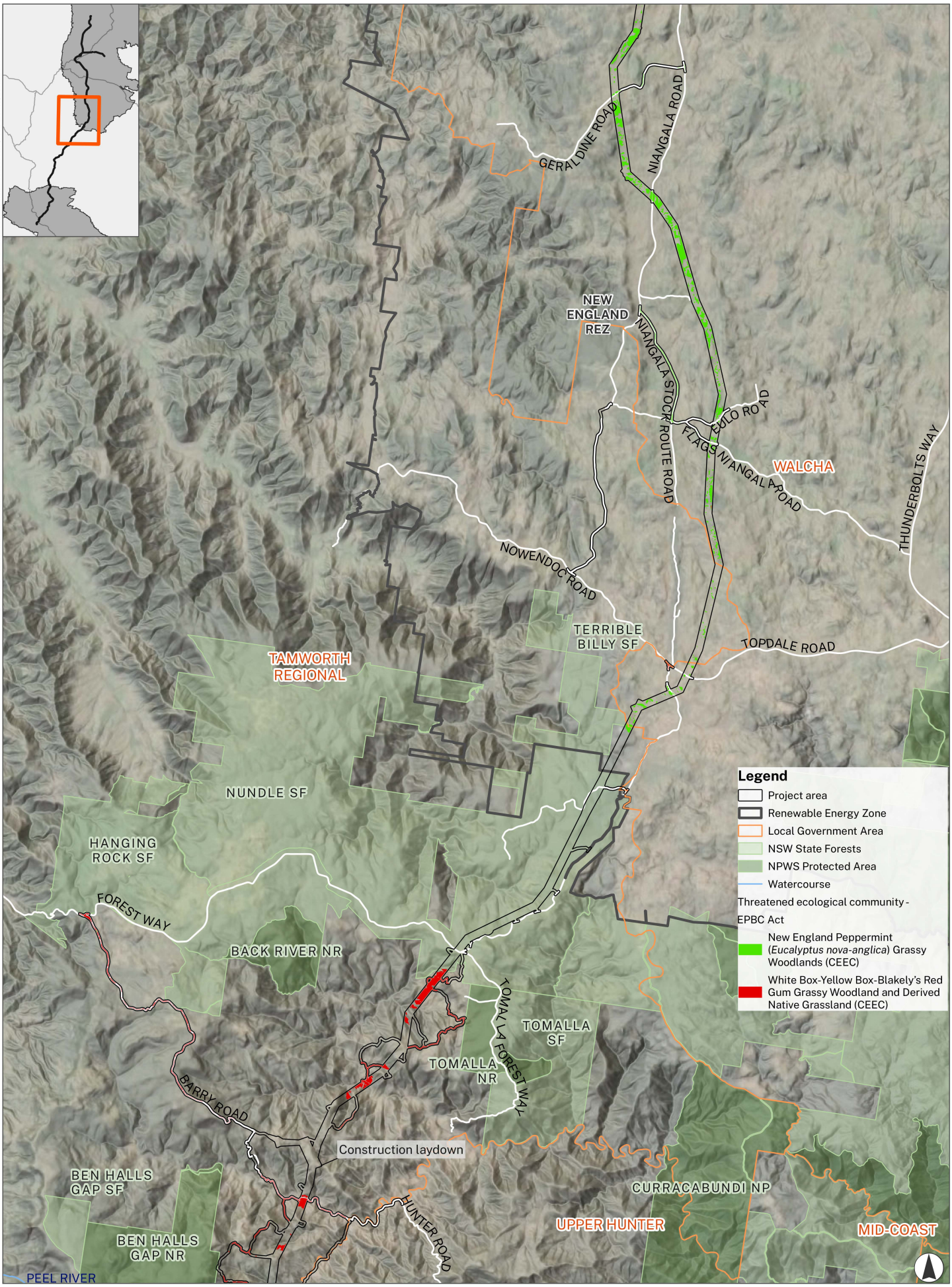


FIGURE 7.3c Threatened ecological communities - EPBC Act (Map 3 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

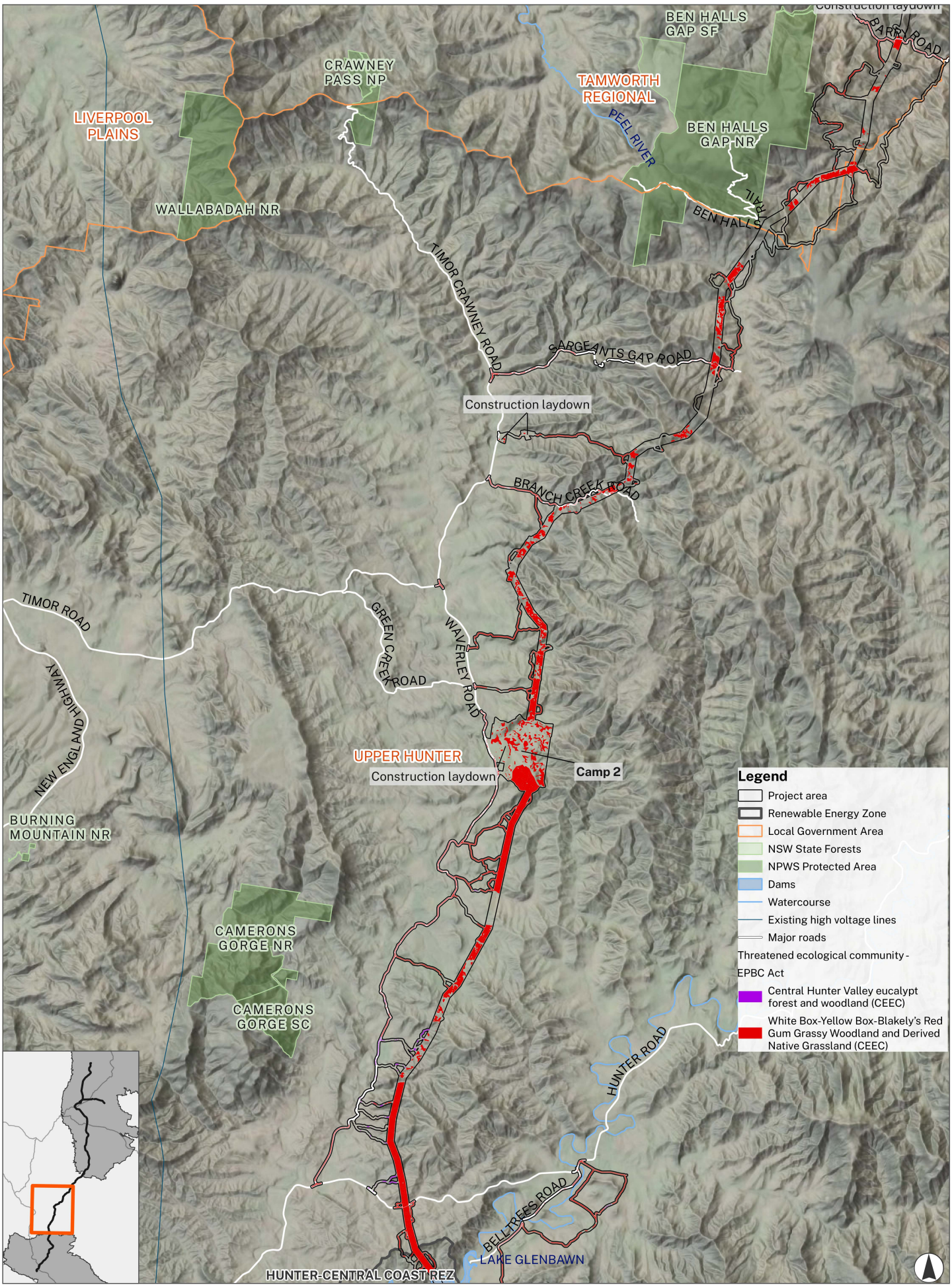


FIGURE 7.3d Threatened ecological communities - EPBC Act (Map 4 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

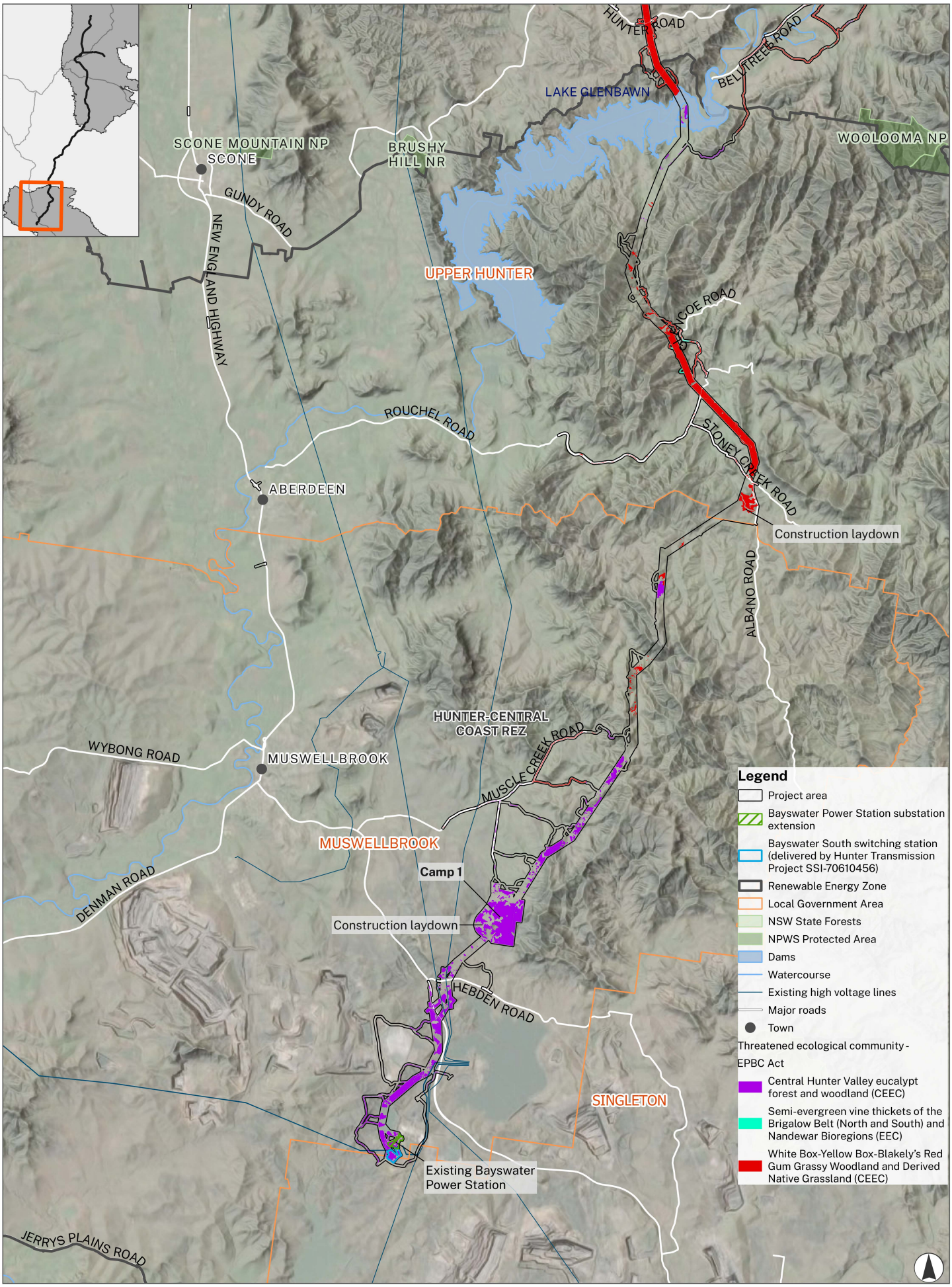


FIGURE 7.3e Threatened ecological communities - EPBC Act (Map 5 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

7.2.4 Threatened flora

A total of 52 candidate threatened flora species were initially identified as having potential to occur within the project area, based on database searches and consultation with CPHR.

Following a review of habitat suitability, geographic distribution and other relevant constraints, 9 species were excluded from further assessment. The remaining 43 species were assessed in accordance with the BAM, including targeted field surveys where required.

Targeted surveys have recorded 8 threatened flora species (including one endangered population) (refer to Figure 7.4). A further 6 species were subject of targeted surveys but were not recorded and are therefore considered unlikely to occur within the project area.

The remaining 29 species were not recorded but were assumed to be present where suitable habitat occurs, as their absence could not be verified due to access limitations or survey constraints.

The threatened flora species recorded or assumed to be present in the disturbance footprint are listed in Section 7.4.1.3.

7.2.5 Threatened fauna

A total of 50 candidate threatened fauna species were initially identified as having potential to occur within the project area, based on database searches and consultation with CPHR.

Following a review of habitat suitability, geographic distribution and other relevant constraints, 15 species were determined to not require further assessment. This included 5 species that were excluded based on the findings of expert assessments undertaken by NSW DCCEEW approved biodiversity experts.

The remaining 35 species were assessed in accordance with the BAM and were considered present within the project area (either due to being recorded or assumed present where suitable habitat occurs).

Targeted field surveys recorded 23 threatened fauna species (refer to Figure 7.4). The remaining 12 species were not recorded but were assumed to be present where suitable habitat occurs, as their absence could not be verified due to access or survey constraints. For a number of these species, NSW DCCEEW approved biodiversity experts assessed the likelihood of occurrence and extent of suitable habitat across accessible and inaccessible areas of the project.

The threatened fauna species recorded or assumed to be present in the disturbance footprint are listed in Section 7.4.1.4.

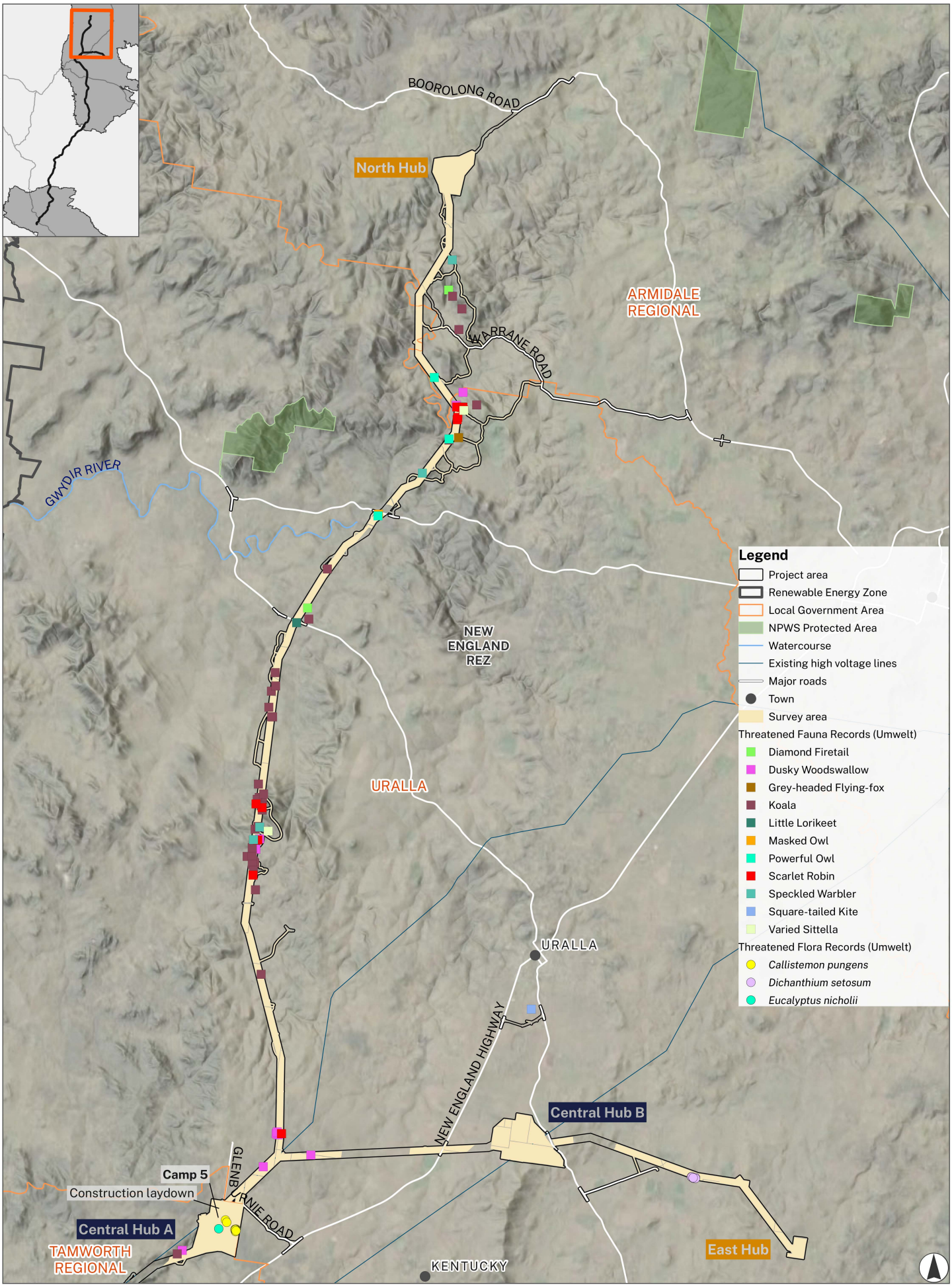


FIGURE 7.4a Threatened flora and fauna species (Map 1 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

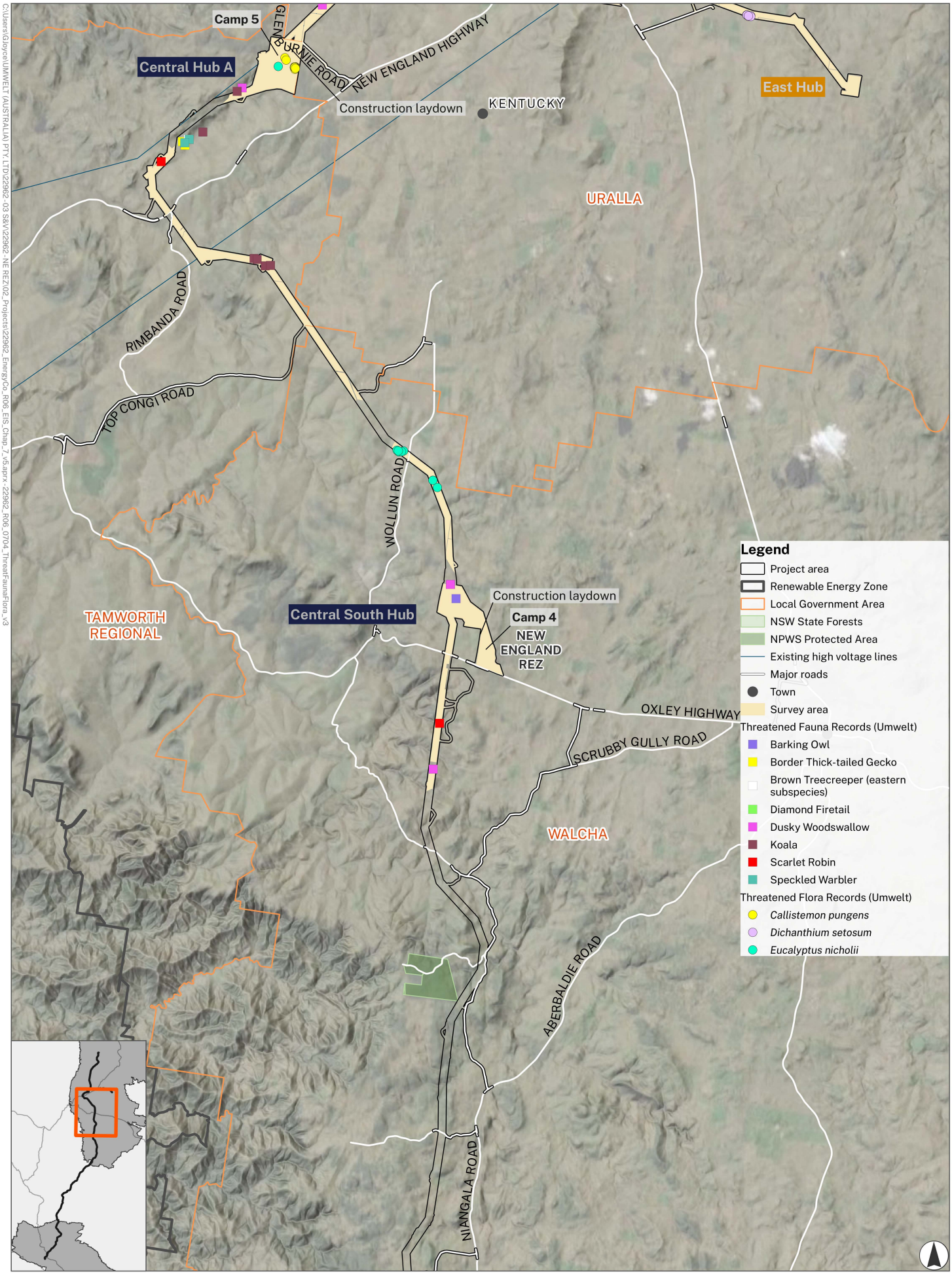


FIGURE 7.4b Threatened flora and fauna species (Map 2 of 5)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

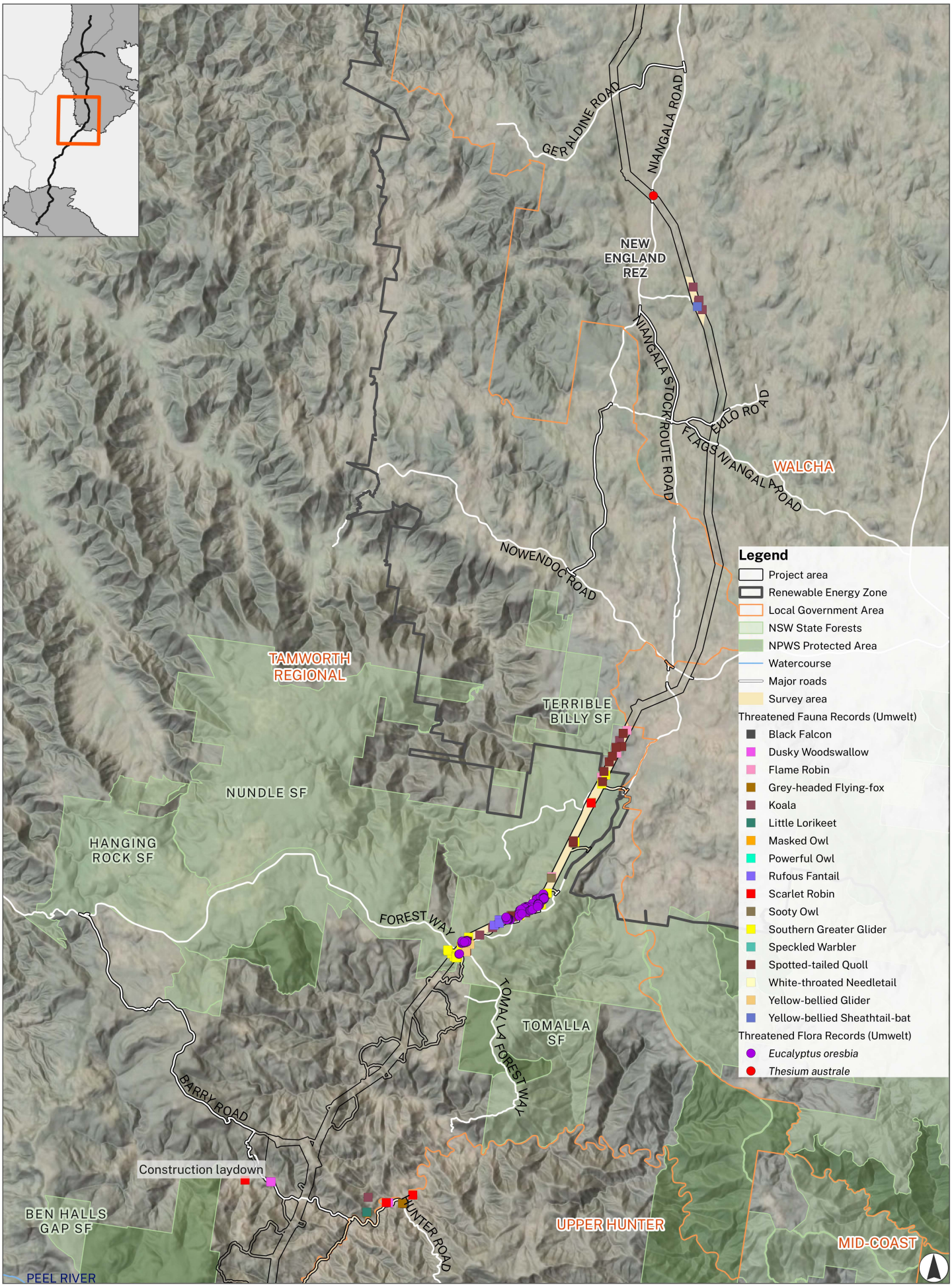


FIGURE 7.4c Threatened flora and fauna species (Map 3 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

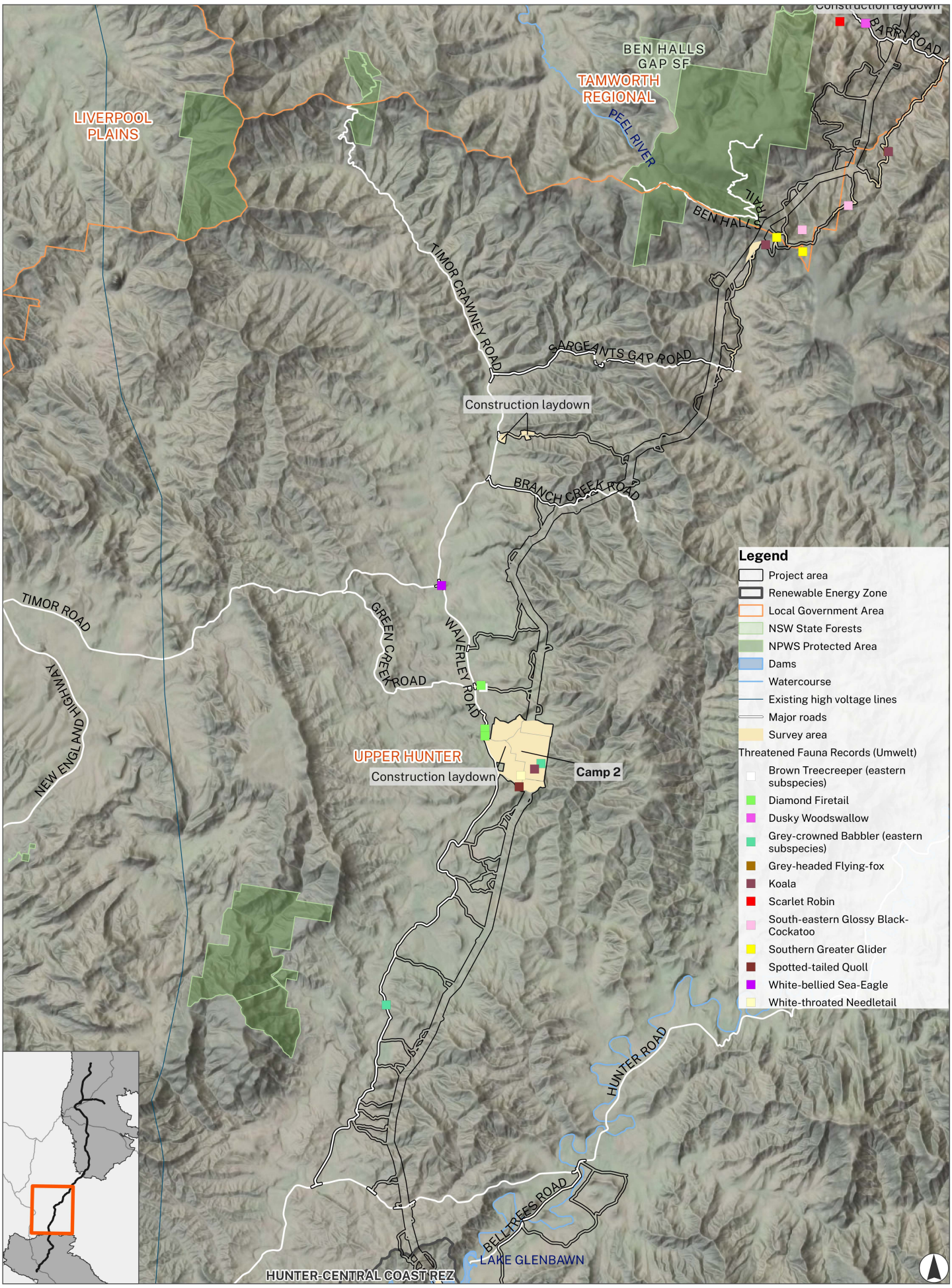


FIGURE 7.4d Threatened flora and fauna species (Map 4 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

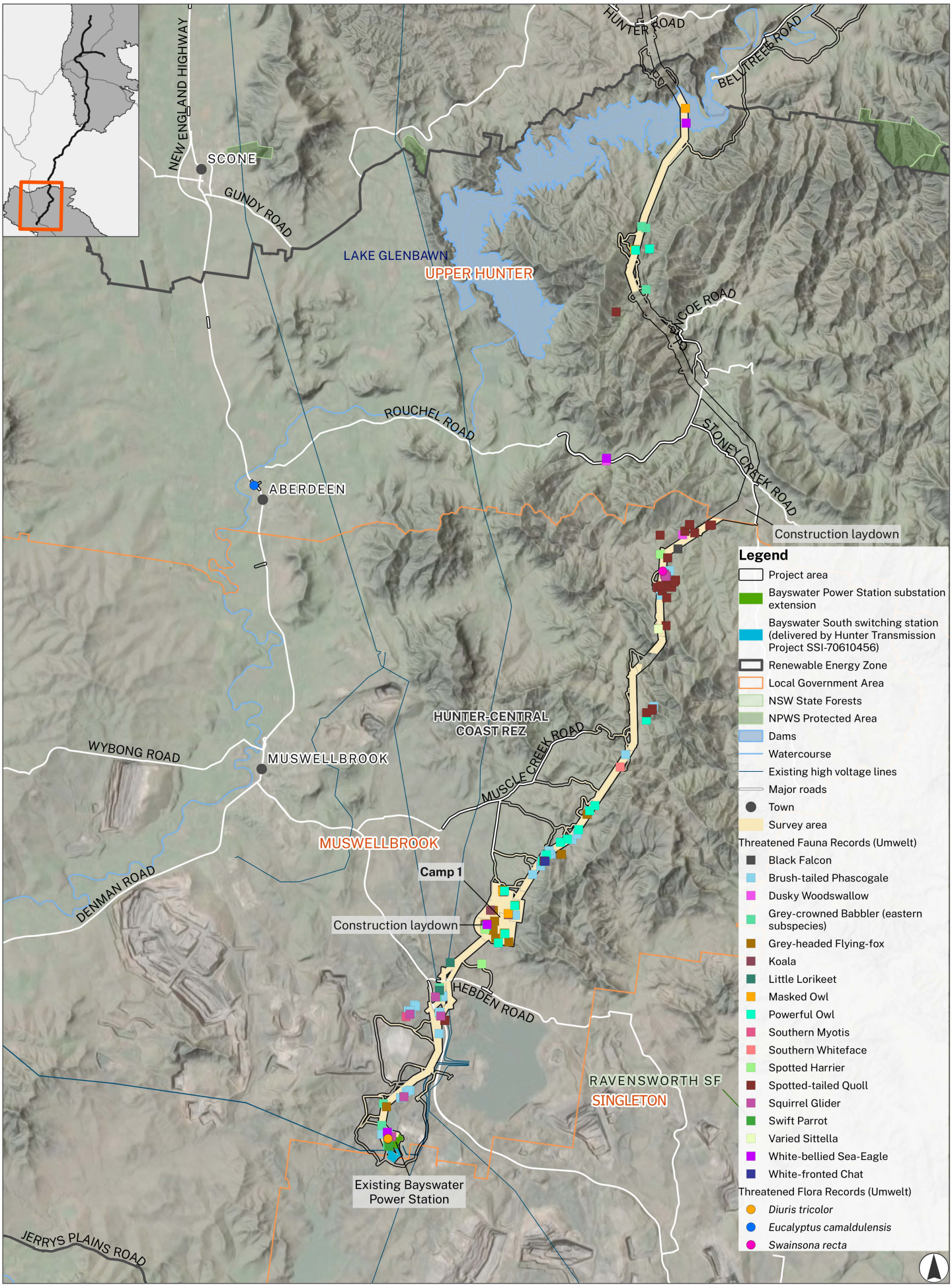


FIGURE 7.4e Threatened flora and fauna species (Map 5 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

7.2.6 Aquatic ecology

The project area extends across 5 catchments, including the Gwydir, Macleay, Namoi, Manning and Hunter rivers. These catchments contain numerous named and unnamed watercourses and associated riparian vegetation. Further detail on these catchments and watercourses, including Strahler stream order, is provided in Section 18.

Eight named watercourses intersected by the project area contain areas mapped as high-value fish habitat under NSW Fisheries mapping, indicating that these areas contain high-quality aquatic habitat with permanent or near-permanent flow conditions and suitable habitat for threatened species. The Barnard River near Barry is known to support habitat for the threatened Manning River Helmeted Turtle (*Myuchelys purvisi*), while the Macdonald River near Niangala Road at Walcha supports habitat for threatened Bell's turtle (*Myuchelys bellii*). There is also potential habitat for several other threatened aquatic species with impacts on aquatic species provided in Section 7.2.5.

No ecological communities listed under the *Fisheries Management Act 1994* (FM Act) are present within the project area.

7.2.7 Groundwater dependent ecosystems

Groundwater dependent ecosystems (GDEs) are ecosystems that rely on groundwater for their persistence and ecological function. This dependence may occur through surface expression of groundwater, such as baseflow watercourses, wetlands and springs, or through subsurface access to groundwater by vegetation via the capillary fringe above the water table.

GDEs are broadly classified into 3 functional groups:

- aquatic ecosystems that depend on the surface expression of groundwater, such as wetlands, springs and gaining streams
- terrestrial ecosystems that rely on subsurface groundwater, typically accessed by deep-rooted vegetation
- subterranean ecosystems that occur below ground and depend on groundwater, including stygofauna and cave systems.

Within the project area, aquatic GDEs are generally considered to have moderate to high groundwater dependence. The Macdonald River is a gaining system with known groundwater interaction.

Potential terrestrial GDEs within the project area comprise a range of native vegetation communities identified from regional studies, exhibiting varying degrees of groundwater dependence from low to high. These communities occur across the Namoi, Gwydir, Manning and Hunter River regions.

The Groundwater Assessment (Technical Report 16) identified areas of high-value terrestrial GDEs within the project area, including Blakely's Red Gum - Yellow Box grassy woodland of the New England Tablelands Bioregion.

A review of the Bureau of Meteorology GDE Atlas did not identify any subterranean GDEs within the project area. However, a small portion of the project area, associated with Sargeants Gap Road, is located in proximity to Timor Caves. A number of caves at Timor are known to contain permanent

lakes, which support habitat for stygofauna such as syncarids (OEH, 2011a). A high abundance of stygofauna have been reported from Timor Caves, associated with the presence of aquatic root mats in caves that comprises a substantial and reliable food source (Thurgate et al 2001). Further caves are known to occur near Barry but no known cave systems are intersected by the project area. While the full extent of the Barry cave system has not been confirmed, sections of the transmission alignment and access tracks occur within the Manning Group Limestone Beds, which are understood to host the Barry cave system. Timor and Barry Caves are both considered GDEs.

7.2.8 Biodiversity of recently identified ancillary sites

The location of workforce accommodation Camp 3 has only recently been identified for the project, following ongoing investigations over an extended period. In May 2026, a potential option for this camp was identified in the Barry locality. EnergyCo has commenced discussions with the landholder regarding the further investigation and potential acquisition of this property.

Through ongoing engagement with Muswellbrook Shire Council, a possible alternative location for Camp 1 has also been identified (referred to as Camp 1 Alternate). EnergyCo is currently investigating the site in consultation with Council.

Neither of these alternatives were considered in the BDAR and do not currently form part of the project area. However, a desktop review and targeted site inspection were undertaken at both locations to identify potential biodiversity constraints through PCT identification, habitat classification and opportunistic threatened species observations.

The Camp 1 Alternate preliminary assessment findings were:

- the presence of disturbed grassland communities where many habitat features were absent, these areas would require further survey and assessment to document potential threatened species habitat
- the presence of an endangered population, being *Cymbidium canaliculatum* population in the Hunter Catchment
- good availability of hollow-bearing trees providing potential habitat for threatened arboreal mammals, hollow-dependent birds and bat species
- some vegetation that may conform to TECs but that requires further detailed survey and assessment
- potential habitat for some locally recorded threatened flora species that would require further survey and assessment.

Biodiversity constraints identified on Camp 1 Alternate are concentrated in the western portion of the site. Woodland vegetation across these areas generally comprise an intact tree canopy that is likely consistent with the Central Hunter Grey Box–Ironbark Woodland listed as an Endangered Ecological Community (EEC) under the BC Act, and the Central Hunter Valley eucalypt forest and woodland listed as a Critically Endangered Ecological Community (CEEC) under the EPBC Act. Large, mature hollow-bearing trees occur in high densities across the site, potentially providing habitat for threatened hollow-dependent species known to occur in the locality, including arboreal mammals and hollow-nesting birds.

The Camp 3 preliminary assessment findings were:

- a predominantly cleared parcel of land containing a mix of native and exotic grassland
- some potential habitat for threatened arboreal mammals within areas supporting trees
- potential habitat for migrating woodland bird species
- potential for some locally occurring threatened species to utilise the riparian corridor to the north.

Biodiversity constraints identified on the Camp 3 site are largely confined to areas supporting trees, higher quality vegetation occurring along the property boundaries, the Barnard River riparian corridor, and within steeper, less accessible areas. In contrast, the degraded paddocks are predominantly located in more accessible parts of the site, which have been cleared and disturbed over time. Consequently, these areas represent lower biodiversity constraints and are more suitable for development than the less accessible areas that support more intact native vegetation.

Both of these locations would be subject to full assessment in the revised BDAR as part of the Submissions Report and Amendment Report, including biodiversity survey.

7.3 Avoidance

Throughout the development of the project, EnergyCo has sought to avoid and minimise impacts to biodiversity. At every stage of development and refinement of the project, consideration has been given to avoiding and minimising direct and indirect impacts on native vegetation, threatened species, threatened ecological communities and their habitat.

At the early planning and strategic design stages, route selection prioritised the avoidance of environmentally sensitive areas, including National Park estate, World Heritage areas, Ramsar wetlands and declared wilderness areas. The route selection process also sought to minimise impacts on native vegetation, TECs, threatened species habitat, core koala habitat, named watercourses and key fish habitat. The preferred study corridor for the project was ultimately announced in July 2024.

Investigations and analyses carried out in late 2024 and into 2025 confirmed that there were significant and compounding constraints along this study corridor, mainly between the Central South Energy Hub and Bayswater Power Station, driven by steep terrain. A new study corridor was announced in October 2025 following further engineering, environmental and constructability investigations. Compared with the preferred study corridor, the new study corridor was shorter, traversed less forest and woodland vegetation and avoided a number of biodiversity constraints. The new study corridor would result in reduced habitat loss and fragmentation, including for threatened species such as koalas and other arboreal mammals. The new study corridor also reduces vegetation clearing by requiring fewer towers, a shorter total length of construction access tracks and significantly fewer spoil haulage movements, which would reduce fauna strike risk.

Further refinement to the new study corridor was undertaken in 2026 through development of the generally 250 metre-wide project area and reference design. This refinement further reduced biodiversity impacts at a local scale through avoidance and minimisation of impacts on biodiversity constraints identified through consultation, field surveys and detailed design investigations.

The project area further avoided biodiversity impacts at a local scale, including:

- further minimising vegetation clearing for tower pads and within the easement, by reducing the overall length of the transmission easement and the number of towers required
- the transmission line corridor avoiding the mapped extent of karst at Timor Caves (except for minor unsealed road widening of Sargeants Gap Road), thereby avoiding direct and indirect impacts on limestone cave systems, rare fossil assemblages, cave-dwelling fauna species (including threatened microbats), hydrological processes and geomorphological features
- avoiding a number of high biodiversity values at Barry, including habitat for the endangered Manning River turtle (*Myuchelys purvisi*) in the Barnard River, 383 individual small-fruited mountain gum (*Eucalyptus oresbia*) which is a threatened tree species at risk of serious and irreversible impact (SAII), and an identified area of karst that contains a number of caves, which support habitat for threatened microbats and invertebrates and contain fragile speleothems.

In addition, the following avoidance and minimisation measures have been incorporated into the development of the reference design:

- locating project infrastructure to avoid high conservation biodiversity values, such as intact and/or good condition patches of TECs, threatened flora species and threatened species habitat
- locating tower pads in cleared or previously disturbed areas or along ridgelines where practicable, to retain vegetation in more sensitive slopes and gullies
- implementing partial vegetation clearing within the disturbance footprint, which allows for the retention of shrub and ground layer species while canopy trees are selectively removed
- retention of riparian vegetation and establishment of Indicative Habitat Connectivity Corridors by spanning watercourses and gullies where adequate conductor clearance can be achieved, maintaining connectivity between larger habitat areas, where practicable
- using existing access tracks where practicable to minimise additional vegetation clearing and minimising construction of new access tracks
- detailed design and final siting of permanent and temporary project infrastructure to avoid and minimise impacts on TECs, threatened species habitat, rocky habitat features, watercourses and other identified biodiversity constraints where practicable.

Refinement of the reference design will continue following the exhibition of the EIS. This will aim to further avoid and minimise impacts on biodiversity as refinements are made and/or biodiversity surveys within the subject land identify new biodiversity values that warrant avoidance. Detailed design and micro siting will continue to consider how permanent and temporary project infrastructure is built and where it is located, to avoid and minimise impacts on biodiversity.

7.4 Potential impacts – construction

7.4.1 Direct impacts

7.4.1.1 Native vegetation

The project area contains 10,028 hectares of native vegetation. Native vegetation occurs in a range of condition states from relatively intact native vegetation to vegetation that has been extensively modified by existing land use and disturbance. A total of approximately 3,203 hectares of native vegetation mapped in the disturbance footprint would be removed, which is approximately 31.94 per cent of the native vegetation in the project area.

A large proportion of the project area has been historically cleared for agricultural and other land uses. Native vegetation comprises approximately 92 per cent of the disturbance footprint, of which 42 per cent consists of timbered vegetation (that is, forest and woodland PCTs) and 58 per cent of native grasslands (that is, derived native grasslands and degraded grasslands). The remaining 8 per cent of the disturbance footprint comprises non-native vegetation, cleared land or other non-vegetated areas.

Construction of the project would result in direct impacts to 45 PCTs mapped within the disturbance footprint. Approximately 2,784 hectares of native vegetation would be fully cleared (disturbance area A) and approximately 418.6 hectares would be partially cleared (disturbance area B).

Table 7.4 presents the extent of impact to each PCT along with the ecosystem credit liability for each PCT. For PCTs mapped within inaccessible land, as a precautionary approach, the vegetation condition has been assumed to be at benchmark condition (that is the highest possible condition for use in credit generation).

Table 7.4. Summary of predicted direct impacts on native vegetation

Plant Community Type	Disturbance area A (ha)	Disturbance area B (ha)	Total area impacted (ha)	Ecosystem credit liability
3086 - Lower North Hinterland Riparian Dry Rainforest	0.18	0	0.18	9
3114 - Upper Hunter Ranges Moist Gully Forest	3.01	0.22	3.22	136
3120 - Hunter-Peel Ranges Dry Rainforest	2.13	0	2.13	107
3151 - Northwest Sydney Sandstone Grey Myrtle Dry Rainforest	0.74	0	0.74	28
3282 - Liverpool Range Apple Gully Forest	2.49	0.64	3.14	104
3283 - Liverpool Range Montane Stringybark Forest	12.77	0	12.77	456

Plant Community Type	Disturbance area A (ha)	Disturbance area B (ha)	Total area impacted (ha)	Ecosystem credit liability
3284 - Liverpool Range Ribbon Gum-Stringybark Forest	33.69	0	33.69	886
3285 - Lower North Escarpment Blue Gum Grassy Forest	16.24	0	16.24	609
3286 - Northern Escarpment Blackbutt Cool Moist Forest	2.85	0	2.84	74
3287 - Northern Escarpment Messmate Cool Wet Forest	13.85	0	13.85	460
3288 - Northern Escarpment Messmate Moist Grassy Forest	219.53	0	219.53	6,686
3314 - Central Hunter Slopes Grey Box Forest	61.65	9.41	71.06	1,355
3315 - Central Hunter Ironbark-Spotted Gum Forest	126.88	24.45	151.34	2,249
3344 - New England Ribbon Gum Grassy Forest	37.98	12.81	50.79	1,345
3345 - New England Snow Gum-Black Sally Woodland	190.72	83.42	274.13	7,199
3353 - Guyra Silvertop Stringybark Moist Forest	147.51	31.64	179.15	2,263
3354 - Liverpool Range Box-Silvertop Stringybark Forest	246.41	0.04	246.46	7,344
3357 - Western New England Flats Apple-Box Grassy Forest	0.07	0	0.07	3
3359 - New England Hills Stringybark-Box Woodland	67.56	27.39	94.96	1,479
3363 - Western New England Blakelys Red Gum-Box Grassy Forest	526	87.82	613.83	11,291
3379 - Barrington-Point Lookout Montane Grassy Forest	0.67	0	0.67	25

Plant Community Type	Disturbance area A (ha)	Disturbance area B (ha)	Total area impacted (ha)	Ecosystem credit liability
3395 - Northwest Elevated White Box Woodland	349.31	22.48	371.80	12,447
3396 - Northwest Slopes Box-Blakelys Red Gum Woodland	126.11	4.26	130.38	3,124
3397 - Northwest Yellow Box Grassy Woodland	3.61	1.08	4.68	254
3401 - Upper Hunter Sheltered Viney Shrub Forest	2.72	0	2.72	100
3431 - Central Hunter Ironbark Grassy Woodland	83.21	15.1	98.32	2,109
3439 - Hunter Escarpment Grey Gum Sheltered Forest	0.11	0.26	0.37	10
3521 - Northwest White Box Woodland	62.81	7.5	70.31	2,931
3525 - Upper Hunter Box-Blakelys Red Gum Grassy Forest	117.27	22.24	139.52	1,820
3705 - Western New England Hills Apple-Stringybark Forest	0.02	0	0.02	1
3722 - Western New England Box-Tumbledown Gum Grassy Forest	0.42	0	0.42	18
3723 - Western New England Panic-Wiregrass Grassland	0.01	0	0.01	1
3724 - Western New England Caleys Ironbark-Tumbledown Gum Forest	0.03	0	0.03	1
3725 - Western New England Ranges Orange Gum-Blackbutt Forest	3.36	0	3.36	169
3728 - Western New England Hills Blackbutt-Stringybark Forest	0.34	0	0.34	15
3729 - Western New England Youmans Stringybark Shrub Forest	26.81	12.55	39.37	1,294

Plant Community Type	Disturbance area A (ha)	Disturbance area B (ha)	Total area impacted (ha)	Ecosystem credit liability
3855 - Western New England Rocky Granite Low Woodland	0.53	0	0.53	24
3935 - Eastern New England Rocky Riparian Scrub	0.19	0	0.19	6
3944 - New England Tableland Carex Fens	0.79	0.14	0.93	30
4015 - Central Hunter Riparian Forest	3.58	2.41	5.98	132
4073 - Lower North Hinterland River Oak Forest	1.76	0	1.76	88
4079 - Northern Hinterland Grassy River Oak Forest	5.06	0	5.06	190
4080 - Northwest River Oak-Apple Forest	14.79	1.22	16.01	577
4125 - New England Youmans Stringybark-Box Forest	245.93	47.17	293.1	2,705
4142 - New England Hills Red Gum-Stringybark Shrub Forest	22.69	4.31	27	407
Total =	2,784.39	418.56	3,203	72,561

Note:[1] Disturbance areas A and B include areas that were inaccessible to survey; vegetation condition and extent in these areas could not be confirmed through field assessment. Vegetation mapping in these areas is based on NSW Government mapping.

[2]Totals may not add precisely due to rounding of individual values.

7.4.1.2 Threatened ecological communities

As part of the development of the reference design, efforts were made to locate project infrastructure to avoid impacts on TECs, in particular on areas of intact and/or good condition TEC. In addition to other project changes such as the reduction in project length achieved in the October 2025 project alignment change, these changes have reduced the overall impact of the project on TECs.

Direct impacts to TECs are summarised in Table 7.5 for BC Act-listed communities and Table 7.6 for EPBC Act-listed communities. It is noted that in inaccessible areas, it has been assumed that any PCT mapped by the SVTM that has a potential association with a TEC is that TEC. This is a conservative assumption as not all associated PCTs meet the diagnostic criteria for a TEC, including factors such as condition.

Six endangered and 2 critically endangered TECs listed under the BC Act would be impacted. Impacts to TECs listed under the EPBC Act are discussed in Section 7.4.1.6.

White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community listed under the BC Act occurs within the disturbance footprint in 4 different conditions, including:

- good condition woodland: 107.50 hectares
- thinned/disturbed condition woodland: 219.67 hectares
- derived native grassland: 487.14 hectares
- degraded grassland: 401.32 hectares.

Two of the TECs are identified as potential SAII entities. These TECs are identified in Table 7.7 and discussed further in Section 7.4.1.5.

Table 7.5. Summary of predicted direct impacts on BC Act listed threatened ecological communities

Threatened ecological community	BC Act Status	SAII entity	Disturbance area A (ha)	Disturbance area B (ha)	Total (ha)
Carex Sedgeland of the New England Tableland, Nandewar, Brigalow Belt South and NSW North Coast Bioregions	E	No	0.79	0.14	0.93
Central Hunter Grey Box — Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions	E	No	61.21	19.84	81.05
Central Hunter Ironbark — Spotted Gum — Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions	E	No	42.16	16.00	58.16
Hunter Valley Vine Thicket in the NSW North Coast and Sydney Basin Bioregions	E	No	4.85	0	4.85
Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions	E	No	0.18	0	0.18
New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion	CE	Yes	90.96	55.79	146.75
Ribbon Gum-Mountain Gum-Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion	E	No	13.66	10.72	24.38

Threatened ecological community	BC Act Status	SAII entity	Disturbance area A (ha)	Disturbance area B (ha)	Total (ha)
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions	CE	Yes	1,072.61	143.03	1,215.62

Note: [1] Disturbance areas A and B include areas that were inaccessible to survey; vegetation condition and extent in these areas could not be confirmed through field assessment, vegetation mapping in these areas is based on NSW Government mapping.

[2] E = Endangered, CE = Critically endangered.

[3] Totals may not add precisely due to rounding of individual values.

Table 7.6. Summary of predicted direct impacts on EPBC Act listed threatened ecological communities

Threatened ecological community	EPBC Act Status	Disturbance area A (ha)	Disturbance area B (ha)	Total (ha)
Central Hunter Valley eucalypt forest and woodland[3]	CE	112.75	38.96	151.71
New England Peppermint (*Eucalyptus nova-anglica*) Grassy Woodlands	CE	90.96	55.79	146.75
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland[3]	CE	696.38	117.93	814.31

Note: [1] Disturbance areas A and B include areas that were inaccessible to survey; vegetation condition and extent in these areas could not be confirmed through field assessment, vegetation mapping in these areas is based on NSW Government mapping.

[2] E = Endangered, CE = Critically endangered.

[3] Denotes that the level of impact is considered significant in accordance with the EPBC Act significant impact criteria.

[4] Totals may not add precisely due to rounding of individual values.

7.4.1.3 Candidate threatened flora

The project would directly impact 37 threatened flora species known or assumed to be present within the disturbance footprint. Eight species were recorded during field surveys and 29 species were assumed present, including:

- 19 species listed under both the BC Act and EPBC Act
- 17 species listed under the BC Act only, including 3 endangered flora populations
- 1 species listed under the EPBC Act only.

Given the large number of species that have been assumed present, it is expected that with further survey in currently inaccessible areas the extent of predicted impact on threatened flora species would be reduced. It is noted that many of the threatened flora species assumed present in inaccessible areas were not found during the extensive targeted flora surveys undertaken in the accessible areas.

Table 7.7 summarises direct impacts on threatened flora species listed under the BC Act and EPBC Act, including whether species were recorded (known) or assumed present within the disturbance footprint. Species credit liability is detailed in the BDAR (Technical Report 1).

Five of the threatened flora species are identified as potential SAII entities. These species are identified in Table 7.7 and discussed further in Section 7.4.1.5.

Table 7.7. Summary of predicted direct impacts on threatened flora species

Scientific name/common name	BC Act Status	EPBC Act Status	Potential SAII entity	Impact in accessible land (hectares)	Impact in inaccessible land (where assumed present) (hectares)	Total impact area (hectares) or individual count[2]	Species credit liability
Acacia pendula - endangered population	EP	Not Listed	No	-	135.48	135.48 ha	9,508
Caladenia amnicola	E	Not Listed	No	-	34.53	34.53 ha	686
Callistemon pungens	Not Listed	V	No	1.63	117.19	1,297 individuals	2,594
Leafless Tongue Orchid (*Cryptostylis hunteriana*)	V	V	No	-	56.9	56.9 ha	1,857
Cymbidium canaliculatum - endangered population	EP	Not Listed	No	-	227.51	2,281 individuals	4,562
White-flowered Wax Plant (*Cynanchum elegans*)	E	E	No	-	20.19	20.19 ha	944
Bluegrass (*Dichanthium setosum*)	V	V	No	6.55	488.01	494.56 ha	15,357
Finger Panic Grass (*Digitaria porrecta*)	E	Not Listed	No	-	5.59	5.59 ha	172
Diuris eborensis	E	E	No	-	58.35	58.35 ha	2,541
Small Snake Orchid (*Diuris pedunculata*)	E	E	No	-	266.09	266.09 ha	8,358
Pine Donkey Orchid (*Diuris tricolor*)	V	Not Listed	No	2.75	53.84	48.73 ha	1,112

Scientific name/common name	BC Act Status	EPBC Act Status	Potential SAII entity	Impact in accessible land (hectares)	Impact in inaccessible land (where assumed present) (hectares)	Total impact area (hectares) or individual count[2]	Species credit liability
Diuris tricolor - population in the Muswellbrook Local Government Area	EP	Not Listed	No	2.75	45.98	56.59 ha	362
Eucalyptus camaldulensis - endangered population	EP	Not Listed	No	0.03	-	0.03 ha	1
Slaty Red Gum (*Eucalyptus glaucina*)	V	V	No	-	7.54	16 individuals	32
Northern Blue Box (*Eucalyptus magnificata*)	E	Not Listed	No	-	31.24	439 individuals	878
Narrow-leaved Black Peppermint (*Eucalyptus nicholii*) [2]	V	V	No	0.74	170.35	7,200 individuals	15,102
Small-fruited Mountain Gum (*Eucalyptus oresbia*)	V	Not Listed	Yes	9.7	136.84	2,294 individuals	6,900
Euphrasia arguta	CE	CE	Yes	-	30.84	30.84 ha	2,128
Polblue Eyebright (*Euphrasia ciliolate*)	V	Not Listed	No	-	263.2	263.2 ha	7,882
Tall Velvet Sea-berry (*Haloragis exalata subsp. Velutina*)	V	V	No	-	35.74	606 individuals	1,212
Granite Homoranthus (*Homoranthus prolixus*)	V	V	No	-	0.29	0.29 ha	15

Scientific name/common name	BC Act Status	EPBC Act Status	Potential SAII entity	Impact in accessible land (hectares)	Impact in inaccessible land (where assumed present) (hectares)	Total impact area (hectares) or individual count[2]	Species credit liability
Yellow Loosestrife (*Lysimachia vulgaris var. davurica*)	E	Not Listed	Yes	-	0.93	0.93 ha	61
Large-leafed Monotaxis (*Monotaxis macrophylla*)	E	Not Listed	No	-	0.29	0.29 ha	15
Hawkweed (*Picris evae*)	V	V	No	-	284.02	284.02 ha	9,181
Native Milkwort (*Polygala linariifolia*)	E	Not Listed	No	-	110.33	110.33 ha	2,650
Scant Pomaderris (*Pomaderris queenslandica*)	E	Not Listed	No	-	6.82	6.82 ha	324
Tarengo Leek Orchid (*Prasophyllum petilum*)	E	E	No	-	43.71	43.71 ha	1,315
Singleton Mint Bush (*Prostanthera cineolifera*)	V	V	No	-	28.95	28.95 ha	1,005
Pterostylis chaetophora	V	Not Listed	No	-	52.42	52.42 ha	1,580
Elegant Greenhood (*Pterostylis elegans*)	V	Not Listed	No	-	17.16	17.16 ha	792
Pterostylis riparia	V	V	Yes	-	57.57	57.57 ha	3,762
Scrub Turpentine (*Rhodamnia rubescens*)	CE	CE	Yes	-	71.71	217 individuals	651
Heath Wrinklewort (*Rutidosis heterogama*)	V	V	No	-	4.72	4.72 ha	70

Scientific name/common name	BC Act Status	EPBC Act Status	Potential SAII entity	Impact in accessible land (hectares)	Impact in inaccessible land (where assumed present) (hectares)	Total impact area (hectares) or individual count[2]	Species credit liability
Small Purple-pea (*Swainsona recta*)	E	E	No	0.1	-	0.01 ha	3
Silky Swainson-pea (*Swainsona sericea*)	V	Not Listed	No	-	381.51	381.51 ha	11,043
Austral Toadflax (*Thesium australe*)	V	V	No	1.52	1,262.89	1,264.41 ha	27,250
Tylophora linearis	V	V	No	-	0.19	0.19 ha	10

Note:[1] V = Vulnerable, E = Endangered, CE = Critically endangered, EP = Endangered population.

[2]Assessment unit of measure and determination of individual count numbers detailed in Section 5.2 of the BDAR.

7.4.1.4 Candidate threatened fauna

Based on conservative assumptions and assumed presence for some species, the project would directly impact potential habitat for 35 threatened fauna species known or assumed to be present within the disturbance footprint. 23 species were recorded during field surveys and 12 species were assumed to be present in the disturbance footprint, including:

- 16 species listed under both the BC Act and EPBC Act

18 species listed under the BC Act only including one endangered fauna population. For the 12 species that have been assumed present, it is expected that with further survey in currently inaccessible areas the extent of predicted impact on threatened fauna species would be reduced. It is noted that some of the threatened fauna species assumed present in inaccessible areas were not found during the targeted surveys undertaken in the accessible areas.

Table 7.8 summarises the direct impacts on threatened fauna species listed under the BC Act and EPBC Act including whether species were recorded (known) or assumed present within the disturbance footprint. Species credit liability is detailed in the BDAR (Technical Report 1).

Seven of the threatened fauna species and one endangered fauna population were identified as potential SAII entities. These entities are identified in Table 7.8 and discussed further in Section 7.4.1.5.

Table 7.8. Summary of predicted direct impacts on threatened fauna species

Scientific name/common name	BC Act Status	EPBC Act Status	Potential SAII entities	Impact in accessible land (hectares)	Impact in inaccessible land (where assumed present) (hectares)	Expert species polygon loss of habitat (hectares)	Total impact area (hectares)	Species credit liability
Tusked Frog (*Adelotus brevis*) endangered population in the Nandewar and New England Tableland Bioregions	EP	Not Listed	Yes	-	-	406.99	406.99	11,987
Rufous Bettong (*Aepyprymnus rufescens*)	V	Not listed	No	-	187.32	-	187.32	6,823
Zigzag Velvet Gecko (*Amalosia rhombifer*)	E	Not listed	No	-	44.99	-	44.99	1,933
Pink-tailed Legless Lizard (*Aprasia parapulchella*)	V	V	No	-	32.29	-	32.29	925
Bush Stone-curlew (*Burhinus grallarius*)	E	Not Listed	No	-	528.54	-	528.54	14,570
Gang-gang Cockatoo (*Callocephalon fimbriatum*)	E	E	No	-	231.72	-	231.72	10,593
South-eastern Glossy Black-Cockatoo (*Calyptorhynchus lathami lathami*)	V	V	No	-	947.07	-	947.07	41,583
Eastern Pygmy-possum (*Cercartetus nanus*)	V	Not Listed	No	-	-	582.25	582.25	26,233
Large-eared Pied Bat (*Chalinolobus dwyeri*)	E	E	Yes	-	-	20.54	20.54	1,448

Scientific name/common name	BC Act Status	EPBC Act Status	Potential SAII entities	Impact in accessible land (hectares)	Impact in inaccessible land (where assumed present) (hectares)	Expert species polygon loss of habitat (hectares)	Total impact area (hectares)	Species credit liability
Hunter Valley Delma (*Delma vescolineata*)	E	E	No	-	591.59	-	591.59	11,269
White-bellied Sea-Eagle (*Haliaeetus leucogaster*)	V	Not Listed	No	-	167.18	-	167.18	6,646
Little Eagle (*Hieraaetus morphnoides*)	V	Not Listed	No	-	-	493.95	493.95	15,331
Stephens' Banded Snake (*Hoplocephalus stephensii*)	V	Not listed	No	-	0.18	-	0.18	9
Long Sunskink (*Lampropholis elongata*)	CE	CE	Yes	-	529.79	-	529.79	27,306
Davies' Tree Frog (*Litoria daviesae*)	V	V	No	-	-	232.23	232.23	8,677
Square-tailed Kite (*Lophoictinia isura*)	V	Not listed	No	-	-	489.33	489.33	12,359
Large Bent-winged Bat(*Miniopterus orianae oceanensis*)	V	Not listed	Yes	-	2.34	-	2.34	8
Stuttering Frog (*Mixophyes balbus*)	E	E	Yes	-	-	100.36	100.36	6,507
Southern Myotis (*Myotis Macropus*)	V	Not Listed	No	-	693.21	-	693.21	17,869

Scientific name/common name	BC Act Status	EPBC Act Status	Potential SAII entities	Impact in accessible land (hectares)	Impact in inaccessible land (where assumed present) (hectares)	Expert species polygon loss of habitat (hectares)	Total impact area (hectares)	Species credit liability
Western Sawshelled Turtle, Bell's Turtle (*Myuchelys bellii*)	E	E	No	-	-	4.82	4.82	96
Manning River Helmeted Turtle, Purvis' Turtle (*Myuchelys purvisi*)	E	E	No	-	-	1.73	1.73	62
Barking Owl (*Ninox connivens*)	V	Not Listed	No	-	-	602.62	602.62	27,184
Powerful Owl (*Ninox strenua*)	V	Not Listed	No	154.39	-	582.09	736.48	30,751
Parma Wallaby (*Notamacropus parma*)	V	V	No	-	78.74	-	78.74	3,584
Southern Greater Glider (*Petauroides volans*)	E	E	No	109.36	431.18	-	539.81	25,659
Squirrel Glider (*Petaurus norfolcensis*)	V	Not Listed	No	-	-	520.46	520.46	22,263
Brush-tailed Rock-wallaby (*Petrogale penicillata*)	E	E	Yes	-	525.79	-	525.79	12,978
Brush-tailed Phascogale(*Phascogale tapoatafa*)	V	Not Listed	No	63.59	431.48	-	495.07	21,888

Scientific name/common name	BC Act Status	EPBC Act Status	Potential SAII entities	Impact in accessible land (hectares)	Impact in inaccessible land (where assumed present) (hectares)	Expert species polygon loss of habitat (hectares)	Total impact area (hectares)	Species credit liability
Koala (*Phascolarctos cinereus*)	E	E	No	297.99[2]	1,074.62	-	1,372.61	56,149
Common Planigale (*Planigale maculata*)	V	Not Listed	No	-	120.97	-	120.97	2,602
Northern long-nosed potoroo (*Potorous tridactylus tridactylus*)	V	V	No	-	90.16	-	90.16	4,476
Masked Owl (*Tyto novaehollandiae*)	V	Not Listed	No	158.53	-	550.52	709.05	30,275
Sooty Owl (*Tyto tenebricosa*)	V	Not listed	Yes	60.73	0.07	54.53	115.26	7,624
Border Thick-tailed Gecko (*Uvidicolus sphyrurus*)	V	V	No	-	90.14	-	90.14	3,683
Eastern Cave Bat (*Vespadelus troughtoni*)	V	Not Listed	No	-	-	20.36	20.36	1,448

Note:[1] V = Vulnerable, E = Endangered, CE = Critically endangered, EP = Endangered population.

[2]The known impact area of the koala is inclusive of confirmed habitat which has then been extrapolated to across the entirety of the species' potential habitat.

7.4.1.5 Serious and irreversible impacts

Under Clause 6.7 of the NSW Biodiversity Conservation Regulation 2017, an impact is to be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species or ecological community becoming extinct, based on 4 guiding principles relating to:

- risk of extinction due to rapid decline
- very small population size
- limited geographic distribution
- lack of potential to recover due to irreplaceability.

Fifteen SAII entities are known or assumed to occur in the disturbance footprint based on the presence of suitable habitat (refer to Table 7.9). Two TECs, one threatened flora species and one threatened fauna species are known to occur. Four threatened flora species, one threatened fauna population and 6 threatened fauna species are assumed to occur. It is expected that with further survey in inaccessible areas, the number and extent of predicted SAII impacts is likely to reduce .

Table 7.9. Summary of predicted direct impacts to species and communities at risk of SAII

Scientific name/common name	Basis for inclusion in the assessment	Impacts to suitable habitat (hectares) or individual count[1,2]
Threatened ecological community		
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions CEEC	Extent was verified in accessible land (312.50 ha) and mapped in inaccessible land (501.80 ha)	81,431 ha
New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion CEEC	Extent was verified in in accessible land (50.07 ha) and mapped in inaccessible land (96.68 ha); community assumed present	146.75 ha
Threatened population		
Tusked frog (*Adelotus brevis*) endangered population in the Nandewar and New England Tableland Bioregions	Extent of assumed presence determined by NSW DCCEEW approved species expert	406.99 ha
Threatened species		
Small-fruited mountain gum (*Eucalyptus oresbia*)	Recorded in accessible land. Assumed present where potential habitat identified in inaccessible land	2,294 individuals

Scientific name/common name	Basis for inclusion in the assessment	Impacts to suitable habitat (hectares) or individual count[1,2]
Euphrasia arguta	Not recorded in accessible land. Assumed present where potential habitat identified in inaccessible land	30.84 ha
Yellow loosestrife (*Lysimachia vulgaris var. davurica*)	Not recorded in accessible land. Assumed present where potential habitat identified in inaccessible land	0.93 ha
Pterostylis riparia	Not recorded in accessible land. Assumed present where potential habitat identified in inaccessible land	57.57 ha
Scrub turpentine (*Rhodamnia rubescens*)	Not recorded in accessible land. Assumed present where potential habitat identified in inaccessible land	217 individuals
Large-eared pied bat (*Chalinolobus dwyeri*)	Extent of potential breeding habitat determined by NSW DCCEEW approved species expert	0.18 ha
Long Sunskink (*Lampropholis elongata*)	Targeted surveys in accessible land have not yet been completed. Assumed present where potential habitat identified inaccessible and inaccessible land	529.79 ha
Large bent-winged bat (*Miniopterus orianae oceanensis*)	Potential breeding habitat was assumed through assessment by NSW DCCEEW approved species expert	0.1 ha
Stuttering frog (*Mixophyes balbus)*	Extent of assumed presence determined by NSW DCCEEW approved species expert	100.36 ha
Brush-tailed rock-wallaby (*Petrogale penicillata*)	Not recorded in accessible land. Assumed present where potential habitat identified in inaccessible land	199.56 ha
Sooty owl (*Tyto tenebricosa*)	Recorded in accessible land. Potential breeding habitat (associated with rocky escarpments) conservatively assumed to be present in inaccessible land	11.95 ha
Eastern cave bat (*Vespadelus troughtoni*)	Extent of potential breeding habitat determined by NSW DCCEEW approved species expert	0.18 ha

Note: [1] Assessment unit of measure and determination of individual count numbers detailed in Section 5.2 of the BDAR.

[2] SAII impact areas may differ from that of Table 7.7 due to specific species SAII requirements as per the NSW Department of Planning, Industry and Environment (DPIE) 'Guidance to assist a decisionmaker to determine a serious and irreversible impact' (DPHIE 2019).

Section 9 of the BDAR (refer to Technical Report 1) provides a detailed assessment for SAII entities. This assessment is intended to assist the determining authority to evaluate the nature of the impact on potential entities at risk of a SAII, including the relevant SAII principle/s that apply to each entity subject to assessment.

Avoidance and mitigation of impacts to potential SAII entities will be further prioritised during refinement of the reference design and detailed design. Mitigation measures to be further prioritised include but are not limited to micro-siting of the transmission line infrastructure and associated work sites to avoid and minimise direct impacts where practicable, retention of habitat features, establishment of 'habitat connectivity corridors', and specific clearing controls in sensitive biodiversity areas (refer to Section 7.7).

7.4.1.6 Matters of National Environmental Significance

The project was determined a controlled action on 16 March 2026 under the EPBC Act due to its potential to significantly impact on Commonwealth listed threatened species and communities.

EPBC Act listed threatened species and ecological communities

Appendix E (Matters of National Environmental Significance) of the BDAR (Technical Report 1) provides a detailed assessment of potential impacts to EPBC listed threatened species and ecological communities from the project. This assessment includes consideration of approved conservation advice, recovery plans and threat abatement plans, as well as a summary of potential impacts.

Three EPBC Act listed TECs were recorded within the disturbance footprint and would be potentially impacted by the project (refer to Table 7.3). Sixteen threatened flora species and 32 threatened fauna species under the EPBC Act are known or likely to occur within the disturbance footprint.

Under the EPBC Act where a project is likely to have a significant residual impact on a listed threatened species and/or community, the impacts must be compensated. Based on the Significant Impacts Assessments, the project would result in significant residual impacts to 3 TECs, 6 flora species and 18 fauna threatened species. Impacts on EPBC listed threatened entities and ecological communities would be offset in accordance with the NSW Biodiversity Offset Scheme (refer to Section 7.7.1).

7.4.1.7 Lake Glenbawn Wildlife Refuge and State forests

The project area traverses the Lake Glenbawn Wildlife Refuge. Wildlife refuges are not considered part of the formal NPWS estate and are typically private properties or, as in this case, leasehold/public land, whose owners (in this case WaterNSW) have entered into an agreement under the NPW Act. This land was registered with the NSW Government as a wildlife refuge in 1974 and is managed by WaterNSW. Within Glenbawn Wildlife Refuge, approximately 75.45 hectares of native vegetation across 6 PCTs would be impacted. This includes 10.21 hectares of vegetation associated with TECs listed under the EPBC Act and 9.74 hectares associated with TECs listed under the BC Act.

The project traverses Nundle State Forest, which is managed for multiple uses including timber production. Approximately 160 hectares of vegetation would be directly impacted within Nundle State Forest, including approximately 5.5 hectares located within a harvesting exclusion area managed to protect environmental, cultural or operational values.

The disturbance footprint also intersects a small area of Hanging Rock State Forest (approximately 0.4 hectares associated with road upgrades) and Terrible Billy State Forest (approximately 0.1 hectares associated with the transmission corridor). These areas are managed for timber harvesting and other approved land uses.

Biodiversity values identified within the affected state forest lands include one PCT, 10 threatened flora species and 10 threatened fauna species in Nundle State Forest; 4 PCTs, 14 threatened flora species and 10 threatened fauna species in Hanging Rock State Forest; and one PCT and 2 threatened fauna species in Terrible Billy State Forest. This includes 0.34 hectares of TECs listed under the BC Act and EPBC Act that occur within the areas of State forest affected by the project. The majority of the impacts occur within land managed for timber harvesting and other general uses.

Overall, impacts to Glenbawn Wildlife Refuge and Nundle State Forest are localised and have been minimised through design refinement and avoidance of higher value habitat where practicable.

7.4.1.8 Impacts on Biodiversity Stewardship Agreements

The project area intersects approximately 4.98 hectares of the Gundy Mountain Biodiversity Stewardship site (Gundy Mountain BSA, BS0268) along existing access tracks, including 1.99 hectares associated with BC Act-listed TECs and 2.90 hectares associated with EPBC Act-listed TECs. While the transmission corridor component of the project area has been excluded from the BSA site, temporary widening of existing access tracks for construction may require a variation to the BSA agreement.

7.4.1.9 Aquatic ecology

The project intersects a number of high-value waterways and aquatic habitats, many of which are classified as high-value fish habitat under NSW Fisheries mapping. A range of threatened and sensitive aquatic species are associated with these habitats, including:

- Gamilaroi crayfish (*Euastacus gamilaroi*)
- Hunter galaxias (*Galaxias sp. Nov. 'Hunter'*)
- Murray cod (*Maccullochella peelii*)
- silver perch (*Bidyanus bidyanus*)
- terrestrial crayfish (*Euastacus maccai*)
- southern purple-spotted gudgeon (*Mogurnda adspersa)*
- Darling River hardyhead (*Craterocephalus amniculus*) (Hunter River catchment population)
- eel-tailed catfish (*Tandanus tandanus*) (Murray–Darling Basin population).

Potential impacts to aquatic habitat during construction are primarily associated with sedimentation and water quality impacts, removal or trimming of riparian vegetation, disturbance at watercourse crossings and potential impacts to fish passage. Indirect impacts to aquatic habitat and GDEs may also occur where groundwater interactions support baseflow in these waterways.

Direct impacts to aquatic habitat have been minimised through project design. Transmission lines have been designed to span watercourses, avoiding disturbance to instream habitat. Existing bridges and crossings would be preferentially used for access. Where new watercourse crossings are required, they would be designed in accordance with *Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings* (Fairfull and Witheridge, 2003) and the *Policy and Guidelines for Fish Habitat Conservation and Management* (DPI, 2013b) to maintain fish passage.

Indirect impacts associated with construction activities, including sedimentation and runoff, would be managed through implementation of the mitigation measures outlined in Section 7.7. Water quality impacts are expected to be temporary and localised, and riparian areas are expected to retain their ecological function.

FM Act assessments of significance were undertaken for the southern purple-spotted gudgeon (*Mogurnda adspersa*), which may occur in Boorolong Creek, Rocky River and unnamed waterways near Uralla. Assessments were also undertaken for the endangered Darling River hardyhead (*Craterocephalus amniculus*) population in the Hunter River catchment where the project intersects the Isis River between Gundy and Crawney. The endangered eel-tailed catfish (*Tandanus tandanus*) population in the Murray–Darling Basin was also assessed, as the project intersects Rocky River and Boorolong Creek, which provide potential habitat for the species. These assessments concluded that the project is unlikely to result in a significant impact on these species or their habitats.

Separate assessments were undertaken in accordance for threatened aquatic species listed under the EPBC Act. These assessments concluded that the project is unlikely to have a significant impact on Gamilaroi Crayfish (*Euastacus gamilaroi*), Hunter Galaxias (*Galaxias sp. nov. 'Hunter'*) or Murray Cod (*Maccullochella peelii*).

The small crayfish (*Euastacus spinichelatus*) is known to occur within Nundle State Forest. While direct impacts to streams and creek habitats have largely been avoided through project design, potential indirect impacts during unmitigated construction activities may result in degradation of water quality, contamination, and degradation of riparian vegetation. These impacts are expected to be localised and the project was found to be unlikely to result in a significant impact on the species.

Terrestrial crayfish (*Euastacus maccai*), which is listed as Endangered under both the FM Act and the EPBC Act, may be impacted by the project. Approximately 809.24 hectares of potential habitat within the Walcha Plateau IBRA Subregion would be affected, including areas of Nundle State Forest where the species is known to occur. This large extent of potential habitat is due to the species inhabiting burrows that are not connected to streams or creeks and can therefore occupy habitats that are not considered aquatic. Given the limited information available on the species' distribution and ecology, and its association with vegetated habitats above 1,000 metres ASL on the Walcha Plateau, the assessment adopted a precautionary approach and assumed that vegetation clearing within the Walcha Plateau IBRA Subregion has the potential to impact habitat for the species. Accordingly, the assessment concluded that the species may be subject to a significant impact as a result of the project.

Further detail on the assessment of aquatic ecology impacts, including threatened aquatic species and key fish habitat, is provided in Appendix B of the BDAR (Technical Report 1).

7.4.1.10 Groundwater dependent ecosystems

During construction, potential impacts to groundwater may occur through localised interception during excavation works, extraction of groundwater for construction activities and risks to groundwater quality from spills or leakage of fuels, chemicals or wastewater With the implementation of standard construction controls, potential impacts to GDEs are expected to be localised and manageable.

A small component of the project intersects the mapped karst landscapes associated with Timor Caves (specifically, where upgrades to Sargeants Gap Road are required). The project is also in proximity to, but with no direct interface with a mapped extent of karst near Barry. Construction activities, particularly the use of vibratory equipment, have the potential to affect subsurface void stability and groundwater flow. This may result in indirect impacts to subterranean GDEs. These risks would be managed through design and construction controls, including minimising vibration where required to avoid impacts on sensitive features.

Consistent with the Groundwater Impact Assessment (GWIA) (refer to Section 19 and Technical Report 16), the overall risk of impact to GDEs during construction was assessed as low.

7.4.2 Indirect impacts

Indirect impacts are those that could potentially occur when the project affects native vegetation and threatened species habitat beyond the disturbance footprint. This includes impacts from activities related to both the construction and operation of the project.

Many indirect impacts would be temporary, as they are associated with specific construction activities, and may be of short duration or may occur in discrete locations (that is, not project area-wide). The following indirect impacts have the potential to occur:

- inadvertent impacts on adjacent habitat or vegetation
- reduced viability of adjacent habitat due to edge effects
- reduced viability of adjacent habitat, including disturbance of breeding and roosting habitat, due to noise, dust or light spill
- transport and establishment of weeds and pathogens from the disturbance footprint to adjacent vegetation
- increased risk of starvation or exposure, and loss of shade or shelter for fauna species
- trampling of threatened flora species
- changed fire regimes during construction and operation resulting from vegetation clearing, ongoing vegetation management within the easement, and the presence of project infrastructure
- changes to water quality, velocity and flows due to construction activities in or near watercourses
- electric and magnetic fields (EMF) exposure during operation of the project
- increased risk of fauna collisions with transmission lines during operation of the project.

Most potential indirect impacts would occur during construction and may persist at reduced intensity during operation. The BDAR undertook an assessment of indirect impacts and found that the likelihood and consequence of the majority of these impacts was low. A moderate level of impact was determined for:

- inadvertent impacts on adjacent habitat/vegetation
- transport of weeds and pathogens from the site to adjacent vegetation
- disturbance of breeding or roosting habitat
- increased risk of fauna collisions with transmission lines.

Mitigation measures are proposed to address indirect impacts.

7.4.3 Prescribed impacts

Prescribed biodiversity impacts are those that may affect biodiversity values in addition to, or instead of, impacts from vegetation clearing and loss of habitat. These impacts typically arise during construction and may continue at a reduced intensity during operation.

A summary of the relevant prescribed biodiversity impacts that may occur during construction of the project is provided below. Measures proposed to manage the residual risk are provided in Section 7.7.

The assessment of prescribed impacts in the BDAR found that with appropriate management and mitigation measures in place as proposed, the impact would be minor for the following prescribed impacts:

- impacts on human made structures
- impacts on non-native vegetation
- impacts associated with waterbodies, water quality and hydrological processes.

7.4.3.1 Karst, caves, crevices, cliffs and other geological features of significance, or rocks

Rocky outcrops, basalt caps, crevices and cliffs occur across the project area, which is underlain by sandstone, granite and limestone geology. Karst features are constrained to the central portion of the project area at Timor and Barry.

These features provide habitat for a range of threatened species known to occur or assumed to be present, including pink-tailed legless lizard (*Aprasia parapulchella*), border thick-tailed gecko (*Uvidicolus sphyrurus*), Hunter Valley delma (*Delma vescolineata*), large-eared pied bat (*Chalinolobus dwyeri*), eastern cave bat (*Vespadelus troughtoni*) and large bentwing-bat (*Miniopterus orianae oceanensis*). Rocky habitats may also support brush-tailed rock wallaby (*Petrogale penicillata*) and the spotted-tailed quoll (*Dasyurus maculata*) while suitable caves may provide roosting habitat for sooty owl (*Tyto tenebricosa*).

Construction of the project would require earthworks and, in some locations, blasting may be required. As a result, some rocky habitat, including rocks, crevices and exposed outcrops, would be removed within the disturbance footprint. Given the nature of these works, impacts on rocky habitat features would be localised.

The transmission easement has been designed to avoid the mapped extent of karst systems at Timor and Barry. However, approximately 4.6 hectares of land associated with a 3.3 kilometres section of Sargeants Gap Road overlies mapped karst. Localised sections of this road would be widened and upgraded to facilitate construction traffic during the construction phase of the project.

To avoid and minimise the risk of impact on karst systems, detailed design and construction planning would incorporate site-specific geotechnical investigations and vibration assessments. Construction methods and equipment selection would be managed to ensure compliance with vibration criteria and to avoid adverse vibration impacts.

7.4.3.2 Vehicle strike

During construction, increased vehicle movements and road use would increase the potential for vehicle strike of native fauna. This would be most pronounced along construction access tracks and public roads, particularly where these intersect with habitat corridors and areas of intact native vegetation.

While vehicle movements would predominantly occur during daylight hours, some species may also be susceptible to vehicle strike during dawn, dusk and other periods of reduced visibility, including nocturnal species.

A range of fauna species may be at risk of vehicle strike, including mammals such as koala (*Phascolarctos cinereus*), spotted-tailed quoll (*Dasyurus maculatus*) and brush-tailed rock wallaby (*Petrogale penicillata*), as well as nocturnal bird species such as owls where vehicle movements occur during dawn, dusk or other periods of reduced visibility.

Vehicle movements would be highest during construction and largely occur during daylight hours. During operation, vehicle use would be limited to periodic inspection and maintenance and would represent a negligible increase relative to existing traffic volumes.

The consequence of vehicle strike on fauna is expected to be moderate. Mitigation measures would be implemented to manage vehicle–fauna interactions during construction and operation (refer to Section 7.7).

7.4.3.3 Habitat connectivity

The project has the potential to affect local and regional habitat connectivity, where the transmission line easement intersects native vegetation and habitat used by threatened species.

Impacts to connectivity would vary depending on species mobility, dispersal capability and habitat requirements. Highly mobile species are expected to be less affected, while species with low mobility or a strong dependence on continuous vegetation cover are likely to be more sensitive to fragmentation.

The upgrade or construction of access tracks would create localised gaps in vegetation, typically around 10 metres-wide, which most species would be able to traverse. The transmission easement would create broader gaps in vegetation, generally up to approximately 140 metres in forested areas for dual 500 kV lines, approximately 120 metres for dual 330 kV lines and approximately 70 metres for the single 500 kV line except at transposition sites and other locations, where additional width may be required to accommodate project infrastructure.

The significance of connectivity impacts would depend on the ability of individual species to move across these cleared or modified areas. Highly mobile species that are tolerant of gaps in habitat, including most birds, some bats and species such as koala (*Phascolarctos cinereus*), are expected to be minimally affected in fragmented landscapes. Ground-dwelling and habitat specialist species may experience moderate impacts, particularly where they avoid open areas. Arboreal mammals, including gliding species, are likely to be most affected where continuous canopy is removed, particularly within Nundle State Forest and larger remnant vegetation patches.

Despite these impacts, the project would remain permeable to fauna movement and would not act as a complete barrier. Retention of vegetation and groundcover within the easement, together with identified habitat connectivity corridors (indicative locations to be confirmed during detailed design), particularly along riparian zones, would maintain movement pathways across the landscape. Retention of groundcover and low-growing native vegetation within the easement would continue to provide opportunities for movement and refuge for many fauna species.

While the maintenance of vegetation at reduced heights may reduce the availability of shade, shelter and other microhabitat features for reptiles and amphibians, these species would generally remain capable of traversing the easement, and impacts to habitat connectivity are therefore expected to be limited. Additional targeted measures would be implemented to further support connectivity. A Connectivity Strategy would be developed in consultation with CPHR to confirm the location and design of connectivity features, including retained vegetation corridors and the provision of artificial structures (for example rope bridges, koala refuge poles) where new barriers to habitat connectivity are created. The strategy would incorporate monitoring to assess effectiveness, with adaptive management applied where required.

7.5 Potential impacts – operation

7.5.1 Direct impacts

Direct impacts on native vegetation and threatened species habitat during operation would occur through ongoing vegetation management to ensure vegetation clearance requirements and APZs are maintained (refer to Section 17.3). Biodiversity impacts and associated offset liabilities associated with operational vegetation management requirements have been incorporated in the impacts assessed in the construction phase as discussed in Section 7.4.1.

7.5.2 Indirect impacts

Some indirect impacts associated with construction of the project may also occur during operation, including:

- reduced viability of adjacent habitat due to edge effects, as the presence of new habitat edges is maintained during operation
- reduced viability of adjacent habitat due to noise, dust or light spill, due to light spill from substations and occasional noise or dust from maintenance activities including vehicle movements along access tracks

- transport of weeds, pests, and pathogens can continue during operation as a result of ongoing vehicular access and maintenance activities
- potential loss of breeding habitats due to ongoing vegetation maintenance (for example, the removal of hazard trees) may result in impacts on nests, dreys or burrows
- trampling of retained threatened flora species during periodic maintenance activities.

Operation of the project may increase the risk of fauna collision with power lines and potential effects from EMF. Species most at risk include large, high-flying birds such as raptors, cockatoos and waterbirds, as well as microbat species such as the Large-eared Pied Bat (*Chalinolobus dwyeri*) and Eastern Cave Bat (*Vespadelus troughtoni*).

Although EMF-related impacts on bird physiology are not well understood and vary by species, the potential for localised effects is acknowledged. Mitigation measures include tower designs that discourage nesting, bird deterrent measures in high-risk areas, and siting of towers to maintain compliance with applicable EMF guidelines. Assessment of potential EMF impacts associated with the project is provided in Section 17.4 and Technical Report 13.

7.5.3 Prescribed impacts

7.5.3.1 Habitat connectivity

For many bird, terrestrial mammal and reptile species including arboreal mammals capable of traversing open ground such as koala, ground layer and shrub vegetation within the transmission easement is expected to regenerate following construction and seed dispersal from adjacent retained vegetation. Regenerated vegetation would provide foraging and shelter resources and facilitate fauna movement across the easement. Consequently, for many species, impacts to habitat connectivity would not be permanent. Furthermore, transmission corridors do not present the same degree of barrier to fauna movement as roads, as they do not involve ongoing vehicle traffic, associated noise, artificial lighting or vehicle-strike risk.

To support habitat connectivity during operation, a Habitat Connectivity Strategy would be implemented. The strategy would include measures such as the retention of vegetation corridors, placement of salvaged fauna habitat and the provision of artificial connectivity structures (for example rope bridges and koala refuge poles), where appropriate. The strategy would also incorporate monitoring to assess effectiveness, with adaptive management applied where required.

7.6 Cumulative impacts

The potential cumulative biodiversity impacts of the project have been identified based on the scale and potential impacts of the project, in combination with the potential impacts of identified relevant future projects. A list of these relevant projects considered in the BDAR cumulative assessment, including their descriptions and interfaces with the project, is provided in Section 24.

The cumulative assessment evaluates the combined effects of the project and other relevant future projects on biodiversity values. This has also helped inform the development of mitigation and management strategies described in Section 7.7 to mitigate and manage biodiversity values long term.

The cumulative assessment is detailed in Appendix C of the BDAR (refer to Technical Report 1), with the key findings summarised in Section 24.

7.7 Mitigation and management

The mitigation measures that will be implemented to avoid or minimise residual biodiversity impacts are listed in Table 7.10. These should be read in conjunction with the BDAR (refer to Technical Report 1), which provides additional information on connectivity mitigation measures.

It is noted that mitigation measures identified in other sections of the EIS are also relevant to biodiversity management (for example, water quality controls, noise controls etc). Some impacts assessed in this EIS are relevant to multiple environmental factors and therefore share common mitigation measures.

Table 7.10. Proposed mitigation and management measures - residual biodiversity impacts (direct, indirect and prescribed)

Reference	Impact	Mitigation measure	Timing	Relevant locations
B1	Loss of native vegetation and threatened species habitat.	The Biodiversity Management Plan (BMP) will be prepared by a suitably qualified ecologist in consultation with relevant government agencies (including CPHR) and implemented for the duration of construction. The BMP will: • describe biodiversity values within the project area and the controls for direct, indirect, prescribed and uncertain impacts • be framed around SMART objectives and include quantitative performance measures, triggers, corrective actions and an adaptive management plan that consolidates and references the sub plans and Biodiversity Impact Monitoring Program (B20) listed in this table • include a program for implementing, evaluating and reporting on the effectiveness of all mitigation measures in this table • include a procedure for managing a clearing/disturbance register and progressive monitoring and annual reporting program to track and verify clearing and disturbance within approved limits, including audit-ready records and spatial tracking (B7) • outline herbicide controls for areas of partial clearing and retained vegetation in the project area, so that native vegetation retained in the project area is not adversely impacted by herbicides during and post construction • include Sensitive Area Maps requirements, showing areas to be protected, including exclusion/no-go zones, rocky habitats, riparian areas, turtle nesting locations, karst, habitat connectivity corridors to be retained and protected habitat features adjoining work areas	Pre-construction: finalise prior to commencement of clearing works. Construction: implement for duration of construction and review/update at least annually or following an incident, in consultation with CPHR.	All locations

Reference	Impact	Mitigation measure	Timing	Relevant locations
		• include induction and toolbox talk requirements (including biodiversity values, protection measures and consequences of breaches) • specify minimum requirements for the following sub-plans: vegetation clearing (B2), fauna management (B10); supplementary hollow and nest strategy (B9); incidental and unexpected finds (B6); biosecurity (weeds/pathogens) (B15), connectivity strategy (B13), riparian vegetation and aquatic biodiversity (B16) • identify priority locations and requirements for bird deterrent measures (B20) • specify and consolidate reporting requirements across sub plans.		
B2	Loss of native vegetation and threatened species habitat.	A Vegetation Clearing Procedure will be prepared as a sub-plan to the BMP that includes: • the requirements to obtain an internal clearing and disturbance permit, prior to the commencement of clearing and disturbance • demarcation and protection of retained vegetation and "no-go" areas • a protocol for fauna management (B10) • a procedure for two-stage clearing (B11) • a protocol for partial clearing (B12) • measures to minimise, manage and re-use vegetation waste, including mulch, logs, and opportunities for millable timber • any restoration or rehabilitation requirements.	Detailed design; construction; operation (as applicable through operational procedures)	Disturbance areas

Reference	Impact	Mitigation measure	Timing	Relevant locations
		The Vegetation Clearing Procedure must also identify locations where low-impact, manual and/or hand-clearing will be undertaken for vegetation that exceeds the clearance requirements for the transmission line (with stumps to be retained in-situ), including • Within a 50 m buffer of the top of bank at MacDonald River • Within a 50 m buffer of the top of bank at Barnard River • Within a 50 m buffer of the top of bank at Booroolong Creek, where vegetation requires removal from (-30.419850254517, 151.4547710379559) • within the TSR adjacent to Niangala Road where a population of *Thesium australe* has been identified. • within no-impact areas for Potential Archaeological Deposits (PADs).		
B3	Loss of native vegetation and threatened species habitat.	During detailed design, the network operator will identify and map Sensitive Areas to inform further avoidance and micro-siting. This mapping will be updated and maintained throughout construction and will include, as a minimum, the biodiversity constraints as outlined in section 7 of the BDAR, which identifies and prioritises biodiversity values to avoid and minimise impacts on. The Sensitive Area Mapping and avoidance framework will be incorporated into the BMP (and GIS/map based site-specific sensitive areas and associated protocols) for construction implementation.	Detailed design (prior to finalisation); construction (implementation through BMP/Species Actions Plans	Sensitive areas
B4	Loss of native vegetation and threatened species habitat.	No-go area demarcation and signage is to be established prior to clearing in each construction area and maintained throughout construction. Demarcation may be physical (for example rope fencing, signage, marking of trees), digital (for example where the presence of stock prevents physical demarcation) or another method as appropriate.	Construction (maintain for duration)	All retained vegetation

Reference	Impact	Mitigation measure	Timing	Relevant locations
		At workforce accommodation, tree protection measures are to be further informed by the requirements of AS 4970-2009 Protection of Trees on Development Sites – Section 4 Tree Protection Measures. All areas containing threatened flora species assessed as retained are to be suitably delineated on site, included in relevant toolbox talks and/or other relevant site plans, and project GIS layers to ensure protection zones are maintained.		
B5	Loss of native vegetation and threatened species habitat.	Micro-site temporary construction infrastructure (including laydown areas, construction ancillary sites and access tracks) to firstly avoid and secondly minimize native vegetation clearing and disturbance of watercourses. Micro-siting will be informed by the biodiversity constraints mapping developed in B3 and the results of any post-approval surveys, will include: • prioritising disturbance in lower condition vegetation (VI <17, and <15 for PCTs representative of Endangered Ecological Communities (EEC)/Critically Endangered Ecological Communities (CEECs) • prioritising avoiding disturbance of Serious and Irreversible Impacts (SAII), Critically Endangered Ecological Communities (CEECs) and Critically Endangered (CE) species • locating transmission infrastructure to minimise impact to vegetated riparian zones • using existing access tracks and clearings • reducing the number of access track waterway crossings and locating waterway crossings at narrow or lower order reaches • avoiding locating access track waterway crossings in or near mapped threatened turtle and frog habitat	Detailed design (finalise); construction (implement throughout)	All locations

Reference	Impact	Mitigation measure	Timing	Relevant locations
		• avoiding/minimising impacts to amphibian breeding habitats, rocky habitat features, hollow-bearing trees • avoiding disturbance in areas of vegetation supporting a high density of threatened species occupancy (that is, overlapping mapped species polygons) • minimising cut and fill. Micro-siting outcomes will be incorporated into the BMP, project GIS layers and site-specific plans prior to works.		
B6	Unexpected threatened species impacts	An unexpected and incidental finds protocol will be included as a sub-plan to the BMP. The protocol will implemented if threatened species or populations that are assessed by the Biodiversity Development Assessment Report (BDAR) are observed outside of mapped species polygons (incidental find), or if threatened species or populations not assessed by the BDAR are found (unexpected find). The protocol will include: • stop-work triggers for both unexpected and incidental finds • assessment requirements to quantify extent of impact • notification of Conservation Programs, Heritage and Regulation (CPHR) and other relevant stakeholders • adaptive responses including survey, review of clearing limits, further assessment • implementation of impact avoidance and minimisation and/or additional mitigation measures.	Construction	Disturbance area

Reference	Impact	Mitigation measure	Timing	Relevant locations
		Unavoidable impacts to unexpected finds must be quantified, and consultation undertaken with DPHI and CPHR on whether additional mitigation measures will be required. This may include offset calculation for residual impacts to threatened species that were not assessed in the EIS and /or threatened species that were assessed but subsequently removed. The protocol will also include procedures for identifying and responding to significant incidental finds. A significant incidental find occurs where records obtained through supplementary surveys, pre-clearing surveys, fauna management activities, clearing tracking or incidental observations indicate that the distribution, occupancy, abundance or extent of impact to a threatened species is materially greater than assumed in the BDAR. Where a significant incidental find is identified, the Network Operator must engage a suitably qualified ecologist to review the effectiveness of existing avoidance and mitigation measures and consult with DPHI and CPHR regarding any additional avoidance, mitigation, monitoring or management measures that may be required.		
B7	Loss of native vegetation and threatened species habitat.	A Clearing and Disturbance Tracking procedure will be prepared (independent of the BMP) that will include: • demonstrated compliance with the requirements of the Vegetation Clearing protocol (B2) for each vegetation clearing stage • documentation of methods and machinery used in partial and full clearing areas • a methodology for tracking clearing and disturbance for each vegetation clearing stage, including separate accounting for full and partial clearing	Pre-construction (setup of marking and tracking) and construction (continuous tracking; verification/reporting within BMP timeframes)	All construction areas

Reference	Impact	Mitigation measure	Timing	Relevant locations
		• a program for reporting the extent of clearing and disturbance against the approved limits to CPHR and any other relevant stakeholders • a methodology for the post-clearing verification of the extent of clearing and disturbance within a vegetation clearing stage. Where partial clearing is to occur, post-clearing verification monitoring and reporting (if required) will be undertaken in accordance with the requirements of the project approval conditions. The Clearing and Disturbance Tracking procedure is to be updated and maintained throughout construction. Audit-ready records, including spatial data, land survey data and supporting recent imagery (where available), will be maintained to enable independent auditing and regulatory review.		
B8	Direct and indirect impacts on rocky habitat features	Prior to works within 100 m of mapped species polygons for rocky-habitat specialist species, including Brush-tailed rock wallaby, Large-eared Pied Bat, Large Bent-wing Bat, and Eastern Cave Bat, engage a suitably qualified ecologist to confirm presence of threatened fauna, and determine any construction activity constraints (for example noise and vibration levels, blasting) and relevant monitoring and mitigation measures (for example use of specific plant/machinery to minimize noise and vibration impacts, exclusions measures for microbat roosting caves within areas to be cleared). Areas of relevant rocky habitat are to be mapped in the BMP and identified in GIS layers and site plans as Sensitive Areas.	Detailed design (finalise) and construction (implement throughout)	Within 100 m of rocky areas containing caves / overhangs / crevices / cliffs / escarpments

Reference	Impact	Mitigation measure	Timing	Relevant locations
B9	Habitat fragmentation / loss of hollow bearing trees, nests and habitat features	A Supplementary Hollow and Nest Strategy will be prepared as a sub-plan to the BMP and will be implemented to provide alternative roosting and nesting habitat for fauna displaced by clearing. The number and size of hollows to be removed from the disturbance footprint will be used to inform the number and type of artificial hollows required to be installed in the surrounding areas. The use of artificial hollows will include a range of hollow sizes (for example small, medium, and large) and reflect the natural range and density of hollow sizes recorded in the clearing extent. The Strategy will define replacement numbers based on the number and types of hollows removed, the process for determining landholder-approved locations and installation timing, including installation targets before clearing and timeframes for installation after clearing. A Trigger Action Response Plan (TARP) will be provided to address delays or underperformance against installation or effectiveness targets. The TARP will: • define the triggers or thresholds relating to performance targets • outlines the steps to be taken if the trigger is reached • outlines the required responses and responsibilities of any corrective actions.	Detailed design; pre-clearing installation (where practicable); construction and operation (monitoring / maintenance)	Relevant locations
B10	Removal of threatened species habitat; harm to fauna during clearing	A fauna management protocol will be prepared as a sub-plan to the BMP that includes: • a process for how surveys will be conducted by a suitably qualified ecologist prior to clearing. Surveys will confirm that protection measures are in place and include fauna searches, hollow inspections, relocation and identification of nesting fauna and habitat features that require relocation and/or further management during clearing	Pre-clearing at each location; post-clearing reporting following clearing activities	All disturbance areas

Reference	Impact	Mitigation measure	Timing	Relevant locations
		• outlines specific management measures for each fauna group with reference to known threatened species and will include, rubbish controls, vehicle-strike controls, and monitoring of use of key habitat features such as caves/cliff lines/turtle-nesting habitat within proximity of construction • identifies fauna relocation areas and locations for salvaged natural habitat materials (including bush rock and logs) • includes a Fauna Handling Protocol, including handling procedures for species fauna groups (for example frogs), the identification of pre-confirmed veterinary support and wildlife rescue contacts • outlines the requirements for post-clearing reports, to be prepared for each vegetation clearing stage. Post-clearing reports will document all fauna interactions, any mortality and outcomes during clearing, details on hollows cleared, their characteristics and occupancy, and quantities and locations of salvaged hollows and logs, and bush rock reused for habitat supplementation • include monitoring and maintenance requirements, including audit-ready annual reporting and spatial data.		
B11	Impacts to hollow dependent threatened fauna	A two-stage clearing procedure will be prepared as part of the Vegetation Clearing Protocol (a sub-plan to the BMP). Where hollow bearing trees or key habitat features are identified, they will be clearly marked on site during pre-clearing surveys by an ecologist and spatially recorded. Prior to the commencement of any clearing, hollow inspections will be undertaken using scope/camera technology by a suitably qualified ecologist to identify active fauna use, assess hollow condition and occupancy, and inform appropriate fauna-sensitive clearing methods which may include avoiding clearing of confirmed breeding habitat during spring/or breeding season.	During pre-clearing and clearing	All disturbance areas with potential to contain hollow bearing trees

Reference	Impact	Mitigation measure	Timing	Relevant locations
		Non-habitat vegetation will be cleared first and habitat tree removal will be delayed for at least 24 hours after clearing of surrounding vegetation. In the absence of surrounding vegetation (for example clearing of an isolated habitat tree), alternate clearing methodology may be prescribed. Habitat trees will be felled using fauna appropriate methods based on hollow size and risk (sectional dismantling preferred for trees with hollows >5 cm), with immediate inspection of felled material, appropriate treatment or relocation of any fauna encountered, and documentation of methods used.		
B12	Partial impacts (partial clearing and retained vegetation within footprint)	A Partial Clearing Protocol will be prepared as part of the Vegetation Clearing Protocol (a sub-plan to the BMP) that defines clearing methods for disturbance area B. The partial clearing protocol will: • outline plant and equipment used to achieve partial clearing (including avoiding tracked machinery and using rubber-tyre machinery where practicable) • identifies areas where hand-clearing is to occur (as a minimum, at the locations identified in section 7 of the BDAR) • assume that removal of root balls and root stock will be avoided except where required for civil/construction footprints, with root zones retained in situ wherever practicable and hand clearing used in mapped sensitive areas • include measures to retain groundcover and shrubs to specified heights • outline appropriate vegetation waste management for mulch, woodchip and logs to ensure partial clearing objectives are met	Pre-construction (prepare); construction (implement)	Disturbance area B; non-disturbance areas within footprint

Reference	Impact	Mitigation measure	Timing	Relevant locations
		• outline protection measures and mapping for retained threatened species/habitat; • include incident reporting requirements • document post-clearing inspections to verify compliance with partial-clearing requirements and meet verification reporting requirements , including, where relevant: data collection requirements; randomly selected point-based monitoring at representative locations; recording of clearing machinery types used; documentation of mulch cover and depth; BAM plots suitable to derive Vegetation Integrity scores and exotic flora cover and species richness against baseline data; and recommendations for changes to clearing methods where targets are not likely to be met. Verification reporting will be prepared by an independent ecologist accredited under the Biodiversity Assessment Method (BAM) and should be suitable to support any required approval conditions and/or offset reconciliation processes.		
B13	Habitat fragmentation and loss of connectivity	A Connectivity Strategy will be developed as a sub-plan to the BMP. The Connectivity Strategy will be prepared in consultation with CPHR that outlines measures to maintain and provide habitat connectivity for target fauna species susceptible to habitat fragmentation, including (but not limited to) koalas, Squirrel gliders, Southern Greater Gliders and Yellow-bellied gliders. The strategy will: • identify locations for habitat connectivity corridors to be retained (that is, in gullies and/or riparian zones), including as a minimum, the 27 indicative habitat corridors identified in the BDAR (their locations to be determined during detailed design) • outline protection measures for the habitat connectivity corridors to be retained across the transmission easement	Pre-construction and detailed design (prepare) and construction; operation (easement management)	Connectivity locations identified in the BDAR and additional locations where feasible

Reference	Impact	Mitigation measure	Timing	Relevant locations
		• prescribe the number, type and location of structures to be installed (for example glider poles, koala refuge poles, rope bridges), with locations to be developed in consultation with relevant landholders. As a minimum, the provision of an artificial crossing structure every 500 m in areas of full clearing (easement-wide) will be investigated • identify the locations of salvaged habitat features such as bush-rock and hollows, that may enable fauna movements across the easement, in accordance with (B10) • include monitoring requirements for at least 2 breeding seasons for target species to evaluate effectiveness with adaptive management processes identified for performance failure. Fauna connectivity features will be mapped in the Connectivity Strategy and shown in accompanying spatial data/GIS layers.		
B14	Inadvertent harm to threatened entities due to lack of awareness	Induct and train all relevant personnel (including subcontractors) on biodiversity values, exclusion zones, clearing limits and key protocols (including consequences for breaches), where sensitive area maps are located. Toolbox talks to occur daily or when commencing work in a new area.	Construction (prior to commencing work; ongoing toolbox talks)	All locations
B15	Increase in weeds and pathogens	The Biosecurity Management Plan will be prepared as a sub-plan to the BMP and will include measures to prevent the introduction and spread of weeds, pathogens, pests and diseases. As a minimum, controls will include wash-down facilities and procedures for vehicles, machinery and footwear at designated entry/exit points; access management zones where pathogens are detected to prevent spread, requirements for suppliers to certify imported soils/materials are clean and free of contaminants/weeds/pathogens; pre-clearing weed mapping, herbicide treatment and recording.	Detailed design; prior to clearing; construction and operation (as applicable)	All locations

Reference	Impact	Mitigation measure	Timing	Relevant locations
		The Biosecurity Management Plan will be prepared in accordance with the document Saving Our Species Hygiene Guidelines – Protocols to protect priority biodiversity areas in NSW from *Phytophthora cinnamomi*, myrtle rust, amphibian chytrid fungus and invasive plants (NSW DPIE 2020).		
B16	Impacts to riparian and aquatic habitats	A Riparian Vegetation and Aquatic Biodiversity Management Plan (RVABMP) will be prepared as a sub-plan to the BMP, to minimise impacts on riparian vegetation and threatened aquatic species, including turtles and amphibians. The RVABMP will: • identify threatened species aquatic habitat, including threatened turtle habitat and nesting areas, frog habitat, crayfish and threatened fish habitat, ground-truthed riparian zones/buffers • reference specific sediment/erosion controls (to be outlined in site-specific Erosion and Sediment Control Plans) to be installed where construction activities occur within 50m of threatened aquatic habitat for example Bells Turtle nesting sites along the MacDonald River, Manning River Helmeted turtle in the Barnard River, and measures to minimise water quality impacts on threatened and notable fauna species such as platypus • include work sequencing and progressive rehabilitation requirements for any riparian works • outline clearing requirements within vegetated riparian zones, including where hand-clearing is required, how root systems and trunk bases will be retained in situ and using hand-clearing for all partial clearing riparian zones and within 10 m from top of bank (top of bank confirmed by on site assessment)	Detailed design (prepare); construction (implement)	Riparian environments disturbed during construction

Reference	Impact	Mitigation measure	Timing	Relevant locations
		• outline avoidance measures to minimise impacts on threatened aquatic species, including no transmission infrastructure or transmission easement-related disturbance to occur within 50m of the top of bank for the MacDonald River and Barnard River, and how waterway crossings near turtle and frog habitat will be avoided where practicable • include management measures to minimise erosion, sedimentation and vegetation removal, and for the rehabilitation or temporary waterway crossings.		
B17	Light pollution	Where lighting is required, lighting will be designed in accordance with the National Light Pollution Guidelines for Wildlife (Commonwealth DCCEEW 2023) and will include directional lighting to minimise spill and direct temporary construction lighting away from remnant vegetation wherever possible. Permanent lighting (during operation) would be installed at energy hubs and switching stations, communications infrastructures (as required) and maintenance facilities.	Detailed design; construction (temporary lighting); operation (permanent lighting)	Operational area and areas requiring temporary construction lighting
B18	Threatened bird losses due to collisions with powerlines	Bird diverters (flappers) will be installed on transmission lines at intervals at priority locations. As a minimum, priority locations are those identified in the BDAR, with additional locations to be determined during detailed design by a qualified ecologist in consultation with CPHR. Priority locations may include near riparian corridors, connectivity corridors and known threatened cockatoo owl/raptor records and key habitats. Installation will occur during line stringing or within 6 months following line installation, to be determined in consultation with CPHR. Diverters will be maintained for the life of the project. Record and provide spatial data to CPHR identifying diverter locations, within 6 months of installation.	Detailed design; construction; operation (inspect/replace as required).	New transmission lines at 15 m intervals

Reference	Impact	Mitigation measure	Timing	Relevant locations
B19	Vehicle strike	Construction access routes will utilise existing tracks where possible and avoid intact vegetation where practicable, to minimise vehicle strike. Where access routes traverse mapped habitat (that is, species polygons) for threatened fauna species susceptible to vehicle strike, fauna warning signage and low speed limits will be implemented, and driver training will include fauna awareness. The BMP will include a requirement for a vehicle strike register, including records of all vehicle strikes including incident recording of date, time, species, quantity and spatial location (where possible). Adaptive management processes will be implemented to address any ongoing strike issues. The results of the register are to be included in annual monitoring reports.	Detailed design; construction; operation (ongoing)	All forested locations
B20	Project-wide biodiversity monitoring and verification	Include a Biodiversity Impact Monitoring Plan (BIMP) as part of the BMP. The BIMP will include a structured monitoring program with annual reporting and an adaptive management component with quantitative triggers and corrective actions (that is, as outlined in a TARP). The BIMP must consolidate the monitoring and adaptive management requirements for all BMP subplans identified in this table. The outcomes of the BIMP will be monitored and evaluated by a suitably qualified biodiversity technical specialist as part of the Independent Environmental Audits carried out for the project.	Pre-construction (prepare); construction and operation (implement and report).	All locations
B22	Relocation of trees containing *Cymbidium canaliculatum* – endangered population.	Trees supporting *Cymbidium canaliculatum* will be sectionally dismantled under the supervision of a suitably qualified ecologist, to enable relocation of orchids outside the development footprint. Relocated *Cymbidium canaliculatum* will be positioned with similar aspect as close as practicable to original location. The date, time, quantity and spatial location will be recorded during this process.	Construction (during clearing of relevant areas)	Relevant locations

Reference	Impact	Mitigation measure	Timing	Relevant locations
B22	Unexpected impacts outside approved disturbance footprint	Procedure will include stop-work triggers, requirements for additional assessment/ecologist input in line with current legislative requirements for non-approved impacts, notification and reporting to relevant agencies, and adaptive management requirements.	Pre-construction (prepare); construction and operation (implement)	All locations
B23	Ongoing impacts during operation	Operational biodiversity management procedures will be developed within the network operator's Environmental Management Strategy (EMS)/Operation Environmental Management Plan (OEMP) to implement biodiversity commitments including incident management, monitoring requirements, vegetation management commitments (including weed management, ongoing habitat protection requirements, operational sediment and erosion controls, and any restoration measures) and avoid unnecessary disturbance in retained and partially cleared native vegetation areas.	Operation (ongoing)	Operational area

7.7.1 Additional conservation initiatives

EnergyCo is committed to implementing biodiversity conservation initiatives beyond compliance with the Biodiversity Offset Scheme (BOS). EnergyCo is currently investigating a number of opportunities to support partners such as research and educational institutions , Landcare, Armidale Tree Group and Local Land Services, to provide local and tangible biodiversity benefits to the New England region.

Further consultation with relevant stakeholders will be undertaken to seek to confirm investment priorities. Potential conservation initiative options currently being investigated are outlined below with further opportunities to be explored:

- targeted research relating to the success of mitigation measures (for example, evaluating the use of glider poles and rope bridges installed across the easement by gliders, evaluating partial clearing with regard to the occurrence and distribution of threatened vegetation including orchids) and relating to wildlife care and rehabilitation
- restoration of White Box-Yellow Box-Blakely's Red Gum Grassy Woodland, New England Peppermint Woodland and threatened species habitat
- restoration and revegetation of riparian corridors and habitat, and/or wildlife corridors
- establishment of a facility to provide specialised veterinary care and rehabilitation services for koalas and other wildlife on the Northern Tablelands
- training opportunities for local veterinarians, veterinary nurses and wildlife carers to assess, treat and manage wildlife more effectively
- provision of educational and volunteer opportunities in wildlife care, husbandry and animal health studies for students.

7.8 Biodiversity offsets

Under the NSW BOS, biodiversity offsets are required for any residual biodiversity impacts after all reasonable steps to avoid and minimise impacts have been taken. The BOS aims to achieve a standard of no net loss of biodiversity occurs as a result of a project.

Direct impacts to native vegetation, TECs and threatened species would result in a biodiversity credit liability for the project that needs to be retired through offsetting. Table 7.11 summarises the biodiversity credit liability requirements for the project under the BOS. Over half of the credit liability for direct impacts is in inaccessible land and therefore likely conservative. Additional survey is likely to result in overall predicted biodiversity impacts and credit liability reducing.

Table 7.11. Native vegetation and threatened species biodiversity offset liability, in both accessible land and inaccessible land

Impact	Credit liability for direct impacts within accessible land (that has been subject to biodiversity surveys)	Credit liability for direct impacts within inaccessible land (that has not been subject to biodiversity surveys)	Total
Total ecosystem credits	28,458	44,103	72,561
Total species credits (flora)	47,299	94,618	141,917
Total species credits (fauna)	176,132	296,666	472,798
Total credit requirements	**251,889**	**435,387**	**687,276**

EnergyCo intends to enter into a Strategic Offset Delivery Agreement (SODA) with DCCEEW (NSW) This is a recent initiative by the NSW Government to strengthen biodiversity conservation through amendments to its BOS. As part of this initiative, DCCEEW (NSW) has developed a Conservation Investment Strategy for both the Hunter and New England regions, which identify key priorities for protecting and restoring biodiversity values and improving connectivity and resilience in the region. Key priorities outlined in the Conservation Investment Strategy include:

- adding to conservation areas next to existing national parks
- implementing pest and weed control programs
- restoring degraded land
- establishing biodiversity stewardship sites in land with good quality remnant vegetation or threatened species habitat for long-term protection and management
- making financial contributions towards a fund to assist landholders of existing stewardship sites.

7.9 Further investigation

While the BDAR assessment is considered robust to meet the requirements of the BAM and based on conservative assumptions where there is uncertainty, EnergyCo is committed to carrying out further ecological surveys and assessments where practicable to continue to refine the understanding of the potential biodiversity impacts of the project as additional land becomes accessible. Therefore, further ecological surveys and assessments will be undertaken between exhibition of the EIS and lodgement of the Submissions Report / Amendment Report, which will include a revised BDAR.

This scope of work will include:

- carrying out ecological surveys out on private land in the project area (where the landholder voluntarily grants survey access) and on new land to be incorporated into a revised project area (for example Camp 1 Alternate and Camp 3)
- carrying out targeted species surveys on accessible land that were not able to be completed for the EIS BDAR (due to survey period timing constraints). In these areas species have been conservatively assumed present for the EIS BDAR
- revising the disturbance footprint to further avoid and minimise impacts on biodiversity values
- reassessing the condition of vegetation mapped in inaccessible area (currently assumed to be in benchmark condition)
- undertaking additional remote assessment methods of biodiversity values in inaccessible land, and where assumed presence has been conservatively assumed for the EIS BDAR
- investigating the application of the Native Vegetation Regulatory map (NVR map) to the project area, that was published in August 2026. The NVR map forms part of the NSW Land Management Framework under Part 5A of the *Local Land Services Act 2013*.

7.9.1 Assessment of flora and fauna species that are not threatened

Some community members have raised questions regarding impacts on particular species of interest that are not threatened species. Under the BAM, the BDAR focuses on assessing impacts to native vegetation, habitat condition and threatened species. Impacts to native vegetation and associated habitat values, including habitat used by non-threatened flora and fauna species, are addressed through the ecosystem credit component of the BAM. Certain threatened species require separate assessment where their presence or habitat cannot be reliably predicted from vegetation type and landscape features alone. The ecosystem credits generated for impacts incorporate impacts on vegetation, habitat and flora and fauna species that are not threatened species and the impact assessment and required offsets address these impacts.

It is acknowledged that the project would directly and indirectly impact habitat for a number of flora and fauna species that are not listed as threatened species, but are protected under the NPW Act. Such species mentioned by stakeholders as being of interest and that are known or likely to occur in the project area include wedge-tailed eagle; platypus; echidna; commonly occurring reptiles such as the eastern-bearded dragon, brown snake, red-bellied black snake; eastern grey kangaroo; red-necked wallaby; swamp wallaby; and hollow-nesting birds such as the sulphur-crested cockatoo, rosella and galah.

Therefore, the impacts on non-threatened species would be indirectly but adequately addressed through ecosystem credits that require offsetting and the mitigation measures prescribed in Section 7.7. For example, the proposed clearing procedures are designed to minimise impacts on all species that may use tree hollows and not just threatened species. The mitigation measures to be implemented at MacDonald River and Barnard River to protect Bells turtle and Manning River helmeted turtle would also protect the platypus. All protected fauna species identified during pre-clearing surveys would be managed in accordance with the relevant protocols prescribed by the BMP.

Aboriginal heritage



8 Section

8 Aboriginal heritage

This section provides a summary of the detailed assessment undertaken to identify the potential impacts of the project on Aboriginal cultural heritage values and identifies mitigation and management measures to be implemented to minimise and manage these impacts.

This section includes information from the Aboriginal Cultural Heritage Assessment (ACHA) undertaken by Umwelt and OzArk, provided in full in Technical Report 2.

8.1 Assessment approach

The ACHA was undertaken in accordance with the following NSW Government guidelines for Aboriginal cultural heritage assessment and management:

- Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (the Guide) (OEH, 2011b)
- Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (the Code of Practice) (DECCW, 2010a)
- Aboriginal Cultural Heritage Consultation Requirements for Proponents (Consultation Requirements) (DECCW, 2010b)
- Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (International Council on Monuments and Sites (Burra Charter) (ICOMOS, 2013).

The assessment was also prepared with reference to the SEARs as detailed in Appendix A.

The section considers issues raised in consultation with Registered Aboriginal Parties (RAPs) and Aboriginal knowledge holders with cultural connection to the project area, other community stakeholders and Heritage NSW, and includes consideration of impacts on Aboriginal cultural heritage, including Aboriginal sites and cultural values (tangible and intangible).

The ACHA methodology included the following key steps:

- **desktop analysis:** review of Heritage NSW's Aboriginal Heritage Information Management System (AHIMS) database and available literature to identify Aboriginal objects, sites and places within and surrounding the project area. Environmental, archaeological and ethnohistorical information was reviewed to establish an understanding of past Aboriginal occupation and land use and to inform archaeological predictions for the ACHA.
- **consultation:** Aboriginal community consultation was undertaken in accordance with the Consultation Requirements, including consultation regarding project details and updates, assessment methodologies, the significance of cultural heritage values and the management of potential impacts.

Additional consultation with Aboriginal knowledge holders with cultural information relevant to the project area was also undertaken as part of the cultural values assessment. The primary purpose of this was to identify places of cultural significance (tangible and intangible) in relation to the project area to assess any potential project-related impacts.

- **Predictive model:** a predictive model was developed and refined iteratively to identify areas of archaeological sensitivity based on landforms, proximity to water and known site distributions. The predictive model was supported by mapping that has guided the survey and test excavation strategies. It has been used to predict where archaeological evidence is most likely to occur in the parts of the project area not yet surveyed.
- **Archaeological field survey and test excavation:** archaeological field survey and test excavation were undertaken with the RAP fieldwork representatives to identify and record Aboriginal cultural heritage values.
- **Cultural values assessment (CVA):** undertaken to identify places of Aboriginal cultural significance that are made up of tangible and intangible Aboriginal cultural heritage values. The cultural mapping report involved desktop research and interviews with Aboriginal knowledge holders with cultural connection to the project area.
- **Significance assessment:** an assessment of the significance of the recorded Aboriginal sites and places.
- **Impact assessment:** an assessment of the potential direct and indirect impacts of project construction and operation on Aboriginal sites and PADs. The assessment adopts a conservative, worst-case approach and assumes that all known Aboriginal sites and PADs within the project area may be impacted, except where designated no-impact areas have been identified.
- **Management measures**: development of mitigation and management measures to avoid, minimise and manage any potential impacts identified.

Further detail on the ACHA assessment approach is provided in Technical Report 2.

8.1.1 Study area

The study area for the ACHA fieldwork is the project area, with additional areas of survey and test excavation undertaken within previous project corridor options that are now excluded from the project area. The ACHA also considers potential for indirect impacts to Aboriginal cultural heritage values in the vicinity of the project area.

Given the scale of the project area, the ACHA study area was divided into 2 broad cultural study regions (refer to Figure 8.1). The 2 study regions and their cultural associations with contemporary RAPs are:

- New England Tablelands: Anaiwan (Nganyaywana), Dainggatti (Thunggutti), Gumbaynggirr and Gomeroi (Kamilaroi)
- Upper Hunter Valley and Highlands: Wonnarua (Wanaruah), Gomeroi (Kamilaroi), and Biripi.

This broad grouping guided consultation and fieldwork involving Aboriginal cultural representatives. These study regions intersect with the 6 LALC administrative boundaries of Armidale, Amaroo, Tamworth, Purfleet/Taree, Nungaroo and Wanaruah (refer to Figure 8.1).

8.1.2 Survey coverage

Archaeological field survey was undertaken with the RAP fieldwork representatives over 22 weeks between August 2024 and March 2026. Due to land access limitations, survey was undertaken over approximately 46 per cent of the project area. Within the project area, 638 survey units were completed, covering approximately 560 kilometres and 2,798 hectares. Areas of proposed larger scale development, such as at energy hubs, were prioritised so that these were surveyed as completely as practicable where access was available.

Due to the iterative process of project design and corridor refinement (refer to Section 2.6 and Appendix B of the EIS), multiple stages of fieldwork of both the current project area as well as earlier proposed alignments has been undertaken. Consequently, survey effort extended well beyond the current project area, with approximately 1,141 kilometres of pedestrian transects (5,707 hectares) completed across all surveyed alignments, reflecting a consistent effort to maximise survey coverage as project design evolved. As a result, survey has occurred in areas no longer within the project area. The ACHA (Technical Report 2) incorporates the outcomes of all survey efforts (that is, within the project area and survey in areas relating to previous project alignments). This summary section focusses on the outcomes of the ACHA specific to the project area as assessed in the EIS.

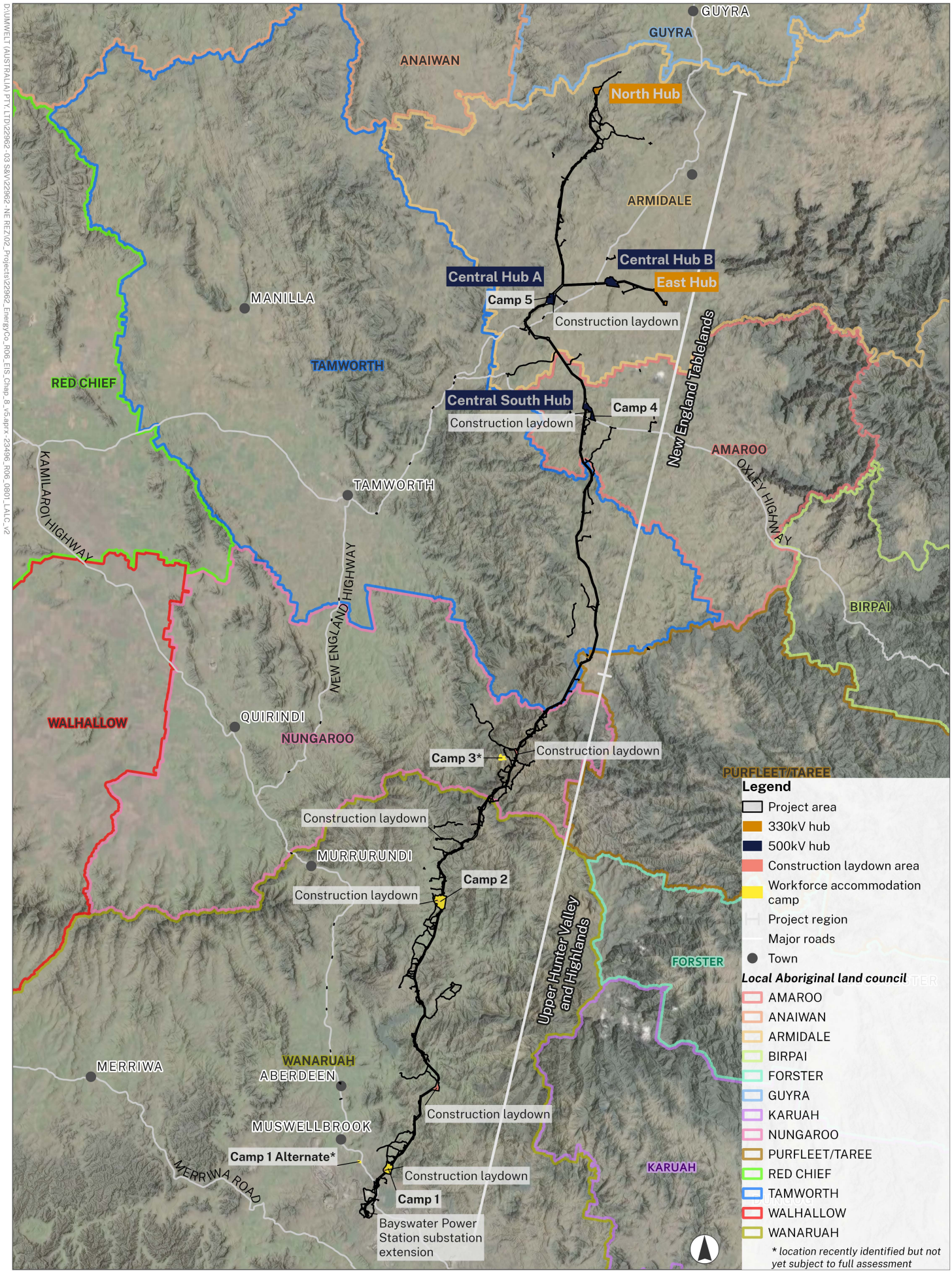


FIGURE 8.1 ACHA study regions and LALC boundaries

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

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GDA2020 MGA Zone 56

8.1.3 Predictive model

Predictive modelling is a key component of archaeological assessment, used to anticipate where Aboriginal cultural heritage values are most likely to occur based on environmental variables and patterns identified in previous investigations.

The predictive model provides a spatial framework to guide the identification, recording, and management of Aboriginal objects, ensuring that areas of potential archaeological significance are appropriately considered in project planning and impact assessment. It has enabled the field survey and testing efforts to be focused in areas of higher archaeological potential.

The predictive model identifies landforms and landscape features according to their archaeological sensitivity, which correlates with the probability of Aboriginal objects being present. The predictive model identified the following areas of varying archaeological sensitivity:

- high sensitivity areas: including known Aboriginal cultural heritage sites registered on the AHIMS database, previously identified PADs, and level to gently sloping land within 200 metres of fourth-order or higher streams. These areas are highly likely to contain archaeological material and are prioritised for survey and test excavation.
- moderate sensitivity areas: including gently sloping land adjacent to second- and third-order streams, ridgelines and crests, scarps and cliff lines, and locations with potential outcropping silcrete. These landscapes are likely to contain archaeological deposits, particularly in areas suitable for temporary camps, travel routes, or resource extraction, but their probability of featuring complex and higher density stone artefact sites is lower than high sensitivity areas.
- low sensitivity areas encompass all other landforms not meeting the criteria above and are considered less likely to contain archaeological material.

An example of the predictive model sensitivity mapping is provided on Figure 8.2. The predictive model is shown within Appendix K of the ACHA (refer to Technical Report 2). The model has been developed through an iterative process and refined using available datasets and field data, including survey and test excavation results, to improve its alignment with observed archaeological patterns and the distribution of Aboriginal objects and areas of PAD. As additional survey and investigation data become available, the predictive model will continue to be reviewed and refined to support future assessment and survey planning across the project area.

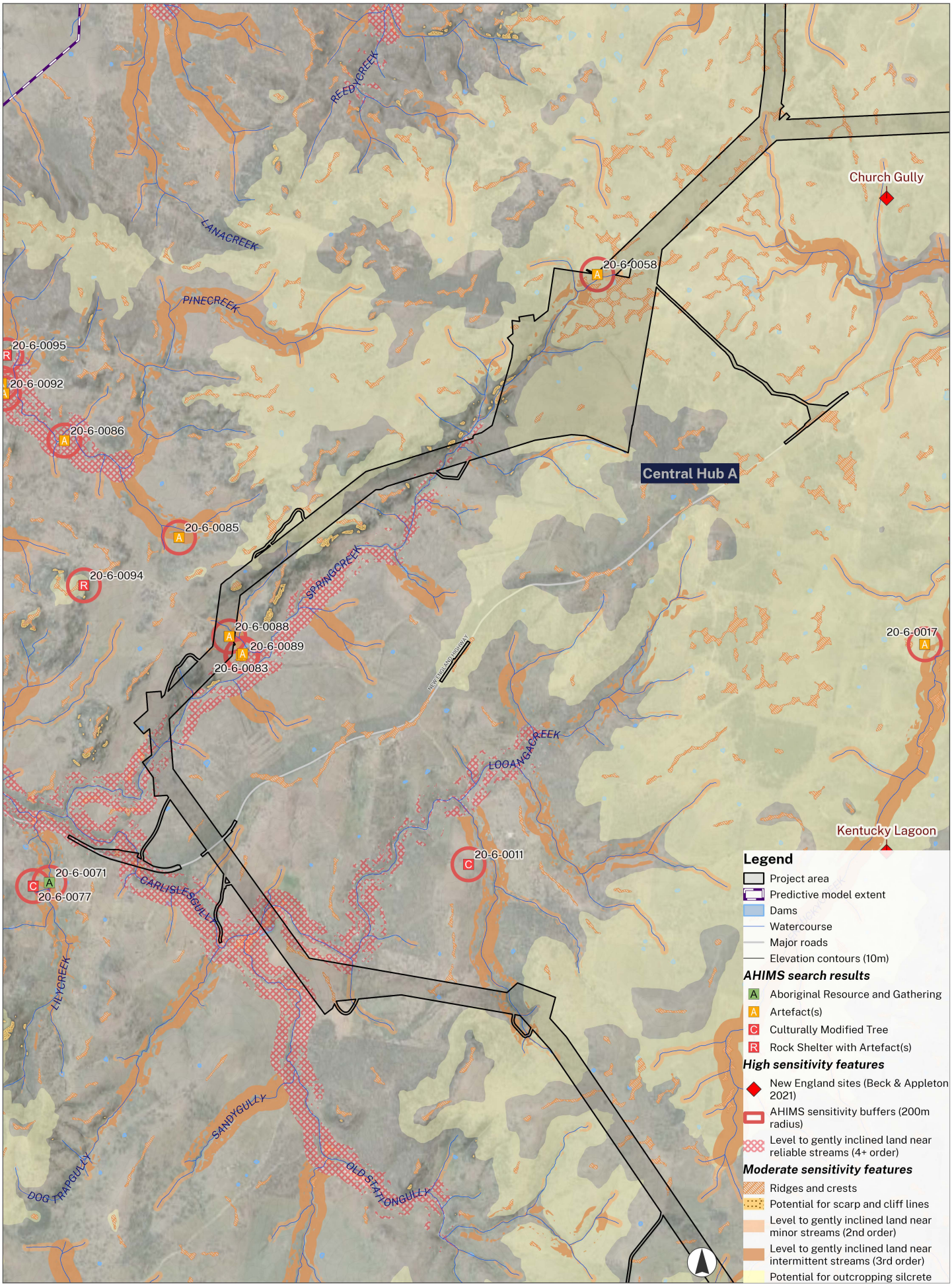


FIGURE 8.2 Predictive model mapping example

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

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GDA2020 MGA Zone 56

8.2 Existing environment

Environmental, ethnohistorical and archaeological information was reviewed to establish an understanding of past Aboriginal occupation and land use. This section provides a summary of the key findings with further detail provided in the ACHA (refer to Technical Report 2).

8.2.1 Environmental context

The decisions made by past Aboriginal peoples regarding where they lived, the resources they utilised, and other aspects of daily life were strongly influenced by the surrounding environment. Landscape features played a key role in the selection of camping sites, activity areas, and transitory or ceremonial places. The preservation and visibility of cultural sites today are affected by environmental factors such as vegetation cover, historical land use and both human and natural disturbance. Understanding the environmental context of the project area is therefore essential for predicting and evaluating the distribution, visibility and preservation of archaeological sites, as well as the likelihood of archaeological material occurring beneath the ground surface.

New England Tablelands region

A hydrological network of creeks, rivers, wetlands and freshwater lagoons is a defining feature, creating a productive 'plateau-and-gorge' mosaic that supported pre-colonial Aboriginal occupation, movement and resource use. Geomorphic processes vary across landforms, with depositional environments (for example floodplains) favouring burial and preservation of archaeological material, while stable uplands typically retain exposed deposits and erosional slopes may both reveal and disturb cultural materials.

Watercourses and lagoons are particularly important landscape features, providing reliable resources and forming focal points for habitation, subsistence and cultural activity, including ceremonial use and travel corridors. The region also contains abundant natural resources for tool manufacture and diverse flora and fauna that supported subsistence practices. Since European settlement in the 19th century, the landscape has been substantially modified by pastoralism and agricultural development, resulting in vegetation clearance and disturbance of soils, particularly on fertile basalt plains, while less productive granitic areas often retain more intact landscape elements. More recently, parts of the New England region have undergone further modification associated with the expansion of urban centres, transport infrastructure, industrial developments, and renewable energy projects, contributing to additional landscape disturbance and changes to land use across the region.

Upper Hunter Valley and Highlands region

The Upper Hunter Valley and Highlands is a highly diverse landscape spanning multiple landforms, including floodplains, ridges, valleys and mountainous terrain. The area is underlain by complex geology ranging from sedimentary and volcanic rocks to basalt, influencing variation in soil fertility, vegetation communities and land use, from rainforests at higher elevations to dry forests and cleared valley floors. A well-developed hydrological network, including the Hunter, Isis and Pages rivers, is a defining feature, supporting ecosystems and historically structuring Aboriginal occupation, movement and trade, with the highest archaeological sensitivity associated with floodplains, terraces and areas near reliable water sources.

Since European settlement, the region has been extensively modified through agriculture, grazing, mining and infrastructure development, particularly within accessible valley landscapes where vegetation clearance, fragmentation and soil erosion are widespread. More rugged areas such as the Tomalla region remain comparatively intact due to limited accessibility.

Cultural implications

Despite these disturbances, the landscape retains significant cultural heritage values, with strong associations between archaeological sites and alluvial landforms, and continued cultural importance of places such as Bulagaranda, Burning Mountain and Baiame Cave (all outside the project area), reflecting enduring Aboriginal connections to Country and both tangible and intangible heritage values.

8.2.2 Ethnohistorical context

Ethnohistorical studies provide contextual understanding of Aboriginal cultural heritage values locally and regionally in relation to the project area.

New England Tablelands region

Aboriginal societies in the New England Tablelands region were organised into small, interconnected family and clan groups with fluid boundaries and strong cultural ties to Country, rather than fixed “tribal” units, with language areas such as Anaiwan (Nganyaywana), Dainggatti and Gumbaynggirr broadly identified through historical and anthropological mapping. Early European exploration and settlement from the early 19th century led to significant disruption, including frontier conflict, displacement and violence, although Aboriginal people continued to maintain connections to land, often working on pastoral stations and adapting to new materials and conditions during the contact period. These interactions have archaeological implications, particularly for contact-period sites where traditional practices intersect with introduced materials. Despite historical impacts, Aboriginal communities in the region remain actively engaged in cultural heritage, continuing to manage and maintain connections to culturally significant places and practices.

Upper Hunter Valley and Highlands region

The Upper Hunter Valley and Highlands region is traditionally associated with the Gomeroi (Kamilaroi), Geawegal/Biripai and Wonnarua peoples, whose territories and cultural connections are complex, overlapping and shaped by kinship, trade and ceremonial relationships. Early European exploration and pastoral expansion from the early 1820s led to widespread frontier conflict, including documented violent encounters and massacres, followed by increasing colonial control through the establishment of institutions such as the Aboriginal Protection Board and missions, which disrupted traditional lifeways and led to dispossession and forced removal of Aboriginal people. Despite this, Aboriginal communities maintained strong cultural connections to Country, with ongoing links to landscape features, ceremonial sites and story places.

8.2.3 Archaeological context

Archaeological records provide context and a baseline understanding of known Aboriginal cultural heritage values locally and regionally in relation to the project area.

AHIMS searches were undertaken across the entirety of the project area including suitable buffers sometimes extending beyond 10 kilometres from the transmission line alignment. The searches aimed to identify previously recorded Aboriginal sites within the project area and help characterise the broader regions. A summary of the outcome of the searches is provided below, with AHIMS sites shown on Figure 8.3.

New England Tablelands region

In total, 140 Aboriginal sites were identified in the New England Tablelands region search area. Open artefact sites dominate the AHIMS assemblage (Table 8.1). The second most common site feature comprises culturally modified trees (CMTs), with Potential Archaeological Deposits (PADs) representing the third most common site feature. The ACHA has defined PADs as the predicted extent of concentrated subsurface Aboriginal objects in a particular area. All remaining site types, including ceremonial, burial, art, quarry, stone arrangements, and habitation features occur at relatively low frequencies within the dataset but are still significant by their presence given that they are rare site types. Stone artefacts within open artefact sites dominate the archaeological record compared to other site categories, largely due to their high preservation potential relative to other archaeological materials.

Of these sites, 9 are within the project area and one is within 20 metres of the project area. Site types within the project area are primarily open artefact sites and / or PADs (or both) and one CMT.

Certain AHIMS site types are recognised as having exceptional Aboriginal cultural heritage significance in NSW due to their direct association with Aboriginal spiritual beliefs, ceremonial practices, social organisation and ancestral connections to Country. Site types such as Aboriginal ceremony and dreaming sites, burial sites, and ceremonial ring sites are some of these examples and occur within the AHIMS search area. A total of 12 such sites were identified in the New England Tablelands region AHIMS searches, none of which are located within the project area.

Table 8.1. AHIMS site types identified in the New England Tablelands

Site features (type)	Number	Per centage of total
Aboriginal Ceremony & Dreaming	2	1.43%
Aboriginal Ceremony & Dreaming & Burial	1	0.71%
Aboriginal Resource & Gathering	1	0.71%
Art	1	0.71%
Art & Aboriginal Ceremony & Dreaming	1	0.71%
Artefact(s)	71	50.71%
Artefact(s) & Aboriginal Resource & Gathering	1	0.71%

Site features (type)	Number	Per centage of total
Artefact(s), Stone Arrangement & Stone Quarry	1	0.71%
Burial & Culturally Modified Tree	2	1.43%
Ceremonial Ring	2	1.43%
Culturally Modified Tree	25	17.86%
Culturally Modified Tree & Artefact(s)	1	0.71%
Grinding Groove	2	1.43%
Habitation Structure	7	5.00%
PAD	9	6.43%
Rockshelter with Art	1	0.71%
Rockshelter with Artefact(s)	7	5.00%
Stone Arrangement	1	0.71%
Stone Quarry	1	0.71%
Stone Quarry & Artefact(s)	1	0.71%
Water Hole	2	1.43%
Grand Total	140	100.00%

Upper Hunter Valley and Highlands region

In total, 782 Aboriginal sites were identified in the Upper Hunter Valley and Highlands region search area (Table 8.2). Open artefact sites dominate the AHIMS search assemblage, representing approximately 95 per cent of the total recorded sites, with PADs the second most common site feature and CMTs the third most common site feature.

All remaining site types including ceremonial sites, burials, shell middens, rock shelters (with or without art and/or artefacts), grinding grooves, and stone arrangements occur at very low frequencies within the dataset. These site types are of high cultural and archaeological significance.

Of the 782 sites, 13 are recorded within the project area (with one site within the project area listed as destroyed). 11 sites are located within 50 metres of the project area. All of these sites feature open stone artefact sites, some of which are associated with PAD, and one site also featuring a CMT.

Similar to the New England Tablelands region, the Upper Hunter Valley and Highlands AHIMS results contain several sites associated with Aboriginal spiritual beliefs, ceremonial practices, social organisation, and ancestral connections to Country. A total of 10 sites of this nature have been recorded within the Upper Hunter Valley and Highlands AHIMS searches, none of which are located within the project area.

Table 8.2. AHIMS site types identified in the Upper Hunter Valley and Highlands Region

Site features (type)	Count	Per centage of total
Aboriginal Resource and Gathering	2	0.26%
Artefact(s)	698	89.26%
Artefact(s) & Culturally Modified Tree	4	0.51%
Artefact(s) & PAD	30	3.84%
Artefact(s) & Stone Quarry	1	0.13%
Artefact(s) & Habitation Structure	1	0.13%
Artefact(s), Hearth & PAD	1	0.13%
Burial & Culturally Modified Tree	1	0.13%
Burial & Stone Arrangement	3	0.38%
Ceremonial Ring	1	0.13%
Ceremonial Ring & Culturally Modified Tree	1	0.13%
Culturally Modified Tree	14	1.79%
Grinding Groove	1	0.13%
PAD	9	1.15%
PAD & Artefact(s)	4	0.51%
Rockshelter with Art	3	0.38%
Rockshelter with Art & Artefact(s)	1	0.13%
Rockshelter with Artefact(s)	2	0.26%
Rockshelter with Stone Arrangement	1	0.13%
Shell Midden	1	0.13%
Stone Arrangement	2	0.26%
Stone Arrangement & Culturally Modified Tree	1	0.13%
Grand Total	**782**	**100.00%**

8.2.4 Archaeological survey

Archaeological field survey was undertaken with the RAP fieldwork representatives over 22 weeks between August 2024 and March 2026. The survey of landforms identified in the predictive model as high or moderate sensitivity were prioritised, however, the logistics of property access meant that full survey of each property accessed was generally undertaken. This resulted in large areas of low sensitivity landforms being surveyed, along with the targeted high and moderate sensitivity landforms. Areas of proposed larger scale development, such as at energy hubs, were also prioritised to ensure that these were surveyed as completely as practicable where access was available.

Within the project area, a total of 117 new Aboriginal sites were identified. These comprise 107 stone artefact sites, 6 CMTs (including one ring tree)[7], one rockshelter with PAD and 3 stone quarry sites. In addition, 77 areas of PAD were identified within the project area during survey and an additional 3 were identified during test excavation of Control Areas[8] (total 80 PAD in total identified in the project area). These are identified in Table 8.3 and shown on Figure 8.3.

Table 8.3. Newly recorded archaeological sites and PADs within the project area following completion of the survey

Feature	Number of sites (or PADs) recorded within New England Tablelands region	Number of sites (or PADs) recorded within Upper Hunter Valley and Highlands region
Stone Artefact(s)	47	60
CMT (requires expert field verification)	6	0
Rockshelter + PAD	1	0
Stone Quarry	3	0
PAD	52*	28
Totals	**109**	**88**

** Including one PAD that was subsequently excavated and found not to contain an archaeological deposit and was therefore excluded from subsequent PAD counts.*

[7] These trees require CMT expert field-verification to establish if they are of Aboriginal cultural origin.

[8] In some instances, as part of the test excavation program, 'Control Areas' were assigned in some areas to test the predictive model or further investigate landscape variability. This designation was completed post-survey, but before test excavation occurred. After testing, these areas were subsequently updated to be either a 'PAD with confirmed deposit' when archaeological material was found, or 'not a site' if no Aboriginal objects were identified. Further information on PAD designation is provided in Section 6.3.2 and Section 8.1.2 of the ACHA in Technical Report 2.

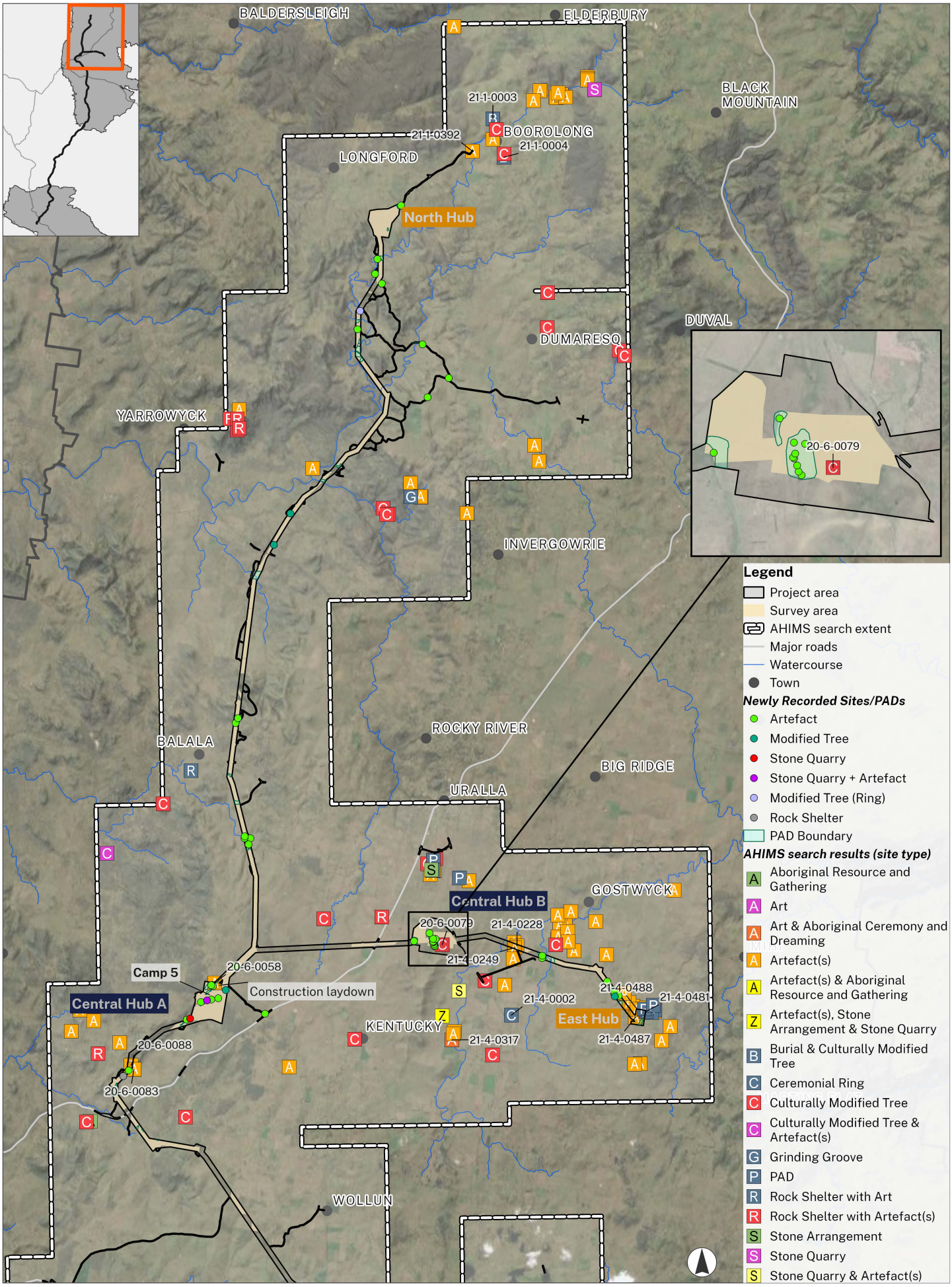


FIGURE 8.3a AHIMS search and survey results (Map 1 of 5)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:270,000 at A4
GDA2020 MGA Zone 56

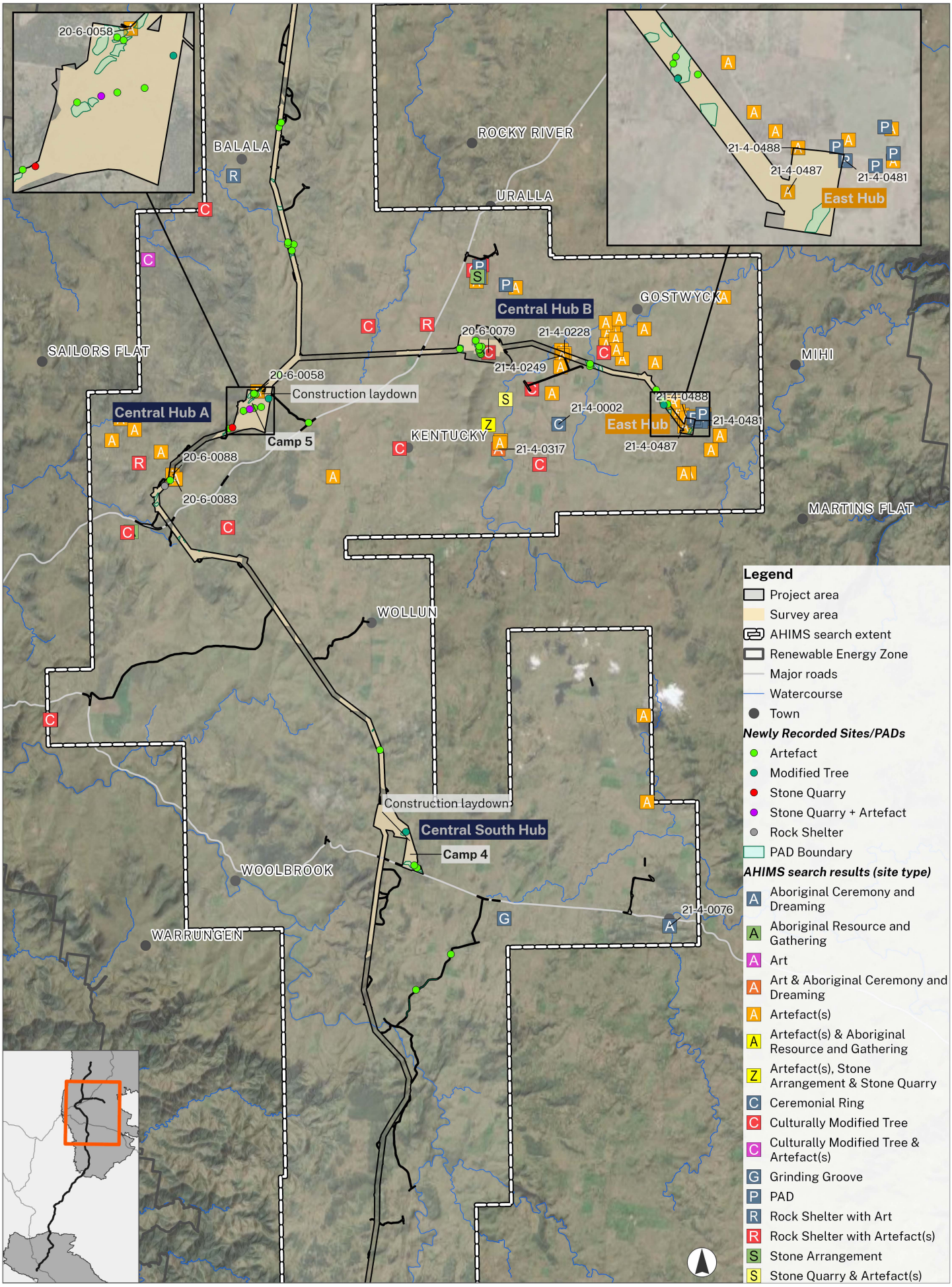


FIGURE 8.3b AHIMS search and survey results (Map 2 of 5)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:265,943 at A4
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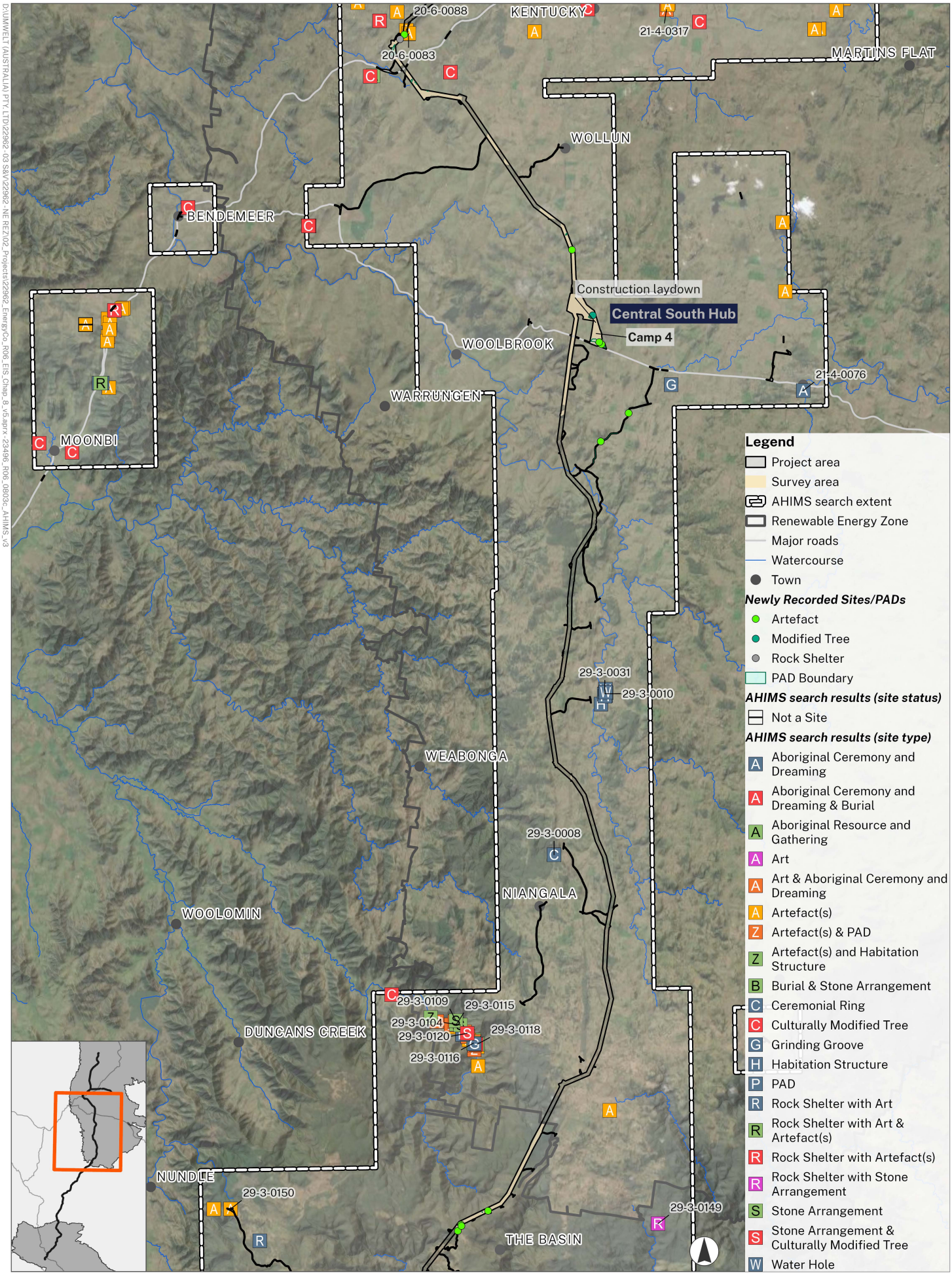


FIGURE 8.3c AHIMS search and survey results (Map 3 of 5)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:330,000 at A4
GDA2020 MGA Zone 56

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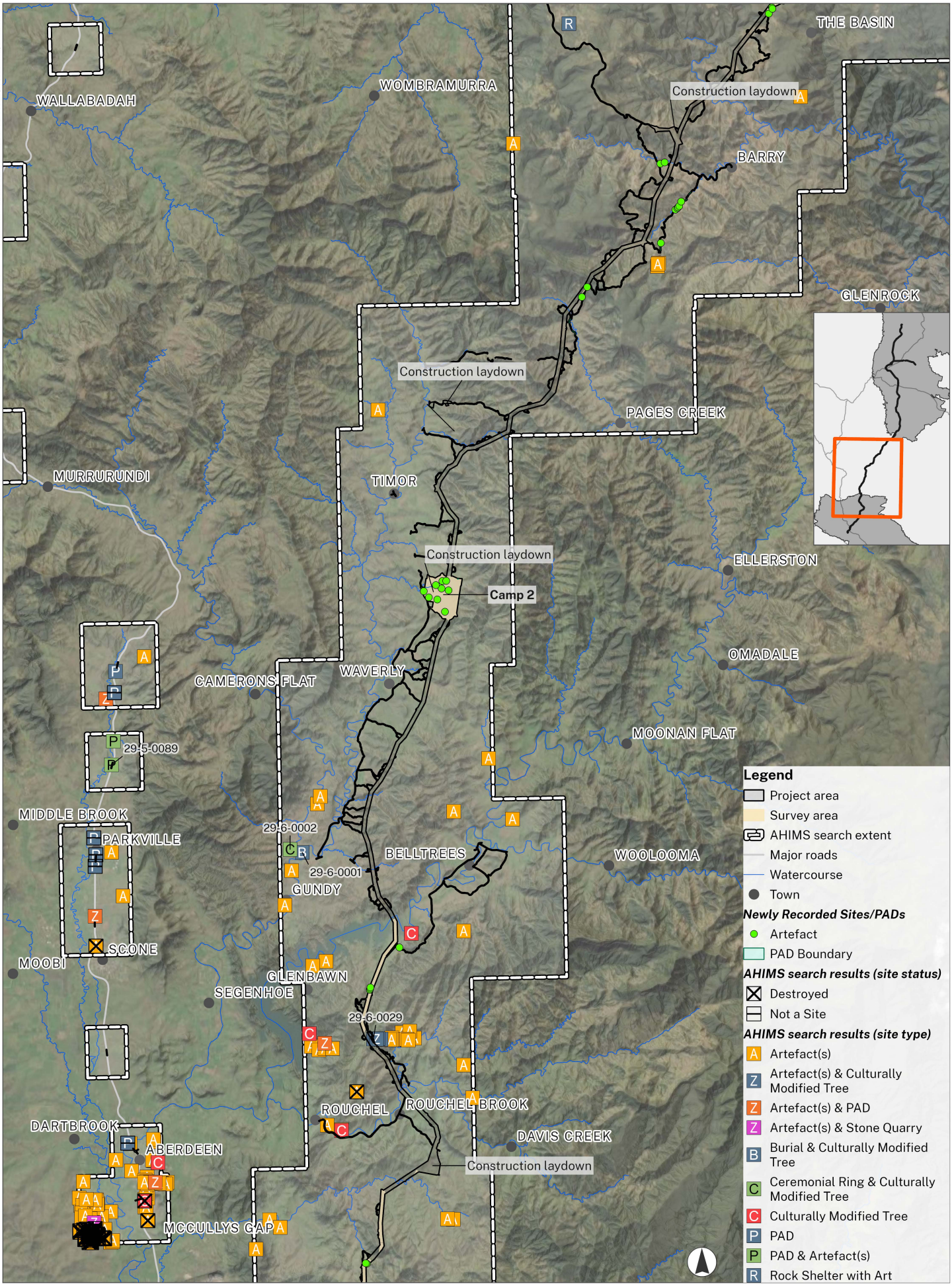


FIGURE 8.3d AHIMS search and survey results (Map 4 of 5)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:330,000 at A4
GDA2020 MGA Zone 56

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Kilometres

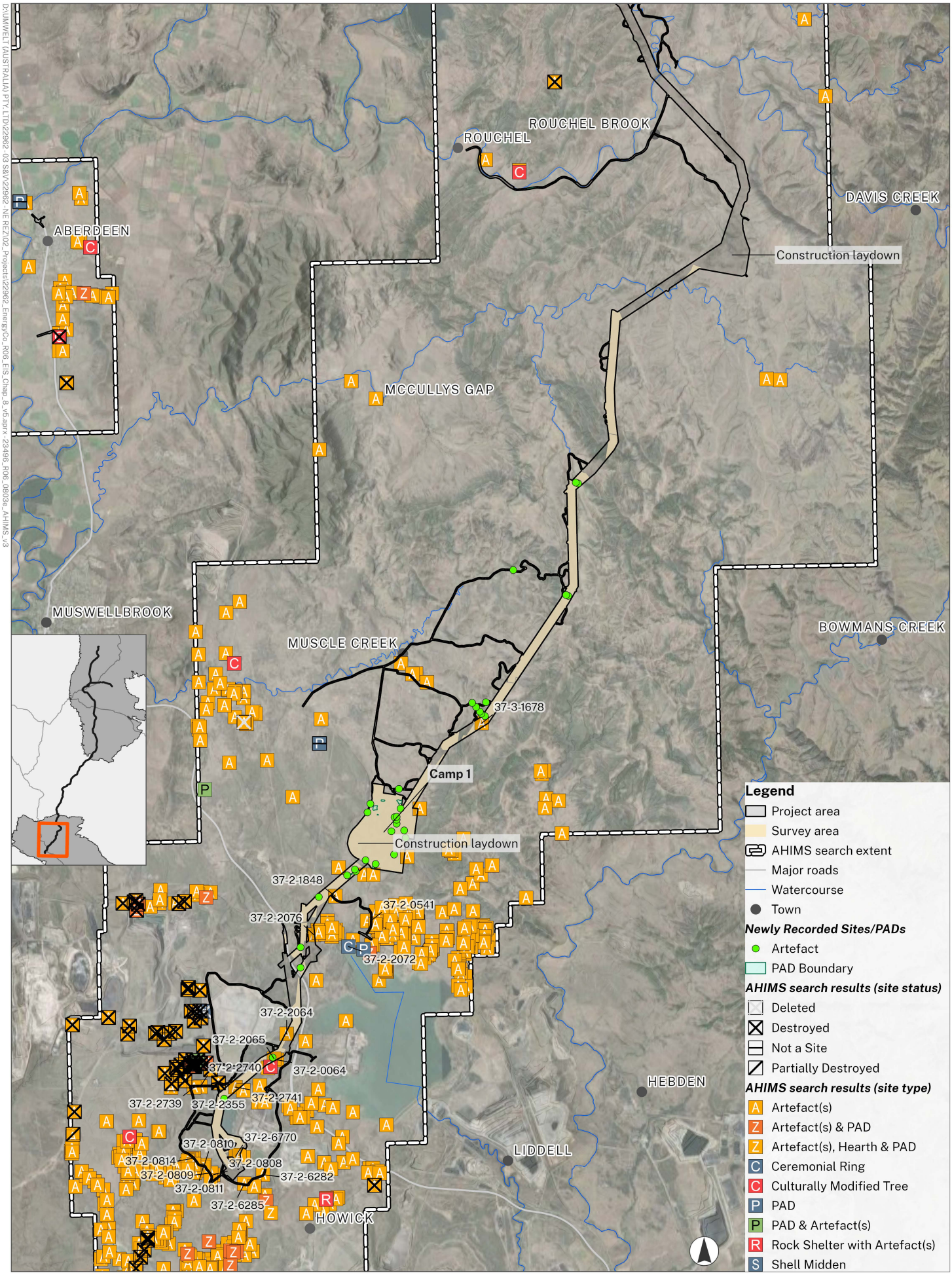


FIGURE 8.3e AHIMS search and survey results (Map 5 of 5)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:140,000 at A4
GDA2020 MGA Zone 56

8.2.5 Test excavation

In addition to field survey, a program of test excavation was undertaken to test landscape features to inform the predictive model; focus on areas of PAD identified from survey and where broadscale earthworks is proposed (for example energy hubs); and identify mitigation or avoidance requirements for the areas/PADs tested as part of the program. As for the field survey, the testing program was subject to land access limitations. Due to project alignment refinements some of the test excavation locations in the New England Tablelands study region are now outside of the project area.

Test excavation was undertaken at 22 locations, comprising 18 PADs identified during survey and 4 'Control Areas'. Three of the tested locations near Boorolong Creek are now outside the project area due to project refinement. Only 2 of the test locations were in the Upper Hunter Valley and Highlands study region.

Test excavation of most PADs within the New England Tablelands study region recovered artefact assemblages indicative of on-site tool manufacture. The distribution and composition of raw materials suggest procurement from nearby sources, reflecting localised land use and resource exploitation. Variation between sites, including higher artefact densities in some areas, indicates differing activity intensities.

Findings of the test excavation program for the Upper Hunter Valley and Highlands study region show stone artefact assemblages that are very small and low-density. Their sparse distribution combined with signs of soil disturbance from agricultural activity and erosion, indicates that the deposits are disturbed and of low integrity. Overall, the assemblage reflects transient Aboriginal use of the landscape rather than sustained occupation.

Full outcomes of the test excavation program are detailed in Section 8 of the ACHA (refer to Technical Report 2).

8.2.6 Predictive model evaluation

The evaluation of survey and test excavation results demonstrates that the predictive model is an effective tool for identifying areas of Aboriginal archaeological potential and prioritising assessment effort across the project area. As detailed in Section 9 of the ACHA, while survey coverage was unevenly distributed, standardising results for equal survey effort showed that high sensitivity areas were expected to contain approximately 52 per cent of newly recorded Aboriginal sites. Additionally, moderate sensitivity areas were expected to contain 30 per cent of newly recorded Aboriginal sites. This suggests a strong relationship between modelled sensitivity and archaeological material.

Test excavation results further supported the model's effectiveness, with high sensitivity areas yielding the highest density of subsurface archaeological material and accounting for an expected 70 per cent of artefacts under a standardised excavation effort scenario, compared with 24 per cent in moderate sensitivity areas and 6 per cent in low sensitivity areas. Although Aboriginal objects were identified across all sensitivity classes, results consistently demonstrated that high and moderate sensitivity areas contain a greater concentration of archaeological material. These findings indicate that the predictive model provides a reliable framework for identifying

archaeological potential, guiding future survey and test excavation, and informing assessment in areas that have not yet been accessible for investigation, while recognising that ongoing survey and excavation outcomes will continue to inform model refinement.

8.2.7 Recently identified ancillary sites

The location of workforce accommodation Camp 3 has only recently been identified for the project, following ongoing investigations over an extended period. In May 2026, a potential option for this camp was identified in the Barry locality. EnergyCo has commenced discussions with the landholder regard the further investigation and potential acquisition of this property.

Through ongoing engagement with Muswellbrook Shire Council, a possible alternative location for Camp 1 has also been identified (referred to as Camp 1 Alternate). EnergyCo is currently investigating the site in consultation with Council.

Neither of these alternatives were considered in the ACHA, however, a desktop review of known and predicted Aboriginal cultural heritage values supplemented by a targeted site inspection was undertaken for both locations to verify landscape sensitivity predictions and understand the nature of select previously recorded archaeological sites.

The Camp 1 Alternate preliminary assessment findings were:

- there are no Aboriginal heritage places listed on the World Heritage List, National Heritage List, or the Commonwealth Health List; no native title claim applications or determinations; and no State listed heritage items or Aboriginal Places
- a single AHIMS site is registered within the area, 'Ramrod Creek' (AHIMS # 3 7-2-0187), however, a review of the site card indicates that it has been incorrectly recorded and is located outside the area
- the predictive model identified that the majority of the area was of low sensitivity with no areas of high sensitivity and a small area of moderate archaeological sensitivity. This small area of moderate sensitivity was associated with crests/ridgelines in the south-western corner of the area, however, this is an isolated hilltop and is not considered suitable to have formed a transitory Aboriginal route.

The Camp 3 preliminary assessment findings were:

- there are no Aboriginal heritage places listed on the World Heritage List, National Heritage List, or the Commonwealth Health List; no native title claim applications or determinations; and no State listed heritage items or Aboriginal Places
- no AHIMS sites are registered within the area
- the predictive model identified areas of high archaeological sensitivity on flat to gently inclined gradients next to the Barnard River and moderate sensitivity on the spurs and crests that lead to the Barnard River. Although the model identified steep areas for scarp and cliff potential, the site inspection verified that these areas do not contain these features. Most of the Camp 3 landscape is of low archaeological sensitivity because it is either steep terrain and/or suitably distant from sources of water.

Overall, Camp 3 is a more likely location to feature archaeological material.

Both of these locations would be subject to full assessment in the addendum ACHA as part of the Submissions Report and Amendment Report, including archaeological survey following the ACHA survey methodology and RAP participation and consultation.

8.2.8 Cultural values

A review of anthropological literature and cultural interviews with Aboriginal knowledge holders completed by anthropologist Dr. Philip Clarke as part of the CVA demonstrate that Aboriginal cultural heritage values in the broader study regions extend beyond the archaeological record and include tangible and intangible values. The CVA identified a number of places of cultural significance. These are shown on Figure 8.4, and include:

- Bora grounds and burial grounds, some of which were previously recorded
- Story Places, where Ancestors performed deeds during the Creation and where their power is still felt
- Songlines, defined as pathways of Ancestors and living people (these locations are redacted as culturally sensitive information)
- former Aboriginal campsites, often with archaeological materials and generally located near water bodies which were part of major foraging zones
- archaeological sites, such as places with surface scatters, quarries and axe grinding grooves; including those recorded during the recent survey
- CMTs, both previously known and those recorded during the survey
- historical places, such as massacre sites and former fringe camps/reserves.

The CVA concluded that all of the identified places of cultural significance fall outside of the project area with the exception of 2 Songlines identified by Anaiwan knowledge holders that cross the project area in the New England Tablelands study region. These Songlines represent a string of connected cultural sites, rather than an existing place in themselves. The interviewees who identified the Songlines generally reported that this was not an issue so long as the cultural sites along them were not interfered with by the project. Interviewees recognised that major roads already cross the Songlines. Consultation with the Anaiwan knowledge holders will continue to better understand the implications for the project and Songlines.

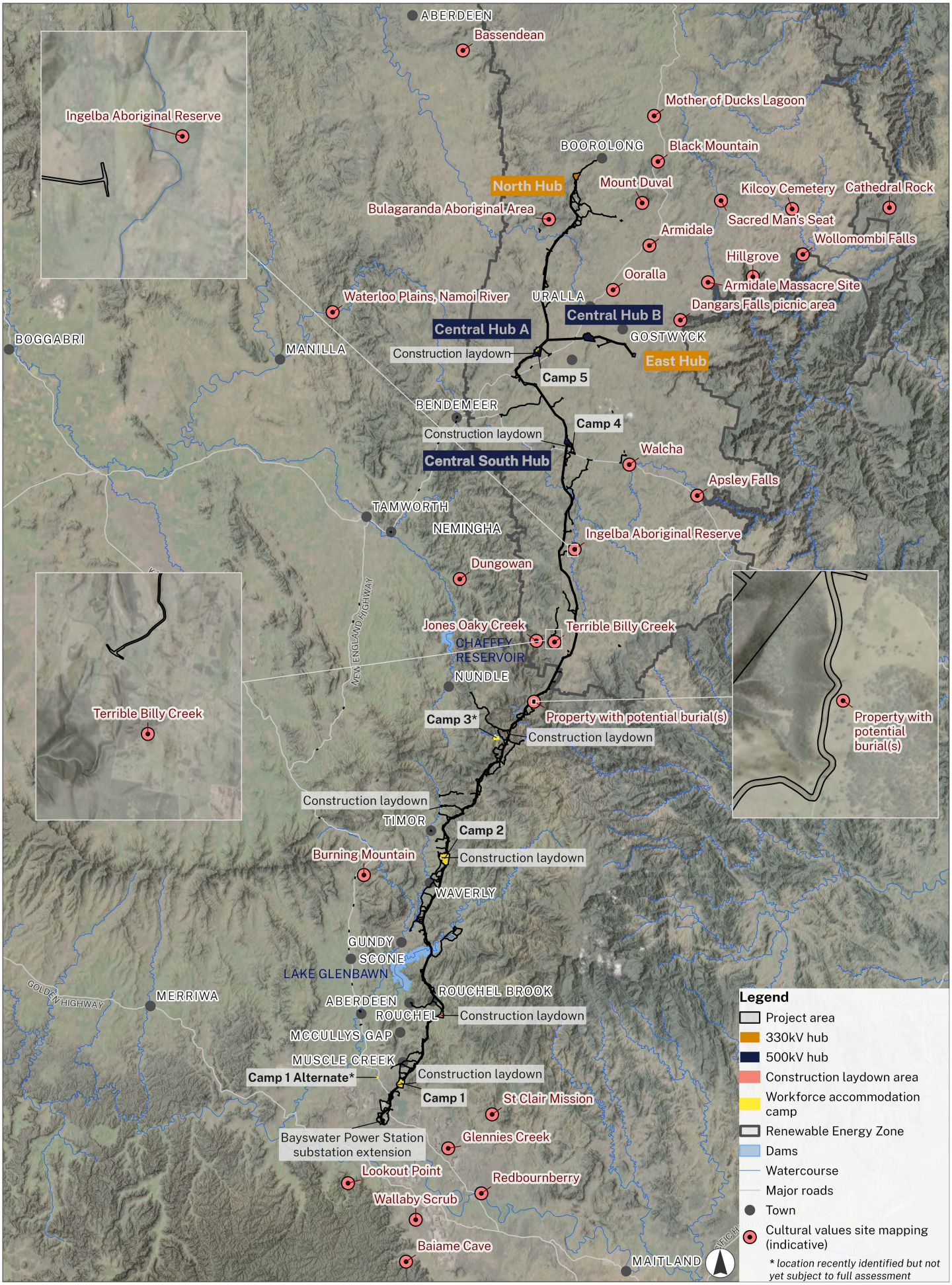


FIGURE 8.4 Places of cultural significance in relation to the project area

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:1,200,000 at A4
GDA2020 MGA Zone 56

8.2.9 Significance assessment

An assessment of significance was undertaken for all sites within the project area. Assessing cultural heritage significance is a key step in understanding and managing Aboriginal cultural heritage values. Significance assessment informs management strategies by identifying the values of sites and places, why they are important and the potential impact of development on their value.

All recorded archaeological sites have been assigned a high significance rating for socio/cultural values, reflecting feedback from RAPs that archaeological sites cannot be meaningfully separated from the broader cultural landscape or Country, and that places within Country often hold elevated cultural values regardless of their assessed scientific significance.

The scientific (archaeological) significance assessment identified that most Aboriginal sites recorded within the project area are of low scientific significance (n=102 of 117), with no sites assessed as being of high scientific significance. A total of 9 sites within the project area were assessed as having moderate scientific significance which included larger or more complex stone artefact scatters, a rock shelter with PAD, and stone quarry sites. Additionally, the test excavation identified 2 PADs within the project area that were assessed as having high scientific significance: one adjacent to Spring Creek and one adjacent to Atchesons Gully in the New England Tablelands study region.

An overview of the scientific significance assessment for Aboriginal sites and PADs within the project area is provided in Table 8.4, and Table 8.5 respectively. Note that the CMTs within the project area have not yet been subject to expert field verification and therefore have not yet been assigned a scientific significance rating.

Table 8.4. Overview of the scientific (archaeological) significance assessment for Aboriginal sites recorded within the project area (excluding previously recorded sites)

	Low significance	Moderate significance	High significance	Significance to be confirmed	Totals
New England Tablelands	**43**	**8**	**-**	**6**	**57**
Artefact	43	4	-	-	47
CMT	-	-	-	6*	6
Rockshelter +PAD	-	1	-	-	1
Stone quarry	-	3	-	-	3
Upper Hunter Valley and Highlands	**59**	**1**	**-**	**-**	**60**
Artefact	59	1	-	-	60
Totals	**102**	**9**	**0**	**6**	**117**

** CMT's require field verification*

Table 8.5. Overview of the scientific (archaeological) significance assessment for PADs recorded within the project area (excluding previously recorded PADs)

	Low significance	Moderate significance	High significance	Significance to be confirmed	Not applicable	Totals
New England Tablelands	**14**	**0**	**2**	**35**	**1**	**52**
PAD (confirmed deposit)	14	-	2	-	-	16
PAD (not excavated)	-	-	-	35	-	35
PAD (excavated but no deposit identified/not a site)	-	-	-	-	1**	1
Upper Hunter Valley and Highlands	**2**	**0**	**0**	**26**	**0**	**28**
PAD (confirmed deposit)	2	-	-	-	-	2
PAD (not excavated)	-	-	-	26	-	26
Totals	**16**	**0**	**2**	**61**	**1**	**80**

** PADs requiring further test excavation when access is available to determine significance*

*** This PAD was excavated; however, no deposit was identified. It will therefore be excluded from future PAD/site counts as an 'invalid' site.*

8.3 Avoidance measures

Avoiding and minimising impacts to Aboriginal cultural heritage values was a key planning principle guiding the route selection process, including avoidance of World, National, Commonwealth and State heritage items and declared Aboriginal Places, which has been achieved and maintained in the current project area.

Key design refinements have resulted in substantial reductions in potential impacts to Aboriginal cultural heritage values. Firstly, the transmission line alignment and location of the East Hub presented in the original Scoping Report (July 2024) (2024 Scoping Report) were refined to move away from the archaeologically complex area of Atchesons Gully, substantially reducing impacts to PADs associated with the watercourse and avoiding a nearby silcrete quarry likely to have been a source of raw material for stone artefacts identified within surrounding sites and PADs. While some Aboriginal sites and PADs within the Atchesons Gully area remain affected by the project, the revised design substantially reduces impacts compared with the alignment presented in the 2024 Scoping Report.

Secondly, the transmission line corridor leading into Central Hub A was redesigned to avoid a large portion of the archaeologically sensitive Spring Creek landscape, including extensive areas of deep sandy deposits with high archaeological potential. While the redesign has significantly reduced impacts, some high-significance PADs within this broader landscape may still be subject to partial impact where complete avoidance is not feasible.

Specific no-impact areas have also been identified to prioritise avoidance of Aboriginal sites considered to be of at least moderate archaeological significance and for which impacts could not be readily mitigated. All of the stone quarry sites and the only rock shelter with PAD identified in the project area would be avoided through no-impact areas. Additionally, all of the desktop assessed CMTs would be avoided, with the likely exception of NEREZ_SpringCk_ST1 which is currently in the disturbance footprint of Central Hub A where design flexibility is highly constrained.

Two PADs of high archaeological significance may be subject to partial impact by the project. This includes NEREZ_SpringCk_PAD8, however, the current disturbance footprint (based on reference design) indicates that any impact would be peripheral to the PAD and further testing would be required to understand if archaeological deposit would occur in the final detailed design disturbance footprint. The other PAD of high archaeological significance, NEREZ_AtchesonsCk_PAD1, is also likely to be partially impacted. It should be noted that this PAD extends within and beyond the entire project area transmission alignment and therefore the project must intersect it at some point for access across Atchesons Gully. Nevertheless, the EIS disturbance footprint (based on the reference design), does not intersect with the portions of this PAD that contained the highest artefact frequencies and significant cultural material (through test excavation). Overall, potential impacts to PADs would be managed through archaeological excavation where relevant.

Overall, these avoidance measures have resulted in the avoidance of numerous Aboriginal sites and PADs across the project area. Notwithstanding this, some impacts to Aboriginal sites and PADs remain unavoidable due to the scale of the project and the extensive distribution of archaeological material across the landscape. Site types and PADs subject to no-impact areas are identified in Section 8.4.1. Key avoidance areas including no-impact areas are shown on Figure F.1 within Appendix F which presents the no-impact areas for the project.

8.4 Potential impacts

The assessment of potential impacts to known Aboriginal sites/PADs adopts a conservative, worst case scenario of potential impact, with the assessment assuming that all Aboriginal sites and PADs within the project area would be impacted, except for those that have been assigned no-impact areas. While this approach is necessary to maintain flexibility during project detailed design, it is likely to overestimate the scale of potential impacts to Aboriginal cultural heritage values. EnergyCo will continue to seek opportunities to avoid impacts as the project design is refined during detailed design.

8.4.1 Direct impacts

Construction activities that involve ground disturbance and/or vegetation removal would be the primary source of impacts on Aboriginal sites and PADs. Such impacts are considered ‘direct’ and can occur at varying scales, ranging from impacting all or part of a site (for example works for an access track may pass through part of a site but leave the rest of the site intact).

Table 8.6 provides a summary of the impact assessment in relation to impacts on known Aboriginal surface sites and PADs. For the purpose of this assessment, the areas designated as 'no-impact' areas are excluded from potential impact within the project area, as there is a commitment that Aboriginal sites or PADs within them would be avoided. EnergyCo has committed to avoidance through no-impact areas to a total of 38 sites/PADs in the project area. This number is expected to increase as detailed design progresses and continues to seek further opportunities to avoid impacts.

Table 8.6. Overview of potential direct impacts to valid sites and PADs that intersect the project area

Features and scientific (archaeological) significance	Avoided through 'no-impact area'	Sites potentially impacted
Artefact	**21**	**103**
Low archaeological significance	21	95
Moderate	0	7
Significance to be confirmed (no site card available and subject to survey)	0	1
CMT	**6***	**1**
Significance to be confirmed (requiring field verification)	6	1
PAD	**7**	**73**
Low (PADs with confirmed deposit)	2	14
High (PADs with confirmed deposit)	0	2
PADs with significance to be confirmed (requiring test excavation)	5	57
PAD and Artefact (AHIMS only)	**0**	**3**
Low	0	1
Moderate	0	2
Rock shelter with PAD	**1**	**0**
Moderate	1	0
Stone quarry	**3**	**0**
Moderate	3	0
Totals	**38**	**180**

*Note that this includes a previously recorded culturally modified tree, Talisker ST-1 (AHIMS ID 20-6-0079)

All of the stone quarry sites and the only rock shelter with PAD identified in the project area would be avoided through no-impact areas. All of the CMTs would be avoided, with the possible exception of one which is currently in the disturbance footprint of Central Hub A where design flexibility is highly constrained. It is acknowledged that this site requires expert field assessment to determine if it is of Aboriginal cultural origin. If this is verified as a CMT, EnergyCo would seek to salvage the tree in accordance with the approach discussed in Section 8.5.

Overall, the majority of potential impacts would be to approximately 99 open artefact sites of low archaeological significance (approximately 45 per cent of sites currently within the project area). This site type is the most common and widespread site type and complete avoidance of such sites is often unfeasible in the context of large-scale developments. Notwithstanding, EnergyCo has sought to avoid impacts with 21 open artefact sites having been designated for avoidance through no-impact areas and further avoidance to be considered as part of detailed design. To address these impacts, all open stone artefact sites that would be subject to impact will be collected as mitigation as outlined in Section 8.5.

PAD avoidance (either confirmed deposit or subject to confirmation through test excavation) is another inherent challenge for the project, as PAD areas are typically much larger than individual site boundaries and often encompass entire landforms. A total of 7 PADs have been designated for avoidance at this stage. Most project impacts to PADs would be partial (as opposed to total) impact. Most potential impacts would occur in areas of subsurface deposit assessed to have low archaeological significance. However, 2 PADs of high archaeological significance (at Spring Creek and Atchesons Gully) may be subject to partial impact by the project as full avoidance is not feasible. Potential impacts to PADs will be managed through archaeological excavation where relevant (refer to Section 8.5).

8.4.2 Indirect impacts

Indirect impacts to Aboriginal archaeological sites include impacts that may occur beyond the immediate area of ground disturbance or vegetation removal resulting from project construction activities. Vibration is a potential source of indirect impact but is relevant only to site types that are susceptible to vibration-related damage. These types identified in the project area comprise Aboriginal rock shelters and standing, dead CMTs. Potential impacts associated with construction vibration will be assessed based on the sensitivity of Aboriginal sites and PADs to the proposed works, with appropriate construction methodologies implemented where a risk of vibration-related impact is identified.

Changes in water flow have a theoretical potential to impact Aboriginal sites and PADs within or adjacent to watercourses. Project construction activities may result in changes in water flow regimes that could lead to increased watercourse erosion, sediment build up downstream from activities, or watercourse diversion. The nature and extent of these changes, and measures to mitigate potential erosion impacts, are assessed within the surface water assessment prepared for the EIS (Section 18 and Technical Report 14).

8.4.3 Intangible or visual impacts

The project's potential impact to places of Aboriginal cultural significance, identified as part of the cultural mapping report in the CVA has been assessed based on Aboriginal community perspectives of what may constitute an impact. The only geographical features of cultural significance that intersect with the project area are associated with 2 Songlines in the New England Tablelands study region. These locations are redacted as culturally sensitive information.

The relevant knowledge holders interviewed generally reported that the intersection of Songlines with the project area was not an issue provided that Aboriginal sites along them were not impacted by the project. All interviewees recognised that major roads already cross the Songlines, and that restricted access to private properties was a greater concern. In the view of some interviewees, the placement of transmission towers for the project will be crucial to avoid disrupting the Songlines. Similarly, another interviewee considered that the transmission line itself was not problematic, provided towers and access roads were located away from Aboriginal sites.

8.4.4 Potential impacts to unknown Aboriginal heritage values

The nature and extent of potential impacts to Aboriginal cultural heritage values are yet to be confirmed through field survey in areas that were not accessible. This includes relevant portions of the project area that have not been subject to archaeological survey and areas of PAD that require further consideration through archaeological test excavation.

The ACHA provides an assessment of the potential for unidentified Aboriginal sites and PADs to be impacted in areas not yet subject to archaeological survey by employing detailed predictive modelling (in addition to desktop research and cultural interviews). The assessment involved calculating the area of moderate and high archaeological sensitivity that intersect with the unsurveyed portions of the project area and using it to estimate how many further sites and PADs may occur (refer to Table 8.7). It aims to present a theoretical sense of how many Aboriginal sites and PADs may be present in unsurveyed portions of the project if all conditions were equal to those surveyed. This has been undertaken to broadly estimate the total archaeological sites and PADs within the project area to gauge the potential quantum of project impacts. Note that this table is presented for illustrative purposes and the number of PADs and sites within unsurveyed areas can only be established through archaeological field investigation

Based on the disturbance footprint (which is based on the reference design), the estimated likely extent of disturbance is in the order of 3,579 hectares. Whilst the ACHA has considered the potential for impact to all sites and PADs within the project area (being 10,928 hectares), with the exception of no-impact areas, the actual extent of impacts based on the detailed design is expected to be much lower, noting it would be based on the disturbance footprint for the detailed design and how it intersects with sites and PADs.

Table 8.7. Potential for impacts to unknown Aboriginal sites based on predictive model

	Moderate and high sensitivity area (ha)	Low sensitivity area (ha)	Number of sites and PADs in project area
Project area accessible and subject to survey	1,642	3,390	• 72 sites within high/moderate areas • 74 PADs within high/moderate areas • 44 sites in low sensitivity • 5 PADs in low sensitivity
Project area not accessible and not subject to survey	1,788	4,107	Based on the density of sites and PADs identified during survey of comparable moderate/high and low sensitivity landforms: • 78 predicted sites within high/moderate areas • 81 predicted PADs within high/moderate areas • 53 predicted sites within low sensitivity • 6 predicted PADs in low sensitivity

8.4.5 Cumulative impacts

The potential cumulative impacts of the project have been identified based on the scale and potential impacts of the project, in combination with the potential impacts of identified relevant future projects. A list of these relevant projects considered by the ACHA cumulative assessment, including their descriptions and interfaces with the project, is provided in Section 24. The cumulative assessment approach provides an overview of the nature of impacts that have occurred or are proposed, with an insight into the remaining archaeological resource in and around the project area. This has also helped inform the development of management and mitigation strategies described in Section 8.5 to protect Aboriginal cultural heritage values long term.

A key outcome of the cumulative assessment was that stone artefact sites, present as surface material and/or subsurface deposits, are the most common Aboriginal site type and hence are most commonly subject to development impacts in the New England Tablelands and Upper Hunter Valley and Highlands regions. However, predictive modelling indicates that these site types are not currently at risk of significant loss, as the most significant deposits are often avoided by developers through flexible project design and layout refinement. Other, less common Aboriginal site types within the study region including CMTs, grinding groove sites, stone quarries and potential stone arrangements have also typically been designated for avoidance. Where avoidance has not been achieved, impacts are minimised through salvage or other mitigation measures in consultation with RAPs.

Further details regarding cumulative impacts is detailed in the ACHA (refer to Technical Report 2), and in Section 24.

8.5 Mitigation and management

8.5.1 Mitigation and management measures

The proposed management measures for Aboriginal cultural heritage values within the project area prioritises further avoidance as the primary option, followed by impact minimisation and, where relevant, salvage. While not all Aboriginal cultural heritage values can be avoided, salvage of those that are impacted by the project will provide a tangible record of these sites. Furthermore, with appropriate curation, salvaged materials can be analysed to improve understanding of Aboriginal cultural heritage and contribute to education and knowledge for future generations.

Table 8.8 provides an overview of proposed management measures for each Aboriginal site and PAD within the project area.

Table 8.8. Overview of proposed management of Aboriginal sites and PADs within the project area

Feature	Avoidance (no-impact)	CMT salvage	Surface artefact collection	Archaeological excavation	Unmitigated impacts[9]	Total
Artefact	21	-	103	-	-	124
CMT	6	1	-	-	-	7
PAD	7	-	-	71	2	80
PAD and Artefact (AHIMS only)	-	-	-	3[10]	-	3
Rockshelter with PAD	1	-	-	-	-	1
Stone Quarry	3	-	-	-	-	3
Totals	38	1	103	74	2	218

Mitigation and management measures relevant to the management of Aboriginal cultural heritage are detailed in Table 8.9.

[9] Two PAD sites with confirmed deposit (NEREZ_AtchesonsCk_Contol1 and NEREZ_Antiene_PAD2) where no further archaeological excavation is recommended due to very limited archaeological evidence of low scientific significance.

[10] Includes requirement for surface artefact collection

Table 8.9. Aboriginal cultural heritage – mitigation and management measures

ID	Impact	Mitigation measure	Timing	Relevant location(s)
AH1	**Cultural heritage management**	An Aboriginal Cultural Heritage Management Plan (ACHMP) will be developed in consultation with Heritage NSW and RAPs. It will provide details of: • processes for further investigation and assessment in relevant areas and at relevant sites • all Aboriginal sites and places of significance relevant to the project area • management measures (for example avoidance, protection and salvage) and the methods for how they will be implemented • measures to ensure ongoing consultation and involvement of RAPs in the management of their cultural heritage values • if relevant and practicable, RAP access arrangements for a selection of significant sites for educational purposes • protocols for recording, assessing and managing newly identified sites at any phase of the project • protocols for educating staff and contractors of their obligations relating to Aboriginal cultural heritage values through a site induction process • protocols for suspected human skeletal materials • protocols for the ongoing care of salvaged Aboriginal objects • provisions for review and updates of the ACHMP.	Detailed design All project stages	All locations
AH2	**Impact to Aboriginal sites**	Avoidance and/or protective measures will be employed to Aboriginal sites and PADs that are within the project area, and for any sites that are outside the project area but at risk of indirect vibration impacts, where practicable. The primary mechanism for avoidance will be the establishment of no-impact areas within the project area that can be applied to the entirety or a portion of a site or PAD as a project commitment to avoid impact.	All project stages	All locations

ID	Impact	Mitigation measure	Timing	Relevant location(s)
		'No-impact' areas will be applied to sites and PADs within the project area that can be avoided, including sites already recorded and those identified through future investigations. The ACHMP will set out the process for identifying, documenting, and managing 'no-impact' areas following project approval.		
AH3	**Impact to Aboriginal sites**	Active protection will involve the establishment of physical barriers between Aboriginal sites and/or PADs and the disturbance footprint prior to project construction occurring in their vicinity. The nature and extent of physical barriers will be responsive to the site type requiring protection. Active protection will be required for all no-impact areas and avoided Aboriginal sites and/or PADs located within 20 m of the final disturbance footprint. The ACHMP will set out detailed requirements for the implementation of these measures, including: • the types of materials used (for example fencing or bollards) and whether they will be temporary or permanent installations. The selection of protection measures will be determined during preparation of the ACHMP, having regard to site-specific factors including land use, stock type and grazing practices, landholder consultation, and the practicality and effectiveness of alternative controls, including electronic exclusion measures where appropriate • appropriate buffers to be applied at barriers. This will initially incorporate a nominal 5 m internal buffer from site features, site boundaries, or PAD boundaries for active protection against potential direct impacts. However, buffers may be refined during the preparation of the ACHMP to better respond to known impact risks • the process for verification and demarcation of boundaries prior to installation. Demarcation will require participation from archaeologists and RAPs and will require a site inspection component by an archaeologist with RAP representation so that proposed boundaries accurately respond to the avoided site. It may require the assistance of a qualified surveyor to record boundaries • appropriate signage to alert persons to their presence and avoidance	Construction	All locations

ID	Impact	Mitigation measure	Timing	Relevant location(s)
		• maintenance requirements of any permanent fencing, including weed management • monitoring requirements to assess site condition and the effectiveness of the implemented avoidance measure. This could range from a single post-construction monitoring exercise to ongoing condition assessments at bi-annual intervals for the duration of construction work. Frequency of monitoring requirements would be established in the ACHMP • the ACHMP will develop a shortlist from the Aboriginal sites covered by no-impact areas that will require archaeological monitoring if the project disturbance footprint encroaches within a certain distance that may place a site at a higher-level risk of inadvertent impact. The criteria for which sites require this measure will be developed in the ACHMP in consultation with RAPs. The details of which construction activities will require monitoring will be developed in the ACHMP.		
AH4	Impact to Aboriginal sites	Distance-based avoidance will apply to Aboriginal sites and PADs designated for avoidance that are located more than 20 m from the final project disturbance footprint. These sites do not require fencing, signage or active land-management measures (although such measures can be employed for additional caution). The ACHMP will include measures to ensure that relevant project personnel are aware of these locations through mapping and related controls, to prevent inadvertent access or disturbance of these areas.	Construction	All locations
AH5	Vibration impact to Aboriginal sites	Vibration-sensitive Aboriginal sites that are scheduled within 'no-impact' areas will be subject to additional measures to avoid project related vibration impact. This will apply to such sites that are within the minimum distances to avoid vibration impacts as identified in the ACHA (Technical Report 2) and summarised in Table 16.17 of the EIS. Where there is risk of vibration impact to vibration-sensitive sites within 'no impact' areas, the ACHMP will set out additional measures to prevent or mitigate vibration impacts. This will include but not be limited to:	Construction	All locations

ID	Impact	Mitigation measure	Timing	Relevant location(s)
		• consultation with vibration specialist to understand full nature and extent of potential vibration impacts (for example cosmetic, structural) in relation to the individual Aboriginal site proposed to be impacted • modification of proposed construction methodology or equipment to minimise the extent of possible vibration impacts • baseline recording of relevant sites, followed by a monitoring program with an appropriate trigger action response plan (TARP) to manage any exceedances in vibration that may impact the relevant sites • other mitigation measures as determined in consultation with the Vibration Specialist • the ACHMP will outline the methodology and procedure for mitigating and/or managing indirect impacts that cannot be avoided through the detailed design stage of the project • the ACHMP being linked to the project the Noise, Vibration and Blast Management Plan to account for the management and mitigation measures of relevant Aboriginal sites.		
AH6	**Impact to Aboriginal sites**	Surface artefact collection will apply to all identified surface artefact sites (primarily stone artefacts) that will otherwise be impacted by the final disturbance footprint. Surface artefact collection will be undertaken by a suitably qualified archaeologist with RAP representatives (field team) and will occur prior to any project-related ground disturbance in the vicinity of the relevant sites. The collection method will generally be as follows, but may be refined through the ACHMP: • site coordinates for each site will be entered into mobile GPS devices to re-locate and confirm locations • the general vicinity of each site location will be inspected by the field team. Stone artefacts will be flagged on the ground and a photo taken of the flagged site. Each flagged artefact will be marked as a waypoint in the GPS	Prior to construction	All locations

ID	Impact	Mitigation measure	Timing	Relevant location(s)
		• all artefacts will be collected into snap lock plastic bags or similar, marked with the project name, site name, collection date and waypoint number. If additional stone artefacts are identified during the artefact collection fieldwork, they will be managed in the same manner • all artefacts will be sorted and recorded post-fieldwork with respect to technological type, implement type, raw material, maximum block length and weight • the collected artefacts will be incorporated into a salvage report detailing the results of the fieldwork, the artefacts recovered at each site and GIS figures showing the artefact locations • the AHIMS records will be updated with a site impact recording form for each collected site. The ACHMP will also detail measures to be employed where ground surface visibility is low, and previously recorded artefacts cannot be located for collection. This may include targeted vegetation management techniques to improve ground surface exposure and visibility. Notwithstanding these measures, it may not be possible to locate all previously recorded artefacts designated for collection due to environmental changes since initial recording, including altered ground surface conditions. Accordingly, the ACHMP will define what constitutes reasonable and practical collection efforts before management of these sites is considered complete.		
AH7	Impact to Aboriginal sites	An archaeological excavation strategy will be developed for the ACHMP in consultation with Heritage NSW and RAPs that will establish the requirements for excavation relating to PADs at risk of project impact. Where excavation is employed, it will be conducted in a staged approach involving a testing phase (Phase 1) followed by salvage phase (Phase 2) if certain thresholds are met. The ACHMP will aim to develop a process whereby Phase 1 excavations can be immediately followed by Phase 2 excavations if certain archaeological thresholds are met.	Prior to construction	All locations

ID	Impact	Mitigation measure	Timing	Relevant location(s)
		Phase 1 – Testing The purpose of the testing phase will be to characterise the nature, extent, significance and management requirements of PADs in relation to where project impacts are proposed. The testing phase will apply in the following circumstances: • if test excavation has not been undertaken at a PAD, it will be to establish if it contains archaeological deposits and requires salvage excavation • where test excavation has been undertaken for the ACHA, but further sampling is required. This may be because: – the project disturbance footprint does not overlap with the previously tested portions of PAD and further testing is required to establish if salvage is required – the PAD has not been adequately characterised because of limited sampling during the previous testing program. In this scenario, further testing would be required to establish if the archaeological character in the disturbance footprint meets thresholds for salvage – it is acknowledged that additional PADs are likely to be identified in unsurveyed portions of the project area, for which the same process would apply. **Phase 2 – Salvage** The decision to undertake salvage excavation is based on a combination of archaeological significance, archaeological potential, research value and the likelihood of project impacts. A detailed salvage excavation methodology, including the criteria and thresholds for progressing from Phase 1 test excavation to Phase 2 open-area (salvage) excavation, will be developed as part of the ACHMP. Salvage excavation will consist of contiguous open area salvage excavation using higher resolution recovery techniques in areas where Phase 1 Excavation has established it is warranted.		

ID	Impact	Mitigation measure	Timing	Relevant location(s)
		Phase 2 salvage locations will be selected to provide the greatest likelihood of capturing the extent of the artefact distribution and to target areas of higher artefact density, significance and/or assemblage complexity. The Phase 2 salvage will also ensure that an appropriate sample of artefacts is retained for intergenerational equity. A salvage excavation methodology will be developed as part of the ACHMP and be implemented as a post-approval measure. Salvage excavation will need to respond to how the final project disturbance footprint intersects with PADs with confirmed deposits, and therefore this ACHA does not provide a salvage excavation methodology, nor has nominated specific sites for salvage. The salvage methodology will: • include a strategy or research design in consultation with RAPs so that salvage can be tailored to research questions • establish thresholds for Phase 1 excavation that trigger Phase 2 open area/salvage • establish limits for open area excavation so that expectations for maximum salvage extents are established prior to salvage fieldwork • include contingency protocols for additional consultation with RAPs and Heritage NSW should the salvage methodology require modification.		
AH8	**Impact to culturally modified trees**	Avoidance is the preferred management approach for culturally modified trees. EnergyCo is currently able to commit to the avoidance of all desktop-verified culturally modified trees within the project area, with the exception of NEREZ_SpringCk_ST1, which is located within the current disturbance footprint of Central Hub A and requires expert field verification before an appropriate management strategy can be determined. Where practicable, avoidance will be achieved through project design refinement and micro-siting of infrastructure. If confirmed to be a culturally modified tree, the ACHMP will detail a process to salvage NEREZ_SpringCk_ST1 and any additional culturally modified trees identified during future archaeological survey that are unavoidable.	Prior to construction	All locations

ID	Impact	Mitigation measure	Timing	Relevant location(s)
		Any additional culturally modified trees must be subject to a verification process. If impact to a verified CMT is unavoidable and salvage of the CMT is to occur, the proposed culturally modified tree salvage procedure is as follows, noting that it may be subject to refinement during the preparation of the ACHMP: • an arboriculturist or arborist with demonstrated expertise in Aboriginal culturally modified tree management will be engaged to determine a suitable removal method in consultation with RAPs relevant to the locality of the tree. This may involve the requirement to saw the tree above the scar location allowing a suitable buffer from the scar feature. The process of removal will be photographed • the removed tree and scar may be treated to preserve the scar to prevent further deterioration. Any treatment option would be completed in consultation with RAPs and a suitably qualified curator • where feasible, the tree will be relocated to a nominated location using suitable materials in consultation with RAPs relevant to the locality of the tree • the outcomes of the tree management activity will be documented in a report including records of the original and new tree location. Note that long term management of any salvaged trees may require a Care Agreement • the AHIMS record will be updated with a site impact recording form for the site.		
AH9	Cultural heritage management	A salvage report will be prepared to document all completed salvage measures. The ACHMP will detail the requirements of salvaging reporting and relevant analysis, along with RAP consultation requirements.	All stages	All locations
AH10	Cultural heritage management	Aboriginal objects recovered during testing/investigative and salvage excavation phases and surface collection will be temporarily stored with the materials recovered during the Stage 1 test excavation program as per that methodology document (refer Appendix L of Technical Report 2).	Prior to construction	All locations

ID	Impact	Mitigation measure	Timing	Relevant location(s)
AH11	**Cultural heritage management**	The long-term management of recovered Aboriginal objects is an aspect of cultural heritage management driven by the desires of local Aboriginal community. Aboriginal objects are typically either stored in a long-term facility (known as a 'keeping place') or reburied on Country in an area that will receive long term protection from further development or other impacts. Acknowledging the broad geographic scale of the project, it is likely that Aboriginal objects will need to be managed on a regional basis at a minimum. The ACHMP will detail long-term care arrangements in consultation with RAPs. However, if long-term care is not resolved during the preparation of the ACHMP, then the ACHMP will set out a process for how decisions will be made, including relevant consultation with RAPs.	All stages	All locations
AH12	**Impact to Aboriginal sites**	Unmitigated impacts may apply to PADs that have been assessed as being of low archaeological significance and are located within the approved project disturbance footprint. For PADs requiring further investigation, significance will be assessed through test excavation in accordance with the ACHMP. The ACHMP will establish clear criteria and thresholds for: • determining archaeological significance • identifying when salvage excavation is required • identifying when unmitigated impact is an appropriate management outcome. Unmitigated impact may also apply to other Aboriginal heritage sites where salvage is not considered appropriate or has not been supported through consultation with RAPs.	All stages	All locations

8.5.2 Further investigation and assessment

Further investigation and assessment is proposed to address the limitations associated with land access constraints and to further inform Aboriginal cultural heritage management for the project. As access becomes available, additional Aboriginal consultation, archaeological survey, test excavation, predictive model review, CMT verification, cultural values investigations and impact assessment will be undertaken either prior to project approval or, where required, post-approval through the ACHMP. The timing of these activities will depend on land access availability, with any commitments not completed prior to project approval to be carried forward and implemented through the ACHMP (should the project be approved).

Archaeological survey will continue in currently inaccessible areas of the project area once access is granted. Survey methods will be consistent with those employed for the ACHA and will aim to maximise the identification of Aboriginal sites and PADs prior to project approval where land access permits. Newly identified Aboriginal sites and PADs will be subject to significance and impact assessment and assigned appropriate management measures. PADs identified within areas at risk of project impact will be subject to archaeological excavation and assessment to inform management requirements.

Additionally, survey will be employed to additional areas to be incorporated into the project area for the Submissions Report and Amendment Report, where access is available. This may include the proposed Camp 3 and Camp 1 Alternate locations which were identified after completion of the ACHA fieldwork. This will be subject to further assessment in the addendum ACHA.

Commitments to further investigation and assessment associated with land access constraints are detailed in Table 8.10.

Table 8.10. Aboriginal cultural heritage – further investigation and assessment measures

ID	Impact	Mitigation measure	Timing	Relevant location (s)
AH13	**Impact to Aboriginal sites**	Archaeological survey by archaeologists and RAP representatives will be conducted in unsurveyed portions of the project area (including any additional area to be incorporated into the project area for the Submissions Report and Amendment Report phase when access is available. Survey methods will be consistent with those employed for the ACHA (Technical Report 2). Survey in unsurveyed portions of the project area will be guided by the predictive model with reference to the following strategy: • accessible areas of moderate and high archaeological sensitivity will be prioritised for survey for inclusion in the addendum ACHA prior to project approval. This will aim to maximise the identification of Aboriginal objects and PADs prior to project approval and identify potential impacts and management requirements. This would reduce the uncertainties around impact and management carried into the post-approval phase. • survey coverage intensity will be greater on landforms in areas of moderate and high archaeological sensitivity in comparison to areas of low archaeological sensitivity. However, survey coverage will vary and take into consideration ground visibility conditions and levels of disturbance. • a 'full coverage' survey of the project area cannot be achieved. Areas of hazardous/dangerous terrain will not be surveyed and is not considered warranted due to the low archaeological sensitivity associated with such areas. For example, steep to precipitous slopes are highly unlikely to contain Aboriginal objects. Notwithstanding, such examples will be considered for their potential to feature Aboriginal rock shelters and targeted for survey if applicable. • if the project disturbance footprint becomes finalised in certain areas prior to survey access, then only the project disturbance footprint will be considered for survey (that is, survey of the surrounding project area would not be necessary).	Detailed design	Unsurveyed portions of the project area

ID	Impact	Mitigation measure	Timing	Relevant location (s)
		All newly identified sites will be subject to significance and impact assessments and assigned a proposed management measure. All sites at risk of project impact will be assigned an appropriate mitigation measure which will be based on a manner consistent with that proposed for known sites in the project area (unless a new site type is identified and then the ACHMP will have alternative measures). All sites not at risk of project impact will be assigned an appropriate avoidance and/or conservation measure. All newly identified PADs at risk of project impact must be subject to archaeological excavation and assessment.		
AH14	Impact to Aboriginal sites	Further archaeological test excavation will aim to be undertaken to inform the Submissions Report and Amendment Report in an addendum ACHA. The scope of testing during this period will be dependent on land access availability and timing considerations for project approval. Test excavation undertaken during this period will aim to contribute to the proposed Phase 1 (testing phase) requirements. Additionally, further testing will seek opportunities to contribute to the aims of the Stage 1 test excavation strategy that was limited because of land access limitations. Acknowledging these aims, further testing will seek to: • test only within areas that are at risk of project impact (that is, within the EIS disturbance footprint or areas considered for disturbance footprint changes) to inform management measures. • further test and refine the predictive model. Acknowledging that archaeological testing for the ACHA has been limited in scope and geographic extent, testing for this purpose alone should focus within the Upper Hunter Valley and Highlands study region but may be applied in the New England study region, where informative • testing of this nature would aim to better inform the identification of PAD and to test if applied PAD boundaries are accurate or need refinement. This approach would include the following: – testing within and beyond drawn PAD boundaries, where relevant, to establish their extent (for example if testing indicates that artefact distributions may extend beyond the PAD boundary at densities that warrant further exploration)	Detailed design	All locations

ID	Impact	Mitigation measure	Timing	Relevant location (s)
		– include sampling of Control Areas in areas of low, moderate and high archaeological sensitivity in areas that are not mapped as PAD. This aims to challenge surveying biases from individual archaeologists and their assignation of PAD boundaries. Project RAPs and Heritage NSW will be provided with further details about additional test excavation in a manner consistent with the ACHA methodology and the Stage 1 test excavation strategy. This will involve nominating the locations for proposed test excavation with a minimum 14-day notification window.		
AH15	**Impact to Aboriginal sites**	The predictive model will be reviewed based on the outcomes of additional investigations completed for the addendum ACHA. Any refinements to the archaeological sensitivity mapping will be carried into the ACHMP. The intent of the predictive model (as refined) will be to guide further investigation requirements in project area into the post-approval phase for the project.	Detailed design	All locations
AH16	**Impacts on Songlines**	An assessment will be undertaken to clarify and manage potential impacts on Songlines. This will involve: • consultation with Aboriginal knowledge holders to determine whether the project may impact identified Songlines • targeted inspections with relevant knowledge holders where Songlines intersect the project area • assessment of whether any Aboriginal sites that contribute to Songlines and may be affected by the project • development of management measures and design responses to address potential impacts in the addendum ACHA, with any unresolved matters managed through the ACHMP process.	Detailed design	All locations

ID	Impact	Mitigation measure	Timing	Relevant location (s)
AH17	**Impact to Culturally Significant Ecological Values**	Further investigation and assessment about the potential impact on culturally significant ecological values with be undertaken with the aim to include the outcomes in the addendum ACHA. The scope may include: • further consultation with Aboriginal knowledge holders to identify culturally significant flora and fauna within the project area • targeted site inspections/meetings with relevant knowledge holders in areas where the Songlines intersect with the project area • targeted field investigations to document culturally significant ecological values • assessment of the potential project impacts on culturally significant ecological values and incorporate outcomes into the addendum ACHA • implementation of management measures, including opportunities to incorporate culturally significant ecological values into rehabilitation and revegetation programs where feasible.	Prior to construction	All locations
AH18	**Vibration impact to Aboriginal sites**	There is potential for unknown vibration-sensitive Aboriginal sites to occur within areas in range of potential vibration impacts. This includes land within and outside the project area boundary. The addendum ACHA, will include an updated assessment for indirect impacts and management measures, if additional vibration-sensitive Aboriginal sites are identified in the intervening period. If any potential impacts will occur, the ACHMP will set out a process for, identifying, assessing and managing indirect impacts for any additional vibration-sensitive Aboriginal site types identified within a potential vibration impact range. This may include the use of predictive modelling to identify the potential for certain site types to occur outside of the project area, followed by provisions to manage identified areas at risk of impact. It will include the identification of potential vibration-sensitive Aboriginal sites within the minimum distances to avoid vibration impacts described in Table 11.2 of Technical Report 2 and the application of measures in AH5 to any newly identified vibration sensitive sites.	Prior to construction	All locations

ID	Impact	Mitigation measure	Timing	Relevant location (s)
AH19	**Impact to Aboriginal sites**	The proposed process for verifying culturally modified trees that have been recorded during fieldwork is provided below. This process will be carried into the ACHMP for relevant trees identified in unsurveyed areas. • **Step 1:** Expert desktop assessment of trees identified during survey which will utilise existing site recording forms and photos. This will assist EnergyCo in prioritising opportunities for avoidance based on this initial assessment. Avoidance no-go areas may be assigned to trees at this stage, which can forego the requirement for field verification. Step 2 field verification will be required if EnergyCo determines that the tree is at risk of project impact • **Step 2:** Field verification of trees within the project area that are at risk of project impact. The fieldwork team will comprise a culturally modified tree expert and at least one RAP representative relevant to the local area of the tree. Each tree will be recorded according to specialist criteria with the aim to reach a determination for the tree • **Step 3**: The outcomes of the fieldwork, impact assessment and management approach will be documented in the addendum ACHA to inform the Submissions Report and Amendment Report, or in accordance with a process set out in the ACHMP if completed after project approval.	Detailed design	All locations
AH20	**Engagement**	EnergyCo will consult with the affected parties to address any potentially conflicting management commitments for previously recorded sites within the project area that have existing management commitments, acknowledging that approved measures under the project will supersede any prior commitments for avoidance under existing approvals.	Prior to construction	All locations

Historical heritage



Section 9

9 Historical heritage

This section provides a summary of the potential impacts of the project on historical heritage values and identifies mitigation and management measures to be implemented to minimise and manage these impacts. Historical heritage assessment considers non-Aboriginal heritage, including places, buildings, structures, landscapes and archaeological remains that tell the story of past land use, settlement and community history since European people arrived in the area.

This section includes information from the Historical Heritage Impact Assessment (HHIA) undertaken by Umwelt, provided in full in Technical Report 3.

9.1 Assessment approach

The HHIA was undertaken generally in accordance with the following guidelines for historical heritage assessment and management:

- Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (International Council on Monuments and Sites (Burra Charter) (ICOMOS, 2013).
- Assessing heritage significance: Guidelines for assessing places and objects against the NSW Heritage Council of NSW Criteria (DPE, 2025)
- Guidelines for preparing a Statement of Heritage Impact (DPE, 2023c)
- Archaeological Assessments Guidelines (DUAP,1996)
- Assessing Significance for Historical Archaeological Sites and 'Relics (DoP, 2009).

The assessment was also prepared with reference to the SEARs as detailed in Appendix A.

This section considers issues raised in engagement to-date relating to historical heritage, including impacts on historical heritage values, potential disturbance to heritage-listed items and cultural landscapes from the community, stakeholders and relevant regulatory authorities including Heritage NSW (refer to Section 5).

The HHIA methodology included the following key steps:

- **historical research** (desktop analysis):
  - review of information from searches of databases and key heritage reference sources
  - reviewing previous heritage assessments that have been undertaken in the area

  - review of aerial imagery to confirm the presence or absence of structures, and historical maps (such as parish maps, pastoral holding maps and other primary sources) to identify former structures not visible in the landscape or on current mapping
  - consideration of community consultation findings including with landholders and occupiers within the project area
  - a review of heritage listings relevant to the project area and surrounding localities
  - an analysis of the historical and heritage context to understand the potential historical heritage (both built elements and historical archaeology) that may be encountered within the project area, to inform field survey.
- **field survey**: the field survey was undertaken in 2 phases:
  - general field survey within, and in the vicinity of, the project area
  - targeted visual inspections of locations that were assessed as requiring further investigation from the desktop analysis or within an existing historical heritage listing.
- **significance assessment:** assessment of the significance of historical heritage identified within the project area in accordance with *Assessing heritage significance: Guidelines for assessing places and objects against the NSW Heritage Council of NSW Criteria* (built heritage elements) and *Assessing Significance for Historical Archaeological Sites and 'Relics'* (areas of historical archaeological potential)
- **heritage impact assessment**: an assessment of potential impacts to historical heritage (direct and indirect) from construction and operation of the project on the listed heritage items, potential heritage items and areas of historical archaeological potential within the study area
- **management measures**: development of mitigation and management measures to avoid, minimise and manage any identified potential impacts to historical heritage.

Further detail on the HHIA assessment approach is provided in Technical Report 3.

9.1.1 Approach to impact assessment

Potential direct impacts to historical heritage include those that can occur as a result of:

- full or partial demolition of significant structures or other elements
- removal, disturbance or general harm to historical archaeology through sub-surface works such as excavation.

Potential indirect impacts to historical heritage include:

- visual impacts as a result of the construction of above ground infrastructure which may change views from heritage sites, landscape character and the relationship between heritage items and the surrounding landscape
- vibration impacts from the use of vibration-generating construction plant and equipment, most likely to be associated with earthworks involving hydraulic hammers and vibratory rollers, along with blasting at some energy hubs and discrete locations within the transmission corridor.

The assessment of historical heritage impacts of the project have been approached slightly differently for the transmission corridor and ancillary development compared to the access tracks and road upgrades. This is because the different characteristics of the project elements have different potential for impacts as outlined in Table 9.1.

Table 9.1. Summary of project works for the purposes of historical heritage impact assessment

Assessment category and nature of works	Project elements	Nature of potential impacts
Transmission corridor and ancillary development assessment area Above-ground (with potential for visual impact)	• transmission line and towers (referred to in this section as the 'Transmission Corridor') • energy hubs • workforce accommodation camps • construction laydown areas • Nemingha maintenance facility • Bayswater Power Station substation extension • communications infrastructure and utilities (may include below ground works also).	Due to their nature and scale, impacts associated with above-ground works as listed may include: • direct physical impacts • indirect physical impacts associated with vibration • indirect visual impacts.
Access track/road assessment area At-grade (not anticipated to have a visual impact)	• access track works • road works.	Due to their nature and scale, impacts associated with at-grade works as listed may include: • direct physical impacts • indirect physical impacts associated with vibration.

9.1.2 Study area

The assessment of potential impacts to historical heritage adopted the following study areas:

- the project area for the assessment of direct physical impacts
- the project area with a 50 metre buffer for the assessment of indirect physical impacts associated with vibration
- a 2 kilometre buffer from the transmission corridor and ancillary development assessment area for the assessment of indirect visual impacts from these project components.

9.1.3 Survey coverage

The field survey was undertaken with the aim to:

- confirm the context of heritage items located within, and in the vicinity of, the project area
- visually inspect areas identified for targeted inspection based on historical research
- provide a general understanding of the landscape character and context of the project area from a historical heritage perspective.

The historical research and desktop analysis identified 50 locations within the project area for targeted field survey (visual inspection). Of the 50 locations identified, 30 were able to be visually inspected during the preparation of the HHIA, with survey coverage limitations largely a result of land access restrictions.

Field access limitations have resulted in approximately 46 per cent of the project area being subject to general heritage survey and 60 per cent of the locations identified for targeted heritage survey being visually inspected.

All inaccessible and therefore unsurveyed portions of the project area were subject to comprehensive desktop assessment that included a review of historical mapping and the historical record more generally, including a review of current and past aerial imagery. This enabled the identification of potential areas, structures and other elements that may reflect historical development within the project area. This has enabled a consideration of potential heritage impacts to the entire project area, including unsurveyed areas.

Additional field survey/targeted visual inspection would be conducted in unsurveyed portions of the project area as land access becomes available, in accordance with the mitigation measures included in Table 9.8, and as discussed in Section 9.5.2.

9.2 Existing environment

9.2.1 Historical landscape context

The project area traverses a predominantly rural landscape across the New England Tablelands, Tamworth region and Upper Hunter, where natural landforms remain evident but are strongly overlaid by long-standing agricultural use and associated infrastructure. Topography strongly influences land use patterns, with steep terrain and less accessible areas often retaining native vegetation, while more accessible land has been extensively modified for agriculture. The pastoral landscapes have been woven around and between the steep hills, deep valleys and often mountainous terrain, with the influence of the terrain on the historical development patterns still evident in the landscape. This is particularly demonstrated in the Upper Hunter and Tamworth regions, between Lake Glenbawn and Waverly / Barry, where large areas of difficult to access terrain have largely been exempt from intensive pastoral land use and continue to retain large areas of remnant native vegetation.

Development in the vicinity of the project area is typically scattered and comprises farmsteads, homesteads, sheds, stockyards, silos and occasional rural industrial or service structures, often clustered within established property boundaries and connected by local road networks. Built elements are relatively more concentrated in the Tamworth regional area due to more intensive agricultural practices, while the New England Tablelands and Upper Hunter regions are defined by broader landholdings with more widely spaced development.

The project area is situated within a broader cultural landscape shaped by over 150 years of pastoral and agricultural land use following European settlement, reflecting evolving land management practices, infrastructure development and socio-economic change. This landscape is defined not by individual heritage elements, but by the cumulative pattern of land use, settlement and community relationships, including pastoral properties, rural townships, mining areas (including various phases of 'gold rush' and mining, and the coal mining history of the Hunter valley) and energy infrastructure.

9.2.2 Heritage listings

Searches of relevant historical heritage databases were undertaken, including the Commonwealth Heritage List (CHL), the National Heritage List (NHL), Australasian Underwater Cultural Heritage Database, Maritime Heritage Database, the State Heritage Register (SHR), available/provided Section 170 Heritage and Conservation Registers being those of the FCNSW, ARTC, TfNSW, NPWS, Department of Education and relevant LEPs.

The searches covered the project area plus a buffer of 2 kilometres around the transmission line, hubs and ancillary developments, and a buffer of 50 metres around access track/roads.

The searches identified that:

- no World, Commonwealth or National heritage listed items are located within or near the project area
- the project area intersects the curtilage of 21 listed heritage items, including one State listed item (Ardglen Tunnel - SHR #01021), 20 items of local heritage significance and one locally listed Heritage Conservation Area (Table 9.2)
- potential indirect impacts from vibration require consideration for (Table 9.3):
  - 21 listed heritage items located within the project area
  - 11 listed local heritage items located outside the project area but within 50 metres of the access track/road assessment area
- outside of the project area, but within 2 kilometres of the transmission corridor and ancillary development assessment area, there are (Table 9.2):
  - 2 items associated with the State listed 'The Captain Thunderbolt Sites' (SHR#01889), being Thunderbolt's Rock and Blanch's Inn (former)
  - 11 listed items of local heritage significance.
- there are no items listed on s170 Registers, Australasian Underwater Cultural Heritage Database or Maritime Heritage Database within the vicinity of the project area.

Figure 9.1 shows the project area in relation to listed heritage items identified. A further breakdown of the search results is provided in Table 9.2.

Table 9.2. Listed heritage items within and in the vicinity of the project area

Item name	Item #	Instrument and significance level	Relevant project element	Approximate distance from the project area (metres)
Homestead and outbuildings, “Boorolong”	I245	Local - Armidale Regional LEP 2012	Access tracks/roads	18
Homestead, “Warrane”	I246	Local - Armidale Regional LEP 2012	Transmission corridor and ancillary development	442
Homestead, “Warrane”	I246	Local - Armidale Regional LEP 2012	Access tracks/roads	Partially within
Cottage, former post office	I034	Local - Armidale Regional LEP 2012	Access tracks/roads	5
Dangar's Lagoon	I54	Local - Uralla LEP 2012	Transmission corridor and ancillary development	1,565
Gostwyck Memorial Chapel and Precinct	I10	Local - Uralla LEP 2012	Transmission corridor and ancillary development	1,249
Deeargee Woolshed	I11	Local - Uralla LEP 2012	Transmission corridor and ancillary development	1,425
The Captain Thunderbolt Sites - Thunderbolt's Rock	01889	State - NSW State Heritage Register	Transmission corridor and ancillary development	1,339
The Captain Thunderbolt Sites - Blanch's Inn (former)	01889	State - NSW State Heritage Register	Transmission corridor and ancillary development	920
Salisbury Court	I14	Local - Uralla LEP 2012	Transmission corridor and ancillary development	527
Salisbury Court	I14	Local - Uralla LEP 2012	Access tracks/roads	Partially within^
Village Precinct (Wollun)	C04	Local - Uralla LEP 2012	Access tracks/roads	Partially within

Item name	Item #	Instrument and significance level	Relevant project element	Approximate distance from the project area (metres)
Walcha Road Railway Station and yard group	I015	State - Walcha LEP 2012 and NSW State Heritage Register	Access tracks/roads	42
Walcha General Cemetery	I004	Local - Walcha LEP 2012	Access tracks/roads	50
Nemingha Hall	I255	Local - Tamworth Regional LEP 2010	Transmission corridor and ancillary development	667
House (Glenbrook)	I440	Local - Tamworth Regional LEP 2010	Transmission corridor and ancillary development	71
House (Glenbrook)	I440	Local - Tamworth Regional Local Environmental Plan 2010	Access tracks/roads	24
All Saints Anglican Church, including Fencing and Gates	I257	Local - Tamworth Regional LEP 2010	Transmission corridor and ancillary development	947
Former Nemingha School	I256	Local - Tamworth Regional LEP 2010	Transmission corridor and ancillary development	908
(Homestead (Goonoo Goonoo) including Shearing Shed, Inn, Graves, Chapel, Cottage Number 1 (Cook's House), Cottage Number 2 (Jackaroo's Quarters), Cottages Number 3, 4, 5, 7, 8, 9, 10, 11	I125	Local - Tamworth Regional LEP 2010	Access tracks/roads	Partially within^
Five Head Stamping Battery	I265	Local - Tamworth Regional LEP 2010	Access tracks/roads	Partially within^
Former Store and Butcher Shop	I258	Local - Tamworth Regional LEP 2010	Access tracks/roads	Partially within
Niangala War Memorial Hall	I261	Local - Tamworth Regional LEP 2010	Access tracks/roads	49

Item name	Item #	Instrument and significance level	Relevant project element	Approximate distance from the project area (metres)
Black Snake Gold Mine	I134	Local - Tamworth Regional LEP 2010	Access tracks/roads	Partially within
Hanging Rock Cemetery	I137	Local - Tamworth Regional LEP 2010	Access tracks/roads	1
House	I136	Local - Tamworth Regional LEP 2010	Access tracks/roads	46
Sheba Dam, including Gatekeeper's Slab Cottage	I135	Local - Tamworth Regional LEP 2010	Access tracks/roads	Partially within^
Barry Station	I75	Local - Upper Hunter LEP 2013	Transmission corridor and ancillary development	Partially within
Barry Station	I75	Local - Upper Hunter LEP 2013	Access tracks/roads	Partially within
Timor Caves and geological site	I214	Local - Upper Hunter LEP 2013	Access tracks/roads	Partially within
Ardglen Tunnel	01021 (SHR) / I199 (LEP)	State – NSW State Heritage Register and Upper Hunter LEP 2013	Access tracks/roads	Partially within
Abbotsford (former Coach House)	I70	Local - Upper Hunter LEP 2013	Access tracks/roads	9
Wyoming Stud	I66	Local - Upper Hunter LEP 2013	Access tracks/roads	Partially within^
Belltrees homestead and outbuildings	I60	Local - Upper Hunter LEP 2013	Transmission corridor and ancillary development	1,185
Belltrees homestead and outbuildings	I60	Local - Upper Hunter LEP 2013	Access tracks/roads	Partially within
Timber house	I82	Local - Upper Hunter LEP 2013	Transmission corridor and ancillary development	760
Timber house	I82	Local - Upper Hunter LEP 2013	Access tracks/roads	Partially within

Item name	Item #	Instrument and significance level	Relevant project element	Approximate distance from the project area (metres)
Rosevale (Roseville)	I83	Local - Upper Hunter LEP 2013	Access tracks/roads	Partially within
Aberdeen Beef Co Pty Ltd (former F.J. Walkers Meatworks)	I215	Local - Upper Hunter LEP 2013	Access tracks/roads	Partially within^
Segenhoe Mill Ruins	I90	Local - Upper Hunter LEP 2013	Access tracks/roads	Partially within^
Commercial premises	I88	Local - Upper Hunter LEP 2013	Access tracks/roads	Partially within
Segenhoe Inn	I94	Local - Upper Hunter LEP 2013	Access tracks/roads	Partially within^
Commercial hotel (bottom pub)	I86	Local - Upper Hunter LEP 2013	Access tracks/roads	Partially within^
Former M. Campbell & Co. Store, including sandstone kerb, guttering and paving to front and south footpath	I87	Local - Upper Hunter LEP 2013	Access tracks/roads	Partially within
Former bank building	I97	Local - Upper Hunter LEP 2013	Access tracks/roads	1
St Mark's Anglican Church, rectory and hall	I112	Local - Upper Hunter LEP 2013	Access tracks/roads	32

** Distance from project area (metres) has been measured from the outer boundaries of the listing curtilage (being the closest boundary to the project area), rather than from any specific structures or elements contained within the curtilage.*

^ Negligible overlap only applies to these items. Where overlap does occur with these items, it is confined to the periphery of the curtilage, intersecting with areas that have been subject to prior disturbance, such as road verges, established roads or tracks, and property boundaries.

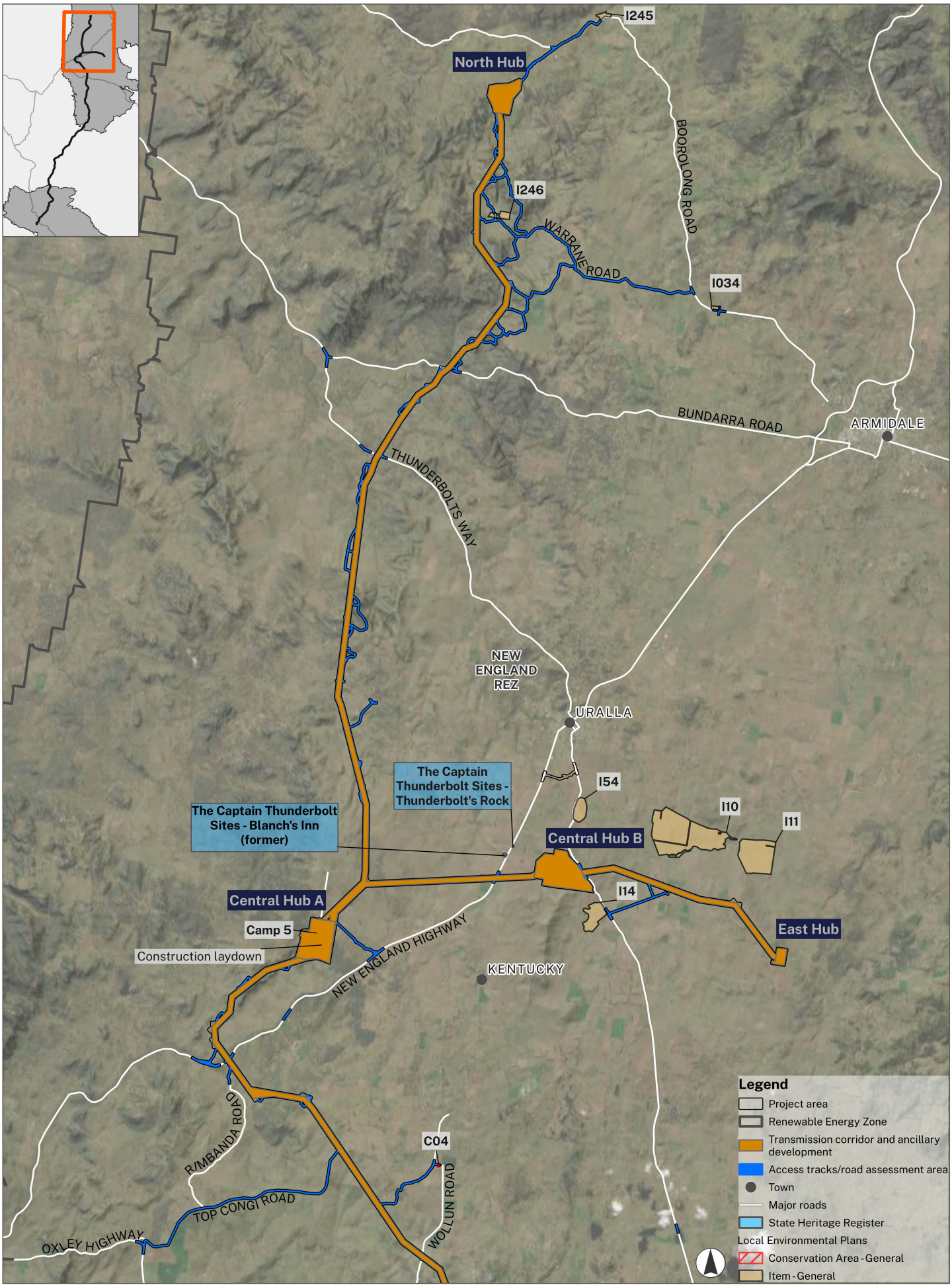


FIGURE 9.1a Relevant heritage items (Map 1 of 6)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:250,000 at A4
GDA2020 MGA Zone 56

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Kilometres

C:\Users\GJoyce\UMWELT (AUSTRALIA) PTY LTD\22962-03 S&V\22962-NE REZ\02_Projects\22962_EnergyCo_R06_EIS_Chap_9_v5.aprx 22962_R06_0901_RelevantHeritageItems_v3

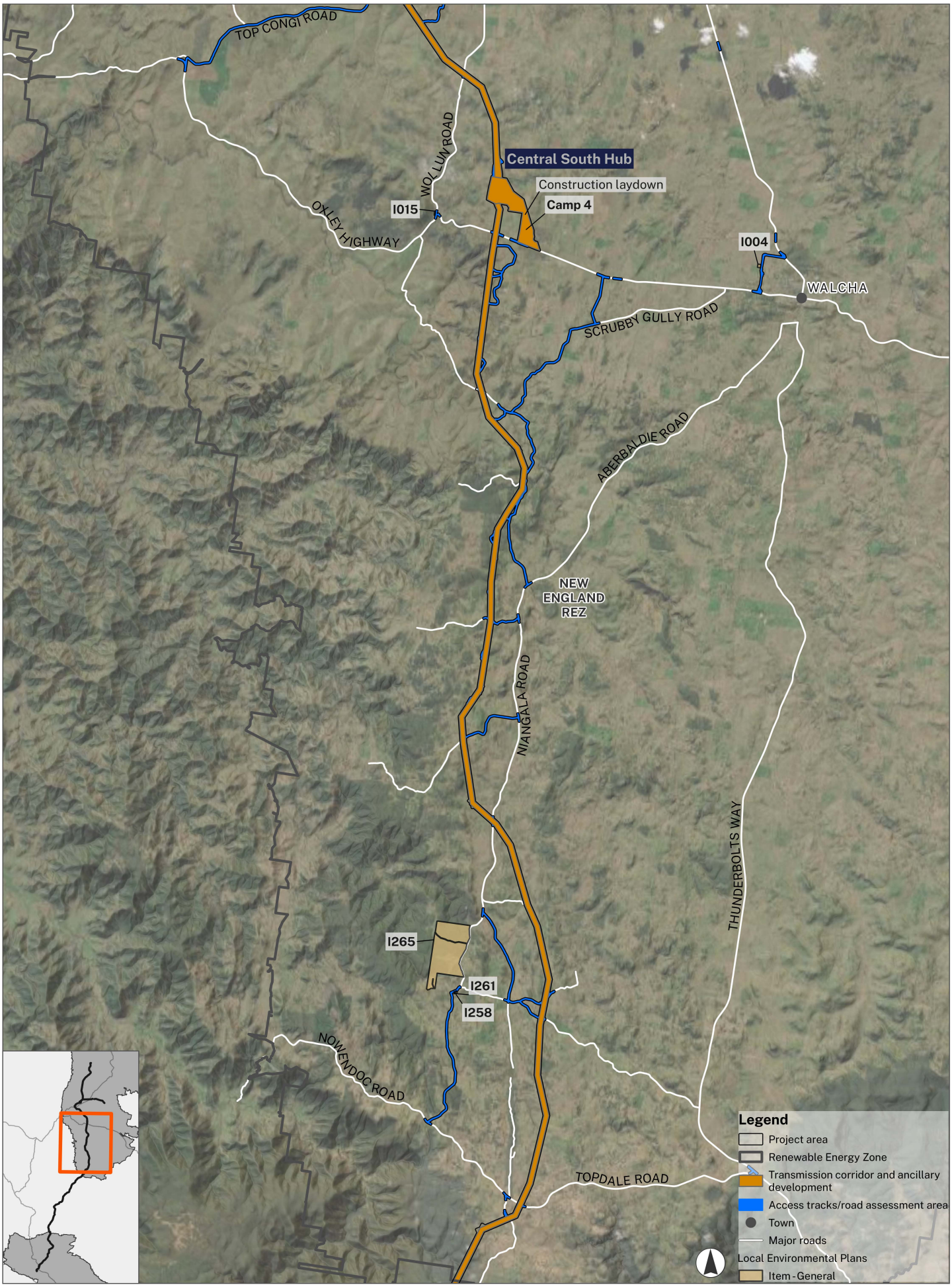


FIGURE 9.1b Relevant heritage items (Map 2 of 6)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:250,000 at A4
GDA2020 MGA Zone 56

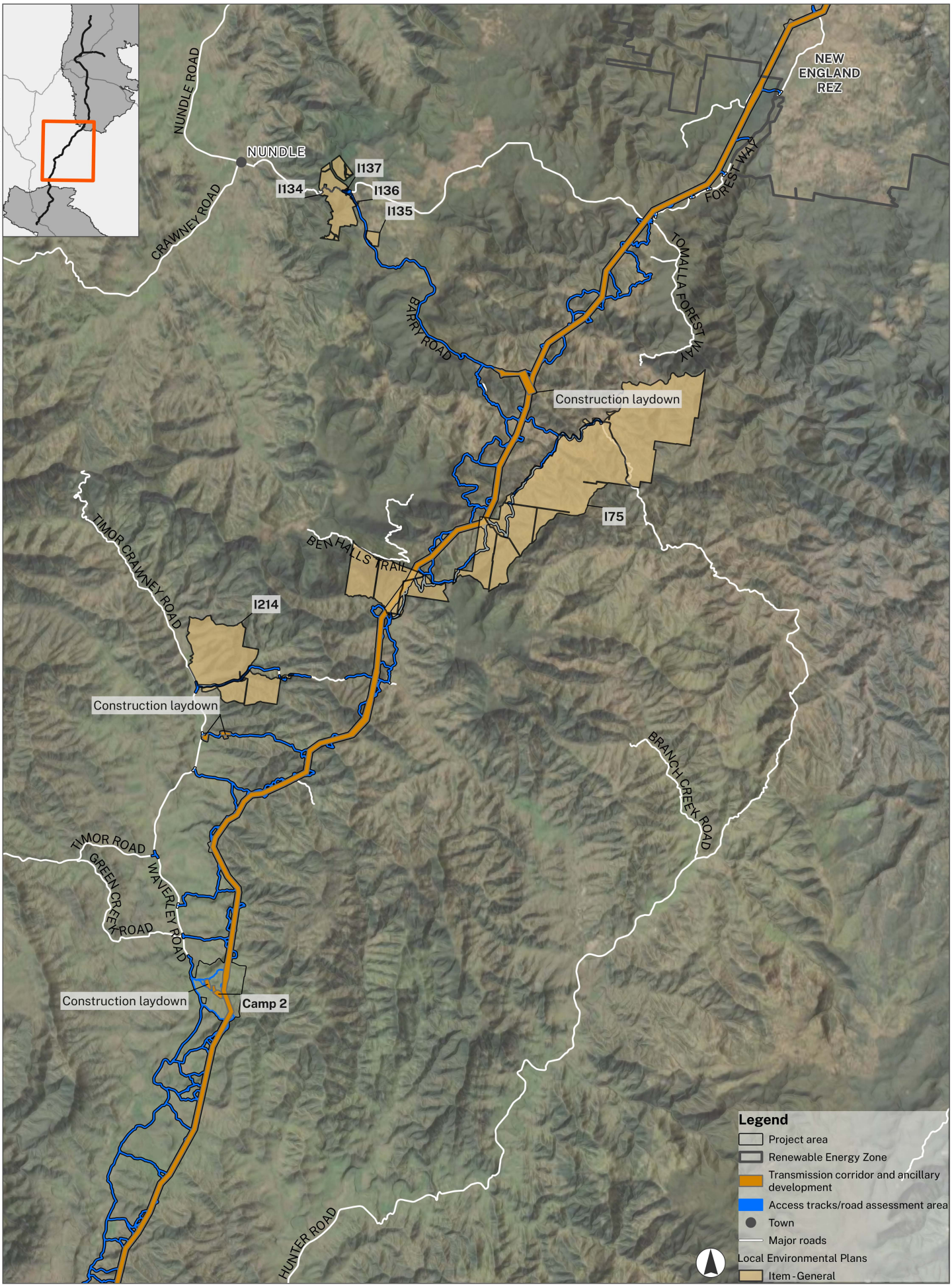


FIGURE 9.1c Relevant heritage items (Map 3 of 6)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:250,000 at A4
GDA2020 MGA Zone 56

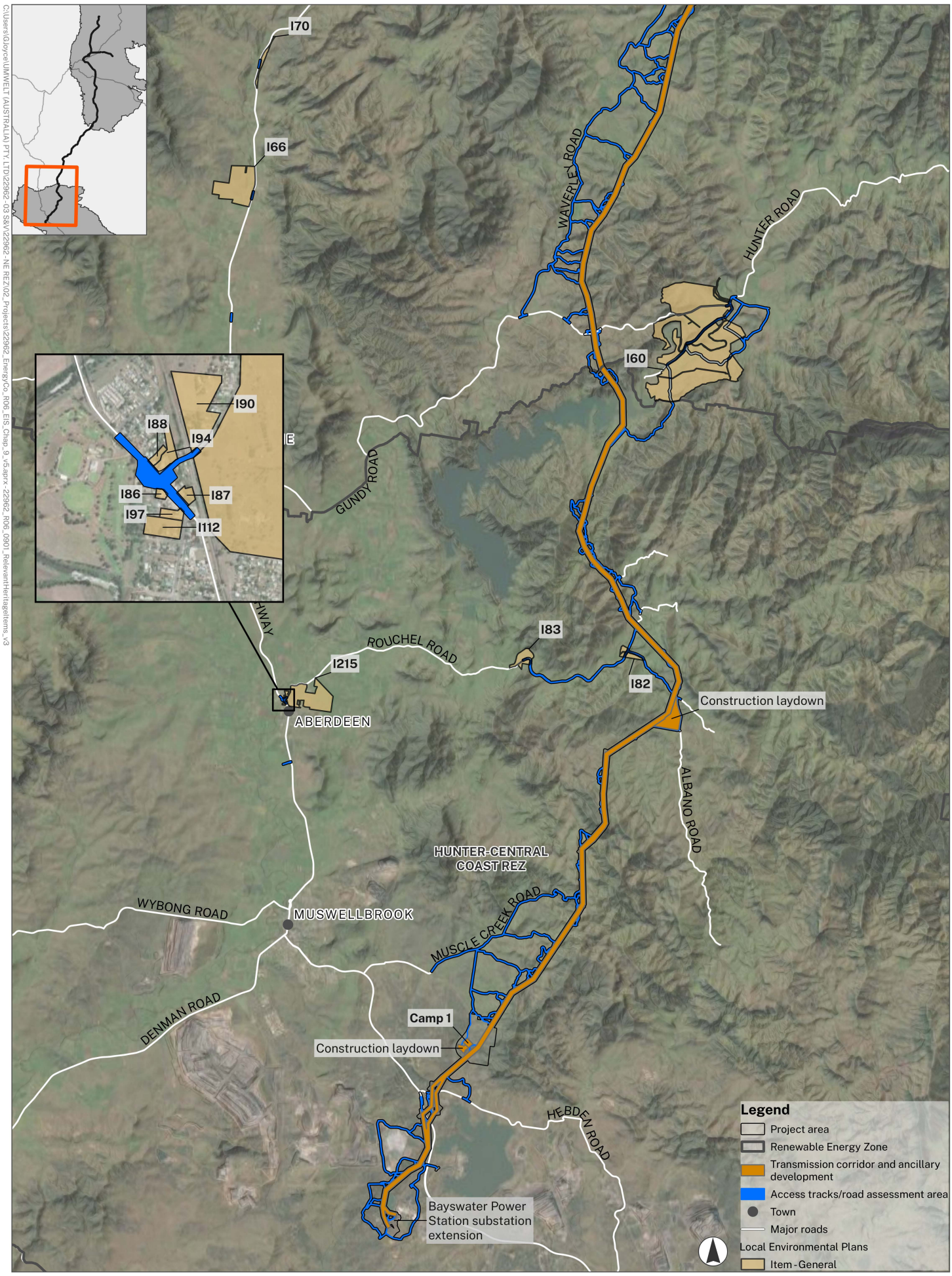


FIGURE 9.1d Relevant heritage items (Map 4 of 6)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:250,000 at A4
GDA2020 MGA Zone 56

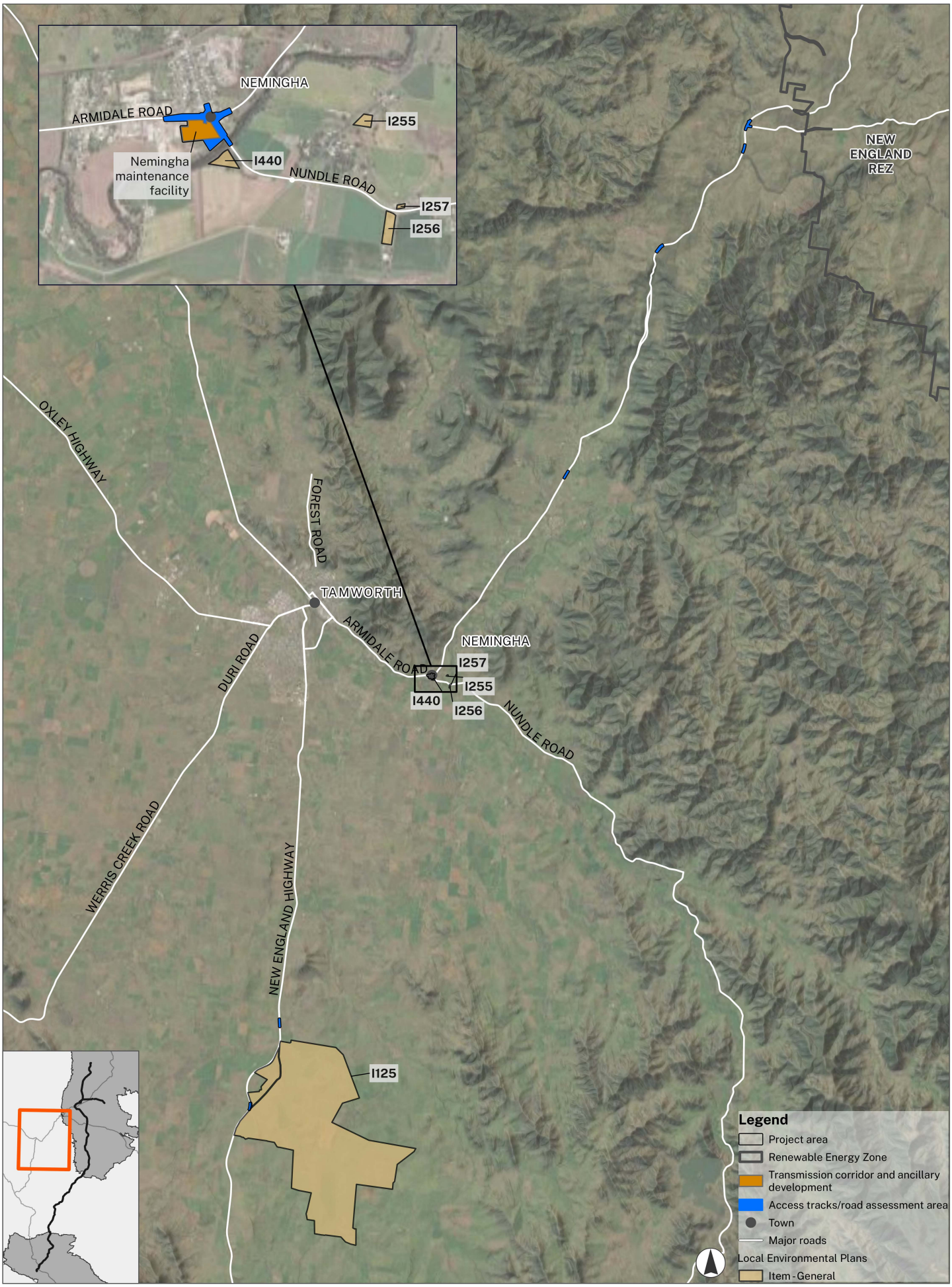


FIGURE 9.1e Relevant heritage items (Map 5 of 6)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

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GDA2020 MGA Zone 56

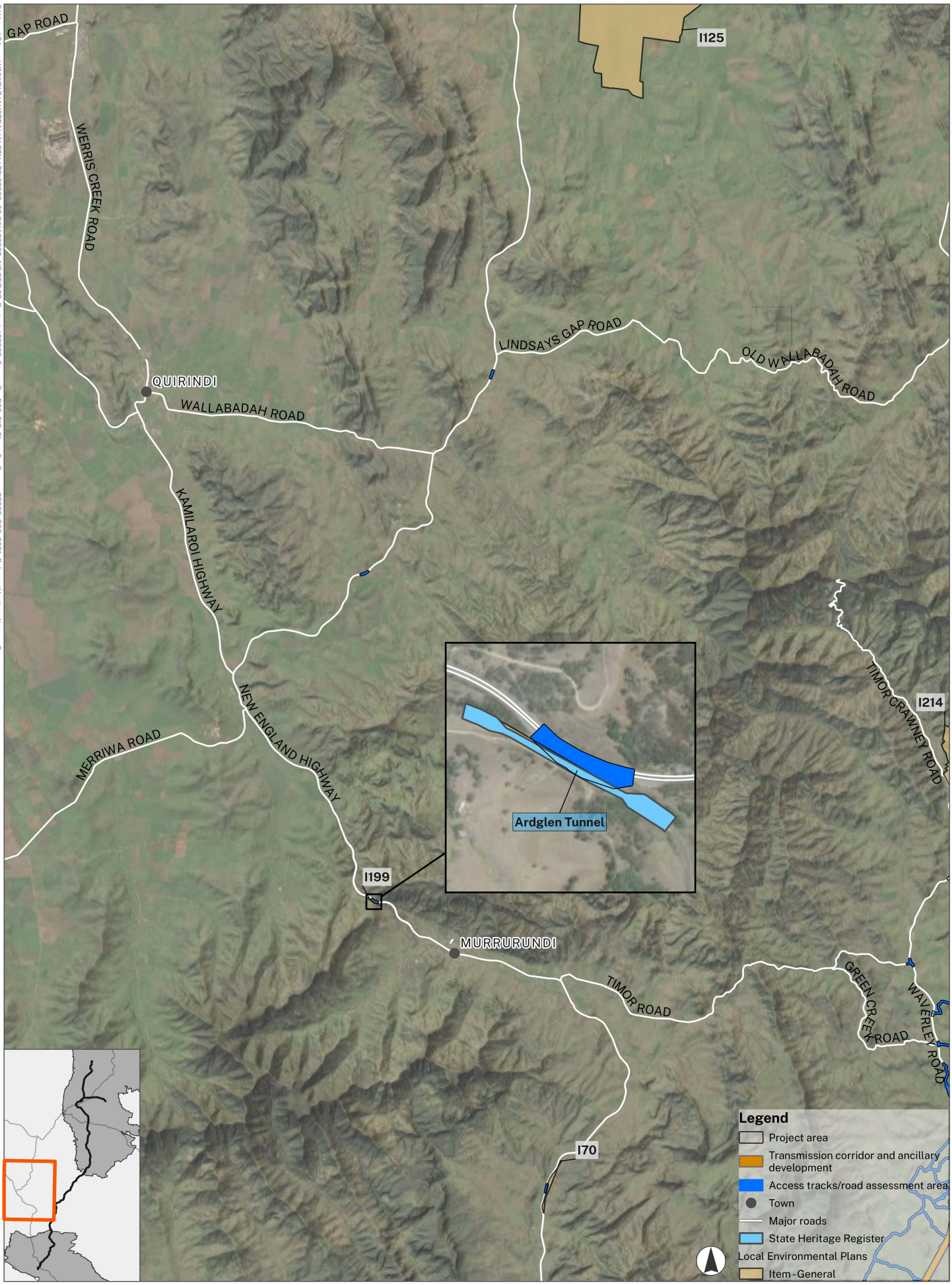


FIGURE 9.1f Relevant heritage items (Map 6 of 6)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:250,000 at A4
GDA2020 MGA Zone 56

9.2.3 Historical archaeological potential

The historical archaeological context of the project area reflects a pattern of pastoral expansion, land reform and agricultural development from the early nineteenth century through to the mid-twentieth century.

Prior to field survey, it was expected that historical archaeological remains would likely be fragmentary, where present. Early structures were typically temporary and constructed from perishable materials, while later structures, although more durable, have often been modified, reused or removed over time. In addition to dwellings, it was considered that a range of ancillary agricultural features may be present, including fencing alignments, stockyards, dams and other farm infrastructure.

A review of available literature and previous historical archaeological investigations found that there is a general absence of detailed archaeological investigations within the project area and its immediate surrounds, resulting in little recorded historical archaeological data. This gap in the record may reflect the inherently low archaeological potential of the landscape, but it may also be attributable to the limited extent of past development or disturbance that would typically trigger archaeological assessment and excavation.

Conversely, it is noted that homesteads, head stations, outstations, and other rural occupation sites of a scale likely to generate a meaningful archaeological footprint are generally well represented in historical mapping. Based on the review of historical mapping, including pastoral holding maps, parish maps and other key sources (refer to Section 6.0 of the HHIA), the absence of known former homesteads and head stations associated with former key estates that overlap with the project area suggested a lower likelihood of encountering substantial archaeological deposits typically associated with larger or more intensively developed rural holdings.

The overall archaeological potential of the project area was assessed as generally low, with localised areas of higher potential associated with former occupation sites and activity areas.

The desktop historical research, and a review of historical mapping and/or aerial imagery completed as part of the HHIA identified 11 discrete and relatively localised areas of low to moderate archaeological potential (that is areas where remains of heritage value may exist) within the project area, based on where the presence of former structures or activity areas. These areas of archaeological potential were subject to further investigation as part of the HHIA and are listed in Table 9.3 and shown on Figure 9.2.

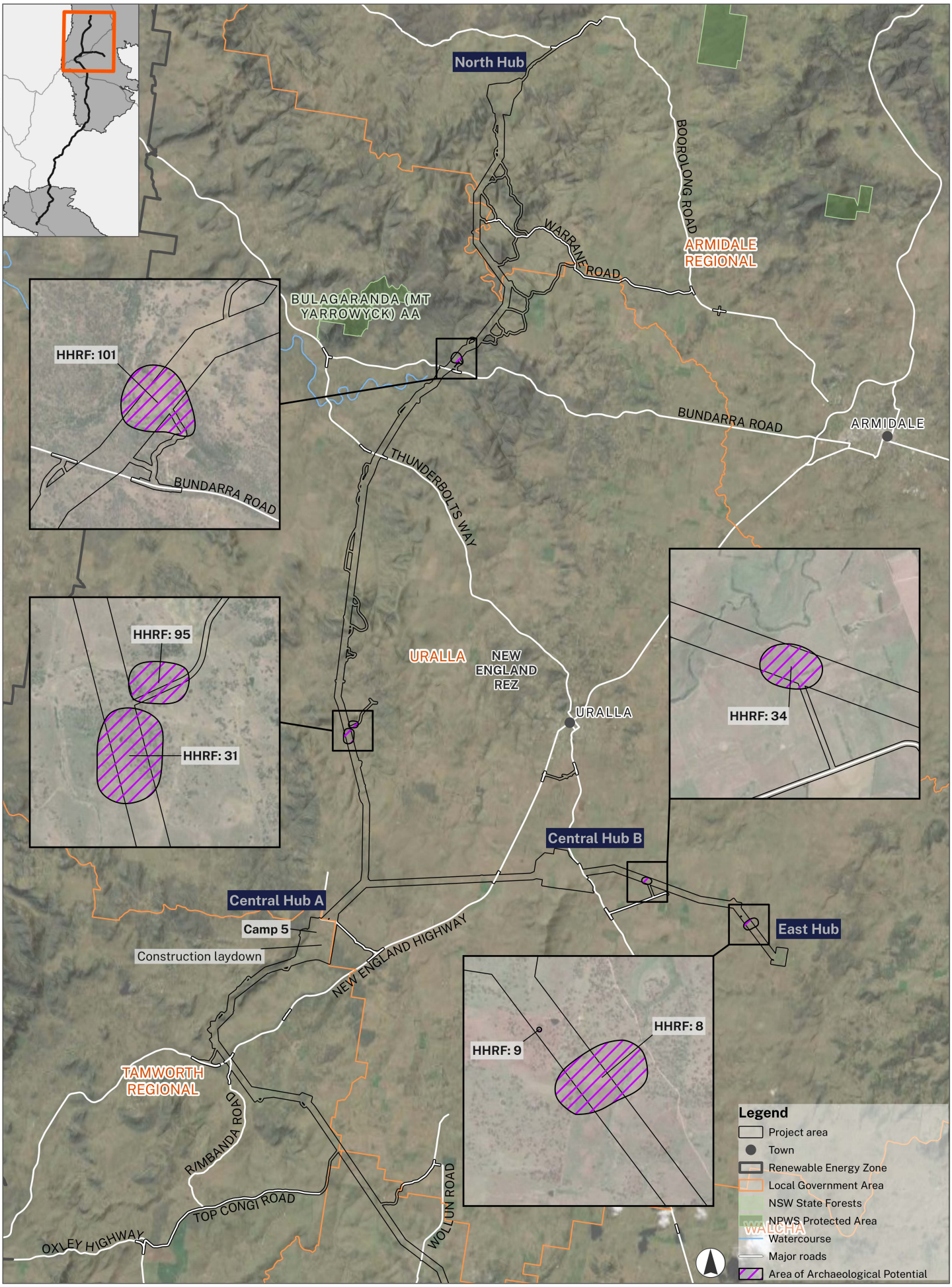


FIGURE 9.2a Areas of archaeological potential identified through desktop research (Map 1 of 4)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:250,000 at A4
GDA2020 MGA Zone 56

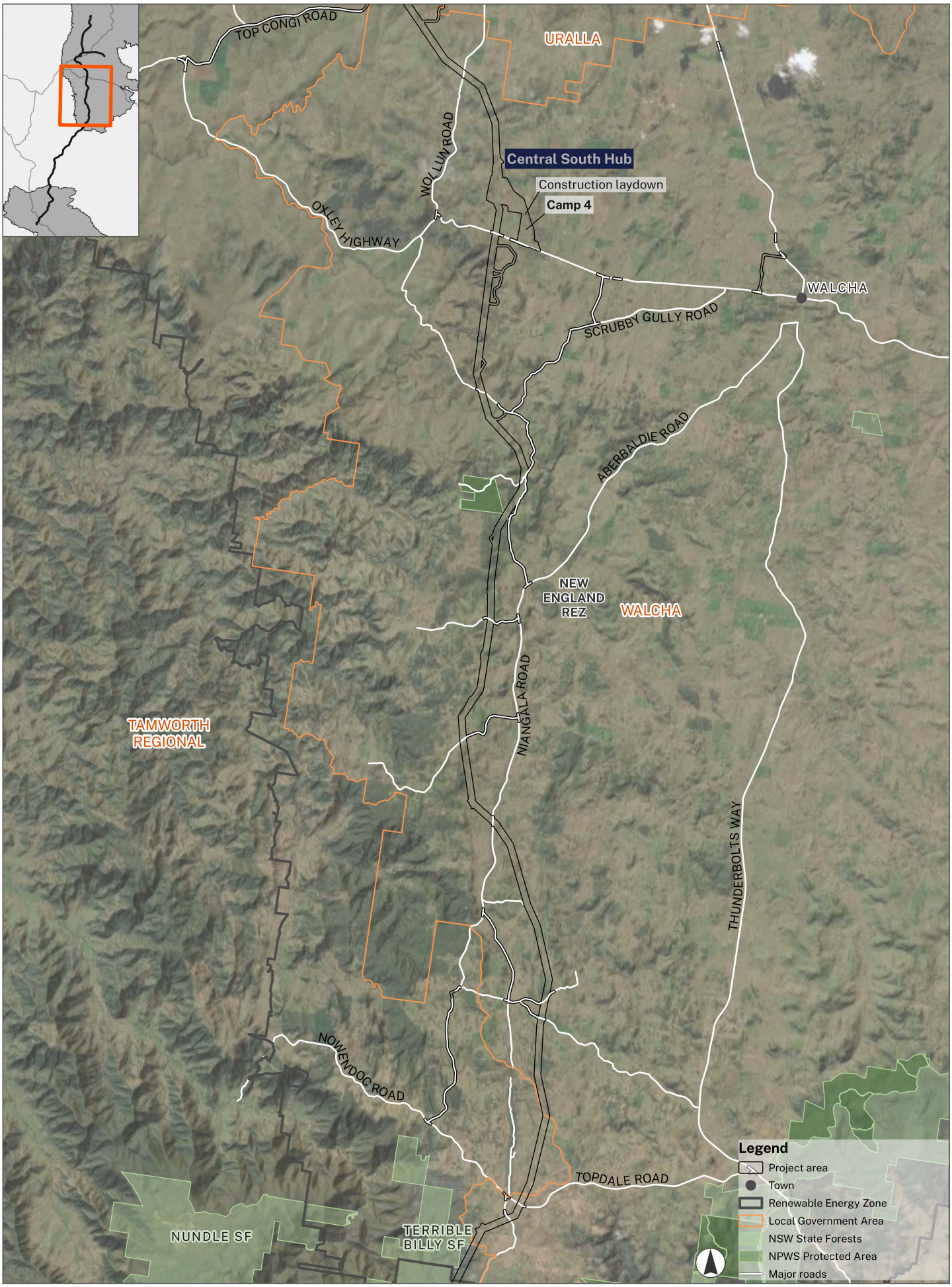


FIGURE 9.2b Areas of archaeological potential identified through desktop research (Map 2 of 4)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:250,000 at A4
GDA2020 MGA Zone 56

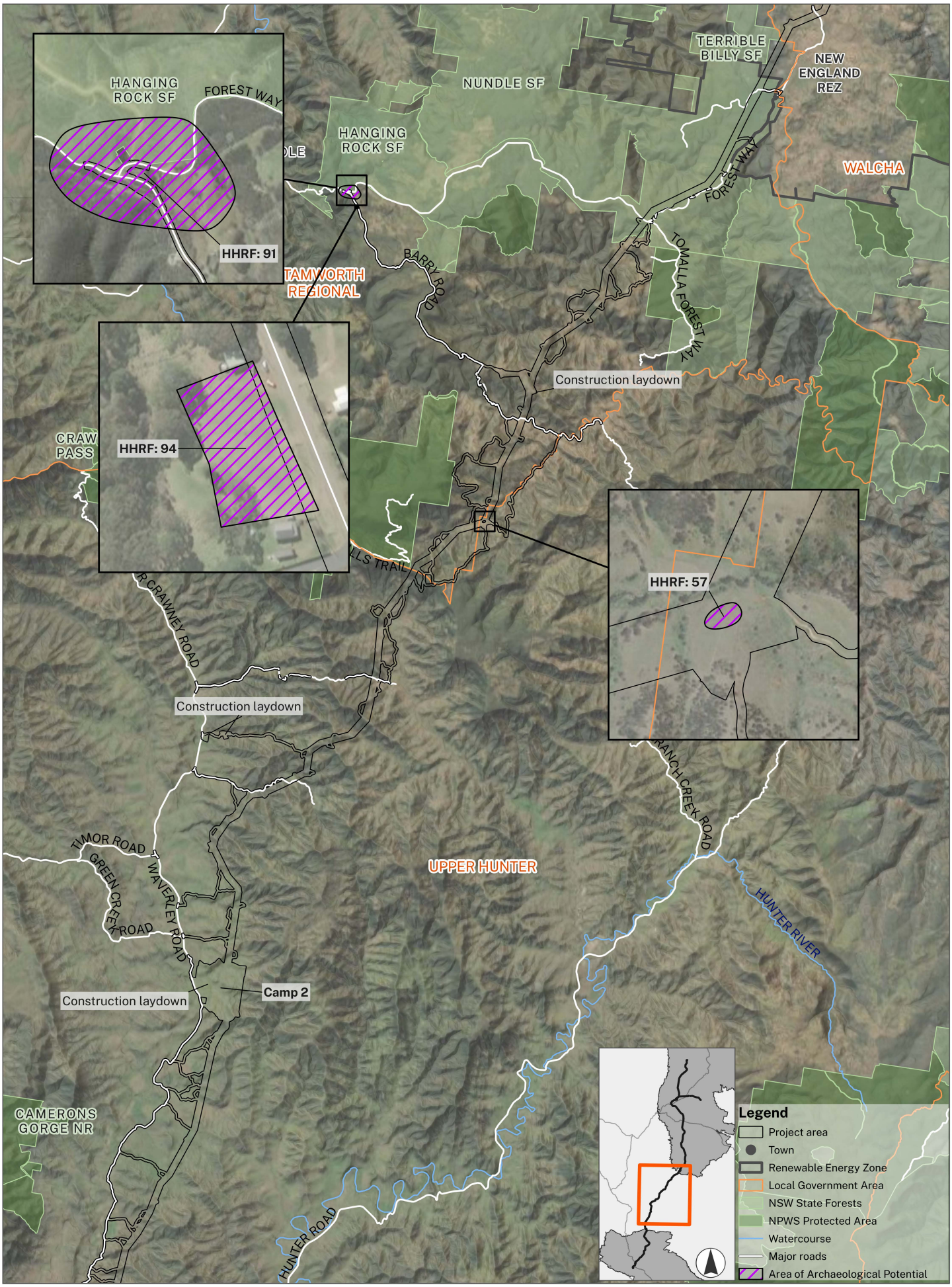


FIGURE 9.2c Areas of archaeological potential identified through desktop research (Map 3 of 4)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:250,000 at A4
GDA2020 MGA Zone 56

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Kilometres



FIGURE 9.2d Areas of archaeological potential identified through desktop research (Map 4 of 4)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:250,000 at A4
GDA2020 MGA Zone 56

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Kilometres

9.2.4 Field survey results

The field survey effort in accessible areas took place across 7 stages of survey between 5 August 2024 and 13 March 2026. The survey was informed by a detailed review of available aerial imagery, pastoral plans, parish maps and prior investigations within and in the general vicinity of the project area. All listed heritage items and the 30 additional locations identified were subject to inspection where access was available (refer to Section 9.1.3 for more information on field survey coverage and limitations).

The results of the field survey generally supported the desktop analysis findings, with the project area observed to comprise a modified rural landscape. Landscape character is defined by low-density rural development, including dwellings, sheds, stockyards, fencing, silos and associated infrastructure, typically aligned with property boundaries and established pastoral land use patterns. Urban interfaces are limited to small settlements or localities such as Rouchel Brook, Muscle Creek, Hanging Rock, Aberdeen, Nemingha and Niangala, with most of the project area located outside major centres. Agricultural modification appears more intensive in the Tamworth Regional area, while the New England Tablelands and Upper Hunter sections are characterised by larger landholdings and more dispersed development.

Elements of heritage interest were recorded during field surveys on Historical Heritage Recording Forms (HHRFs) and consisted of a variety of buildings, structures and/or elements, or areas of historical archaeological potential including but not limited to:

- standing structures, collapsed or collapsing structures and structural remains (such as timber huts, timber piers, railway culverts, dwellings)
- exotic trees or plants (both individuals and groups – these may indicate the former presence of an area of occupation)
- landform elements that could indicate the presence of former land use or occupation
- areas of historical archaeological potential as indicated by remnant material or other features visible on the ground surface (for example mounds, depressions)
- areas of archaeological potential indicated by historical research and literature review (for example sites indicating former structures or occupation on historical maps).

A total of 26 individual elements of heritage interest are located partially within the project area and consist of:

- the 11 areas of heritage interest identified through the desktop assessment
- a further 15 areas of heritage interest identified in the project area during field surveys.

These are listed in Table 9.3 and shown on Figure 9.3. These 26 items were carried forward for a preliminary significance assessment to identify which HHRFs demonstrate sufficient potential heritage value to warrant further assessment under the formal NSW heritage significance assessment criteria.

Table 9.3. Potential heritage items within the project area warranting further assessment

HHRFs identified through historical research/literature review	HHRFs identified through survey that were subject to post-survey historical research
HHRF: 8 – Toongabbie Outstation*	HHRF: 2 – Potential Placed Stone and Plantings
HHRF: 9 – Shepherd's Hut Stone Foundation*	HHRF: 4 – Collapsed Structure 1
HHRF: 31 – Balala Former Structures 1*	HHRF: 5 – Wollun Railway Culvert*
HHRF: 34 – Salisbury Court Former Outstation*	HHRF: 6 – Looanga Creek Fragments
HHRF: 57 – Barry Station Former Structure*	HHRF: 18 – Collapsed Structure 2
HHRF: 89 – Fisher's Corner*	HHRF: 21 – Collapsing Structures 3
HHRF: 90 – Former Aberdeen Civic Theatre & Skating Rink*	HHRF: 58 – Potential Hut
HHRF: 91 – Former Hanging Rock Village*	HHRF: 64 – Boorolong Sheds
HHRF: 94 – Hanging Rock Former Digger's Hut*	HHRF: 67 – Structure Remains
HHRF: 95 – Balala Former Structures 2*	HHRF: 84 – Potential Hut Remains
HHRF: 101 – Huts, Gardens and Drainage Channel Site	HHRF: 93: Former Hanging Rock School*
	HHRF: 96- Aberdeen Memorial Plaques
	HHRF: 98 – Building Remains and Miscellaneous Material
	HHRF: 105 – Niangala Dwelling 1
	HHRF: 106 – Niangala Dwelling 2

** subject to formal significance assessment against the NSW Heritage Criteria (Section 9.2.5).*

Two north to south orientated linear rock mounds (HHRF 14) were identified within 15 metres of the western boundary of the project area, located on a minor hillcrest west of Atchesons Gully in the Gostwyck Area, southeast of Uralla (adjacent to the transmission line corridor near East Hub). Although considered unlikely (noting the usual orientation of a Christian burial is east to west and the available historical record provides no evidence for any burials within this portion of land), there is some potential for them to be a rural memorial or burial site. As their provenance and original purpose are not known, and given their proximity to the project area, a no-impact area (20 metre buffer) has been applied to the mounds as a precautionary mitigation measure to minimise risks associated with inadvertent impacts to the mounds as a result of the project.

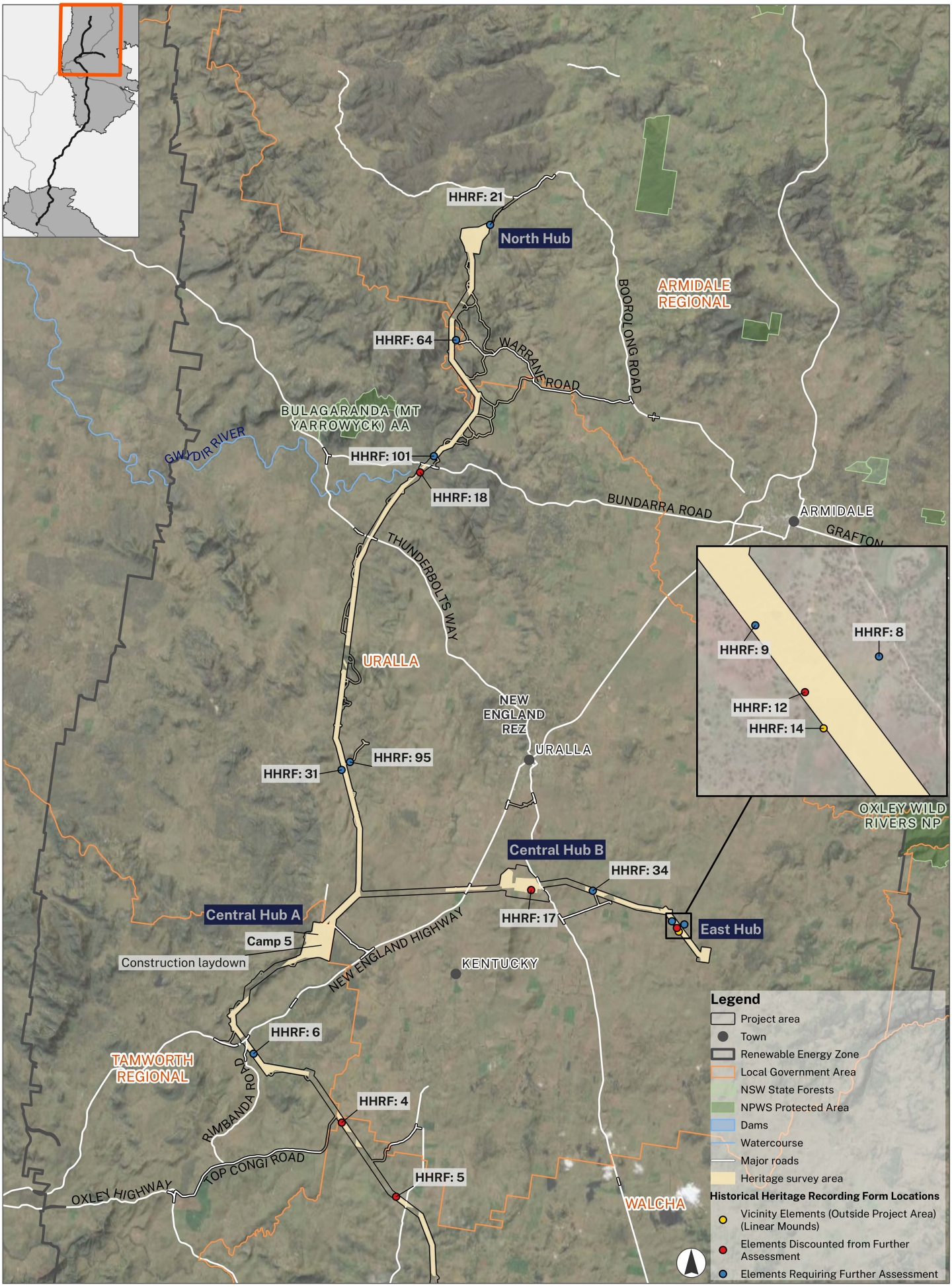


FIGURE 9.3a Historical heritage survey outcomes - non-listed items (Map 1 of 6)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:300,000 at A4
GDA2020 MGA Zone 56

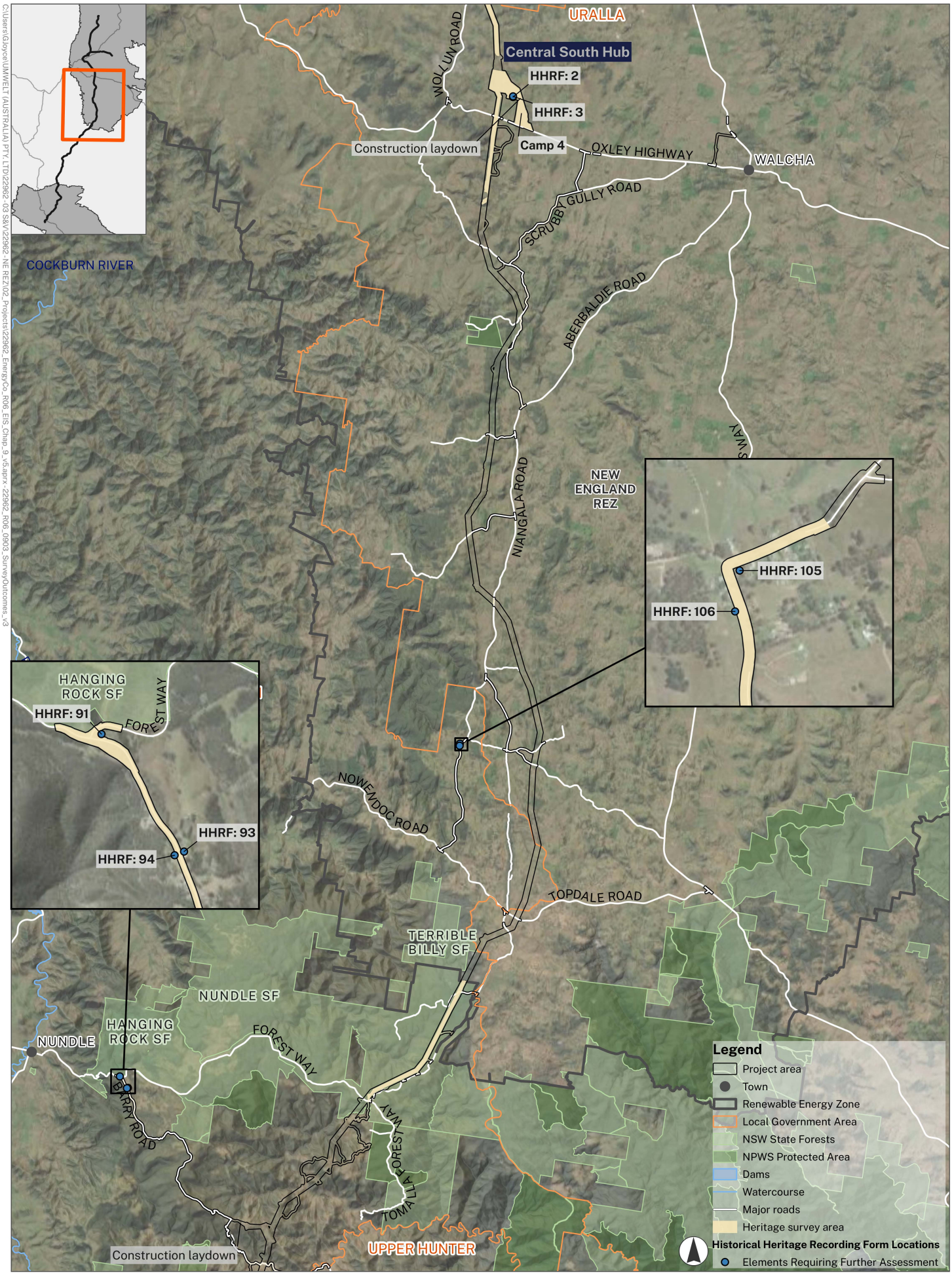


FIGURE 9.3b Historical heritage survey outcomes - non-listed items (Map 2 of 6)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:300,000 at A4
GDA2020 MGA Zone 56

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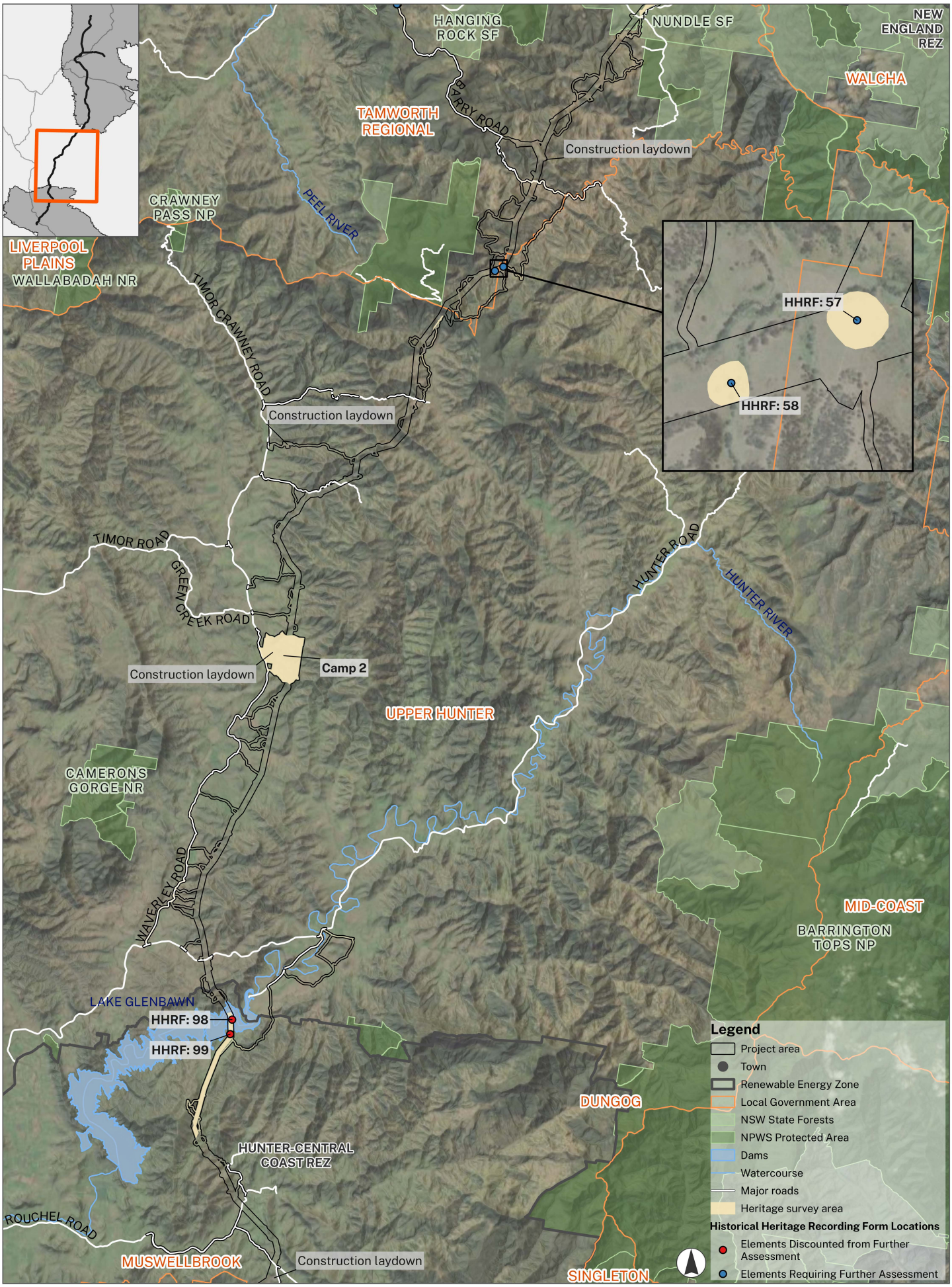


FIGURE 9.3c Historical heritage survey outcomes - non-listed items (Map 3 of 6)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:300,000 at A4
GDA2020 MGA Zone 56

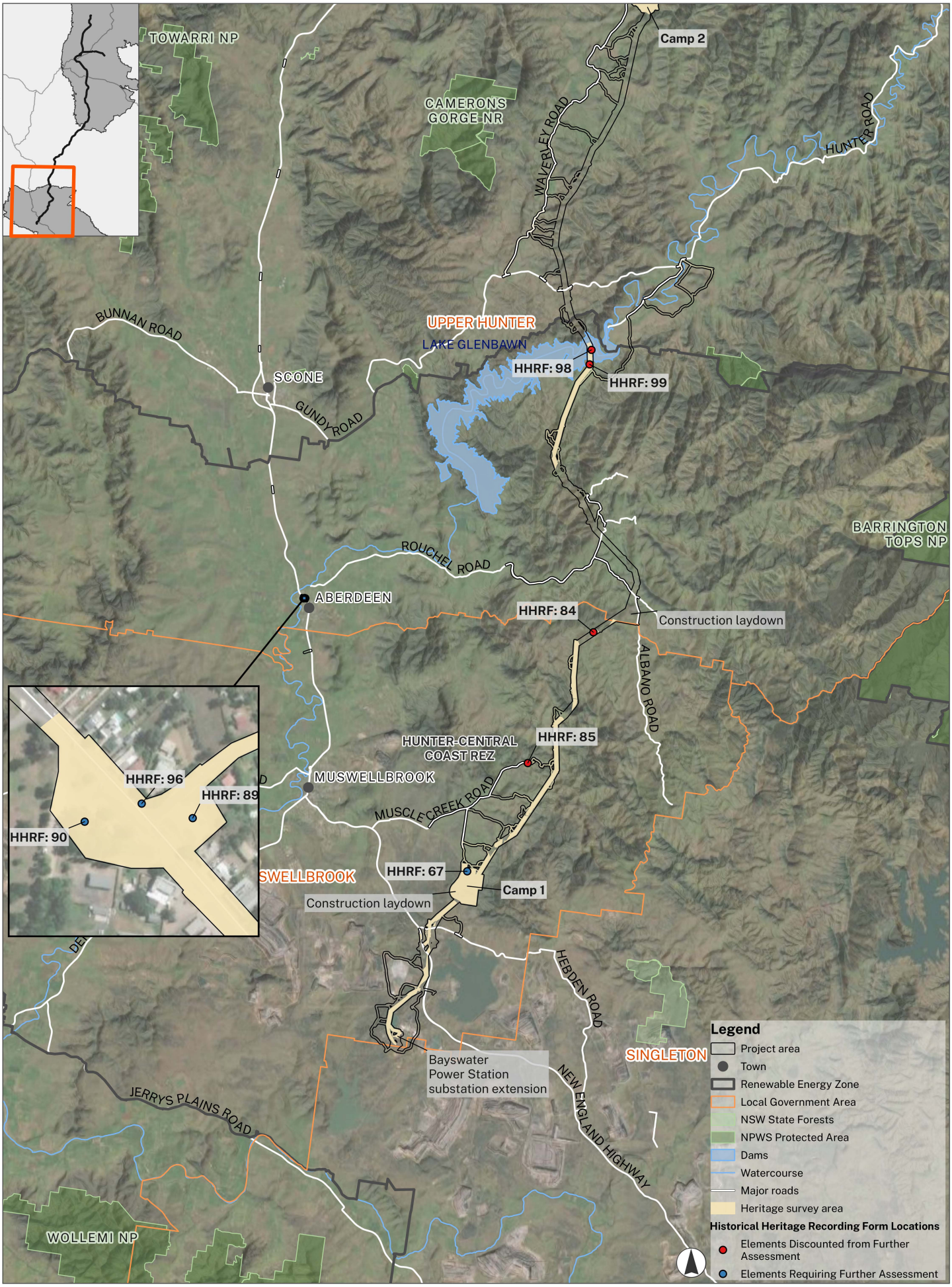


FIGURE 9.3d Historical heritage survey outcomes - non-listed items (Map 4 of 6)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

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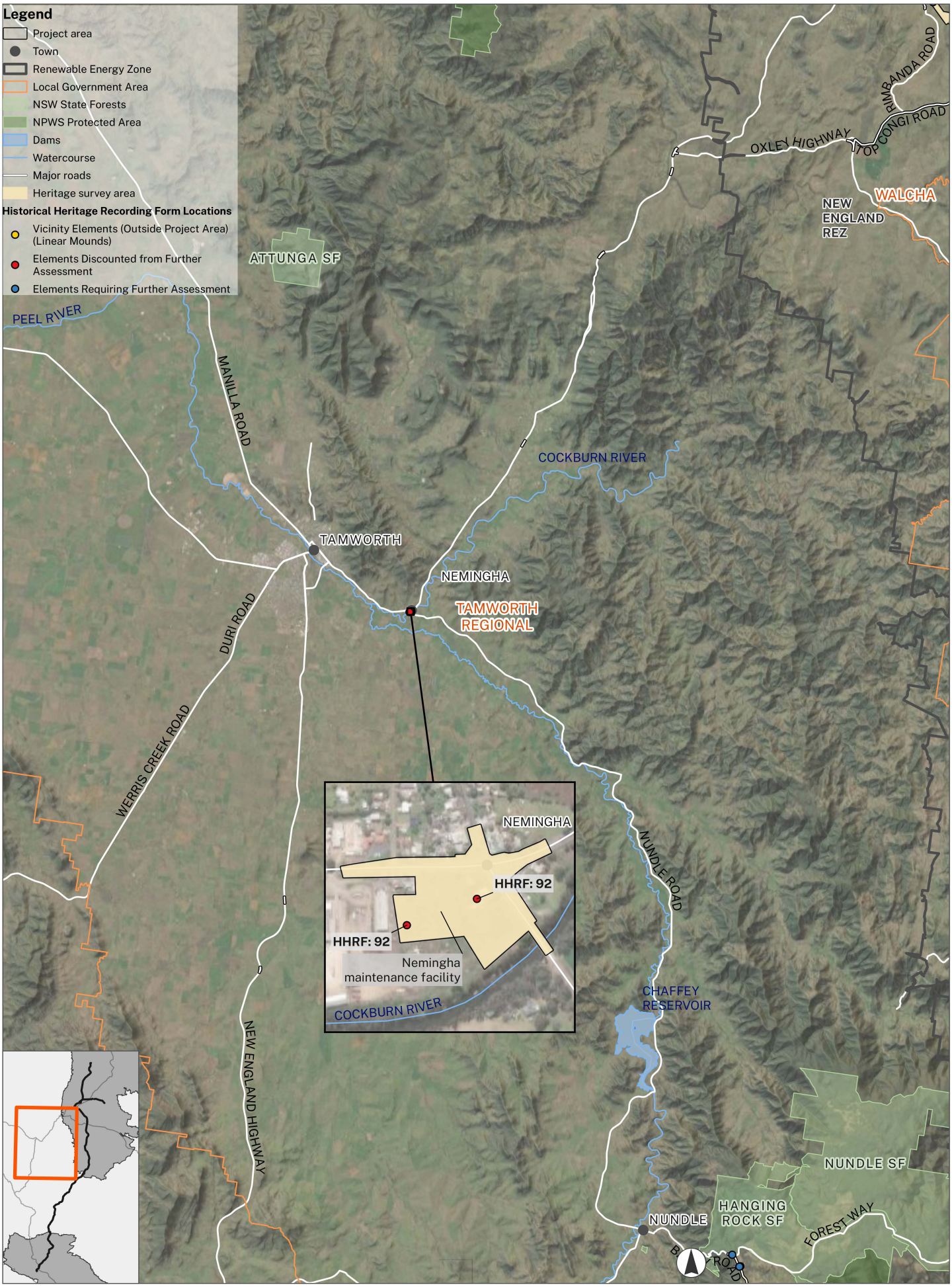


FIGURE 9.3e Historical heritage survey outcomes - non-listed items (Map 5 of 6)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:300,000 at A4
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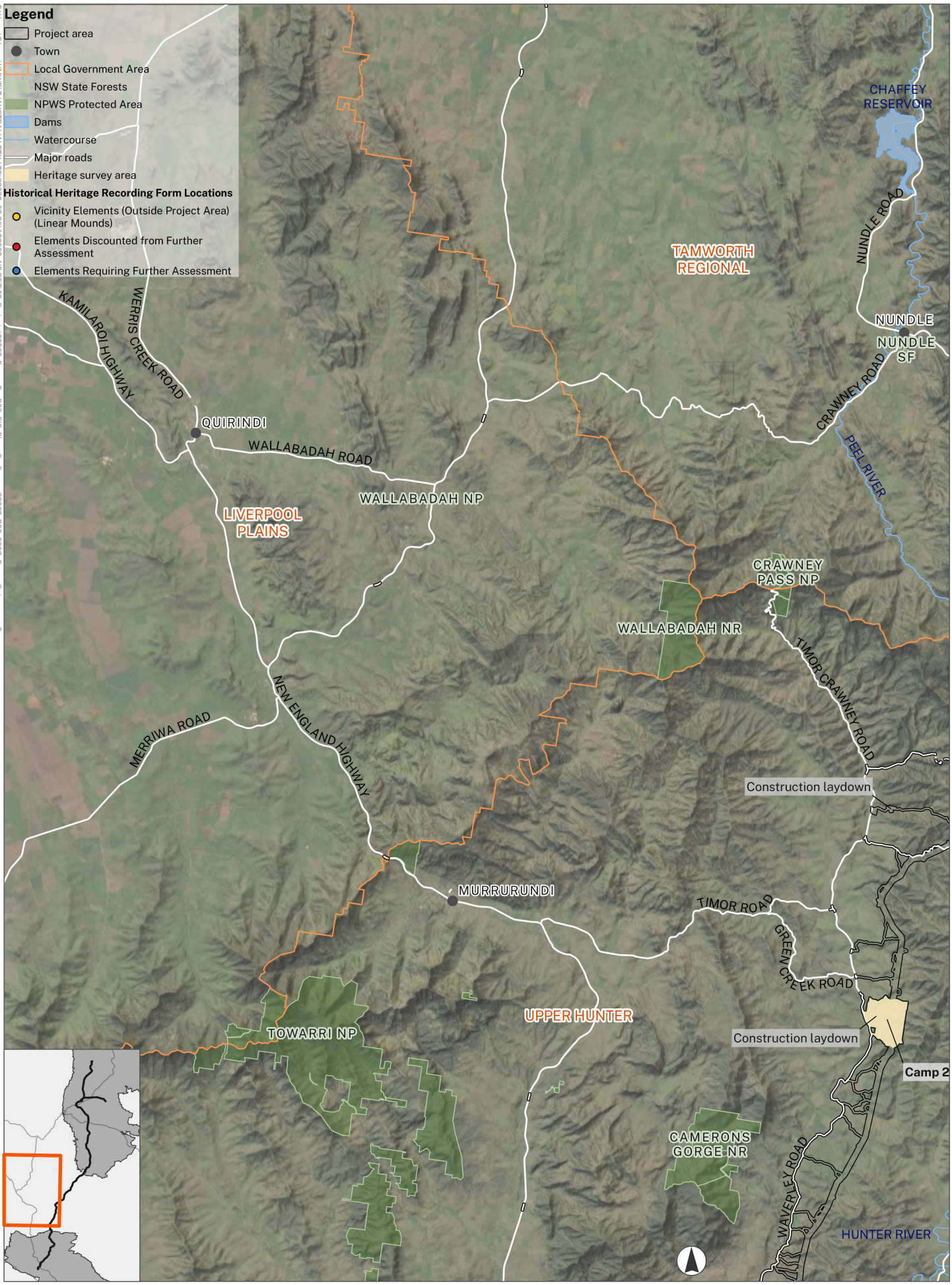


FIGURE 9.3f Historical heritage survey outcomes - non-listed items (Map 6 of 6)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

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9.2.5 Significance assessment

The significance of the listed heritage items that intersect the project area was not reassessed as part of the HHIA, however, a review of the significance assessment for each item was undertaken, where available.

Following the field survey, a preliminary assessment of significance was undertaken of the 26 items of heritage interest. This included reviewing each of these elements to determine if an individual element was potentially of heritage significance such that it warranted formal significance assessment against the NSW Heritage Criteria.

This process identified that 13 of the 26 items of heritage interest (refer to Table 9.3) demonstrated sufficient heritage value to warrant significance assessment against the NSW Heritage Criteria. Of the 13 elements, 11 are identified as areas of archaeological potential (that is consisting of subsurface heritage remains) and 2 comprise built elements of heritage interest, being HHRF: 5 – Wollun Railway Culvert and HHRF: 93 – Former Hanging Rock School. The details of these 13 elements are set out below.

Built elements of heritage interest

HHRF: 5 – Wollun Railway Culvert is of local historical heritage significance as an intact late nineteenth-century railway culvert associated with the Great Northern Railway. It demonstrates 1880s railway engineering and drainage techniques, retains high integrity, and contributes to understanding historical railway construction and transport development in the region.

HHRF: 93 – Former Hanging Rock School has potential local heritage significance for its association with the development of public education and community infrastructure in the Hanging Rock district from the late nineteenth to twentieth century. Established in the early 1880s, it reflects settlement patterns and government service provision in rural mining and pastoral communities in regional NSW. The location may retain original school-related fabric in adapted form, which could help demonstrate the development and operation of small rural schools, subject to further confirmation of integrity and surviving fabric.

Areas of historical archaeological potential

- HHRF: 8 – Toongabbie Outstation
- HHRF: 9 – Shepherd's Hut Stone Foundation
- HHRF: 31 – Balala Former Structures 1
- HHRF: 34 – Salisbury Court Former Outstation
- HHRF: 57 – Barry Station Former Structure
- HHRF: 89 – Fisher's Corner
- HHRF: 90 – Former Aberdeen Civic Theatre and Skating Rink
- HHRF: 91 – Former Hanging Rock Village
- HHRF: 94 – Hanging Rock Former Digger's Hut
- HHRF: 95 – Balala Former Structures 2
- HHRF: 101 – Huts, Garden and Drainage Channel.

The areas of historical archaeological potential identified as warranting significance assessment against the NSW Heritage Criteria all relate to historical mapping and information within the historical record and were observed to comprise either material likely indicative of historical land use, or cleared, relatively undisturbed land. These areas were assessed as having potential local significance (dependent on the presence, condition and integrity of subsurface archaeological deposits) associated with former outstations, former areas of occupation and/or former areas of pastoral land use. These 13 areas that are of potential local significance are shown on Figure 9.3. Further details of these areas of archaeological potential is provided in the HHIA (refer to Technical Report 3).

No identified built elements or areas of archaeological potential were assessed as having State heritage significance within the project area.

Overall, the historical heritage resource within the project area is considered to be of local significance, characterised by a dispersed archaeological landscape reflecting rural land use history.

9.3 Avoidance measures

9.3.1 Avoidance to historical heritage through the route selection process

Avoiding and minimising impacts to historical heritage values was a key planning principle guiding the route selection process, including avoidance of World, National, Commonwealth and State heritage items, which has been achieved and maintained in the project area. Although the project area overlaps with the curtilage of the Ardglen Railway Tunnel heritage listing (SHR #0102), this was associated with a planned extension to the existing lay-by on the New England Highway that is no longer proposed. Given the potential interaction with the Ardglen Railway Tunnel, EnergyCo has committed to exclude works in this location by implementing a no-impact area to effectively avoid all potential direct and indirect physical impacts to this heritage item.

Other key project changes that have reduced potential impacts to listed heritage items include:

- route changes moving the transmission line alignment away from the Timor Caves and Geological site (a local significance item in the Upper Hunter LEP 2013). Minor public road upgrades remain within the curtilage of this heritage item and management controls are proposed for these works including related to minimisation of vibration impacts
- realignment of the transmission line alignment to reduce the extent of the project area within the Barry Station heritage curtilage (a local significance item in the Upper Hunter LEP 2013)
- removal of the transmission line alignment from the project area within the vicinity of 'Boorolong Homestead' (a local significance item in the Armidale LEP 2012). Road upgrades are proposed within the vicinity of this heritage item, however the extent of the project in this area is substantially reduced
- realignment of the transmission line alignment to create a greater distance between the transmission line and towers and Homestead 'Warrane' (a local significance item in the Armidale LEP 2012).

In addition to the above, the potential archaeological remains of the former dwelling (Toongabbie Homestead) associated with Toongabbie Outstation has been avoided through a realignment of a section of the transmission corridor near East Hub as part of the development of the project transmission corridor alignment.

9.3.2 Avoidance to historical heritage within the project area

Specific no-impact areas within the project area were also developed to prioritise avoidance of historical heritage values where practicable. This includes avoiding both direct physical impact and indirect physical impacts associated with vibration. In most instances, where the listing curtilage of an item overlaps with the project area, the no-impact area was applied to the entirety of the area of overlap to effectively avoid all physical works within the listing curtilage. No-impact areas applied to historical heritage are shown on Figure F.1 within Appendix F management and mitigation measures.

Of the 21 listed heritage items that intersect the project area, direct impacts to 20 items would be avoided through the implementation of a no-impact area. In addition, of the 13 potential historical heritage items that intersect the project area, direct impacts to 6 items (consisting of 2 built elements and 4 areas of potential historical archaeological potential) would similarly be avoided through the implementation of no-impact areas.

Potential indirect impacts from construction vibration would be avoided for listed heritage items and 2 potential heritage items within the study area (the project area, with a 50 metre buffer) by requiring minimum safe working distances for vibration intensive equipment. If this cannot be achieved, alternative construction methodologies will be investigated and implemented.

While direct impacts to historical heritage would be avoided through proposed mitigation measures, residual indirect impacts from construction vibration remain for a small number of listed and potential historical heritage items as discussed in Section 9.4 below.

The mitigation measures described in Section 9.5.1, along with continued development of the detailed design and construction methodology for the project would aim to further avoid and/or minimise the residual direct and indirect impacts associated with vibration as part of the project where possible. In instances where direct and indirect impacts cannot be avoided, the mitigation measures included in Section 9.5 would be implemented to minimise the impacts where possible.

9.4 Potential impacts

The assessment of impacts on listed heritage items has adopted a conservative, worst case scenario of potential impact, with the assessment assuming that all heritage items within the project area could be impacted, except for those that have been assigned no-impact areas. While this approach is necessary to maintain flexibility during continued development of the project's design and construction methodology, it is likely to overestimate the scale of impacts to historical heritage values. EnergyCo has committed to implement a process to continue to seek opportunities to further avoid impacts as the project design is refined during detailed design, where possible.

9.4.1 Impacts to listed heritage items

Whilst the project area overlaps with a number of listed heritage items, the avoidance commitments made by EnergyCo means that the project would effectively avoid impacts to most listed heritage items identified within the project area.

Visual impacts to listed heritage items would generally be negligible to low, with the exception of Barry Station (I75 Upper Hunter LEP 2013), where a moderate visual impact is predicted due to the transmission line corridor passing through portions of the listing. The project avoids the homestead and other buildings of heritage significance but does pass through the broader listed area. To address this moderate level of visual impact, mitigation measures are proposed including archival recording.

Construction activities associated with the project have the potential to result in indirect impacts through vibration for a small number of listed and potential historical heritage items where avoidance could not be achieved through the design process and application of no-impact areas. Vibration impacts are relevant only to heritage item types that are susceptible to vibration-related damage such as buildings, fences, structural elements and other standing features. However, potential indirect impacts associated with construction vibration would be mitigated and are largely expected to be avoided through compliance with relevant criteria and construction management measures as detailed in the Noise and Vibration Impact Assessment (refer to Section 16 and Technical Report 9).

The majority of potential impacts to listed heritage items were avoided through the application of no-impact areas. Table 9.4 summarises the listed heritage items where all potential impacts could not be avoided, identifying the residual impacts with management measures applied.

Table 9.4. Listed heritage items with residual impacts

Heritage item name	Item ID	Assessed impact
Homestead, "Warrane"	I246 Armidale Regional LEP 2012	No direct impacts as no-impact area applied within the project area No vibration impacts expected **Potential low visual impact**
Salisbury Court	I14 Uralla LEP 2012	No direct impacts as no-impact area applied within the project area No vibration impacts expected **Potential low visual impact**
Barry Station	I75 Upper Hunter LEP 2013	No direct impacts as the no-impact area has been applied to identified significant built elements associated with this heritage listing No vibration impact to identified significant elements within listing curtilage **Potential moderate visual impact**

Heritage item name	Item ID	Assessed impact
Belltrees homestead and outbuildings	I60 Upper Hunter LEP 2013	No direct impacts as no-impact area has been applied to identified significant built elements associated with this heritage listing No vibration impact to identified significant elements within listing curtilage **Potential negligible visual impact**
Timber house	I82 Upper Hunter LEP 2013	No direct impacts as no-impact area has been applied to identified significant built elements associated with this heritage listing No vibration impacts **Potential negligible visual impact**

9.4.2 Impacts to unlisted potential heritage items (built form)

Potential heritage items (built form) are those recorded items that are not subject to any formal listing identified in the project area that have been assessed to meet one or more of the criteria for assessing heritage significance in NSW. As discussed in Section 9.2.5, these are HHRF: 5 – Wollun Railway Culvert and HHRF: 93 – Former Hanging Rock School.

No-impact areas are proposed for both of these potential heritage items to avoid direct impacts. Indirect (construction vibration impacts) would be managed in accordance with the management measures outlined in Section 9.5.1.

9.4.3 Impacts to areas of historical archaeological potential

Based on the conservative assumption that impacts could occur anywhere within the project area (except where no-impact areas have been applied), the project may result in impacts to the following identified areas of historical archaeological potential:

- HHRF: 8 – Toongabbie Outstation
- HHRF: 31 – Balala Former Structures 1
- HHRF: 34 – Salisbury Court Former Outstation
- HHRF: 57 – Barry Station Former Structure
- HHRF: 91 – Former Hanging Rock Village
- HHRF: 95 – Balala Former Structures 2
- HHRF: 101 – Huts, Garden and Drainage Channel.

These areas of historical archaeological potential have been assessed as being of local heritage significance. The detailed design process would confirm the full extent of potential impacts to these areas and would take into consideration the mitigation measures proposed for these areas.

No-impact areas have been proposed for the following areas of historical archaeological potential to avoid potential direct impacts on:

- HHRF: 9 – Shepherd's Hut Foundation
- HHRF: 89 – Fishers Corner
- HHRF: 90 – Former Aberdeen Civic Theatre and Skating Rink
- HHRF: 94 – Hanging Rock Former Digger's Hut.

Figure 9.2 shows the location of these 11 items and the proposed management measures to address these impacts are provided in Section 9.4.

9.4.4 Cumulative impacts

The potential cumulative impacts of the project have been identified based on the scale and potential impacts of the project, in combination with the potential impacts of identified relevant future projects and broader developments supporting the New England REZ. A list of these relevant projects considered in the historical heritage cumulative assessment, including their descriptions, is provided in Section 24.

The assessment concluded that the project is not expected to result in substantial cumulative loss of heritage significance at a regional scale. While the project would contribute to the ongoing evolution of the broader cultural landscape, this change is considered consistent with the existing pattern of infrastructure and rural land use development that characterises local and regional areas. Subject to implementation of the recommended mitigation and management measures, the residual cumulative impact to historical heritage is therefore not anticipated to be significant.

Further details regarding cumulative impacts is detailed in the HHIA (refer to Technical Report 3) and in Section 24.

9.5 Management and mitigation

9.5.1 Management and mitigation measures

EnergyCo is committed to seek opportunities for further avoidance of historical heritage impacts as part of the detailed design process. Mitigation and management measures to be implemented to avoid, minimise and manage potential direct and indirect impacts to historical heritage are detailed in Table 9.5.

Mitigation and management measures in other EIS technical assessments that are relevant to the management of historical heritage include the Noise and Vibration Assessment (refer to Section 16 and Technical Report 9), including measures which address vibration impacts on heritage sites.

Table 9.5 Management and mitigation measures relating to historical heritage

Reference number	Impact	Mitigation measure	Timing	Relevant location
HH1	Direct and indirect impact to historical heritage values	A Historical Heritage Management Plan (HHMP) will be prepared in consultation with Heritage NSW. The HHMP will be prepared (and approved) prior to the commencement of construction and will include as a minimum: • all listed heritage items, potential heritage items and areas of archaeological potential relevant to the project area • processes for further investigation (including archaeological) and assessment if identified to be required, including unsurveyed portions of the project area as access becomes available • nominated management measures (for example avoidance, protection and archaeological management) and the methods for how they will be implemented • protocols for recording, assessing and managing newly identified historical heritage elements at any phase of the project • protocols for educating staff and contractors of their obligations relating to historical heritage through a site induction process • protocols for unexpected heritage finds, including protocols for suspected human skeletal remains • provisions for review and updates of the HHMP.	Detailed design Prior to construction	All locations
HH2	Direct and indirect impact - listed heritage item - Barry Station	Photographic archival recordings will be prepared in accordance with the NSW Department of Energy Climate Change and Water Guidelines *'Guidelines for preparing archival recordings of heritage items as a condition of consent'* (DCCEEW, 2025g).	Detailed design	Barry Station – I75 Upper Hunter LEP 2013

Reference number	Impact	Mitigation measure	Timing	Relevant location
HH3	Direct and indirect impact to historical heritage values	Avoidance and protective measures will be employed for historical heritage items within the project area that are to be retained, as well as historical heritage located in the immediate vicinity of the project area. This will include the development and implementation of no-impact areas as set out in Table 11.2 of the HHIA and future no-impact areas as determined by future assessments in unsurveyed areas, detailed design process and/or the implementation of the HHMP.	Detailed design	Project area
HH4	Direct impact to historical heritage values	Physical barriers and appropriate signage (when necessary) will be established between no-impact areas (including listed heritage items, potential heritage items and/or areas of historical archaeological potential) and the disturbance footprint prior to project construction occurring in their vicinity. The HHMP will set out detailed requirements for the implementation of these measures.	Prior to construction	All areas set out in Table 11.2 of the HHIA, as confirmed by the HHMP
HH5	Direct and indirect impact to historical heritage values	Distance-based avoidance will apply to historical heritage designated for avoidance that is not at risk of inadvertent physical impacts from construction activities due to either their typology or their distance from the final project disturbance footprint. These elements do not require fencing, signage or active land-management measures (although such measures can be employed for additional caution). The HHMP will set out detailed requirements for the implementation of these measures.	Prior to construction	All areas set out in Table 11.2 of the HHIA, as confirmed by the HHMP

Reference number	Impact	Mitigation measure	Timing	Relevant location
HH6	Indirect impact to historical heritage values	Historical heritage items (both listed and potential historical items with built elements) should be assessed to determine whether they are vibration sensitive. Vibration-sensitive historical heritage items (both listed and potential historical items with built elements) will be protected from project related vibration impacts, through the implementation of no impact areas and/or the development of alternative construction methodologies where minimum working distances for vibration intensive equipment cannot be met. Protection measures will be detailed in the HHMP and will apply to all potential items and items that are listed in Section 9.2.1 and Section 9.2.2 of the HHIA.	Detailed design	All listed heritage items and potential heritage items
HH7	Direct impact to historical heritage values	Archaeological monitoring will be undertaken within the access track and road upgrade areas where ground disturbing works are proposed within identified areas of historical archaeological potential. Archaeological monitoring within the access track and road upgrade areas will be guided by a location-specific archaeological research design and work method statement to ensure the archaeological monitoring methodology is appropriate for the location, predicted archaeological remains and the required project works. The archaeological research design and work method statement will be developed in consultation with Heritage NSW as part of the HHMP and implemented as a post-approval measure.	Prior to construction During construction	Where ground disturbing works are proposed within identified areas of historical archaeological potential: the Former Hanging Rock Village (HHRF: 91) and Balala Former Structures 2 (HHRF: 95)

Reference number	Impact	Mitigation measure	Timing	Relevant location
HH8	Direct impact to historical heritage values	Archaeological test excavation to confirm the presence or absence of archaeological remains is proposed to be undertaken within the project area where ground disturbing works cannot be avoided within areas of historical archaeological potential. All test excavation will be guided by a location-specific archaeological research design and work method statement in consultation with Heritage NSW to ensure the test excavation methodology is appropriate for the location and predicted archaeological remains.	Prior to construction	Where ground disturbing works are proposed within areas of historical archaeological potential: HHRF: 8 – Toongabbie Outstation, HHRF: 31 – Balala Former Structures 1, HHRF: 34 – Salisbury Court Former Outstation, HHRF: 57 – Barry Station Former Structure and HHRF: 101 – Huts, Garden and Drainage Channel
HH9	Direct impact to historical heritage values	Additional archaeological investigation or monitoring will be undertaken as required by the results of the test excavation or monitoring. If required, an archaeological research design and work method statement for the proposed locations of archaeological investigation or monitoring will be developed in consultation with Heritage NSW as part of the HHMP and implemented as a post-approval measure.	Prior to construction commencing in relevant areas	As required by HHMP and results of archaeological test excavations
HH10	Direct impact to historical heritage values	A location specific archaeological research design and archaeological work method statement will be prepared for each area of archaeological potential that will be subject to ground disturbance as part of the project. The archaeological research design and work method statement will be prepared in accordance with the relevant Heritage NSW guidelines. It will be prepared in consultation (and endorsed by) Heritage NSW prior to any on-site archaeological works being undertaken.	Prior to construction commencing in relevant areas	All areas of historical archaeological potential subject to archaeological investigation

Reference number	Impact	Mitigation measure	Timing	Relevant location
HH11	Direct impact to historical heritage values	An archaeological report will be prepared to document all completed archaeological investigation. The HHMP will detail the requirements of post investigation reporting.	Post archaeological investigation	All areas of historical archaeological potential subject to archaeological investigation
HH12	Direct and indirect impacts to historical heritage values	Additional targeted survey and visual inspection will be conducted in unsurveyed portions of the project area before and/or after project approval. Survey methods will be consistent with those employed for this HHIA. Survey reporting will align with the relevant stage of the project. All newly identified historical heritage will be subject to significance and impact assessments and assigned a proposed management measure. All newly identified historical heritage at risk of project impact would be assigned an appropriate mitigation measure which will be consistent with that proposed for known potential items and areas of archaeological potential in the project area.	Detailed design	The 20 locations that were identified for visual inspection, but were not able to be inspected due to land access constraints Additional targeted visual inspections as required based on findings of other technical reports Additional targeted visual inspections as required based on design development changes
HH13	Vibration impacts associated with Sergeants Gap Road construction works in the vicinity of Timor Caves	EnergyCo will seek geotechnical and vibration advice to inform the construction vibration limits to be applied to works on Sargeants Gap Road to avoid vibration impacts to Timor Caves (I214 — Upper Hunter LEP 2013). Construction works will be designed to not exceed these vibration limits (as detailed in the NVIA commitment NV6, refer to Section 16 and Technical Report 9 of the EIS).	Construction	Sergeants Gap Road construction works in the vicinity of Timor Caves

9.5.2 Further investigation and assessment

Further investigation and assessment is proposed to inform aspects of historical heritage management for the project due to land access being unavailable in some areas. As access becomes available, additional field investigations are proposed and the assessment of impacts and associated management measures will be supplemented as this work is completed.

Subject to additional land access becoming available post EIS, it is currently proposed that an addendum to the HHIA (referred to as the addendum HHIA) would be prepared to inform the project Submissions Report / Amendment Report. The addendum HHIA would document the findings of any additional field investigations (including survey / visual inspection) and update the impact assessment findings and management measures, where relevant. Any matters not resolved through the addendum HHIA would be addressed post-determination of the project through the preparation and implementation of an HHMP (should the project be approved) as outlined in Section 9.5.1.

Commitments to further field investigations (including survey / visual inspection) and assessment associated with land access constraints are detailed in Table 9.5.

Social



Section 10

10 Social

This section provides a summary of the assessment undertaken to identify the social benefits and impacts of the project during both construction and operation. It also identifies appropriate mitigation, management and enhancement measures to be implemented.

This section includes information from the Social Impact Assessment (SIA) undertaken by Umwelt, provided in full in Technical Report 4.

10.1 Assessment approach

The SIA has been undertaken in alignment with the Social Impact Assessment Guideline (DPHI, 2026, 'the SIA Guideline') and associated Technical Supplement (DPHI, 2026d), and the Undertaking Engagement Guidelines for State Significant Projects (DPHI, 2026b), with the key activities of this process aligning to the broader EIA process.

The assessment was also prepared with reference to the SEARs as outlined in Appendix A.

Key phases and activities undertaken for the SIA included:

- developing a social baseline of the locality in which the project is proposed, to understand the current social environment and the communities, groups and individuals potentially affected by the project. This baseline is established through the analysis of both primary and secondary data and forms the basis for identifying and predicting social impacts
- undertaking a scoping exercise of social impact identification to inform the approach to subsequent phases of the assessment
- targeted SIA engagement to understand and validate key social impacts from the perspectives of those likely to be most affected by the project
- undertaking an assessment of the social impacts of the project, providing an evidence base for the evaluated impact significance through review of relevant project information, secondary research and literature and by drawing on the findings of other technical assessments
- identifying mitigation and/or enhancement measures, informed by community feedback, to avoid, reduce or manage adverse impacts, and to enhance the potential community benefits
- determining residual social impact significance rankings
- development of a Social Impact Management Framework.

The identification of social impacts considered the impact categories as identified in the SIA Guideline and shown on Figure 10.1.



Figure 10.1. Social impact categories

Source: (DPHI, 2026a)

The social impact evaluation methodology involves consideration of likelihood and magnitude to determine impact significance that ranges from negligible to very high (refer to Table 10.1). The residual impact is also assessed, following consideration of the mitigation or enhancement measures to be put in place to avoid or the identified social impact.

Table 10.1. Social impact significance matrix

	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	Low	Medium	High	High
D Unlikely	Negligible	Low	Low	Medium	High
E Very unlikely	Negligible	Negligible	Low	Medium	Medium

Source: (DPHI, 2026a)

10.1.1 Social locality

The project's social locality represents the study area for the SIA and has been defined in accordance with the requirements of the SIA Guideline.

Given the linear nature of the project, the social locality of the project is spatially dispersed, with proposed activities in varied geographic areas likely to result in differing experiences of social impacts for local communities. The SIA has given consideration to project affected landholders and proximal landholders, regional service centres, rural townships and to the LGAs of which the project is proposed to traverse more broadly.

The social locality is visually represented on Figure 10.2.



FIGURE 10.2 Social locality

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:1,000,000 at A4
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10.1.1.1 SIA engagement

Community engagement as part of the SIA commenced in 2023 in the project's scoping phase and reflected in the project's 2024 Scoping Report. In this phase, SIA engagement involved participation in the EnergyCo-led community information sessions and community meetings.

During the preparation of the EIS and SIA, targeted SIA interviews and meetings were undertaken in 2rounds, with engagement activities occurring between February and March 2025 and between February and April 2026.

Engagement mechanisms adopted for SIA engagement included semi-structured interviews, personal and group meetings, online survey, and a computer assisted telephone interview (CATI) survey. Online surveys were administered from April to July 2025 and April to May 2026, and the CATI survey was administered in March and April 2026. SIA representatives also participated in EnergyCo-led engagement activities to reach other groups or affected parties, including via the project's community information sessions and at a Community Reference Group meeting. Quantitative and qualitative information collected through all engagement mechanisms has been analysed to understand and validate the potential impacts, to inform the evaluation of social impacts, and to inform the development of social impact mitigation, enhancement and management measures.

Table 10.2 provides a summary of the number of participants who were involved in the SIA engagement, and the relevant stakeholder groups who took part in each engagement mechanism. Further discussion on the stakeholder engagement undertaken by EnergyCo is provided in Section 5.

Table 10.2. SIA consultation statistics

Mechanism	Targeted stakeholder group	Number of participants / groups engaged
Interview or meeting	• community, special interest and environmental groups • Aboriginal and Torres Strait Islander groups and representatives • agricultural bodies • local government • education and training providers • health and emergency service providers • industry/business groups	46
Online survey	• project affected landholders • proximal landholders • local and broader community	622
CATI survey	• local and broader community • proximal landholders.	600

10.2 Existing environment

The social baseline provides a foundation from which social impacts relating to the project can be predicted and then monitored over time. To inform the development of the social baseline, a range of data sources have been used to reflect the spatially dispersed and linear nature of the project. The approach and sources used are detailed in the SIA (refer to Technical Report 4).

The SIA considers the 41 suburbs and localities across the 2 regions the project is proposed to traverse, as outlined on Figure 10.3, noting that Singleton LGA has not been included due to the very small area of the LGA impacted by the project and the absence of nearby communities. The social baseline has considered these suburbs and localities, alongside LGA and urban centre data for key regional service centres and towns the project is most likely to draw on.

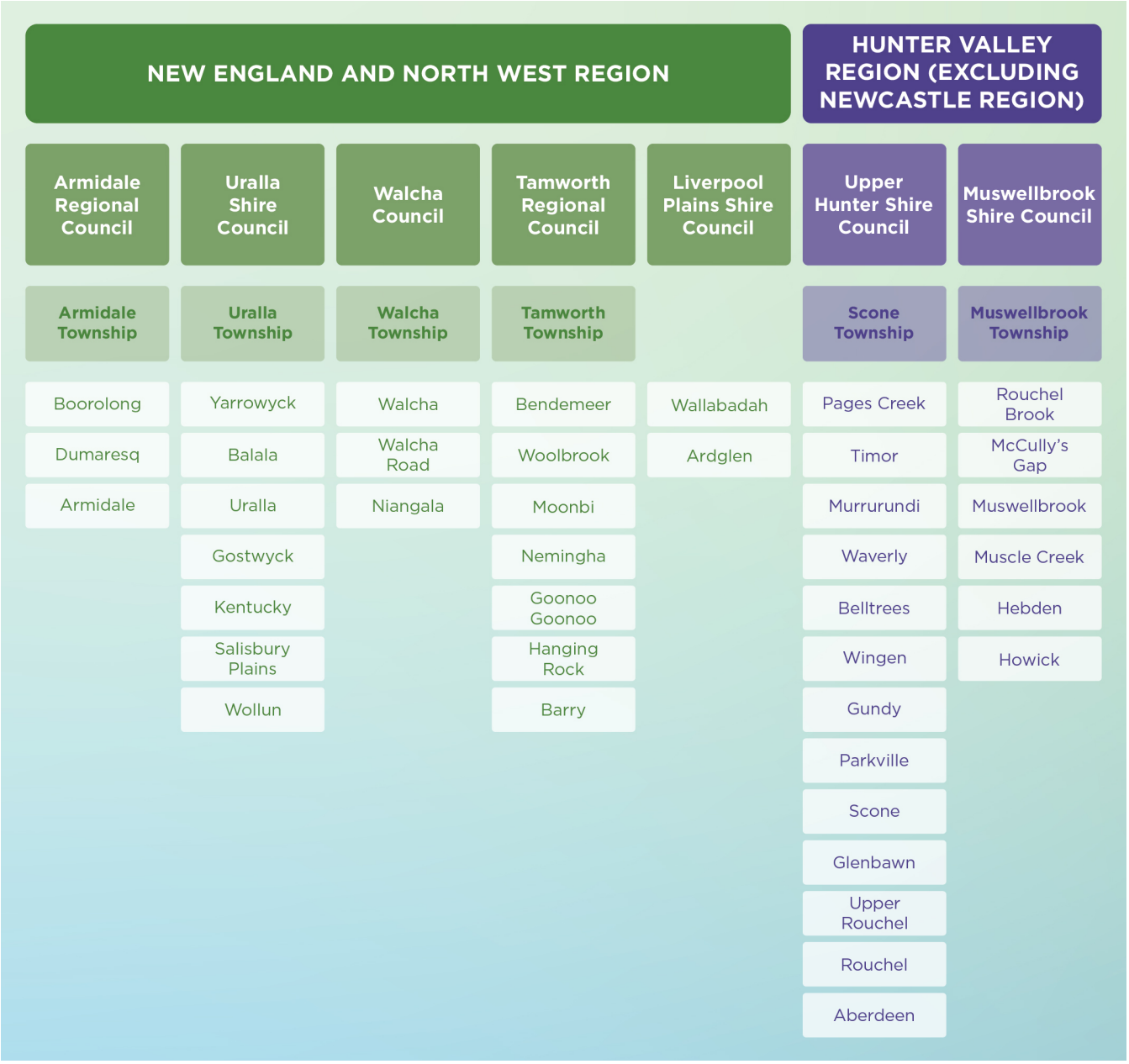


Figure 10.3. Social locality LGAs and key localities

10.2.1 Regional context

The project spans 2 regions, the Hunter Region and the New England and Northwest Region. The Hunter and the New England and Northwest regions encompass a broad and diverse social and environmental context across northern NSW, extending from coastal and peri-urban areas to tablelands, inland catchments and semi-arid rural landscapes. The regions include a mix of major regional centres, smaller towns and dispersed rural communities, shaped by long-standing agricultural, industrial and resource-based activities, strong place attachment and varied access to services and infrastructure. Both regions are part of Country for multiple Aboriginal Nations, with enduring cultural connections to land, water and community that continue to influence contemporary social structures, land use and regional identity.

While the Hunter Region includes more intensive industrial land uses and established transport corridors, the New England and Northwest region is characterised by greater remoteness and reliance on natural resource-based livelihoods.

In more recent years, communities across the Hunter and New England and Northwest regions have been navigating change associated with economic restructuring, demographic shifts, climate variability and increasing development pressure. Central to this context is the accelerating energy transition within the regions, including the transformation of traditional energy systems, establishment of the REZs, the expansion of renewable energy and transmission infrastructure, and changes to regional employment, land use and investment patterns.

10.2.2 Key social characteristics

Table 10.3 provides a summary of key social characteristics of the social locality.

Table 10.3. Key social characteristics

Social characteristic	Summary
Population and demographics	The social locality includes a mix of larger regional service centres, including Armidale, Tamworth and Muswellbrook, and smaller rural centres such as Uralla, Walcha and Scone. These centres provide employment, education, health and community services to surrounding rural localities. Communities are typically characterised by ageing populations, smaller settlement patterns and an ongoing reliance on regional centres for access to higher-order services and facilities.
Economic profile and livelihoods	Agriculture is a defining feature across the social locality and contributes significantly to local identity, employment and economic activity. The Hunter region also maintains strong associations with mining, energy and industrial activities. While economic opportunities associated with major infrastructure investment are recognised, communities differ in their capacity to benefit from such opportunities. Variations in education attainment, occupational profiles and access to employment contribute to differing levels of social resilience across the social locality.

Social characteristic	Summary
Housing and economic resources	Access to economic resources varies considerably across the social locality. Some communities demonstrate relatively high levels of financial advantage, whereas others exhibit greater levels of financial disadvantage and sensitivity to changes in employment, household costs and housing affordability. These differences may influence how project-related economic benefits and pressures are experienced by different communities. Many localities are characterised by constrained housing supply and low vacancy rates, with broader pressures on housing impacting availability across the social locality, including key services centres.
Access to services and infrastructure	Access to services differs significantly across the social locality, particularly between regional centres and smaller rural localities. Larger centres (such as Armidale, Tamworth and Muswellbrook) provide access to health, education, emergency and community services, while more remote communities often rely on travel to access essential facilities.
Community identity and sense of place	Communities across the social locality exhibit strong place attachment, long-standing connections to rural landscapes and significant pride in local identity. Social networks, volunteer organisations and community groups play an important role in maintaining social cohesion and supporting community wellbeing.
Community vulnerability	A community vulnerability assessment was undertaken to understand the relative capacity of communities to respond to project-related change. The assessment considered socio-economic advantage and disadvantage, education and occupation outcomes, economic resources, service accessibility and remoteness indicators. Overall, the vulnerability assessment indicates that the project area contains a heterogeneous mix of communities with differing levels of resilience. As such, social impacts and opportunities associated with the project are unlikely to be experienced uniformly across the social locality.

Table 10.4 presents a thematic summary of community engagement outcomes gathered through the SIA engagement process, with outcomes organised by social impact category as per the SIA Guideline. These summarised outcomes indicate the perceived social impacts of the project from the perspective of affected and local communities. Further detail on the community engagement outcomes, and how community feedback has informed the social impact evaluation, is contained in Technical Report 4.

Table 10.4. Engagement outcomes summary

Impact category	Engagement outcomes summary
Planning and construction	
Decision making systems and procedural fairness	• concerns regarding the adequacy and responsiveness of community consultation processes, including uncertainty regarding how community feedback was or is being incorporated into project decision-making • perceived limited ability to influence project siting and design • perceived imbalance in which stakeholders feel they are bearing a disproportionate share of project costs (for example land use impacts, landscape change, disruption and uncertainty), while expected benefits — such as employment, investment or community funding — are seen as benefiting others.
Livelihood changes	• concerns regarding impacts to agricultural productivity, disruption to farming operations, biosecurity and ongoing viability of farming enterprises • concerns regarding potential changes to rural property values, saleability, and insurance premiums.
Mental health and wellbeing	• elevated levels of stress, anxiety and uncertainty associated with project announcement and planning, land access and acquisition processes and uncertain approval timeframes • concerns regarding cumulative pressure on local communities from multiple proposed renewable energy projects across the region.
Sense of community	• concerns that construction workforce influx may alter the character of small rural communities and disrupt existing social networks • concern relating to increased community division and conflict between neighbours, families and community groups due to the numerous major projects proposed within rural communities • concerns regarding antisocial behaviour, community safety and reduced social cohesion associated with a transient workforce.
Sense of place	• concerns regarding vegetation clearing, impacts on flora and fauna, and changes to or loss of places/communities of environmental and recreational value • changing character and identity of the region due to presence of new industries.
Social amenity	• concerns regarding construction-related noise, dust, lighting, traffic and disruption to daily activities • concerns regarding increased heavy vehicle movements and impacts on local roads.
Aboriginal cultural values	• concerns regarding potential impact to culturally significant places, cultural landscapes and connections to Country • strong interest in ensuring Aboriginal knowledge and cultural values is recognised within project decision-making processes.

Impact category	Engagement outcomes summary
Accessibility to services, utilities and infrastructure	• concerns regarding potential pressure on housing, accommodation due to the incoming construction workforce • concern relating to the additional pressures to be experienced by health services and emergency services in the regions, associated with the construction workforce • preference for workforce accommodation solutions that minimise impact on local services and communities and deliver longer-term community benefits • concerns about strain on water resources, especially during dry periods.
Economic resilience	• strong interest in local employment, training and procurement opportunities • interest in ensuring project investment contributes to lasting regional economic outcomes and skills development.
Operations	
Livelihood changes	• concerns regarding long-term impacts on agricultural productivity, property management and future land use opportunities • interest in ensuring enduring economic benefits remain within the region.
Sense of place and amenity	• concerns regarding the permanent visual presence of transmission infrastructure and changes to landscape character.
Health and wellbeing	• concerns regarding human health effects associated with transmission infrastructure, including EMF and electrical hazards.
Intergenerational equity	• broad benefits associated with the energy transition for future generations to have increased access to renewable energy sources • inequitable impacts to be experienced by local communities for the benefit of broader society.
Decision making and procedural fairness	• concerns relating to transparency of project decisions, information sharing and project readiness to make commitments to manage the range of localised impacts.

10.3 Potential impacts

The SIA provides a detailed evaluation of the potential social impacts that may be experienced by different parties or groups due to project activities. The evaluation of social impacts has been informed through consideration of the social baseline conditions, through outcomes of SIA engagement, via relevant secondary social research, as well as through the findings of the relevant technical assessments that have been prepared as part of the EIS.

Impact significance has been evaluated by considering both likelihood and magnitude, as per the SIA Guideline, that ranges from a negligible impact to a very high impact (refer to Table 10.1). The residual impact significance is also assessed, following consideration of the mitigation or enhancement measures to be put in place to avoid or the identified social impact.

Community perception of impact has also been considered against the evidence base for each impact. Where concerns raised by affected communities do not have corresponding technical evidence, these are reported as a perceived issue or impact. Assessing the range of impacts in this way supports the development of mitigation and enhancement measures that address both technical and perceived matters, ensuring that the assessment responds to impacts requiring technical management, and to those considered important by affected communities.

Impact significance is represented using a colour-coded rating system. The colour blue has been used to denote negative impacts, and green to denote positive impacts/benefits. Colours are used to indicate the relative level of impact (for example negligible, low, medium, high and very high), with darker colours reflecting higher levels of impact significance.

Codes have also been used to denote likelihood levels (very unlikely (E), unlikely (D), possible (C), likely (B), almost certain (A)) and magnitude levels (minimal (1), minor (2), moderate (3), major (4), transformational (5)).

Where relevant and practicable, the outcomes of this impact evaluation have informed the project's proposed management strategies to address residual social impacts. Relevant impact management and enhancement plans and strategies are further discussed further in Section 10.4.

10.3.1 Planning and construction impacts

Table 10.5 and Table 10.6 provide a summary of the potential positive and negative social impacts that may arise during the planning and construction[11] of the project. The tables outline the relevant social impact category, provides a brief description of the social impact, the affected parties, presents the pre-mitigation impact significance ranking and, the applicable mitigation and enhancement measures, which is then used to determine the residual social impact significance ranking.

[11] Where these impacts will also be experienced to the same extent during the operational period this is also indicated, where these impacts will be experienced differently during the operational phase, these are further evaluated in Section 10.3.2.

Table 10.5. Social impact evaluation – positive impacts (planning and construction)

SIA category	Duration	Social impact	Affected stakeholder	Pre-mitigation impact ranking	Overview of management measures and relevant plans	Residual impact ranking
Livelihoods	Construction	**Opportunities for local business development and increase in commercial activity** Generation of increased local spend and opportunities for local business development and increased commercial activity, through demand for goods and services such as civil works, transport, accommodation, catering and professional services, providing short term benefits for local businesses.	**Wider community (LGA)**	C/2 = Low	Local Industry Participation Plan (SO3)	C/3 = Medium
Livelihoods	Construction	**Increase in employment opportunities** Increase in employment opportunities at a local and regional level, associated with workforce demand across construction, operations and supporting industries, providing short-term employment outcomes for some local residents.	**Wider community (LGA)**	C/1 = Low	Local Industry Participation Plan (SO3)	C/2 = Low
Livelihoods	Construction	**Opportunities for skills development** Opportunities for skills development, including training, upskilling and exposure to new industries associated with renewable energy and major infrastructure delivery supporting workforce capability development and offering pathways for some groups to enter or transition within the labour market.	**Wider community (LGA)** **Employment and training providers**	C/1 = Low	Local Industry Participation Plan (SO3)	C/2 = Low

Table 10.6. Social impact evaluation – negative impacts (planning and construction)

SIA category	Duration	Social impact	Affected stakeholder	Pre-mitigation impact ranking	Overview of management measures and relevant plans	Residual impact ranking
Health & Wellbeing	Planning and construction	**Increase in stress and anxiety** The project has the potential to contribute to increased stress, anxiety and uncertainty for project-affected landholders and proximal landholders including due to uncertainty relating to how people may experience impacts, land access arrangements, and changing project timeframes.	**Project affected landholders**	A/4 = Very High	Continuation of existing access support to mental health service providers through the Property Acquisition Support Line and Enhanced Mental Health Support Program Update and implementation of CSEP for both construction and operations, including targeted landholder and community awareness and information provision campaigns for localised construction activities Implementation of Community Wellbeing Strategy as a component of the Social Impact Management Plan (SIM Plan) (SO1)	C/3 = Medium
Health & Wellbeing	Planning and construction	As above	**Proximal landholders**	A/3 = High	As above	C/3 = Medium

SIA category	Duration	Social impact	Affected stakeholder	Pre-mitigation impact ranking	Overview of management measures and relevant plans	Residual impact ranking
Health & Wellbeing	Planning and construction	**Increase in stress and anxiety** The project has the potential to contribute to increased stress, anxiety and uncertainty for the broader community, including due to uncertainty relating to how people may experience impacts, cumulative pressures and changing project timeframes.	**Local community (Suburb and Locality, or SAL)**	B/2 = Medium	As above	C/2 = Low
Livelihoods, decision making systems	Planning, construction and operation	**Inequitable distribution of project impacts** The project has the potential to result in an inequitable distribution of impacts across the community, with project affected and proximal landholders and residents experiencing a greater concentration of project effects.	**Proximal landholders**	A/4 = Very High	Implementation of management measures as determined in relevant technical assessments Update and implementation of CSEP for both construction and operations, including targeted landholder and community awareness and information provision campaigns for localised construction activities and clear communication channels with the project via dedicated place manager	B/2 = Medium
Livelihoods, decision making systems	Planning, construction and operation	As above	**Project affected landholders**	A/3 = High	Application of Strategic Benefits Payment Scheme Update and implementation of CSEP for both construction and operations, including targeted landholder and community awareness and information provision campaigns for localised construction activities and clear communication channels with the project via dedicated place manager Property Management Plan / Property Specific Management Plan Place management support through allocated place manager	C/3 = Medium
Livelihoods, decision making systems	Planning, construction and operation	As above	**Local community (SAL)**	A/2 = Medium	Funding delivered for local infrastructure, services and employment initiatives through EnergyCo's CEBP, delivered separately by EnergyCo in its role as Infrastructure Planner under the EII Act (not as part of this project)	B/2 = Medium

SIA category	Duration	Social impact	Affected stakeholder	Pre-mitigation impact ranking	Overview of management measures and relevant plans	Residual impact ranking
Livelihoods	Construction	**Disruption to agricultural operations** Including reduced access to productive farming areas of properties, interference with grazing activities and livestock movement, and movement of machinery, as well as on ability to maintain aerial spraying activities for operational farms. These impacts may be experienced differently depending on duration of construction activity within the property, property layout, type of agricultural enterprise, and the location of the infrastructure within the property. It is anticipated that the majority of project-affected landholders would be able to continue to operate personal and commercial agricultural enterprises under and around the project infrastructure once it is established.	**Project affected landholders**	B/3 = High	Update and implementation of CSEP for both construction and operations, including targeted landholder and community awareness and information provision campaigns for localised construction activities and including clear communication channels for landholders with the project during construction via dedicated place manager Property Management Plan / Property Specific Management Plan Biosecurity Management Plan	C/3 = Medium
Livelihoods	Construction and operation	**Perceived change in rural property values** Presence of transmission infrastructure and its associated potential influence on rural property values, saleability and insurance costs for project-affected and proximal landholders, particularly where properties function as both productive assets and long-term financial security (including retirement and succession planning). The uncertainty associated with these perceived changes can contribute to stress and reduced confidence in future financial planning at the household or small business level.	**Project affected landholders** **Proximal landholders**	C/4 = High	Acquisition process undertaken in line with the *Land Acquisition (Just Terms Compensation) Act 1991* Application of Strategic Benefits Payment Scheme Place management support through allocated place manager for landholders whose properties are proposed for full or partial acquisition Update and implementation of CSEP during construction and operations	C/3 = Medium
Decision-Making Systems	Planning	**Relocation of landholders due to property acquisition** Property acquisition associated with the energy hubs and ancillary infrastructure sites for accommodation camps has the potential to result in the relocation of a small number of landholders, with potential associated impacts on personal livelihoods, place attachment and social networks.	**Five project affected landholders**	A/3 = High	Acquisition process undertaken in line with the *Land Acquisition (Just Terms Compensation) Act 1991* Property Management Plan / Property Specific Management Plan Personalised support through allocated Acquisition Manager and Place Manager Continued consideration of design refinements Update and implementation of CSEP for both construction and operations, including targeted landholder and community awareness and information provision campaigns for localised construction activities and clear communication channels with the project via dedicated place manager	A/2 = Medium

SIA category	Duration	Social impact	Affected stakeholder	Pre-mitigation impact ranking	Overview of management measures and relevant plans	Residual impact ranking
Accessibility	Construction	**Reduced access to water** Uncertainty regarding project water sourcing and available supply, may cause potential reduced access for existing users, heightened by existing sensitivities in regional water security, particularly in anticipated drought or water restriction conditions, as well as the cumulative demand on regional water supply of multiple projects across the region.	**Wider community (LGA)**	B/4 = High	Extract water with consideration of the rules within the relevant Water Sharing Plans (for example cease to pump rules) Water management and prioritisation of water access in accordance with the *Water Management Act 2000* including management of water allocation in drought periods in accordance with DCCEEW's Extreme Events Policy, placing priority on critical human water needs over project construction water needs during such conditions Implementation of a Soil and Water Management Plan	C/3 = Medium
Community	Planning	**Increased community division and interpersonal conflict** Potential for project activities to increase community division and interpersonal conflict driven by differing views and perceptions of the project, differing experiences of impacts, and the inequitable distribution of impacts and benefits.	**Local community (SAL)**	B/4 = High	SIM Plan and associated a Community Wellbeing Strategy Update and implementation of CSEP during construction and operations	C/3 = Medium
Community, way of life, health and wellbeing	Construction	**Increase in antisocial behaviour** The project has the potential to contribute to increased antisocial behaviour, associated with the influx of a non-resident workforce and changes in community composition. This may contribute to a reduction in sense of public safety and social cohesion particularly in areas nearby the workforce accommodation camps.	**Emergency and health service providers**	B/3 = High	Workforce Management Plan (SO4) including Workforce Code of Conduct, including zero tolerance for anti-social, discriminatory or unsafe behaviour toward other workers or members of the community, and workforce accommodation camp operational management arrangements	C/2 = Low
Community, way of life, health and wellbeing	Construction	As above	**Local community (SAL)**	C/4 = High	As above	C/3 = Medium
Community, way of life, health and wellbeing	Construction	As above	**Project affected landholders** **Proximal landholders** **Wider community (LGA)**	C/3 = Medium	As above	C/2 = Low

SIA category	Duration	Social impact	Affected stakeholder	Pre-mitigation impact ranking	Overview of management measures and relevant plans	Residual impact ranking
Surroundings	Construction	**Reduced social amenity due to noise, vibration and dust** The project has the potential to reduce social amenity, including disturbance to daily activities, outdoor use and general enjoyment of property or local surrounds, due to increased noise, vibration and dust generated by construction activities, plant and equipment operation, and construction-related traffic.	**Project affected landholders**	A/2 = Medium	Implementation of Noise, Vibration and Blast Management Plan Dust suppression methods including covering and spraying Update and implementation of CSEP for construction, including targeted landholder and community awareness and information provision campaigns for localised construction activities and including clear communication channels for landholders with the project during construction via dedicated place manager Property Management Plan / Property Specific Management Plan	A/2= Medium
Surroundings	Construction	As above	**Proximal landholders**	A/2 = Medium	As above	A/1 = Low
Surroundings	Construction	As above	**Local community (SAL)**	C/2 = Low	As above	D/1 = Negligible
Surroundings	Construction	**Loss of environmental values of community importance** Potential loss of environmental values, associated with vegetation clearing, earthworks and broader disturbance to the natural environment, native bushland, and local flora and fauna habitat.	**Project affected landholders**	B/3 = High	Avoidance of high-value environmental areas and reduction in disturbance footprint during corridor refinement process Biodiversity Management Plan Strategic Offset Delivery Agreement	B/2 = Medium
Surroundings	Construction	As above	**Proximal landholders**	B/3 = High	As above	B/2 = Medium
Surroundings	Construction	As above	**Local community (SAL)**	C/2 = Low	As above	C/1 = Low
Decision-making Systems	Planning and construction	**Reduced trust in project planning and decision-making processes** Perceived lack of transparency of project planning and associated community engagement processes, the quality of information provided and the extent to which community input has been considered, reducing trust in project planning and decision-making processes.	**Project affected landholders**	A/4 = Very High	Update and implementation of CSEP for construction, including targeted landholder and community awareness and information provision campaigns for localised construction activities and including clear communication channels for landholders with the project during construction via dedicated place manager	C/3 = Medium
Decision-making Systems	Planning and construction	As above	**Proximal landholders**	B/4 = High	As above	C/3 = Medium
Decision-making Systems	Planning and construction	As above	**Community/special interest groups**	B/3 = High	As above	C/3 = Medium
Decision-making Systems	Planning and construction	As above	**Local community (SAL)**	B/2 = Medium	As above	C/2 = Low

SIA category	Duration	Social impact	Affected stakeholder	Pre-mitigation impact ranking	Overview of management measures and relevant plans	Residual impact ranking
Decision-making Systems	Planning and construction	As above	**Wider community (LGA)**	C/3 = Medium	As above	C/2 = Low
Decision-making Systems	Planning and construction	**Procedural fairness for Aboriginal and Torres Strait Islander community** Aboriginal and Torres Strait Islander representatives have concern regarding the perceived adequacy of consultation, the need for project-led engagement to be undertaken in culturally appropriate ways, and the importance of ensuring that Traditional Owners, Elders and knowledge holders are appropriately involved in decision-making processes. Perceptions of lack of transparency and insufficient opportunity to influence process and outcomes may contribute to reduced trust and heightened sensitivity to project impacts.	**Traditional Owners** **Aboriginal and Torres Strait Islander and representative organisations**	C/3 = Medium	SIM Plan (SO1) including dedicated Community Wellbeing Strategy Update and implementation of CSEP during construction and operations (SO2) inclusive of culturally appropriate Aboriginal and Torres Strait Islander participation and consultation processes Funding delivered for local infrastructure, services and employment initiatives through EnergyCo's CEBP, delivered separately by EnergyCo in its role as Infrastructure Planner under the EII Act Local Industry Participation Plan, inclusive of targeted Aboriginal and Torres Strait Islander participation commitments and associated initiatives (SO3)	C/2 = Low
Decision-making systems / Cumulative Impact	Planning and construction	**Consultation fatigue** Continuation of consultation fatigue amongst local communities, associated with perceived prolonged voluntary engagement processes and cumulative exposure to engagement processes across multiple concurrent major projects, with a perceived limited role for community input or contribution, which over time has reduced people's capacity and willingness to participate in project-led engagement processes.	**Project affected landholders**	A/4 = Very High	SIM Plan (SO1) including dedicated Community Wellbeing Strategy Update and implementation of CSEP during construction and operations (SO2) Property Management Plans	C/3 = Medium
Decision-making systems / Cumulative Impact	Planning and construction	As above	**Proximal landholders**	B/4 = High	SIM Plan (SO1) including dedicated Community Wellbeing Strategy Update and implementation of CSEP during construction and operations (SO2)	C/3 = Medium
Decision-making systems / Cumulative Impact	Planning and construction	As above	**Community/special interest groups**	A/3 = High	As above	C/2 = Low
Decision-making systems / Cumulative Impact	Planning and construction	As above	**Local community (SAL)**	A/2 = Medium	Funding delivered for local infrastructure, services and employment initiatives through EnergyCo's CEBP, delivered separately by EnergyCo in its role as Infrastructure Planner under the EII Act	C/2 = Low

SIA category	Duration	Social impact	Affected stakeholder	Pre-mitigation impact ranking	Overview of management measures and relevant plans	Residual impact ranking
Decision-making systems / Cumulative Impact	Planning and construction	As above	**Wider community (LGA)**	B/2 = Medium	As above	C/2 = Low
Accessibility	Construction	**Reduced access to affordable rental housing and short-term accommodation** Increased demand from project personnel has the potential to reduce access to short-term accommodation and place additional pressure on the rental housing market, further exacerbated by major regional events and cumulative demand from multiple concurrent projects. The workforce accommodation camps are expected to largely reduce the pressure on local housing markets however impacts may be experienced during the establishment of each accommodation camp and will vary spatially depending on proximity to service centres and available accommodation stock.	**Wider community (LGA)** **Users of affordable, community or crisis housing**	C/3 = Medium	Workforce Management Plan (SO4) Local Industry Participation Plan (SO3)	D/2 = Low
Accessibility	Construction	**Reduced access to health services** Increased demand associated with the incoming workforce has the potential to reduce access to local health services, including general practitioners, community health centres, and specialist care, particularly given the already constrained service capacity especially in smaller communities and in locations proximal to workforce accommodation camps where baseline service provision is limited or absent.	**Wider community (LGA)**	B/3 = High	Workforce Management Plan (SO4) Inclusion of medical supplies and first aid facilities in workforce accommodation camps, including Telehealth services and first aid and paramedic personnel	C/2 = Low
Accessibility	Construction	**Strain on service capacity for emergency service responders** Increased population and activity associated with the project has the potential to place additional strain on emergency service responders, including ambulance, police and Rural Fire Service (RFS), reducing response capacity and affecting accessibility for local communities, particularly those in areas with elevated hazard exposure such as bushfire-prone area.	**Emergency/health service providers**	C/3 = Medium	Update and implementation of CSEP during construction and operations (SO2) Workforce Management Plan (SO4) Development of relevant Emergency Plan in consultation with emergency service providers	C/2 = Low
Accessibility	Construction	**Skills drain from other business sectors** Higher wages and more secure employment associated with the project may attract workers away from existing industries, including agriculture, small business, manufacturing and local service resulting in challenges in attracting and retaining skilled workers already present across multiple sectors.	**Employment and training providers**	C/3 = Medium	Local Industry Participation Plan (SO3)	D/2 = Low

SIA category	Duration	Social impact	Affected stakeholder	Pre-mitigation impact ranking	Overview of management measures and relevant plans	Residual impact ranking
Accessibility	Construction	**Increased travel times** Temporary road closures, congestion, detouring or other traffic flow changes due to the increase in construction vehicle movements, may cause changes to access, trip times, and connectivity across local and regional road networks, particularly for residents in areas reliant on single access roads. This is anticipated to be heightened in localities of concentrated construction activity and associated traffic movements, particularly near the locations where energy hubs and workforce accommodation camps are proposed.	**Wider community (LGA)**	C/2 = Low	Development and implementation of a Traffic and Transport Management Plan, interconnected with the updated CSEP (SO2), where it relates specifically to protocols and mechanisms for information provision and communication around traffic impacts and local road changes throughout the construction period, with tailored mechanisms for residents and project affected landholders most affected	C/1 = Low
Accessibility	Construction	As above	**Project affected landholders** **Proximal landholders** **Local community (SAL)**	B/2 = Medium	As above, and including tailored and place-based information provision and communication mechanisms for project affected and proximal landholders, and local communities, and/or in areas identified as expected to experience concentrated construction activity and associated traffic movements	B/1 = Low
Community	Construction	**Altered sense of community and disruption to local networks** The project has the potential to alter sense of community and disrupt local networks, driven by population change, workforce influx and changes in land use and ownership.	**Local community (SAL)**	C/3 = Medium	SIM Plan and associated a Community Wellbeing Strategy component (SO1) Workforce Management Plan (SO4)	C/2 = Low
Surroundings	Construction	**Reduced social amenity due to increased traffic on local roads** Increased traffic associated with the project has the potential to reduce social amenity for local residents, particularly in areas anticipated to experience higher construction traffic volumes and where road infrastructure has reduced capacity.	**Local community (SAL)** (located in proximity to energy hubs and workforce accommodation camps)	B/2 = Medium	Implementation of a Traffic and Transport Management Plan, interconnected with the updated CSEP (SO2), where it relates specifically to protocols and mechanisms for information provision and communication around traffic impacts and local road changes throughout the construction period	B/1 = Low
Surroundings	Construction	As above	**Project affected landholders** **Proximal landholders**	B/2 = Medium	As above	B/1 = Low
Surroundings	Construction	As above	**Wider community (LGA)**	B/1 = Low	As above	B/1 = Low

SIA category	Duration	Social impact	Affected stakeholder	Pre-mitigation impact ranking	Overview of management measures and relevant plans	Residual impact ranking
Surroundings	Construction	**Reduced public safety due to increased traffic on local roads** Reduced safety on local roads, particularly where heavy vehicles and construction traffic interact with existing rural road users, as well as due to driver behaviour and fatigue.	**Project affected landholders** **Proximal landholders** **Local community (SAL)** (located in proximity to energy hubs and workforce accommodation camps) **Emergency/health service providers** **Other road users**	C/3 = Medium	Implementation of a Traffic and Transport Management Plan Driver Code of Conduct addressing road use, fatigue and safety	C/2 =Low
Surroundings	Construction	As above	**Wider community (LGA)**	C/2 = Low	As above	C/2 = Low
Culture	Construction and operation	**Reduced connection to Country and potential impacts on cultural values** While feedback from Aboriginal community members who participated in the RAP process reported increased connection to Country through their participation, for Aboriginal community members who were not engaged as RAPs the project has the potential to reduce connection to Country.	**Traditional Owners** **Aboriginal and Torres Strait Islander and representative organisations**	C/2 = Low	Implementation of Aboriginal Cultural Heritage Management Plan	C/1 = Low

10.3.2 Operational impacts

Table 10.7 and Table 10.8 provide a summary of the potential positive and negative social impacts respectively that may arise during the operation of the project. The tables outline the relevant social impact category as defined by the SIA Guideline, provides a brief description of the social impact, affected stakeholders, presents the pre mitigation social impact significance ranking and, a summary of relevant mitigation and enhancement measures, used to determine the residual social impact ranking.

Table 10.7. Social impact evaluation – positive impacts (operation)

SIA category	Duration	Social impact	Affected stakeholder	Pre mitigation impact ranking	Overview of management measures and relevant plans	Residual impact ranking
Livelihoods	Operation	**Diversification of income streams** During operation, easement affected landholders within the project transmission line corridor would receive supplementary income through easement payments and compensation mechanisms.	**Easement affected landholders**	C/3 = Medium	Application of Strategic Benefits Payment Scheme Property Management Plans	C/3 = Medium

SIA category	Duration	Social impact	Affected stakeholder	Pre mitigation impact ranking	Overview of management measures and relevant plans	Residual impact ranking
Access	Operation	**Improved access within or nearby properties** During operation, the establishment of project access tracks has the potential to improve physical access across and within affected properties, particularly for project affected landholders.	**Project affected landholders** **Proximal landholders**	C/2 = Low	Property Management Plans	C/3 = Medium
Surroundings	Operation	**Increasing energy supply and security, and reducing impacts of climate change** The project is expected to contribute to increasing energy supply and security, as well as supporting the transition to renewable energy and reducing the impacts of climate change. These benefits are experienced at a regional and state level, rather than being concentrated within local communities, and may be perceived differently across stakeholder groups.	**Wider community (LGA)**	A/3 = High	Continuation of regular project communications and public awareness as a part of the CSEP (SO2)	A/3 = High

Table 10.8. Social impact evaluation – negative impacts (operation)

SIA category	Duration	Social impact	Affected stakeholder	Pre mitigation impact ranking	Overview of management measures and relevant plans	Residual impact ranking
Surroundings	Operation	**Altered sense of place and change in landscape character** The project has the potential to alter sense of place and change landscape character as a result of the ongoing presence of transmission infrastructure within the landscape and the increasing industrialisation of previously rural areas.	**Project affected landholders** **Proximal landholders**	A/5 = Very High	Design of alignment considering feedback from project affected landholders to reduce impacts on residences where possible Implementation of measures identified in the LVIA	B/4 = High
Surroundings	Operation	As above	**Local community (SAL)** **Wider community (LGA)**	C/3 = Medium	As above	C/2 = Low
Livelihoods	Operation	**Perceived change in rural property values** Presence of transmission infrastructure and its associated potential influence on rural property values, saleability and insurance costs for project affected and proximal landholders, particularly where properties function as both productive assets and long-term financial security (including retirement and succession planning). The uncertainty associated with these perceived changes can contribute to stress and reduced confidence in future financial planning at the household or small business level.	**Project affected landholders** **Proximal landholders**	C/4 = High	Application of Strategic Benefits Payment Scheme Individual place managers for landholders whose properties are proposed for full or partial acquisition, and for landholders who may relocate off their properties Update and implementation of CSEP during construction and operations (SO2)	C/3 = Medium

SIA category	Duration	Social impact	Affected stakeholder	Pre mitigation impact ranking	Overview of management measures and relevant plans	Residual impact ranking
Livelihoods	Operation	**Disruption to agricultural operations** Potential disruption to agricultural activities, including interference with grazing and movement of machinery, as well as aerial spraying. Based on the current project area, it is anticipated that the majority of project affected landholders would be able to continue to operate personal and commercial agricultural enterprises under and around the easement.	**Project affected landholder**	D/3 = Low	Update and implementation of CSEP during construction and operations (SO2) Property Management Plans / Property Specific Management Plan Biosecurity Management Plan	D/2 = Low
Health & Wellbeing	Operation	**Perceived physical health impacts associated with EMF** Perceived safety risks and associated impacts on physical health, including electrical hazards through living and working near high-voltage powerlines, or long-term exposure to EMF. Perceived health impacts associated with EMF, despite being within established Australian guidelines and assessed as negligible at nearby dwellings and infrastructure (refer to Section 17.4), may contribute to anxiety and stress for some residents.	**Project affected landholder** **Proximal landholder**	D/2 = Low	Update and implementation of CSEP during construction and operations (SO2)	D/2 = Low
Accessibility	Operation	**Strain on service capacity for emergency service responders** Increased population and activity associated with the project has the potential to place additional strain on emergency service responders, including ambulance, police and Rural Fire Service (RFS), reducing response capacity and affecting accessibility for local communities, particularly those in areas with elevated hazard exposure such as bushfire-prone area.	**Emergency/health service providers**	C/2 = Low	Update and implementation of CSEP during construction and operations (SO2) Workforce Management Plan (SO4) Development of relevant Emergency Plan in consultation with emergency service providers	D/2 = Low
Surroundings, Livelihoods	Operation and decommissioning	**Uncertainty regarding decommissioning** Concerns regarding certainty and accountability for decommissioning include whether transmission infrastructure will be fully removed at the end of its operational life, whether land will be reinstated to a condition that supports future productive use, and the risk of residual environmental and land management impacts.	**Wider community (LGA)**	A/3 = High	Update and implementation of CSEP during construction and operations (SO2) Infrastructure to be progressively maintained, upgraded, replaced or repowered over time to support the ongoing operation of the electricity network	E/1 = Negligible
Surroundings, Livelihoods	Operation and decommissioning	As above	**Project affected landholder**	B/4 = High	As above	E/1 = Negligible

10.3.3 Cumulative impacts

As outlined in Section 5, community engagement undertaken as part of the SIA (Technical Report 4) identified housing availability and affordability, workforce attraction and retention, access to local services, and local infrastructure capacity as key cumulative impact concerns. Local councils in particular have raised concerns regarding the ability of existing infrastructure and services to accommodate growth associated with multiple concurrent developments across the 2 regions.

Potential cumulative impacts are expected to be most pronounced during the construction phase, particularly where development activity and workforce demand overlap, resulting in increased demand for housing and short-term accommodation (noting that this project is proposing workforce accommodation camps to address worker housing), pressure on community services and infrastructure, increased traffic movements, and changes to social amenity and community cohesion. The cumulative assessment also identified opportunities for increased employment, workforce development, business growth and regional investment. The nature and extent of cumulative social impacts would depend on the timing, scale and duration of concurrent developments, highlighting the importance of coordinated workforce accommodation planning, infrastructure planning and ongoing stakeholder engagement.

Further detail regarding cumulative impacts is provided in the SIA (Technical Report 4) and Section 24.

10.4 Mitigation and management

As identified in Table 10.5 to Table 10.8 there are a number of proposed management plans or strategies to be implemented in response to the predicted negative and positive social impacts that have been evaluated as significant or having a residual social impact post-mitigation. Table 10.9 provides an overview of each of the relevant plans and strategies proposed to manage the impacts and maximise the benefits associated with the project.

Table 10.9. Social impact management framework

Reference	Impacts addressed	Description	Timing	Relevant location
SO1	• Opportunity for employment opportunities and skills development • Impacts on mental health, increase in stress and anxiety • Changes in sense of community and cohesion • Population change and workforce influx causing potential strain on regional services	The **SIM Plan** will outline measures to address or manage social impacts and opportunities assessed as having high or medium significance and will describe monitoring arrangements inclusive of performance targets for each measure. Adaptive management protocols or processes will also be outlined in the event that the intended outcomes of the measures are not realised. The SIM Plan will detail measures relating to: • coordination with relevant government agencies and authorities with differing statutory roles and responsibilities, ensuring a consistent and integrated approach to managing project-related, and cumulative impacts • coordination with relevant government agencies and regional service providers to strengthen local health service provision and accessibility for residents • a dedicated Community Wellbeing Strategy to be prepared and implemented to identify, monitor and manage potential impacts on community health, wellbeing and social cohesion associated with construction and operation of the project. The Strategy will include consideration of: – measures to address stress, anxiety and uncertainty such as mental health training for the site-based workforce and personnel, particularly those in public-facing roles or who may interact with landholders – clear and timely communication, accessible complaints and enquiries mechanisms – new and ongoing initiatives to support mental health and wellbeing, including access to appropriate support services and referral pathways – partnership formation with existing local mental health services and community wellbeing programs – monitoring and adaptive management arrangements to identify changing or emerging wellbeing issues	Pre-construction Construction	Project area Local Regional

Reference	Impacts addressed	Description	Timing	Relevant location
		– measures to advocate for, and support increased health service capacity in impacted areas – opportunities for collaboration with councils, service providers and community stakeholders as required to identify emerging issues and responses and strengthen local health service availability and accessibility. The effectiveness of the SIM Plan will be monitored through a structured program of performance indicators, data collection, stakeholder engagement and periodic review, enabling comparison of actual outcomes against predicted impacts and community expectations. Ongoing monitoring will also ensure any anticipated social impacts that may arise are identified and managed.		
SO2	Decision making and procedural fairness to seek to enhance levels of trust in the planning and assessment process, and reduce consultation fatigue	The existing project **Community and Stakeholder Engagement Plan (CSEP)** will be revised and updated to guide ongoing, proactive and responsive engagement with landholders, communities, councils, service providers and Aboriginal and Torres Strait Islanders groups throughout the pre-construction and construction period. The Plan will: • prioritise engagement to support pre-construction activities and detailed construction phase planning • focus on timely notification of construction activities, changes to schedules, access arrangements, traffic movements and potential impacts • identify engagement mechanisms for use that are clear, accessible and plain-language • include mechanisms to ensure culturally appropriate engagement with Aboriginal and Torres Strait Islanders representatives and communities • identify targeted engagement approaches for stakeholder groups including for directly affected landholders, proximal landholders, community groups and vulnerable community members	Pre-construction Construction	Project area Local Regional

Reference	Impacts addressed	Description	Timing	Relevant location
		• include ongoing coordination with councils, emergency services and service providers to manage construction-related and cumulative impacts and identify emerging issues • integrate enquiries and complaints management mechanisms • provide clear points of contact • identify measures and approaches to reduce consultation fatigue and clearly communicate decision drivers • include monitoring and adaptive engagement measures to respond to emerging issues and impacts The revised CSEP will also include a dedicated Landholder Engagement Strategy which will be implemented to guide ongoing and consistent engagement with landholders affected by property access, land acquisition and construction activities. This Strategy will seek to manage land access and property interactions in a transparent, consistent and landholder-centred manner for easement-affected and proximal landholders. The Strategy will: • set out clear principles for respectful, transparent and responsive engagement • include roles and responsibilities, including the appointment of dedicated land access personnel and consistent points of contact for landholder interactions throughout the acquisition and land access processes • include actions to provide for early notification of access requirements and construction activities • develop property-specific engagement arrangements reflecting individual landholder preferences, needs, values and land use • include clear communication of decision drivers and constraints • ensure coordination with other proponents to minimise cumulative and repeated impacts on landholders.		

Reference	Impacts addressed	Description	Timing	Relevant location
SO3	• Increased employment and opportunities for skills development • Local business development and increased commercial activity	The **Local Industry Participation Plan** will be prepared and implemented to facilitate local worker and business participation in the project. The Plan will seek to: • identify targets for local employment and procurement • identify skills gaps to align training provision with project needs • ensure early communication of required skills and occupations through dedicated engagement activities • formalise partnerships with relevant education and training providers (including TAFE NSW, universities and schools) to establish regional training and skills initiatives • outline collaboration pathways with local employment providers to leverage existing networks • initiatives to realise and maximise local and Aboriginal and Torres Strait Islanders participation in direct employment and contracting pathways • ensure a focus on apprenticeships, traineeships, pre-employment and upskilling programs with transferable outcomes, supporting workforce continuity and contributing to longer-term regional capability and legacy employment benefits • coordination with relevant government agencies and Aboriginal and Torres Strait Islanders organisations in the region to deliver targeted skills, employment or training programs for Aboriginal and Torres Strait Islanders young people • development of a centralised workforce coordination hub or provider, offering a single point of contact for contractors to encourage local employment and procurement.	Detailed design Pre-construction Construction	Project area Local Regional
SO4	• Changes in community composition and cohesion and changes in public safety and security	The **Workforce Management Plan** will be prepared and implemented to manage workforce behaviour, wellbeing and integration with local communities, and to minimise potential social impacts associated with workforce presence during construction and operation.	Detailed design Construction	Project area Local Regional

	• Impacts on health and wellbeing and access to services • Decline in social amenity and increased disruption • Reduced access to local accommodation and health services • Change in sense of community includes reduced public safety	The Plan will also include management measures relating to the establishment and operation of workforce accommodation camps in order to ensure minimisation of impacts on local communities, services and regional housing markets. The Plan will: • outline strategies to balance the use of workforce accommodation with appropriate use of local accommodation, avoiding over-concentration in individual towns, and reducing pressure on, short-term accommodation and vulnerable population groups, particularly focussing on the workforce requirements in the project's enabling works period with consideration into major events and seasonal tourism periods that may affect availability • outline workforce accommodation arrangements for workers who will require housing in short-stay accommodation in the region • outline strategies to ensure workforce accommodation camps provide sufficient health services to meet the needs of workers while on shift, including at a minimum camp-based first aid and medic personnel, and facilitated access to General Practitioners via Telehealth services, to ensure that the project workforce has no reliance on local health services • include monitoring and adaptive management arrangements to respond to cumulative housing impacts over the construction period • outline mandatory cultural awareness training requirements for all workers • ongoing exploration of opportunities for legacy outcomes following construction, such as repurposing workforce accommodation camp facilities for community use • include measures to support workforce wellbeing, manage fatigue and travel demands such as the provision of appropriate on-site amenities, recreation facilities and access to communication services at workforce accommodation camps • address access and transport arrangements to/from the workforce accommodation camps to reduce pressure on local roads and services • include measures to promote positive interaction with local communities, including opportunities for participation in local events and activities where appropriate		

Reference	Impacts addressed	Description	Timing	Relevant location

		• include a Workforce Code of Conduct to clearly define expected standards of behaviour for all project personnel, including contractors and subcontractors, including:
		  ○ zero tolerance for anti-social, discriminatory or unsafe behaviour toward other workers or members of the community
		  ○ clear expectations regarding respectful interactions with landholders, community members and Aboriginal and Torres Strait Islander peoples
		  ○ requirements for compliance with alcohol and drug management policies
		  ○ clear expectations for adherence to site safety, biosecurity and access protocols
		  ○ procedures for managing breaches, including corrective actions and removal from site where required
		  ○ clear induction processes
		  ○ ongoing monitoring to ensure consistent application and accountability across the workforce
		• outline monitoring arrangements to enable responsive management of unanticipated impacts which will be regularly reviewed to ensure effectiveness over the life of the project
		• include protocols for complaints handling, monitoring of community impacts, and adaptive management where issues emerge.		

Landscape and visual



11

Section

11 Landscape and visual

This section provides a summary of the assessment undertaken to identify the potential impacts of the project on landscape character and visual amenity. It also identifies the measures to be implemented to minimise and manage these impacts.

This section includes information from the Landscape Character and Visual Impact Assessment (LCVIA) undertaken by Moir Studio, provided in full in Technical Report 5.

11.1 Assessment approach

The LCVIA was undertaken in accordance with the Transmission Guideline (DPHI, 2024c) (the Transmission Guideline) and the Transmission Guideline: Technical Supplement for Landscape Character and Visual Impact Assessment (DPHI, 2025) (the Visual Technical Supplement). The Visual Technical Supplement provides guidance for the assessment of landscape character and a detailed methodology for the assessment of visual impacts of transmission projects that has been applied for the project as outlined below.

The assessment was also prepared with reference to the SEARs detailed in Appendix A.

This section also considers issues raised in engagement with community stakeholders (refer to Section 5) including landscape and visual impacts associated with changes to the existing rural amenity and local landscape.

The LCVIA is based on the reference design and it has assumed a maximum transmission tower height of 80 metres. This has been applied to all transmission towers, including both 500 kV and 330 kV towers as a conservative assessment basis. As identified in Section 3, transmission towers for the project would typically be between 45 metre and 75 metre high.

11.1.1 Landscape character assessment

The landscape character assessment included:

- a baseline study including field surveys from publicly accessible areas to establish the landscape character of the area. This included consideration of physical features (landform, geology, hydrology) ecological and vegetation characteristics, land use, settlements and built form, planning context (land zoning and strategic land uses), cultural and heritage values and key landscape features (topographic landmarks, waterbodies, protected areas)

- defining landscape character zones and their scenic quality based on landform and topography, vegetation and land cover patterns, land use, and human influence including consideration of equine landscape character within relevant portions of the Upper Hunter LGA
- assessing the visual impact on the landscape character zones, including assessing and combining the sensitivity of each landscape character zone and the magnitude of the change.

The landscape character assessment was accompanied by land based photography taken from publicly accessible locations and drone imagery to aid in the assessment. Where access was limited, the assessment was supplemented by analysis of aerial imagery.

An assessment of the impacts to key landscape features and sensitive areas from publicly accessible viewpoints was also undertaken. This included water features and heritage features (both Aboriginal cultural heritage and historical heritage). In recognition of the scenic and landscape values of the equine CIC, an assessment of the potential visual impacts on the equine CIC was also undertaken. The assessment included viewshed mapping and photomontages prepared from various locations within the equine CIC. Assessment was also undertaken for the viticulture CIC, noting that no transmission line infrastructure is proposed within the viticulture CIC, with the nearest tower located approximately 10 kilometres from the boundary of the mapped viticulture CIC.

The study area for the landscape character assessment includes all areas within 5 kilometres of the proposed indicative transmission tower locations and energy hub footprints (refer to Figure 11.2). This considers the impact of the above ground components of the project, but does not include components such as roads and ancillary infrastructure as they are unlikely to influence landscape character at a regional scale. The Nemingha maintenance facility was considered separately in the assessment, reflecting its differing scale, setting and visual context in comparison to the transmission corridor. Due to its relatively low built form and location within an established industrial zone, a 2 kilometre landscape character assessment study area was applied to the Nemingha maintenance facility.

Cumulative impacts on landscape character were also assessed to determine the extent to which the combined presence of multiple projects influences landscape character within both an individual viewshed and the broader landscape as people move through it.

Further detail about the landscape character assessment methodology is detailed in Section 3 of the LCVIA (refer to Technical Report 5).

11.1.2 Visual impact assessment

The visual impact assessment followed a staged process including:

- defining a visual study area – with an assumed tower height of 80 metres, a visual study area of 1,527 metres from the reference design transmission tower locations was applied in accordance with the Visual Technical Supplement
- defining a visual setback – the project primarily intersects land zoned RU1 Primary Production. With an assumed tower height of 80 metres, a visual setback distance of 377 metres was applied in accordance with the Visual Technical Supplement. Any sensitive receiver located within the visual setback requires a detailed assessment of impacts under the Visual Technical Supplement

- undertaking a visual impact assessment on sensitive receivers (private dwellings and other sensitive receivers, public viewpoints and heritage items) in accordance with the Visual Technical Supplement, including:
  - Simple assessment – a conservative desktop assessment using viewshed mapping (that is, areas of theoretical visibility from sensitive receivers based on topography alone), thus adopting a conservative approach at this initial assessment step. A conservative assessment approach was adopted whereby any non-easement affected receivers with a predicted line of sight to the project were progressed to the intermediate assessment
  - Intermediate assessment – an analysis using 3D modelling and spatial analysis tools (wireframes) to quantify the potential magnitude of visual change. This included consideration of key variables such as distance, scale of infrastructure and elevation differences. Detailed methodologies for the calculation of visual magnitude and visual sensitivity to derive the overall visual impact rating are provided in both the Visual Technical Supplement and the LCVIA (refer to Section 8.3 to Section 8.5 of Technical Report 5)
  - Detailed assessment – including the preparation of photomontages and visualisations to comprehensively assess visual impacts on sensitive receivers identified as having a moderate or higher visual impact from the intermediate assessment. Where access was available, the detailed assessment included field verification and photomontages. Where access was not available, LiDAR renders were used to ascertain the extent to which the project is filtered by intervening buildings and/or vegetation. The assessment determined visual impact by combining visual magnitude and visual sensitivity to assign an overall visual impact rating for each sensitive receiver (very low to high)
- identification of measures to avoid and/or mitigate sensitive receivers with moderate and high visual impacts
- qualitative assessment of the visual impacts from temporary construction related infrastructure and permanent operational ancillary infrastructure
- night lighting assessment which combined a quantitative assessment of the existing night lighting environment using Visible Infrared Imaging Radiometer Suite nighttime radiance data with a qualitative assessment of potential impacts.

To assess potential visual impacts associated with heritage sites a heritage visual study area was established. This area was a conservative 2 kilometre study area from the transmission corridor and from the Nemingha maintenance facility (refer to Appendix B of the LCVIA (Technical Report 5) and the HHIA (Technical Report 3)).

The visual impact assessment methodology is shown in a simplified graphic on Figure 11.1 and is detailed in Section 8 of the LCVIA (refer to Technical Report 5).

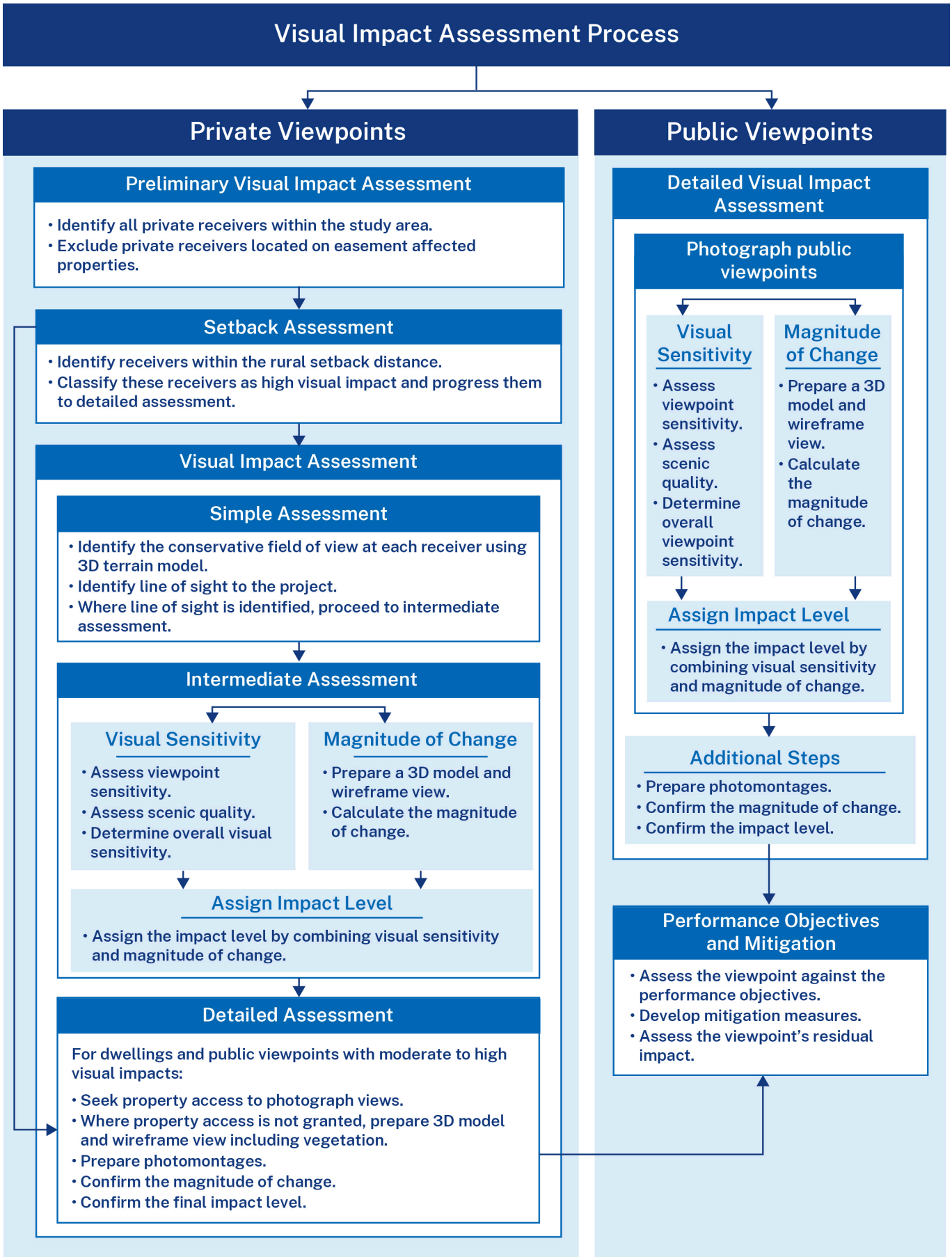


Figure 11.1. Visual impact assessment process

11.1.3 Land access

Not all private properties were accessible for on-site assessment. In such cases, publicly accessible vantage points, high-resolution aerial imagery, LiDAR-derived terrain and vegetation data, and topographic mapping were relied upon to inform the assessment. Not having access for on-site assessment limited the ability to confirm the actual primary viewpoint, viewing direction and principal outdoor living areas associated with dwellings. Where access was unavailable, primary viewpoints were inferred from available spatial data, dwelling orientation, access arrangements, surrounding land use and the likely outlook from primary living areas. Where uncertainty remained, views orientated towards the project were selected as the primary view as a precautionary and conservative assessment measure.

11.2 Existing environment

11.2.1 Landscape values and visual sensitivity

The existing landscape character of the landscape character study area (being 5 kilometres from the indicative transmission tower locations and energy hub footprints) is defined by a broad, predominantly rural landscape extending across the New England Tablelands and Hunter Valley regions, with a strong underlying agricultural land use context and a varied natural setting shaped by geology, landform, vegetation and water systems.

11.2.2 Landscape character zones and scenic quality

The landscape character across the project area and surrounds has been characterised into distinct landscape character zones based on common characteristics such as landforms, vegetation, land use, waterbodies and key features. A total of 10 landscape character zones were identified for the project within the landscape character study area.

The 10 landscape character zones and their identified scenic quality rating are summarised in Table 11.1. and shown on Figure 11.2. The ratings are based on the guidance provided in the Visual Technical Supplement which uses a structured and quantifiable approach to allow landscape attributes to be assessed in a transparent and repeatable manner. It is acknowledged that scenic quality is a subjective matter as visual appeal can vary between individuals and that landholders may rate scenic quality differently. Illustrative examples of each landscape character zone are provided in Photo 1 to Photo 10. A full description of each zone is in Section 6 of the LCVIA (refer to Technical Report 5).

Table 11.1. Landscape character zones

Zone	Name	Description	Key viewpoints / corridors	Key landscape features	Sensitivity	Scenic quality rating
LCZ01	Forested Foothills	Low-lying gently undulating terrain occurring either at the base of higher, more densely vegetated ranges and ridges associated with LCZ05 or in isolated patches within broad pastoral land.	Oxley Highway and Thunderbolts Way (Tourist Drive 21) Barry Road Hunter Road Niangala Road Timor Road	Great Dividing Range Ben Halls Gap National Park Equine CIC land	Moderate	Moderate
LCZ02	Foothill Pastures	Expansive rolling pastoral landscape that has been predominantly cleared to support open undulating grazing land.	Waverley Road Pages Creek Road Timor Crawney Road Hunter Road Rouchel Road Albano Road Sandy Creek Road, McCullys Gap	Equine CIC land Grazing pastures	Moderate where equine CIC land applies[12] Low in all other locations	Low

[12] The moderate sensitivity rating applied to equine CIC land recognises that its scenic qualities and landscape setting contribute to its ongoing function, reputation and regional identity.

Zone	Name	Description	Key viewpoints / corridors	Key landscape features	Sensitivity	Scenic quality rating
LCZ03	Plateau Pastures	Historic agricultural land use practices, primarily cropping and grazing resulting in the extensive clearing of land.	New England Highway Oxley Highway and Thunderbolts Way (Tourist Drive 21) Gostwyck Road (Tourist Drive 19) Thunderbolts Rock lookout and heritage site Dangars Lagoon and Bird Hide	Dangars Lagoon New England Tableland Region Granite boulders	Low	Low
LCZ04	New England Forested Pastures	Expanses of flat to gently undulating native grazing pastures.	Kyabia Stopping Bay New England Highway Kingstown Road Thunderbolts Way Bundarra Road	Aberbaldie Nature Reserve Native grazing pastures	Low	Low

Zone	Name	Description	Key viewpoints / corridors	Key landscape features	Sensitivity	Scenic quality rating
LCZ05	Forested Hills	Steep and rugged landforms supporting dense native vegetation and areas of protected public open space, resulting in a strongly naturalistic and visually contained landscape character.	Lake Glenbawn Camping Area Hunter Road Timor Caves Sargeants Gap Road Forest Way	Mount Yarrowyck Nature Reserve The Great Dividing Range Camerons Gorge State Conservation Area Black River Nature Reserve Ben Halls Gap Nature Reserve and National Park	High	Moderate
LCZ06	Pastoral Plains	Flat to undulating pastoral landscape within a shallow valley landform. This area is a contained basin framed by vegetated ridges and undulating foothills.	Belltrees Road Waverley Road Timor Community Hall Old Armidale Road	Hunter River Lake Glenbawn Equine CIC	Moderate where equine CIC land applies[13] Low in all other locations	Low

[13] The moderate sensitivity rating applied to equine CIC land recognises that its scenic qualities and landscape setting contribute to its ongoing function, reputation and regional identity.

Zone	Name	Description	Key viewpoints / corridors	Key landscape features	Sensitivity	Scenic quality rating
LCZ07	Managed Native Forestry	Undulating to steeply sloping terrain within State Forests dedicated to native forestry and managed by the Forestry Corporation. These include Terrible Billy, Nundle, Tuggolo and Tomalla State Forests. Portions of these forests include established pine plantations.	Forest Way	Tomalla State Forest Nundle State Forest Tuggolo State Forest Terrible Billy State Forest	Low	Low
LCZ08	Managed Plantation Forestry	Undulating to steeply sloping terrain dedicated to commercial pine plantations owned and operated by the Forestry Corporation.	Forest Way Niangala-Walcha Road	Nundle State Forest Hanging Rock State Forest Pine plantations	Very low	Low
LCZ09	Hunter Region Forested Pastures	Landscape that has been modified to accommodate large scale transport networks, mining operations and electrical infrastructure leading to the fragmentation of remnant vegetation.	New England Highway Hebden Road Thomas Mitchell Drive	Native forest Energy infrastructure	Very low	Low
LCZ10	Mining and Energy Development	Highly modified landscape where natural topographic and ecological systems have been replaced or altered by extractive industries and large scale infrastructure.	Lake Liddell Recreation Area New England Highway Hebden Road	Lake Liddell Plashett Reservoir Open cut coal mines	Very low	Very low

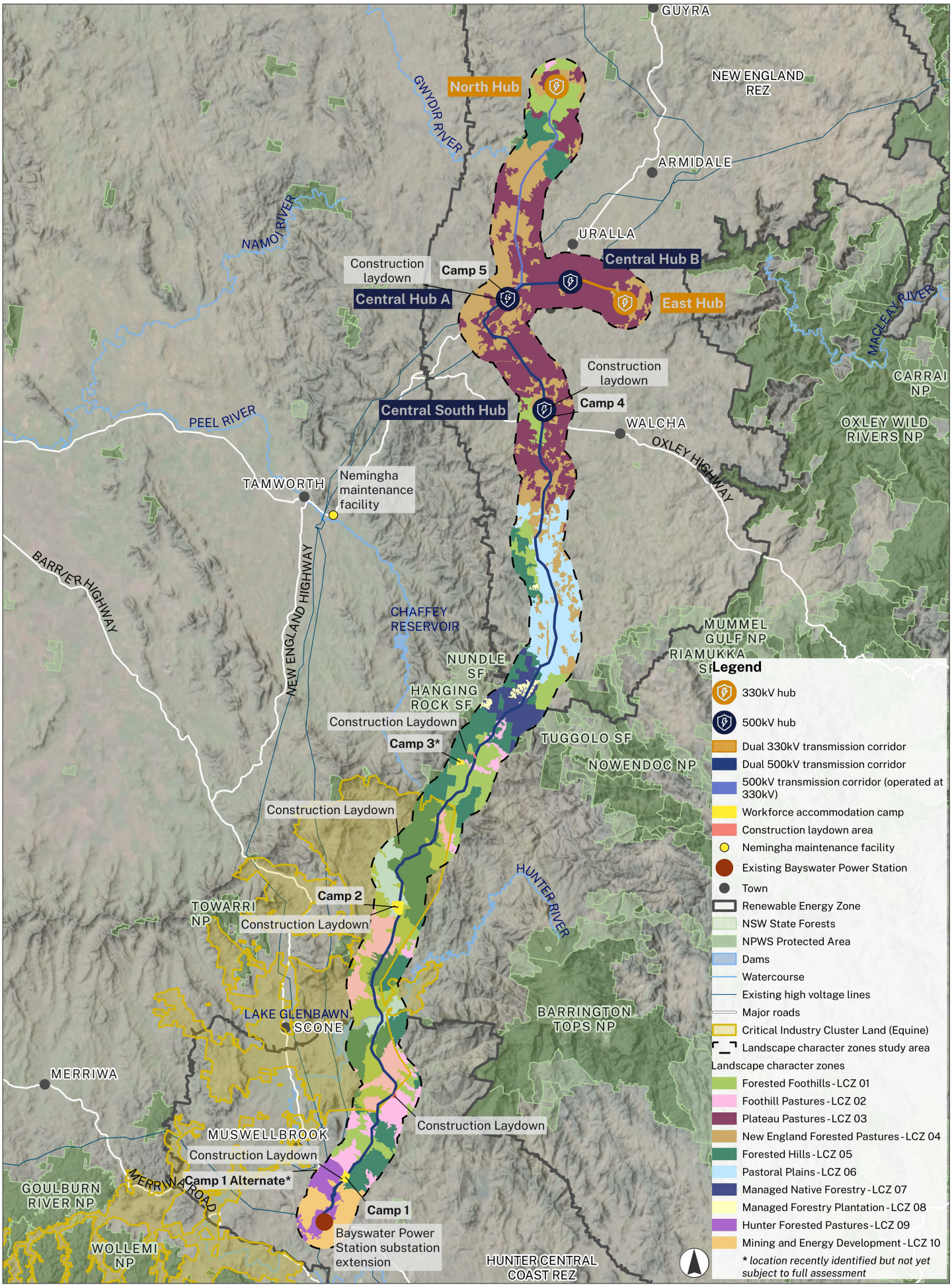


FIGURE 11.2 Landscape character zones

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

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

0 20 40
Kilometres



Photo 1. LCZ01 View south-east from Waverley Road, typical equine CIC land within LCZ01, with higher vegetated ridges / ranges of LCZ05 in the background



Photo 2. LCZ02 View north from Rouchel Road, typical equine CIC land

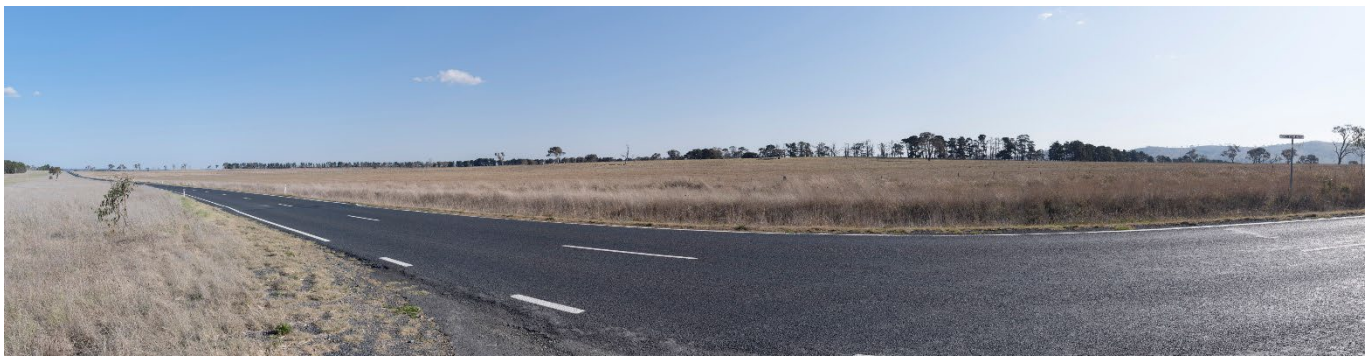


Photo 3. LCZ03 View south west from Thunderbolts Way (Tourist Drive 21)



Photo 4. LCZ04 Drone imagery facing north east from the New England Highway



Photo 5. LCZ05 Forest Way facing east



Photo 6. LCZ06 View from Timor Crawney Road facing east within the equine CIC



Photo 7. LCZ07 Native forestry on Forest Way within Nundle State Forest



Photo 8. LCZ08 Clear felling and pine plantation within Nundle State Forest



Photo 9. LCZ09 Forested pastures from the New England Highway



Photo 10. LCZ10 Lake Liddell, Liddell substation and Bayswater Power Station

11.2.3 Sensitive receivers and viewpoints

In accordance with the Visual Technical Supplement, private sensitive receivers were identified as dwellings, tourist and visitor accommodation and private recreation areas. On landholdings where the proposed transmission infrastructure would be constructed and the land would be affected by an easement (referred to as an easement-affected dwelling or receiver), no visual impact assessment is required in accordance with the Visual Technical Supplement. This is because the affected landholder is eligible for compensation of impacts under the *Land Acquisition (Just Terms Compensation) Act 1991*. EnergyCo has, however, sought to avoid and minimise impacts on the visual amenity of residences including both easement and non-easement affected landholders (refer to Section 11.3), with the minimisation of impacts on the visual amenity of residences and landscapes being a key planning principle for the project as outlined in Section 2.6.

The visual impact assessment generally used the transmission line corridor portion of the project area to identify potential easement affected receivers for the purposes of applying the methodology as outlined in the Visual Technical Supplement. Where the encroachment of the project area onto a landholding was very minor, these landholdings were not considered easement affected and were therefore considered in the visual impact assessment.

Within the visual impact study area, the assessment identified:

- 100 easement affected private receivers
- 57 non-easement affected private receivers.

Private receiver locations and easement-affected status were identified and verified by EnergyCo, where possible, and have been used as the basis for the private receiver assessment. Private receivers within the visual study area are shown on Figure 11.3.

In accordance with the Visual Technical Supplement, public viewpoints were identified as publicly accessible locations with potential views towards the project, such as roads, scenic routes, public open spaces, lookouts, town centres and other locations where people may experience views of the surrounding landscape.

Ten public viewpoints were selected for the project within the visual study area (refer to Table 11.2 and Figure 11.3).

Table 11.2. Public viewpoints

Public viewpoint ID	Approximate location
PVP-01	Thunderbolts Way, 24 km west of Armidale
PVP-02	Kingstown Road, 12 km west of Uralla
PVP-03	Thunderbolt Rocks, 6 km south of Uralla
PVP-04	Thunderbolts Way, 6 km south of Uralla
PVP-05	New England Highway, 23 km south west of Uralla
PVP-06	Oxley Highway, 16 km west of Walcha

Public viewpoint ID	Approximate location
PVP-07	Niangala Road; 17 km south west of Walcha
PVP-08	Corner of Forest Way and Topdale Road, 10 km south of Niangala
PVP-09	Sargeants Gap Road, Pages Creek
PVP-10	Hunter Road, 5 km north east of Gundy

11.3 Avoidance measures

Avoiding and minimising impacts on the visual amenity of residences and landscapes was a key planning principle guiding the route selection process. EnergyCo has sought to reduce impacts to landholders at all stages of the route selection process. As a result, the number of impacted landholders has been gradually reduced with the progressive refinement and narrowing of the study corridor. These refinements have sought to minimise impacts to residential areas, rural villages and rural residences, where possible.

Targeted refinements to the EIS project area have also been made to reduce impacts to dwellings in response to community and landholder feedback. These include:

- Rouchel: investigation of a number of alternative alignments in this area in response to community requests to move the corridor as far west as possible (preferably previous corridor) due to proximity to dwellings, the Rouchel church and the communities of Rouchel Brook and Upper Rouchel. The EIS project area maximises distances to dwellings.
- Gundy: the alignment was refined in response to a community request to move the alignment as far east as possible to limit impacts to dwellings and equine facilities (including Scone Polo Club). The EIS project area has been moved east as far as practicable within the bounds of topography, reducing visual impacts to several dwellings and equine facilities.
- Waverly: the alignment was refined in response to a community request to move the alignment as far east as possible to limit impacts to dwellings and land use. The EIS project area has been moved east as far as practicable within bounds of topography, reducing visual impacts.
- Barry: The alignment was refined to avoid geotechnical and environmental impacts, and avoids impacts to dwellings within 500 metres (previously 5 dwellings). The EIS project area extends outside the 3 kilometre study corridor (October 2025), however no new landholders are impacted.
- Niangala to Oxley Highway: The alignment was refined to achieve a more balanced outcome integrating landholder, environmental and renewable-interface considerations, reducing the overall angles in the alignment and increasing the distance from dwellings.
- Nowendoc Road: a localised alignment refinement occurred to avoid directly impacting a dwelling.

11.4 Potential impacts – construction

The construction of the project would result in temporary changes to the visual amenity and landscape character of the study area, which would impact residents, tourists and road users.

11.4.1 Ancillary infrastructure daytime impacts

Construction phase ancillary infrastructure, including laydown areas, material stockpiles, concrete batch plants, crushing and screening areas, stringing sites, site offices and amenities introduce localised and temporary visual change into the landscape. This infrastructure would result in temporary and localised visual impact during construction, particularly where located near dwellings, public roads or open rural views.

Potential visual effects from proposed workforce accommodation camps relate to the introduction of temporary structures, internal access roads, parking areas, fencing, signage and vehicle movements. These effects would be greatest where camps are located in open rural settings, close to public roads or near dwellings with limited intervening screening.

A viewshed screening analysis was undertaken to identify dwellings with line of sight of the workforce accommodation camps and construction laydown areas. The viewshed assessment identified a limited number of dwellings with potential visibility towards the proposed workforce accommodation camps and associated laydown areas. The potential visual impacts are generally expected to be limited due to the low height of the temporary camp and laydown infrastructure, separation distance from dwellings, intervening vegetation and the temporary nature of the works. Where the camps and laydown areas are located near proposed energy hubs or transmission infrastructure, they are unlikely to materially increase the visual impact already identified for the primary project infrastructure. Additional detail for potentially affected receivers is provided in Table 42 of the LCVIA (refer to Technical Report 5). It is noted that the locations of Camp 3 and Camp 1 Alternate were identified after completion of the visual impact assessment and therefore have not been assessed in detail as part of the LCVIA. Detailed visual impact assessment of both locations would be undertaken following exhibition of the EIS and included in an Amendment Report.

Works on public roads and the establishment of access tracks to support construction were also considered in the assessment. Public road upgrades are expected to result in limited visual change where they occur within existing road corridors, although localised effects may occur where vegetation removal, widening, earthworks or new drainage infrastructure are required. Similarly, where access tracks follow existing farm tracks, fence lines, cleared areas or infrastructure corridors, visual change is expected to be limited. Greater localised contrast may occur where new tracks cross visually exposed slopes, ridge lines, creek crossings or areas of intact vegetation. Temporary access tracks would be rehabilitated where they are no longer required, subject to operational requirements and landholder discussions.

11.4.2 Night lighting assessment

Workforce accommodation camps and other construction areas would require lighting for safety and security. The assessment concluded that lighting impacts would be localised and temporary during construction and would be effectively managed through the management and mitigation measures outlined in Section 11.6.

11.5 Potential impacts – operation

The project would result in the introduction of new permanent transmission infrastructure within the landscape, including transmission line towers, 5 new energy hubs and ancillary infrastructure as described in Section 3.

11.5.1 Impacts to landscape character

An assessment of the potential impact of the project on the landscape character zones identified in Section 11.2.2 was undertaken by evaluating the sensitivity of the landscape and the magnitude of the project's visual effects in that area. The findings are summarised in Table 11.3.

Table 11.3. Visual impact for landscape character zones

Zone	Name	Sensitivity	Visual magnitude	Landscape character impact rating
LCZ01	Forested Foothills	Moderate	Low	Moderate
LCZ02	Foothill Pastures	Moderate / Low[14]	Moderate	Moderate
LCZ03	Plateau Pastures	Low	Low	Low
LCZ04	New England Forested Pastures	Low	Low	Low
LCZ05	Forested Hills	High	Low	Moderate
LCZ06	Pastoral Plains	Moderate / Low[15]	Low	Low
LCZ07	Managed Native Forestry	Low	Low	Low
LCZ08	Managed Plantation Forestry	Very low	Very low	Very low
LCZ09	Hunter Forested Pastures	Very low	Very low	Very low
LCZ10	Mining and Energy Development	Very low	Very low	Very low

[14] Sensitivity is Moderate where equine CIC land applies and Low in all other instances in LCZ02

[15] Sensitivity is Moderate where equine CIC land applies and Low in all other instances in LCZ06

The assessment of landscape character impacts across the 10 LCZs indicates that the project would generally result in low to very low visual impacts on landscape character, reflecting the predominantly modified and resilient nature of the receiving environment and the project's linear, dispersed footprint. Moderate impacts were identified for more sensitive landscape character types, including LCZ01, LCZ02 and LCZ05, where the project traverses landscapes with higher scenic quality and stronger natural character, including areas associated with the equine CIC. In these locations, transmission infrastructure may become locally prominent at close range, particularly where vegetation clearing is required, however, these effects are spatially confined and are not predicted to result in widespread or dominant changes to overall landscape character.

11.5.2 Impacts to private receivers and public viewpoints

Simple assessment (viewshed mapping)

Of the 57 non-easement affected private receivers and 10 public viewpoints identified within the visual study area, 54 private receivers and all 10 public viewpoints were identified as having theoretical line of sight to the project and progressed to the intermediate assessment.

Intermediate assessment

Of the 54 private receivers considered in the intermediate assessment:

- 28 non easement affected private receivers were identified as having a low visual impact rating, not requiring further assessment
- 19 non easement affected private receivers were identified as having a moderate visual impact rating requiring a detailed assessment
- 7 non easement affected private receivers were identified as having a high visual impact rating requiring a detailed assessment.

Of the 10 public viewpoints considered in the intermediate assessment:

- 5 public viewpoint receivers were identified as having a low visual impact rating, not requiring further assessment
- 5 public viewpoint receivers were identified as having a moderate visual impact rating, requiring a detailed assessment
- no public viewpoint receivers were identified as having a high visual impact rating.

Detailed assessment

Of the 26 private receivers considered in the detailed assessment:

- 4 non easement affected private receivers were assessed as having a high visual impact rating and require mitigation
- 5 non easement affected private receivers were assessed as having a moderate visual impact rating and require mitigation
- 17 non easement affected private receivers were identified as having a low, very low or nil visual impact rating and do not require mitigation.

Receivers with moderate to high visual impacts were generally in close proximity to the alignment, had elevated or open outlooks, limited intervening screening or had broad visibility of the transmission towers and hub infrastructure.

All 4 receivers with a high visual impact rating are located in the vicinity of Rouchel Brook, including the Rouchel Uniting Church. EnergyCo investigated multiple alternative alignments in this area, in response to community feedback, to seek to minimise visual impacts and corridor refinements were undertaken to increase distances to receivers. Continued refinement of the reference design is being undertaken to seek to further reduce visual impacts in this area where practicable, however, design constraints related to topography, watercourse and road crossings and biosecurity considerations are limiting.

Of the 5 public viewpoints considered in the detailed assessment:

- one public viewpoint receiver (PVP-07, a public road viewpoint) was assessed as having a moderate visual impact rating and requires mitigation
- 4 public viewpoint receivers were assessed as having a low, very low or nil visual impact rating and do not require mitigation.

The outcomes of the visual impact assessment for private receivers and public viewpoints are shown on Figure 11.3, with proposed mitigation discussed in Section 11.6.

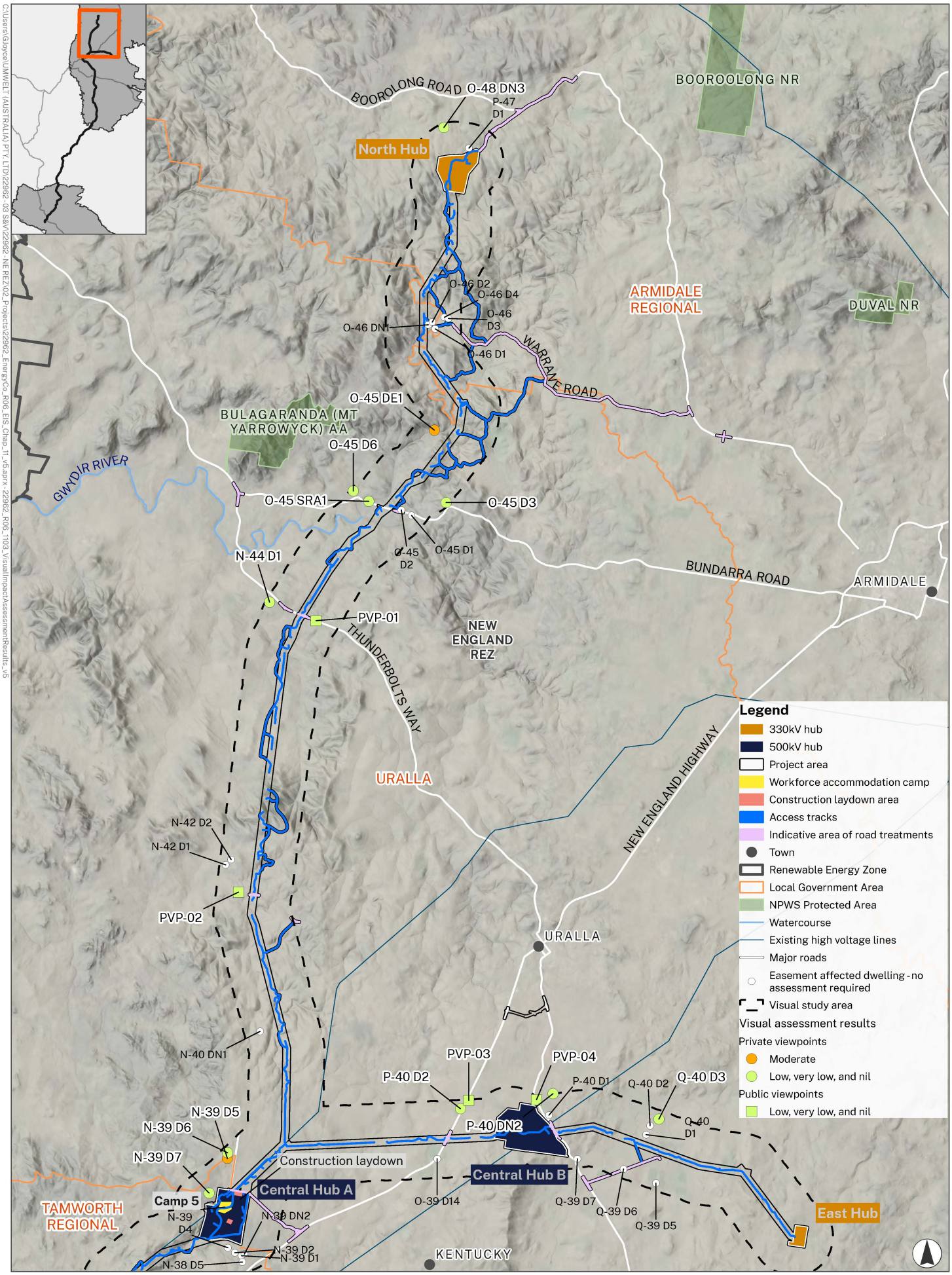


FIGURE 11.3a Visual impact assessment result (Map 1 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

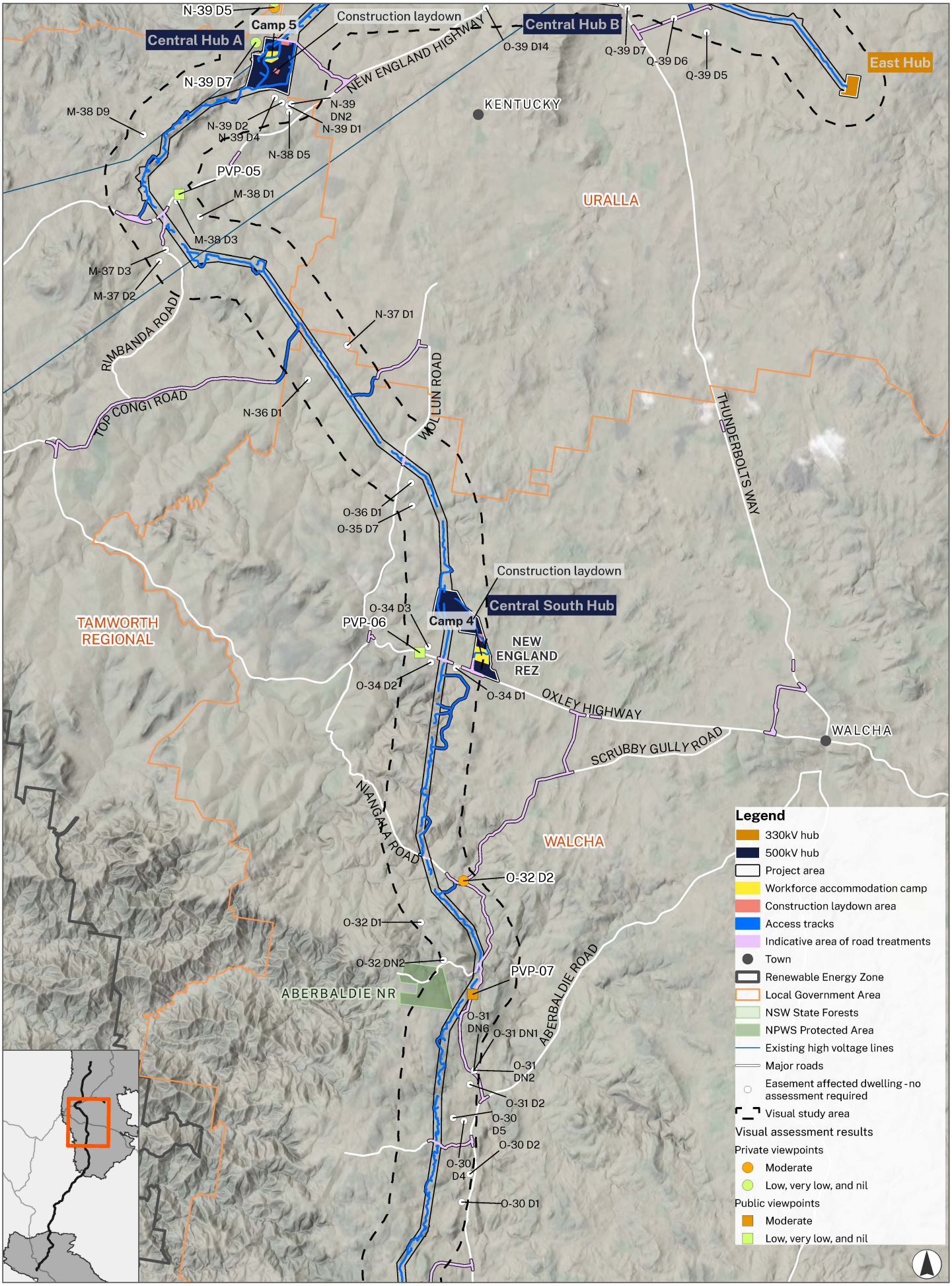


FIGURE 11.3b Visual impact assessment result (Map 2 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

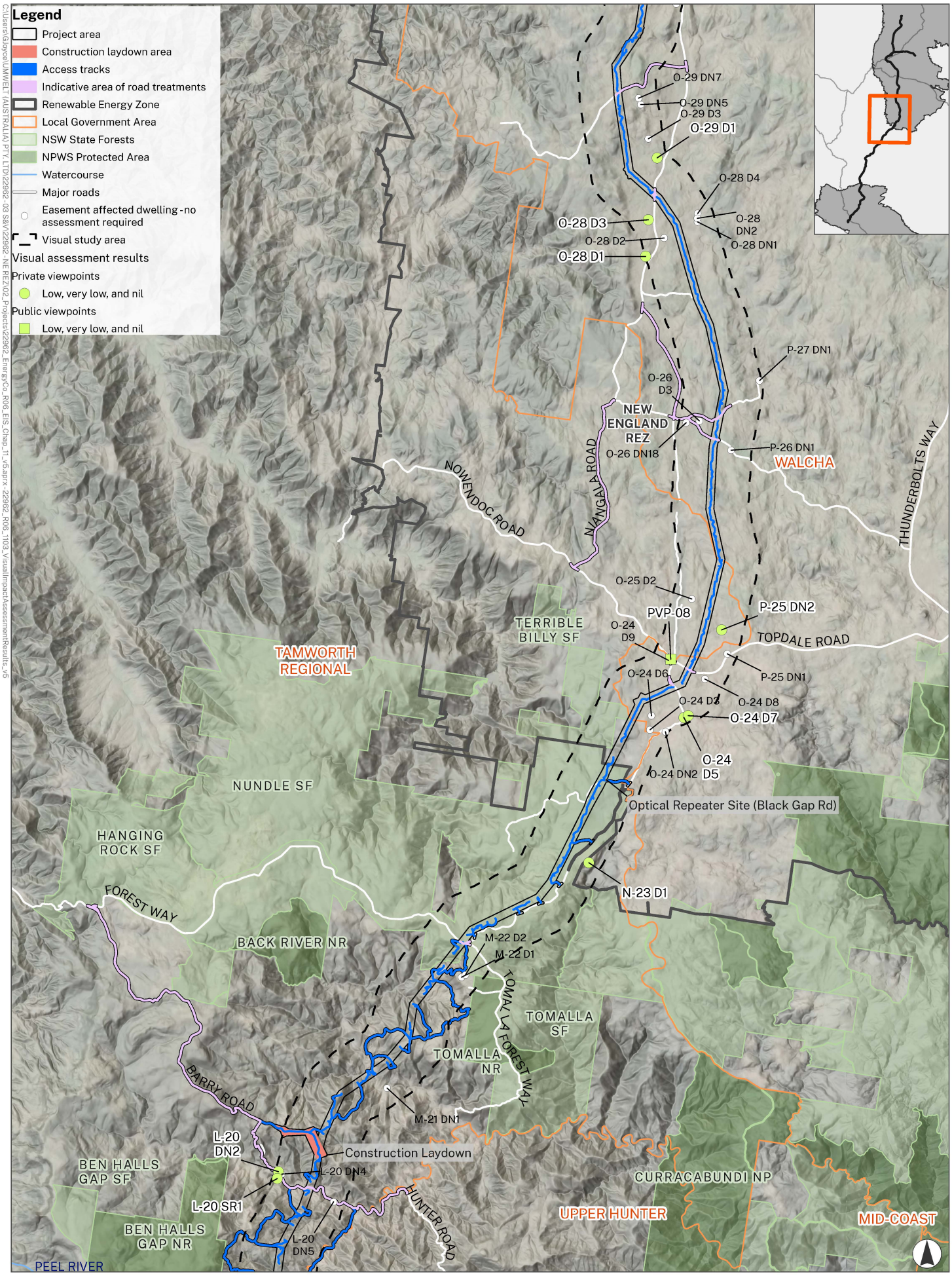


FIGURE 11.3c Visual impact assessment result (Map 3 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

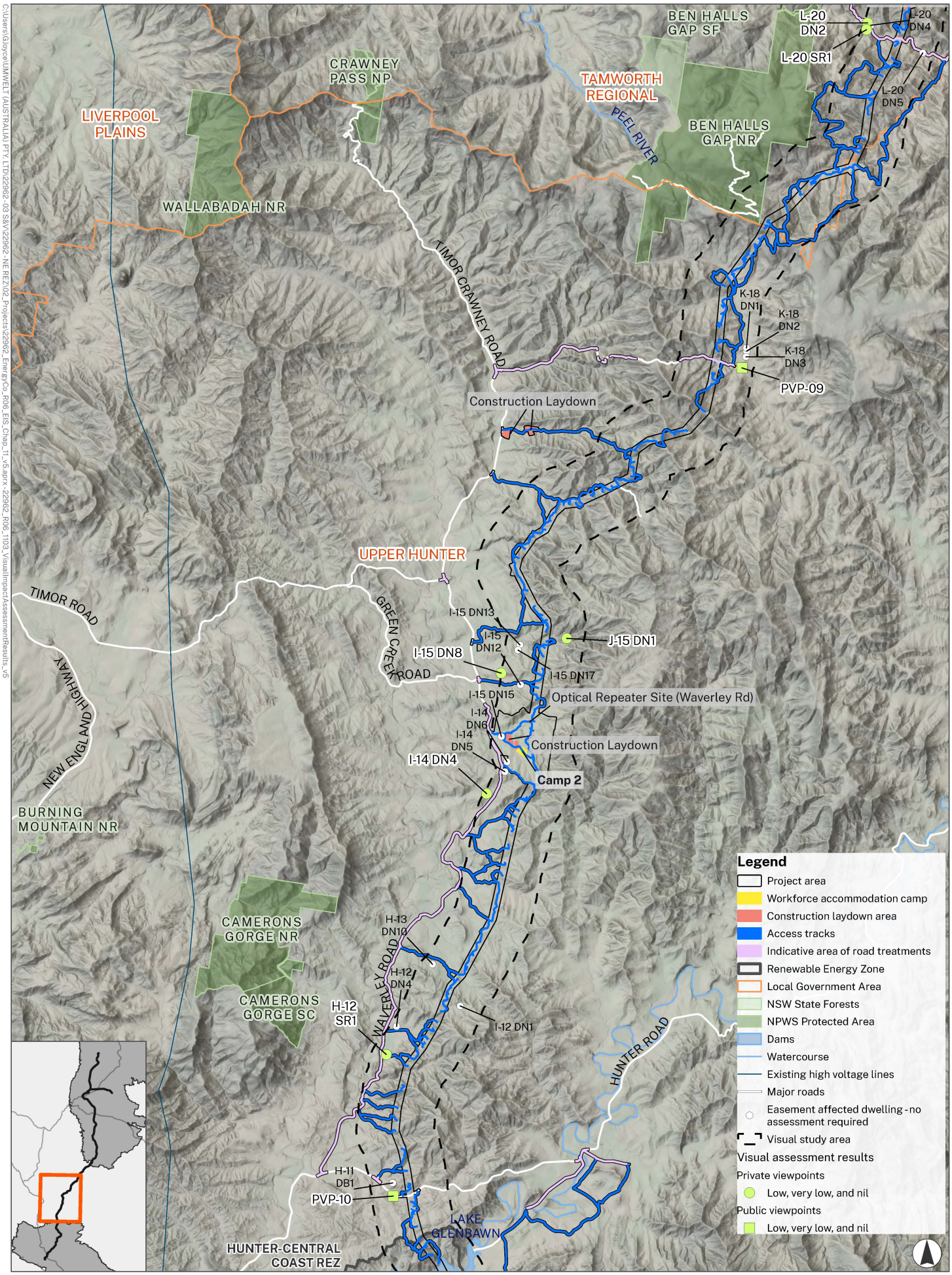


FIGURE 11.3d Visual impact assessment result (Map 4 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

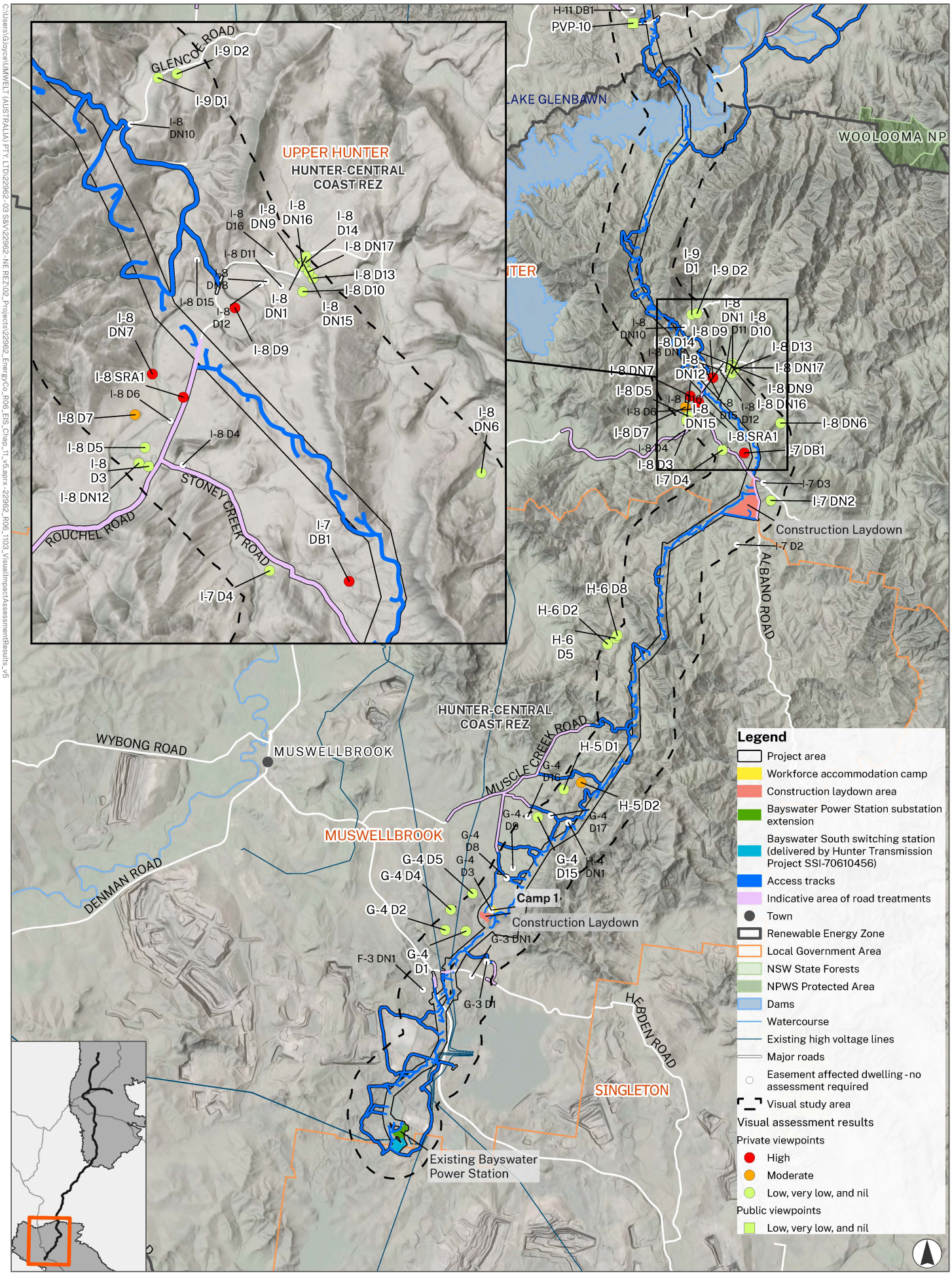


FIGURE 11.3e Visual impact assessment result (Map 5 of 5)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

11.5.3 Ancillary infrastructure daytime impacts

Permanent operational ancillary infrastructure includes communications infrastructure, utilities and the Nemingha maintenance facility. Visual impacts from communications infrastructure and utility works are expected to be localised and unlikely to result in material long-term visual impacts.

Given its location within an established industrial zone characterised by existing disturbance, its relatively low built form and more localised extent compared with the transmission towers and energy hubs, the Nemingha maintenance facility is expected to have a lower visual impact than the primary transmission infrastructure. However, localised visual effects may occur where the facility is visible from nearby dwellings, public roads or elevated viewpoints.

Permanent access tracks required for operation and maintenance would remain visible in some locations but are expected to be visually subordinate to the transmission towers, conductors and energy hubs.

Permanent ancillary infrastructure is expected to have lower visual prominence than the primary transmission infrastructure, subject to the appropriate implementation of the management and mitigation measures outlined in Section 11.6.

11.5.4 Night lighting assessment

The project traverses extensive rural, agricultural and forested landscapes where existing artificial lighting is generally limited. In these areas night lighting is typically associated with scattered dwellings, farm infrastructure, local roads, vehicles and small settlements. Higher night lighting levels are generally associated with established towns, regional centres, industrial areas, major transport corridors and around the existing Bayswater Power Station.

The assessment confirmed that operational lighting would be limited to permanent infrastructure where required for safety, security, access, maintenance or emergency response. No lighting is proposed along the transmission line, as routine maintenance would be undertaken during daytime hours. Accordingly, operational lighting impacts would be substantially more localised than the daytime visibility of the project. Operational lighting would be designed in accordance with AS/NZS 4282: Control of the obtrusive effects of outdoor lighting (Standards Australia, 2019) to minimise off-site lighting impacts, including light spill, glare and sky glow towards nearby dwellings, public roads and surrounding rural areas.

Potential impacts on Siding Spring Observatory were assessed and, given the approximately 200 kilometre separation, the absence of operational lighting along the transmission line, and the localised nature of sources, the project is not expected to result in material night lighting impacts on the observatory or its associated dark sky values.

11.5.5 Equine CIC impact assessment

The equine CIC encompasses a diverse range of landscape character types (LCZ01, LCZ02, LCZ05 and LCZ06). These areas exhibit variation in topography, vegetation extent, and the intensity of built form associated with equine industries, including horse breeding, husbandry, and sales. The landscape is also influenced by existing infrastructure, including two 330 kV transmission lines, which traverse parts of the CIC and form established linear elements within the broader rural setting.

The scenic values of the equine CIC are integral to the ongoing reputation of the industry. Regional landscape character assessments identify key attributes including expansive irrigated pastures, irrigated grazing land, and densely vegetated ridgelines that frame and contain views across equine properties. While key focal areas of the CIC occur around Scone and Aberdeen, outside the immediate study area, the broader network of equine-related landscapes extends into the study area and is evident along publicly accessible locations, including Hunter Road, Rouchel Road, Timor-Crawney Road and Waverley Road. These corridors provide views to multiple studs, polo fields, and associated facilities, contributing to the collective perception and experience of the equine CIC.

A regional-scale viewshed and photomontage assessment was undertaken to assess potential visual impacts to the equine CIC (refer to Appendix A of the LCVIA, Technical Report 5). The transmission corridor has been strategically sited to avoid key hubs within the equine CIC, including Scone and areas that are central to the industry's identity and function. Instead, it generally traverses or runs adjacent to lower-order rural roads, including Hunter Road and Rouchel Road, as well as sections parallel to Waverley Road and Timor Crawney Road. These routes are not identified as protected scenic routes, or tourist drives and are considered to have a more limited role in contributing to the broader perception and experience of the equine CIC.

Photomontages prepared from representative viewpoints along Waverley Road and Timor Crawney Road indicate that while transmission towers may be visible and at times locally prominent, these areas tend to be less strongly associated with the defining scenic and functional features of the equine CIC. The siting and design of the corridor has also sought to minimise visual impacts through the avoidance of prominent ridgelines and by positioning infrastructure against vegetated backdrops, reducing visual prominence and assisting in integrating infrastructure into the landscape.

Existing topography, vegetation and undulating landforms further assist in filtering and intermittently screening views of the transmission line. As a result, visibility is often partial and transient, particularly when experienced from the road network.

At a local scale, transmission towers may appear visually dominant in close proximity, however these effects are generally confined and do not extend consistently across the broader landscape. It is noted that there are a number of existing high voltage transmission lines (including two 330 kV lines) within the equine CIC in the vicinity of the project area. At the scale of the equine CIC, the project is not expected to fundamentally alter the underlying rural character or scenic identity of the landscape. The key attributes that define the equine CIC, namely expansive pasture systems, vegetated ridgelines and the dispersed pattern of equine related development would remain intact.

Overall, the project introduces a new linear infrastructure element within parts of the equine CIC that are relatively less critical to its core scenic and functional values. While the transmission line would be perceptible from certain sections of Waverley Road and Timor Crawney Road as well as intersecting Hunter Road, it is not anticipated to detract from the key landscape features or diminish the overall scenic quality and character that underpin the equine CIC at a regional level.

11.5.6 Viticulture CIC impact assessment

The viticulture CIC includes a highly integrated concentration of vineyards and associated wineries and tourism infrastructure within the Hunter Valley. The region is defined by land uses associated with the viticulture industry including perennial horticulture and grazing irrigated modified pastures. The area is broadly defined by expansive views across undulating vineyards and rural valleys framed by rugged ridgelines retaining dense native vegetation communities.

No transmission line infrastructure is proposed within the viticulture CIC, with the nearest tower located approximately 10 kilometres from the closest CIC land parcel. At this distance, transmission infrastructure is likely to be indistinguishable within the broader landscape context. Furthermore, the surrounding topography, intervening vegetation and built form effectively screen potential views and the project is not expected to result in any impacts on the landscape character of the viticulture CIC.

11.5.7 Heritage features

11.5.7.1 Historic heritage

Visual impacts on the setting of heritage items vary, depending on proximity, visibility, and the relationship between each item and its surrounding rural landscape. Greater potential impacts are associated with heritage items located close to project infrastructure and with more open views, where new infrastructure may alter aspects of the rural setting that contribute to heritage significance, for example at Thunderbolt's Rock, Blanch's Inn or Warrane Homestead.

For other heritage items, including Dangar's Lagoon, Gostwyck Memorial Chapel and Deeargee Woolshed, visibility is limited by distance, vegetation, landform and existing infrastructure. Minimal visual change is anticipated for items where screening or separation reduces visual prominence.

As noted in the HHIA (refer to Technical Report 3), the visual assessment indicates that the project would have varying visual effects across the listed and potential heritage items assessed, depending on item type, the contribution of setting to significance, distance, landform, vegetation, existing infrastructure and the orientation of principal views.

Overall visual impacts are assessed as negligible-to-low for the majority of heritage items identified within the landscape character assessment study area, where the project would either be:

- distant, screened or limited to secondary views, or would relate to items whose significance is not dependent on identified views, vistas or visually prominent above-ground built form
- visible within the broader rural setting but would not obscure, dominate or materially alter the principal elements through which these items are experienced and understood. In these cases, visibility is generally moderated by distance, vegetation, landform or the orientation of key views, and any change would remain within the wider landscape context of the heritage item.

The exception to this is Barry Station, where impacts to the main homestead complex would be negligible (as the homestead buildings are located away from the transmission corridor and would not be directly affected by infrastructure in their immediate setting), however, the overall visual impact to Barry Station is assessed as moderate because the transmission corridor would pass through substantial portions of the mapped pastoral curtilage and would alter parts of the wider rural setting and landscape character that contribute to its presentation as a maintained pastoral station.

Further detail on the visual impact assessment of heritage items is provided in the HHIA (refer to Technical Report 3).

11.5.7.2 Aboriginal cultural heritage

The LCVIA included a landscape character impact assessment of 2 culturally significant areas in proximity to the project: Bulagaranda (Mount Yarrowyck) Aboriginal Area and Ingleba Aboriginal Reserve (Inglebah). Viewshed mapping indicates that, based on topography alone, both areas would have visibility of multiple transmission towers. However, given the screening effect of dense intervening vegetation and separation distance from project elements, the project is not expected to impact the landscape character of either area.

11.5.8 Cumulative impacts

The potential cumulative impacts of the project have been identified based on the scale and potential impacts of the project, in combination with the potential impacts of identified relevant future projects and broader developments supporting the New England REZ. A list of these relevant projects considered in the cumulative assessment, including their descriptions, is provided in Section 24.

The assessment recognises the project's location within both the New England REZ and the Hunter-Central Coast REZ and the resultant concentration of projects within the region which reflects the intended function of REZs. At a regional scale, the project would contribute to cumulative landscape change associated with renewable energy, transmission and other major infrastructure. However, these effects would generally be moderated by the scale of the landscape, landform, vegetation, existing modified land uses, existing infrastructure and the dispersed nature of the project.

Further details regarding cumulative impacts are detailed in the LCVIA (refer to Technical Report 5), and in Section 24.

11.6 Management and mitigation measures

11.6.1 Performance objectives and residual impacts

The Visual Technical Supplement defines visual performance objectives which provide a consistent framework for determining whether visual impacts are acceptable, whether mitigation is required and whether residual impacts have been appropriately minimised or justified. The performance objectives are reproduced in Table 11.4 below.

Table 11.4. Visual performance objectives

Visual impact rating	Performance objectives
High	This level of impact should be avoided unless the proponent can justify that: • all reasonable efforts have been made to avoid the impact and alternative project designs are not feasible or would be unlikely to materially reduce the impact, • all reasonable mitigation options have been considered, and • the proposed mitigation measures would effectively mitigate the impact and would not result in a significant obstruction of views.
Moderate	**Public road viewpoints** As far as is reasonable and feasible, the proponent should seek to reduce moderate visual impacts to road users. Appropriate mitigation options include vegetation or other screening. Mitigation should only be considered if it would not obstruct important views and sight lines, could be confined to a relatively small area (that is, vegetation screening would not be required for several hundred metres along a transport corridor) and where agreed with the relevant road authority. **All other private receivers and public viewpoints** Visual impact mitigation should be implemented within the project corridor and/or offered to the affected landholder and should be proportionate to the scale of impact. There is no expectation this mitigation should eliminate the view of the development entirely, but it must reduce the impact to an acceptable level and not create unacceptable visual impacts to other receivers.
Low and Very Low	No mitigation required.

Source: DPHI, 2025

11.6.1.1 Public viewpoint

For public road viewpoints with a moderate visual impact rating, the Visual Technical Supplement requires proponents to, as far as reasonable and feasible, seek to reduce moderate visual impacts to road users.

At PVP-07, the project would be visually prominent from the public road corridor of Niangala and Niangala-Walcha Road, which is approximately 50 kilometres long and intersects the transmission corridor twice, providing multiple open views of the transmission line along the road, however, views would generally be experienced for short durations by road users. Mitigation would therefore be localised and proportionate. Continuous screening along the road corridor is not considered practical or appropriate, particularly where it may obstruct rural views or road sightlines. Potential mitigation will focus on retaining existing roadside vegetation, and considering localised planting only where it would not create adverse safety or visual outcomes.

11.6.1.2 Private receivers

For private receivers with a moderate visual impact rating, the Visual Technical Supplement requires visual mitigation measures to be implemented within the project corridor and/or offered to affected landholders, proportionate to the scale of impact. The objective of mitigation is not to fully screen the project, but to reduce visual impacts to an acceptable level without creating adverse impacts for other receivers or fully obscuring rural views.

For private receivers with a high visual impact rating, the Visual Technical Supplement requires that impacts should be avoided where practicable. Where avoidance is not possible, the assessment must demonstrate that reasonable efforts have been made to minimise impacts through design refinement and mitigation measures, and that any residual impact is appropriately justified with reference to the relevant performance objectives.

Proposed mitigation measures for each of the private receivers assessed as having a high or moderate visual impact rating, and post mitigation residual visual impacts are provided in Table 11.5. The location of each receiver is shown on Figure 11.3. Pre and post mitigation photomontages are provided below for each of these receivers.

Table 11.5. Response to visual performance objectives – private receivers

Receiver ID	Receiver type	Visual impact rating (pre mitigation)	Mitigation opportunity	Residual impact rating (post mitigation)
N-39 D5	Private receiver	Moderate	Supplementary vegetation screening will be offered to the landholder along the eastern and south-eastern sides of the dwelling, integrated with existing mature vegetation. Planting would fill gaps within the existing vegetation structure and substantially filter views toward the project, including transmission towers, Central Hub A, Camp 5 and laydown areas. Refer to Photomontage 1.	Low
O-32 D2	Private receiver	Moderate	Supplementary vegetation screening will be offered to the landholder, particularly within the southern and western portions of the property, to reinforce existing vegetation filtering toward the project. The assessment is based on the secondary view toward the project, noting that the primary north-eastern outlook has no identified visibility. Refer to Photomontage 2.	Low
I-8 D9	Private receiver	High	EnergyCo is exploring opportunities for local tower placement refinements and tower height reduction within the corridor where feasible. Further consideration on this would be included in the Submissions Report / Amendment Report. Supplementary vegetation screening will be offered to the landholder, particularly along the southern and south-western portions of the property, to reinforce existing vegetation filtering toward the project. However, due to the elevated and open outlook, proximity to the alignment and broad extent of visible infrastructure, upper tower sections and conductors are likely to remain visible above and between vegetation. Proposed screening reduces the residual visual impact rating from high to low and as planting matures views are expected to become increasingly filtered. Refer to Photomontage 3.	Low

Receiver ID	Receiver type	Visual impact rating (pre mitigation)	Mitigation opportunity	Residual impact rating (post mitigation)
I-8 DN7	Private receiver	High (primary viewpoint)	EnergyCo is exploring opportunities for local tower placement refinements and tower height reduction within the corridor where feasible. Further consideration on this would be included in the Submissions Report / Amendment Report. Supplementary vegetation screening will be offered to the landholder, noting the constrained space between the dwelling, eastern property boundary and Rouchel Brook. Proposed mitigation reduces the residual visual impact rating to moderate. More extensive or denser planting could further screen views but would also reduce the open outlook from the property across Rouchel Brook. Clear-stemmed, high-branching tree species would be prioritised to filter elevated infrastructure while maintaining lower-level views across Rouchel Brook. Refer to Photomontage 4.	Moderate (primary viewpoint)
I-8 SRA1	Place of worship	High	EnergyCo is exploring opportunities for local tower placement refinements and tower height reduction within the corridor where feasible. Further consideration on this would be included in the Submissions Report / Amendment Report. Supplementary vegetation screening will be offered to Rouchel Uniting Church. As access to the church was not available, the photomontage was prepared from the public road on the south-eastern side of the church, oriented north-east toward the project. While transmission towers would remain clearly visible from the public road viewpoint, a LiDAR render prepared from the church entrance indicates that actual visibility from the church would be substantially reduced with mitigation. Refer to Photomontage 5a (primary view) and Photomontage 5b (supplementary roadside viewpoint).	Low

Receiver ID	Receiver type	Visual impact rating (pre mitigation)	Mitigation opportunity	Residual impact rating (post mitigation)
I-8 D7	Private receiver	Moderate	Supplementary vegetation screening will be offered to the landholder along the north-eastern portion of the property, where planting may filter visible towers while maintaining broader rural outlooks. Proposed mitigation reduces the residual visual impact rating from moderate to low. As the planting matures beyond 5 m, the remaining visible tower elements are expected to become increasingly filtered, further reducing their prominence within the view. Refer to Photomontage 6.	Low
I-7 DB1	Private receiver	High (primary viewpoint), Moderate (secondary viewpoint)	Supplementary vegetation screening would be offered to the landholder, noting that the elevated and exposed dwelling location limits the effectiveness of screening. Mitigation may require planting close to the dwelling, potentially with earthworks to provide adequate separation, while avoiding unreasonable obstruction of open rural views. Design refinements have also been considered, however, opportunities are very limited by the topography and other alignment constraints. No transmission towers would be located within the 377 m visual setback to this sensitive receiver. The proposed screening mitigation is indicative but demonstrates the level of screening for primary and secondary views that could be achieved through targeted planting. Overall, the residual visual impact is expected to remain moderate at 5 years for the secondary viewpoint, before reducing to low at 10 years as the trees mature. For the primary viewpoint, the residual visual impact rating is expected to reduce to low at 5 years and very low at 10 years. Ongoing consultation with the landholder is continuing to confirm the preferred planting extent, species selection, stock size and establishment approach. Refer to Photomontage 7a (primary view at 5 years) Photomontage 7b (primary view at 5 and 10 years), Photomontage 7c (secondary view at 10 years) and Photomontage 7d (secondary view at 5 and 10 years).	Low (primary viewpoint at 5 years) Low (secondary viewpoint at 10 years)

Receiver ID	Receiver type	Visual impact rating (pre mitigation)	Mitigation opportunity	Residual impact rating (post mitigation)
H-5 D2	Private receiver	Moderate	Supplementary vegetation screening will be offered to the landholder, particularly along the eastern side of the property and closer to primary viewing areas. As the planting matures beyond 5 m, the remaining visible tower elements are expected to become increasingly filtered, further reducing their prominence within the view. Refer to Photomontage 8.	Low
O-45 DE1	Private receiver	Moderate	Supplementary vegetation screening will be offered to the landholder along the eastern side of the dwelling, targeting views towards the eastern portion of the project while retaining the broader outlook across the valley and towards the forested hills. Refer to Photomontage 9.	Low

Photomontage 1

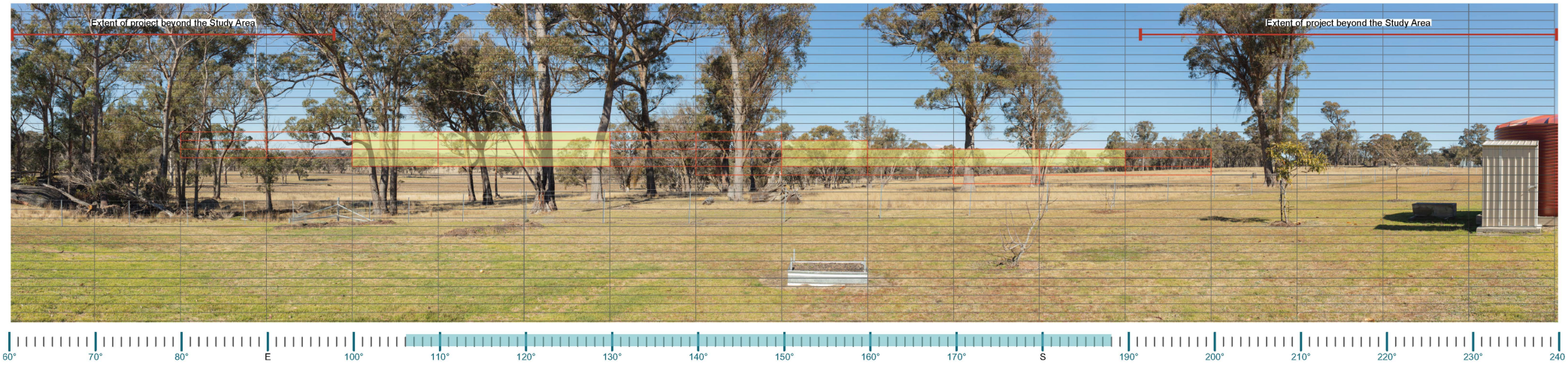
Receiver ID: N-39 D5 primary view facing southeast, without mitigation / with mitigation

umwelt

Receiver ID:
N-39 D5 Primary view

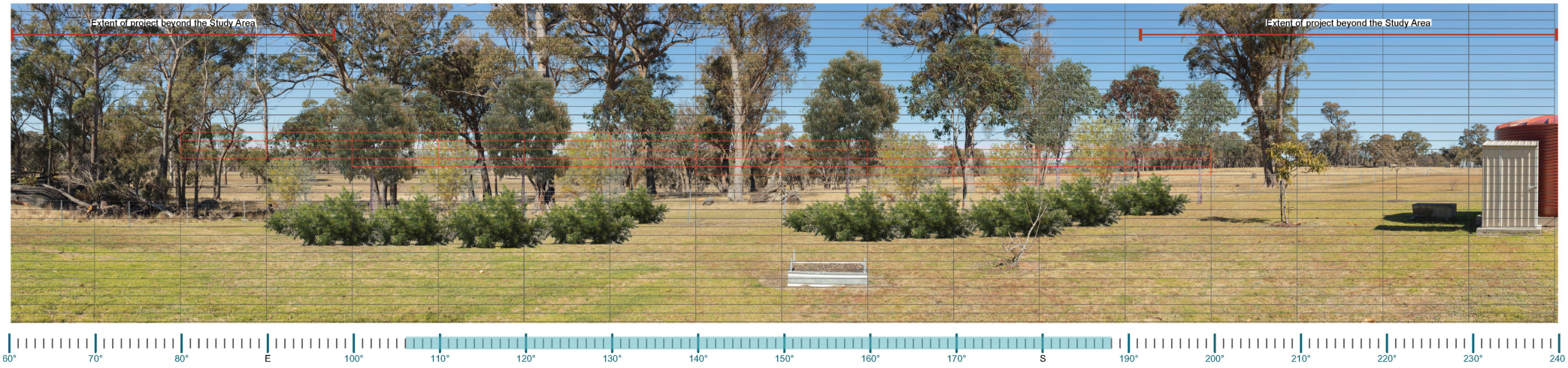
LEGEND:

- Cell occupied by transmission tower
- Cell unoccupied due to intervening elements
- Extent of project located within the study area



Number of Occupied Cells: 21 - Moderate

180° Proposed View (without mitigation)



Number of Occupied Cells: 0 - Nil

180° Proposed View (with mitigation)

Image Source: Moir Studio (2026)

Photomontage 2

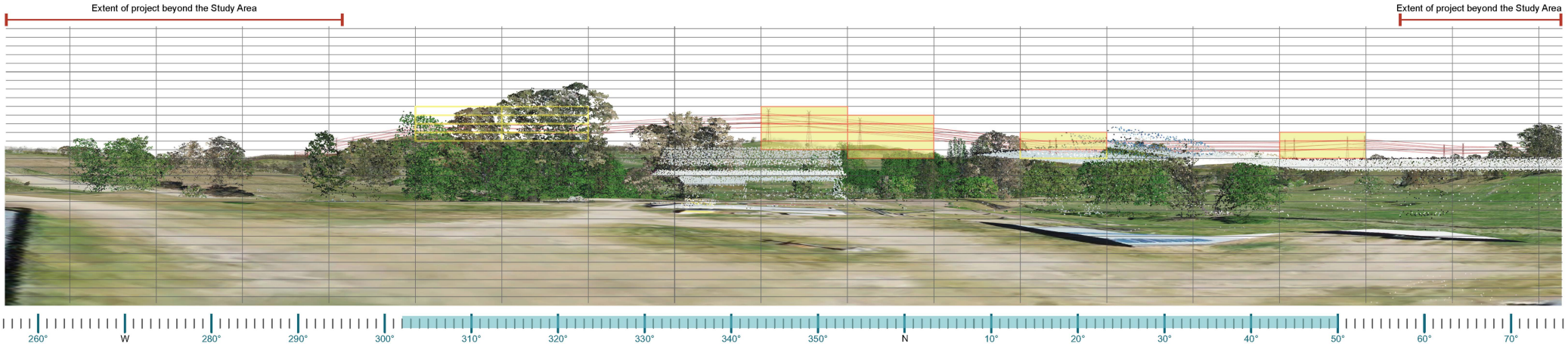
Receiver ID: O-32 D2 secondary viewpoint, LiDAR photomontage without mitigation / with mitigation

umwelt

Receiver ID:
O-32 D2
180° Detailed Assessment

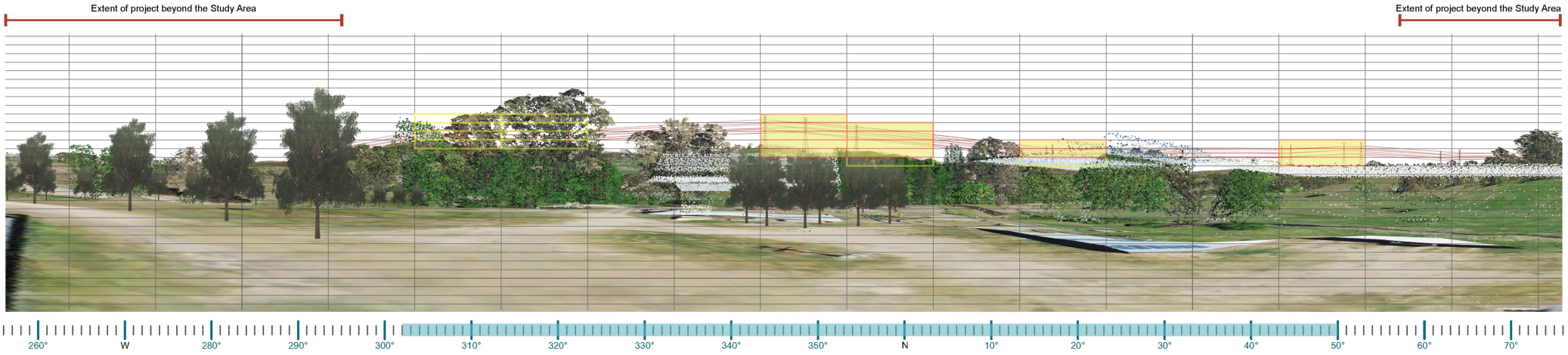
Secondary Viewpoint
LiDAR Photomontage

LEGEND:
- Cell occupied by transmission tower
- Cell unoccupied due to intervening elements
- Extent of project located within the study area



Number of Occupied Cells: 15 - Moderate

180° Proposed View (without mitigation)



Number of Occupied Cells: 14 - Low

180° Proposed View (with mitigation)

Image Source: Moir Studio (2026)

Photomontage 3

Receiver ID: I-8 D9 primary view facing southwest, LiDAR photomontage, without mitigation / with mitigation

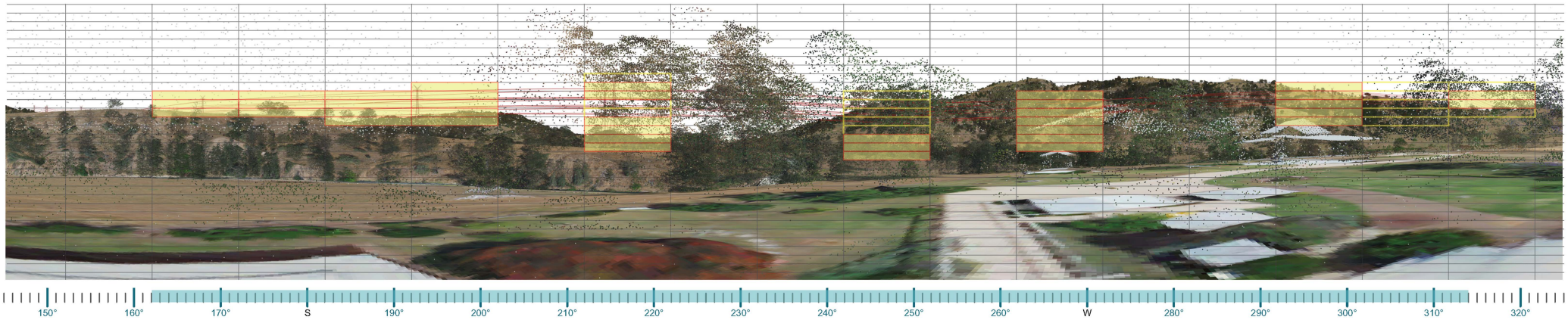
umwelt

Receiver ID:
I-8 D9
180° Detailed Assessment

Primary view
LiDAR Photomontage

LEGEND:
- Cell occupied by transmission tower
- Cell unoccupied due to intervening elements
- Extent of project located within the study area

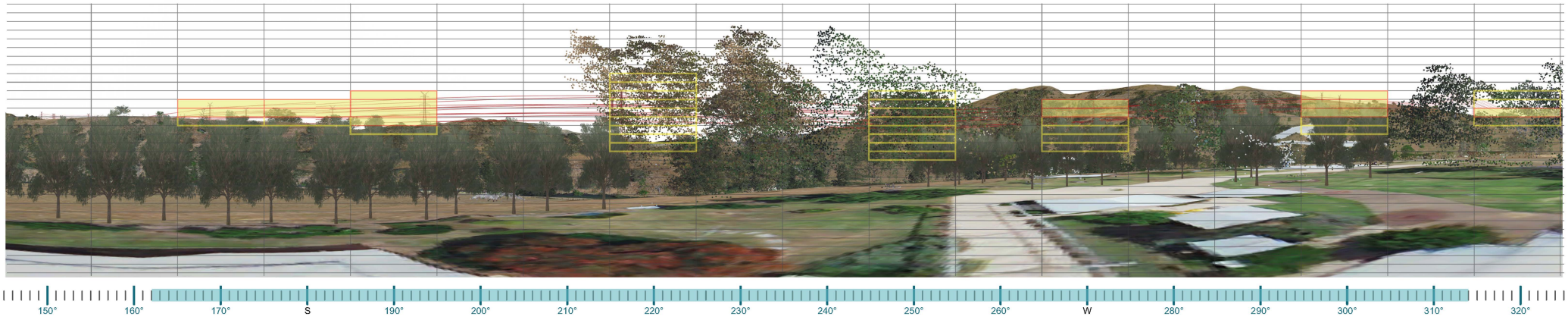
Extent of project beyond the Study Area



Number of Occupied Cells: 38 - Very High

180° Proposed View (without mitigation)

Extent of project beyond the Study Area



Number of Occupied Cells: 14 - Low

180° Proposed View (with mitigation)

Image Source: Moir Studio (2026)

Photomontage 4

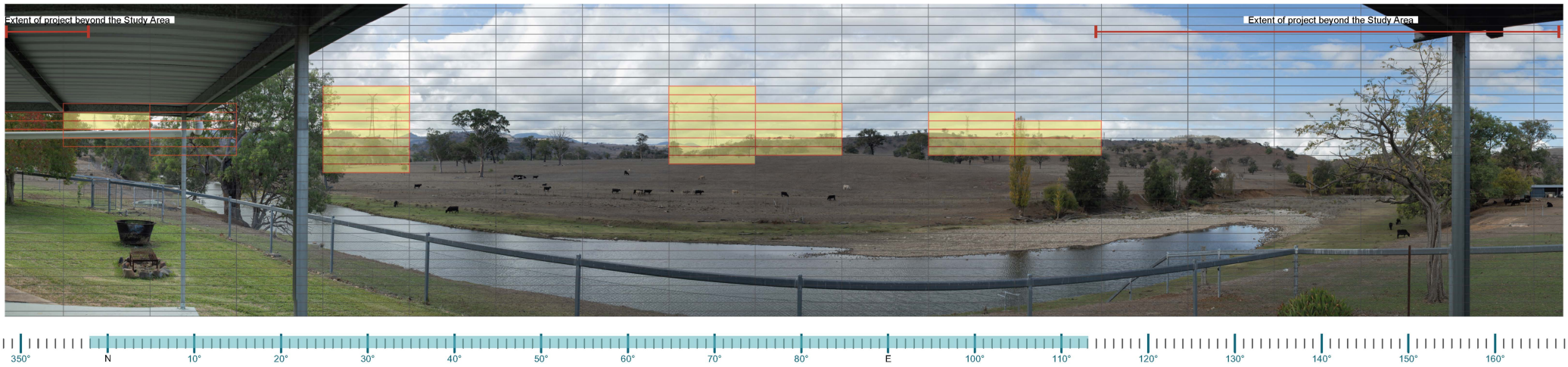
Receiver ID: I-8 DN7 primary view facing east, without mitigation / with mitigation

Receiver ID:

I-8 DN7 Primary view

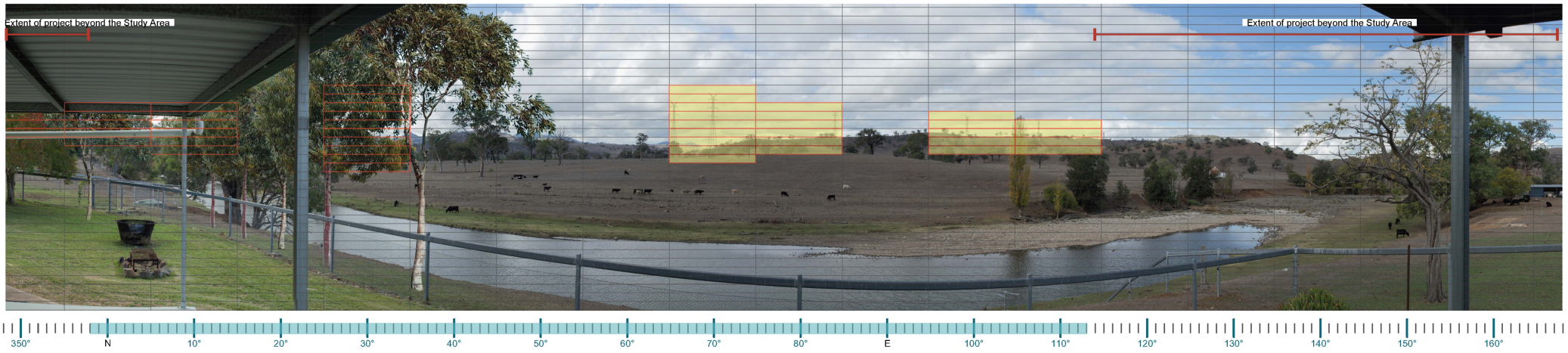
LEGEND:

- Cell occupied by transmission tower
- Cell unoccupied due to intervening elements
- Extent of project located within the study area



180° Proposed View (without mitigation)

Number of Occupied Cells: 36 - High



180° Proposed View (with mitigation)

Number of Occupied Cells: 24 - Moderate

Image Source: Moir Studio (2026)

Photomontage 5a

Receiver ID: I-8 SRA1, primary view facing northeast, LiDAR photomontage without mitigation / with mitigation

umwelt

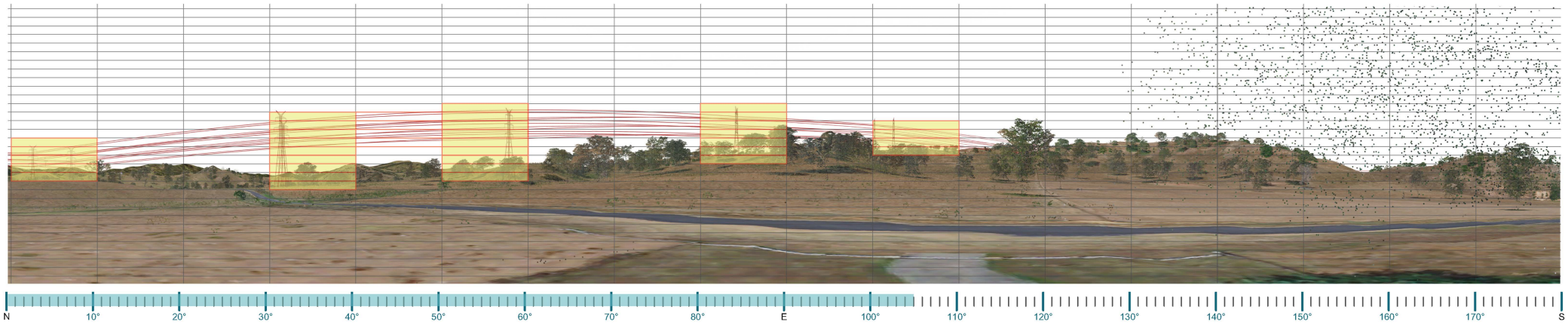
Receiver ID:

I-8 SRA1

180° Detailed Assessment

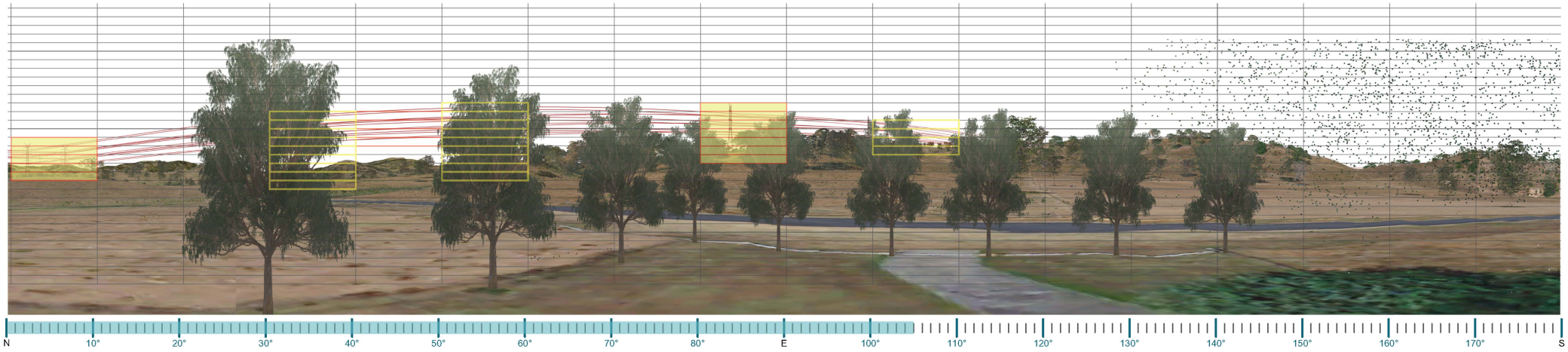
Primary view
LiDAR Photomontage

LEGEND:
- Cell occupied by transmission tower
- Cell unoccupied due to intervening elements
- Extent of project located within the study area



180° Proposed View (without mitigation)

Number of Occupied Cells: 34



180° Proposed View (with mitigation)

Number of Occupied Cells: 12

Image Source: Moir Studio (2026)

Photomontage 5b

Receiver ID: I-8 SRA1, supplementary road-side viewpoint facing northwest without mitigation / with mitigation

umwelt

Receiver ID:

I-8 SRA1

Place of worship (Supplementary road-side viewpoint facing Northeast)

LEGEND:

- Cell occupied by transmission tower
- Cell unoccupied due to intervening elements
- Extent of project located within the study area



Number of Occupied Cells: 41

180° Proposed View (without mitigation)



180° Proposed View (with mitigation)

Number of Occupied Cells: 34

Viewpoint note: This photomontage was prepared from the public road reserve outside the Rouchel Church property because site access was unavailable. The road-based photomontage illustrates project visibility from this location but does not represent the primary outlook from the church entrance or the screening effect of the proposed on-site planting. The residual impact assessment are therefore based on the LiDAR-rendered view from the church entrance.

Image Source: Moir Studio (2026)

Photomontage 6

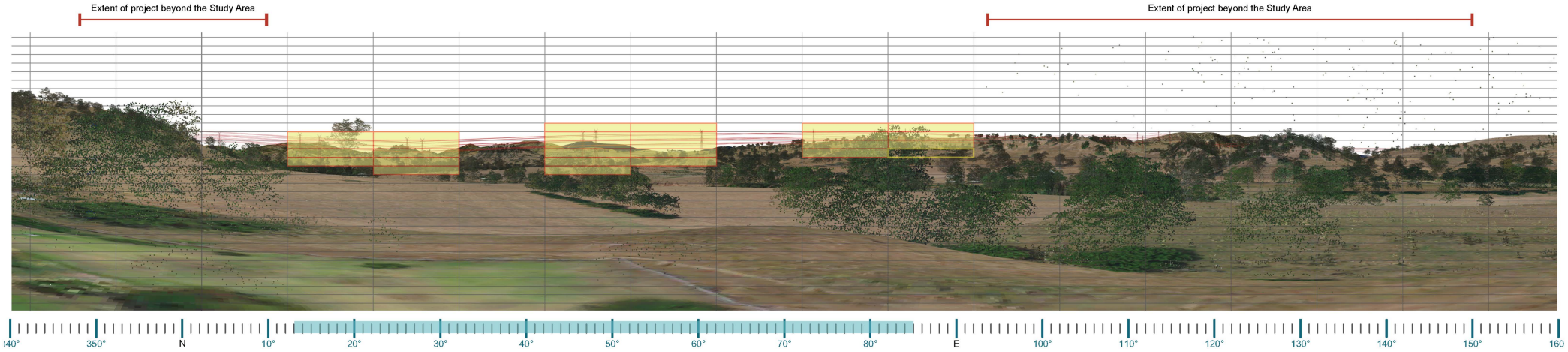
Receiver ID: I-8 D7, primary view facing east, LiDAR photomontage without mitigation / with mitigation

umwelt

Receiver ID:
I-8 D7
180° Detailed Assessment

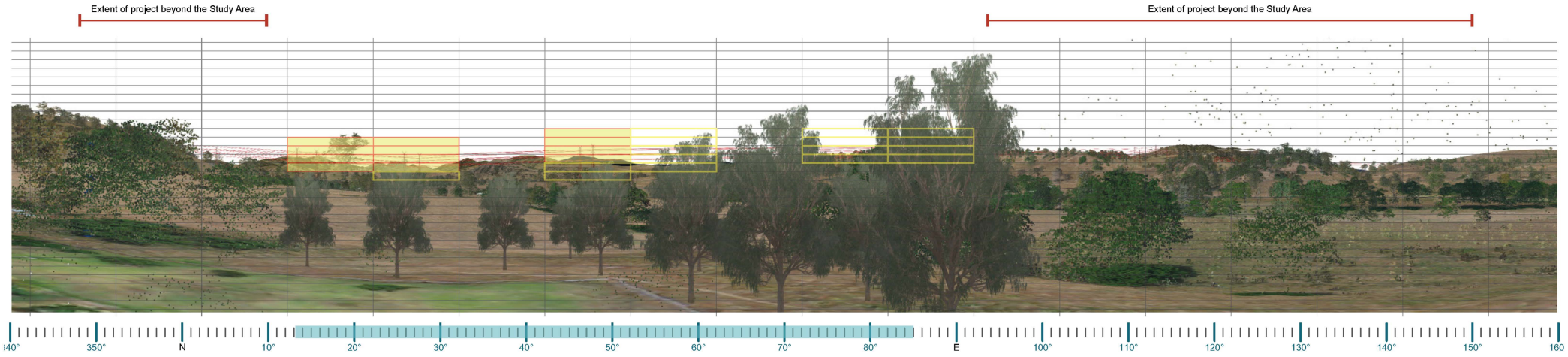
Primary view
LiDAR Photomontage

LEGEND:
- Cell occupied by transmission tower
- Cell unoccupied due to intervening elements
- Extent of project located within the study area



Number of Occupied Cells: 27 - Moderate

180° Proposed View (without mitigation)



Number of Occupied Cells: 12 - Low

180° Proposed View (with mitigation)

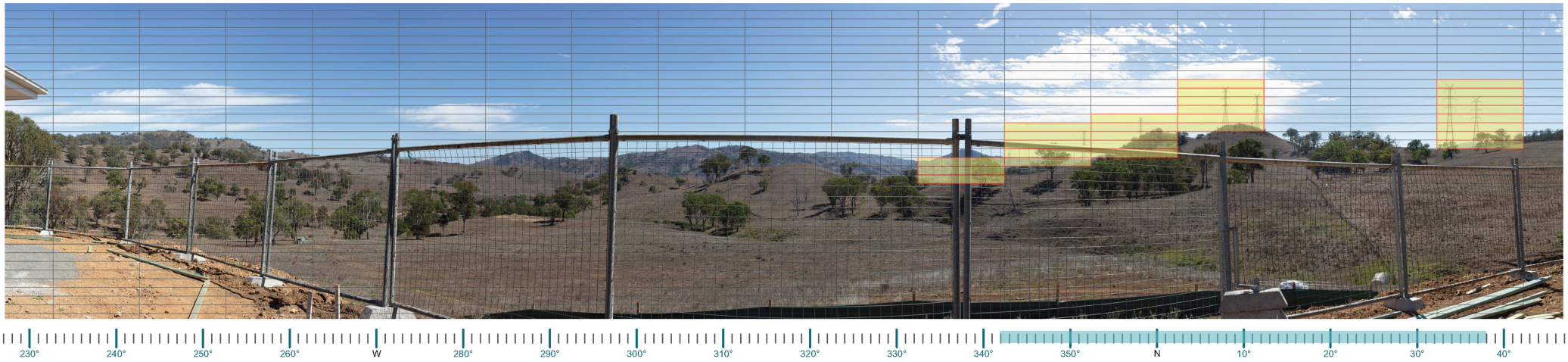
Image Source: Moir Studio (2026)

Photomontage 7a **Receiver ID:** I-7 DB1 primary view facing north without mitigation / with mitigation at 5 years

Receiver ID:
I-7 DB1 Primary view

LEGEND:
- Cell occupied by transmission tower
- Cell unoccupied due to intervening elements
- Extent of project located within the study area

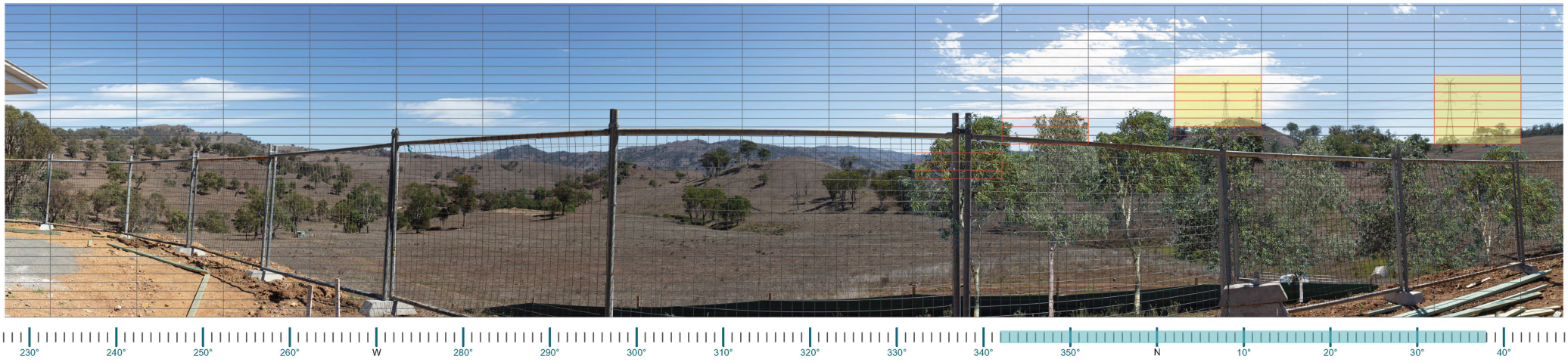
Extent of project beyond the Study Area



180° Proposed View (without mitigation)

Number of Occupied Cells: 27 - High

Extent of project beyond the Study Area



180° Proposed View (with mitigation) - 5 years

Number of Occupied Cells: 14 - Low

Image Source: Moir Studio (2026)

Photomontage 7b **Receiver ID:** I-7 DB1 primary view facing north with mitigation at 5 years and at 10 years

Receiver ID:

I-7 DB1 Primary view

Extent of project beyond the Study Area



180° Proposed View (with mitigation) - 5 years

Extent of project beyond the Study Area



180° Proposed View (with mitigation) - 10 years

Image Source: Moir Studio (2026)

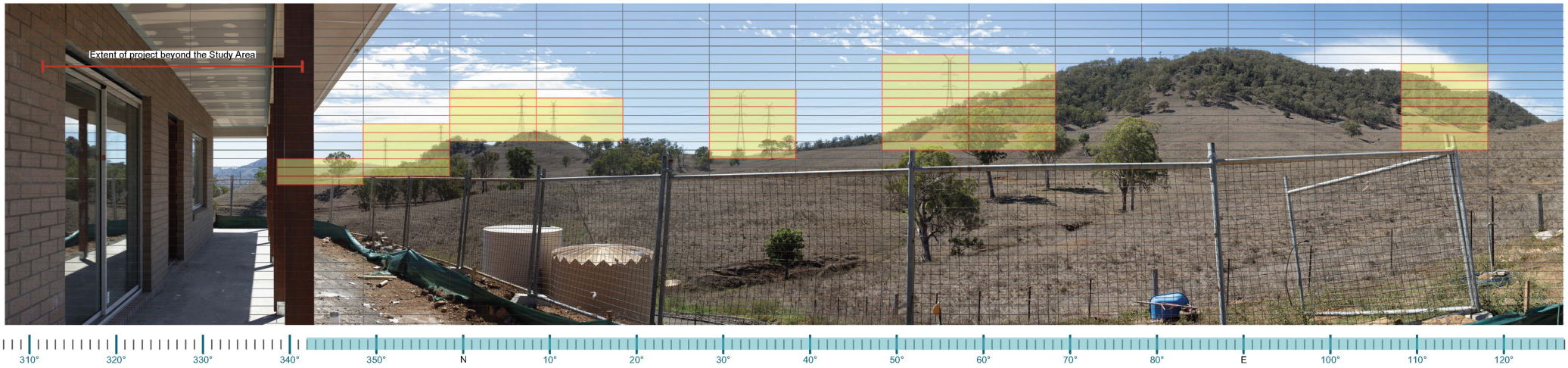
Photomontage 7c

Receiver ID: I-7 DB1 secondary view facing northeast without mitigation / with mitigation at 5 years

Receiver ID:

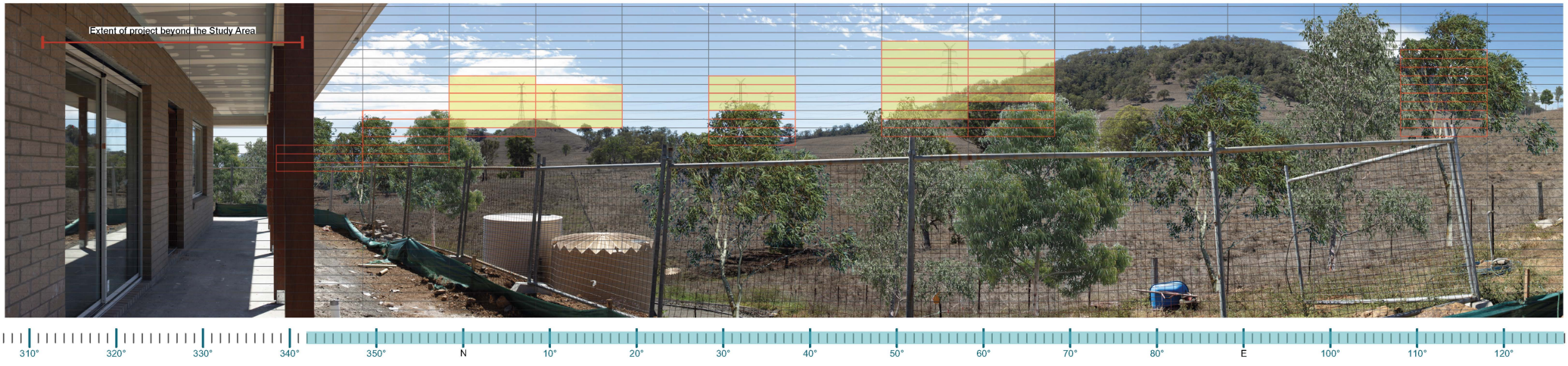
I-7 DB1 Secondary Viewpoint

LEGEND:
- Cell occupied by transmission tower
- Cell unoccupied due to intervening elements
- Extent of project located within the study area



Number of Occupied Cells: 59 - Very High

180° Proposed View (without mitigation)



Number of Occupied Cells: 30 - High

180° Proposed View (with mitigation) - 5 years

Image Source: Moir Studio (2026)

Photomontage 7d I-7 DB1 secondary view facing northeast with mitigation at 5 years and at 10 years

Receiver ID:

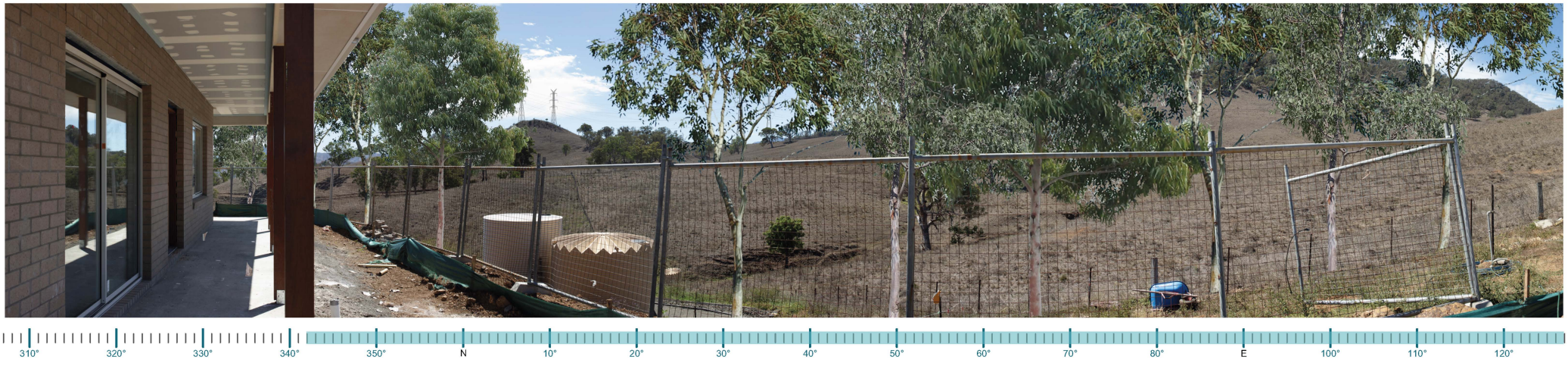
I-7 DB1 Secondary Viewpoint

Extent of project beyond the Study Area



180° Proposed View (with mitigation) - 5 years

Extent of project beyond the Study Area



180° Proposed View (with mitigation) - 10 years

Image Source: Moir Studio (2026)

Photomontage 8

H-5 D2 primary view facing southwest, LiDAR photomontage without mitigation / with mitigation

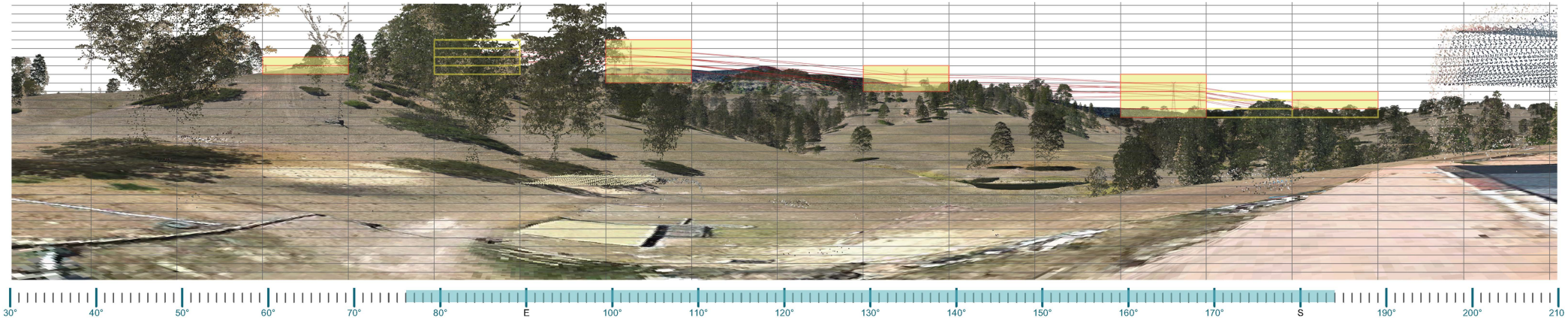
umwelt

Receiver ID:

H-5 D2

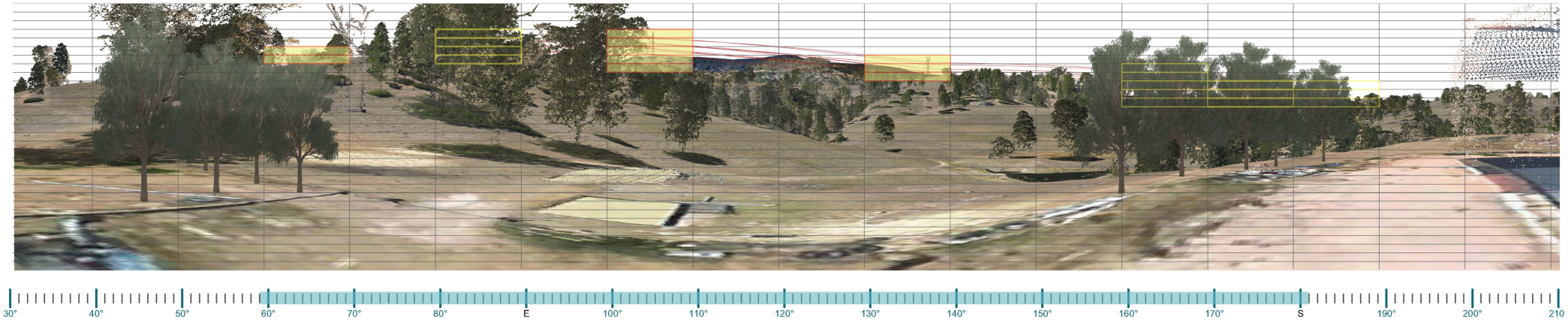
180° Detailed Assessment

Primary View
LiDAR Photomontage



Number of Occupied Cells: 17 - Moderate

180° Proposed View (without mitigation)



Number of Occupied Cells: 10 - Low

180° Proposed View (with mitigation)

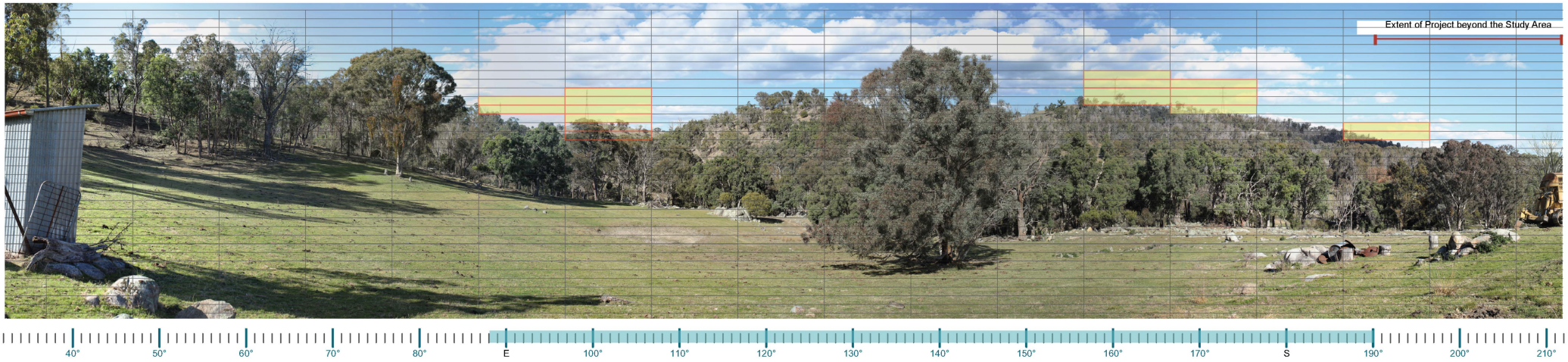
Image Source: Moir Studio (2026)

Photomontage 9 O-45 DE1 primary view facing southeast without mitigation / with mitigation

Receiver ID:

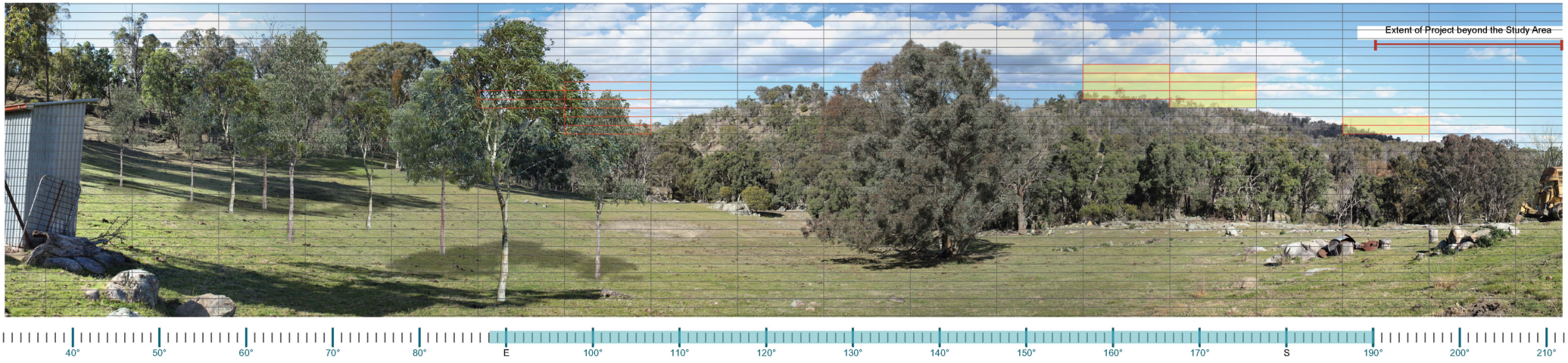
O-45 DE1 Primary view

LEGEND:
- Cell occupied by transmission tower
- Cell unoccupied due to intervening elements
- Extent of project located within the study area



Number of Occupied Cells: 16 - Moderate

180° Proposed View (without mitigation)



Number of Occupied Cells: 10 - Low

180° Proposed View (with mitigation) - 5 years

Image Source: Moir Studio (2026)

11.6.2 Management and mitigation

Mitigation measures are considered across 2 phases, namely primary measures which are incorporated during the design and refinement of the project, and secondary measures which address any residual visual effects.

The project has had numerous design changes and refinements informed by a preliminary visual assessment and ongoing community consultation. This iterative process has supported a proactive approach to minimising visual impacts in response to identified constraints and sensitive receivers. Further detail is provided in Appendix B. This process sought to minimise potential impacts across environmental, social and visual domains wherever practicable. Key design strategies considered during the planning and design phase included:

- maximising separation distances from existing dwellings and townships
- avoiding national parks, conservation areas and culturally sensitive locations
- preferentially locating infrastructure within disturbed mining and energy operational land
- utilising operational forestry land while avoiding recreational areas
- limiting vegetation clearance to the extent required for safe construction, operation and maintenance of the transmission infrastructure
- responding to local landform and landscape features to reduce visibility and visual prominence where feasible.

Secondary management and mitigation measures identified to address residual visual impacts are identified in Table 11.6. These measures are typically more localised and may include targeted responses at specific receiver locations or viewpoints.

Table 11.6. Secondary mitigation measures

Reference	Impact	Mitigation	Timing	Relevant location
LV1	Visual impact from infrastructure	Infrastructure will be designed to reduce visual contrast with the surrounding landscape. This will include the following measures: • a recessive colour palette will be selected for substations, switching stations and ancillary facilities to reduce contrast with the surrounding landscape • unnecessary lighting, signage and external fittings associated with infrastructure will be avoided • low-reflectivity materials and finishes will be used on transmission towers and ancillary structures to minimise glare • substations and switching stations will be sited within the project area to use existing landform or vegetation screening where practicable • the visual footprint of infrastructure will be limited through compact layout and consolidation of elements where practicable • temporary infrastructure not required for ongoing operation will be removed following construction, and disturbed areas will be rehabilitated • building materials and finishes will be selected to support visual integration with the surrounding rural landscape.	Detailed design Construction Operation	Energy hubs, substations, switching stations, Nemingha maintenance facility, workforce accommodation camps, laydown areas and infrastructure sites
LV2	Visual impact from access tracks	Access tracks will be designed and managed to reduce visual contrast and temporary disturbance. This will include the following: • new access tracks will be designed to minimise earthworks (cut and fill) and avoid unnecessary vegetation removal • existing tracks and roads will be used or upgraded where available to reduce the extent of new disturbance • access tracks not required for operation will be rehabilitated following construction	Detailed design Pre-construction Operation	Access tracks and road upgrade areas

Reference	Impact	Mitigation	Timing	Relevant location
		• locally appropriate surface materials will be used where practicable to reduce visual contrast • temporary disturbance areas associated with access tracks will be clearly defined and progressively rehabilitated where practicable.		
LV3	Visual impact from transmission line and tower design	Transmission line alignment, tower siting and tower design will be reviewed during detailed design to reduce visual prominence where practicable. This will include the following measures: • alignment and tower siting will respond to landform and landscape features to reduce visual prominence, including avoiding skyline locations where practicable • transmission structures will be located to be viewed against more visually complex backgrounds, including vegetation or landform, rather than open sky where practicable • tower placement will consider the relationship between transmission structures and sensitive receivers, including avoiding direct alignment within primary view corridors where practicable • separation distances between transmission structures and sensitive receivers will be maximised where practicable • tower height, form and spacing will be considered during detailed design to reduce visual prominence in sensitive areas • tower spacing at road crossings and key viewpoints will be maximised where practicable to reduce visual clutter • standardised tower designs and finishes will be used to maintain visual consistency along the alignment.	Detailed design Construction	Transmission line corridor, road crossings, key public viewpoints and sensitive receiver locations

Reference	Impact	Mitigation	Timing	Relevant location
LV4	Residual visual impacts to sensitive receivers	Supplementary planting or screening will be offered to landholders and managers of private receivers and sensitive land uses assessed as having moderate or high visual impacts. Planting layouts will be developed with the landholder or relevant manager and will target primary viewing areas, integrate with existing mature vegetation and filter views toward transmission towers, energy hubs, workforce accommodation camps and laydown areas.	Detailed design Pre-construction Construction	Private receivers and sensitive land uses assessed as having moderate or high visual impacts, including Rouchel Church
LV5	Loss of existing vegetation screening	Existing vegetation that contributes to visual screening and landscape character will be retained and managed where practicable. This will include the following measures: • existing vegetation will be retained to the maximum extent practicable, including adopting a targeted approach to vegetation clearance rather than full easement clearing where practicable and in accordance with the BMP • retained vegetation will be managed during construction in accordance with the BMP • vegetation management will maintain existing screening and landscape character, where safe and practicable.	Detailed design Pre-construction Construction Operation	Transmission line corridor, access tracks, energy hubs, laydown areas, workforce accommodation camps and sensitive receiver locations
LV6	Visual impact on cultural and sensitive landscapes	Infrastructure located near cultural and sensitive landscape settings will be reviewed during detailed design to minimise visual intrusion where practicable. This will include the following measures: • culturally important view lines, landscapes and heritage values will be considered during detailed design, with infrastructure positioned to minimise intrusion where practicable • impacts to national parks, conservation areas and culturally sensitive locations will be avoided or minimised where practicable.	Detailed design	National parks, conservation areas, heritage settings, culturally sensitive landscapes and other sensitive landscape areas

Reference	Impact	Mitigation	Timing	Relevant location
LV7	Night lighting impacts	Lighting will be designed and managed to minimise light spill, glare and sky glow. This will include the following measures: • lighting associated with energy hubs and ancillary infrastructure sites will be minimised and limited to operational requirements • directional lighting and shielding will be used to reduce light spill to surrounding areas • low-intensity lighting will be used where practicable • lighting will be switched off or reduced when not required for safety or operational purposes • lighting will comply with Australian/New Zealand Standard AS/NZS 4282:2019, Control of the obtrusive effects of outdoor lighting, where applicable.	Detailed design Construction Operation	Energy hubs, Nemingha maintenance facility, workforce accommodation camps, laydown areas, construction areas and ancillary infrastructure sites
LV8	Temporary construction visual impacts	Construction work areas will be managed to reduce temporary visual impacts. This will include the following measures: • temporary works areas will be rehabilitated following construction to return land to its previous use or an approved stable condition • equipment, materials, stockpiles and temporary facilities will be stored away from prominent or highly visible locations where practicable • temporary disturbance areas will be clearly defined and maintained in an orderly condition during construction • dust generation will be managed in accordance with relevant construction environmental management measures to reduce visual and amenity impacts.	Construction Prior to operation	Transmission line corridor, laydown areas, access tracks, road upgrade areas and temporary disturbance areas

Reference	Impact	Mitigation	Timing	Relevant location
LV9	Residual visual impacts in the Rouchel area	During detailed design, EnergyCo will review opportunities to further reduce visual impacts in the Rouchel area (Rouchel Brook and Upper Rouchel). This will include consideration of local tower siting, tower height, tower form, tower spacing, the number of visible towers and the use of landform and retained vegetation to reduce visual prominence. The review will document the design response and any constraints that limit further visual refinement.	Detailed design	Rouchel area
LV10	Transmission tower visual impact within the I-7 DB1 setback	No transmission towers will be located within the 377 metre visual setback identified for receiver I-7 DB1. This setback will be mapped and managed as a visual exclusion zone for I-7 DB1 during detailed design and will be considered in tower siting, tower spacing and alignment refinement.	Detailed design	Transmission line corridor near receiver I-7 DB1
LV11	Public road visual amenity	For PVP-07 and other relevant public road viewpoints, existing roadside vegetation will be retained where compatible with road safety and construction requirements. Any localised supplementary planting will be limited to locations where it does not obstruct road safety sightlines or important rural views and will be confirmed with the relevant road authority.	Detailed design Construction	PVP-07, Niangala Road, Niangala-Walcha Road and other relevant public road viewpoints

Land use and property



Section 12

12 Land use and property

This section provides a summary of the assessment undertaken to identify the potential impacts of the project on existing land uses and property during construction and operation of the project and identifies mitigation and management measures to be implemented to minimise these impacts.

This section includes information from the Agricultural Impact Assessment and Economic Impact Assessment which are provided in full in Technical Report 6 and 8 respectively.

12.1 Assessment approach

This land use and property assessment has been prepared with reference to the SEARs set out in Appendix A. It also considers issues raised in engagement with community stakeholders (refer to Section 5) relating to impacts to land use and property value, including impacts to natural areas of high community value such as Nundle State Forest, high value agricultural land, equine CIC and agricultural operations in the region.

The methodology for assessing the potential land use and property impacts of the project involved:

- reviewing the legislative and policy context relevant to land use and property within and surrounding the project area
- identifying and mapping existing land uses within and surrounding the project area based on a desktop review of spatial data, aerial photography, land use and land zoning mapping and other available information
- analysing and describing the existing environment as it relates to land use and property
- investigating any native title claims existing within the project area through searches of the following databases on 10 April 2026 (as part of the ACHA):
  - the Register of Native Title Claims
  - the National Native Title Register
  - the Register of Indigenous Land Use Agreements, native title applications, registration decisions and determinations.
- reviewing Aboriginal land claims, including a search of the NSW Register of Aboriginal Land Claims
- reviewing relevant technical reports developed to support the preparation of this EIS

- assessing the potential changes to land use and potential impacts to property from construction and operation of the project, including consideration of the issues raised through engagement with the community, stakeholders and landholders (refer to Section 5)
- identifying mitigation and management measures to avoid, minimise or manage land use and property impacts from the construction and operation of the project.

12.2 Existing environment

12.2.1 Land zoning

Land zoning throughout the project area (as identified in applicable LEPs) is shown on Figure 12.1, and is predominantly RU1 – Primary Production, being 79 per cent of the project area.

The northern portion of the project area from the North Hub to Central Hub A is mostly land zoned RU2 – Rural Landscape. The central portion of the project area again contains land that is mostly RU1 with some pockets of land with different zonings including RU2, with areas zoned RU3 – Forestry (associated with Nundle, Terrible Billy and Hanging Rock State Forests) and areas of RU4 – Primary Production Small Lots. Smaller areas in the southern portion of the project area associated with Bayswater Power Station and Lake Glenbawn are zoned as SP2 – Infrastructure.

12.2.2 Land use

An analysis of the NSW Land Use 2017 data set (regional land use mapping) was undertaken for the project to determine the existing land use within the project area. It is noted that some members of the community have raised concerns with the limitations of using some of these government datasets for land use mapping as there may be differences on a property-by-property basis. This is acknowledged, however, at the scale of the project, this mapping does provide useful information for consideration in this assessment. As described in Section 13 and Technical Report 6, the assessment of land use impacts was also supported by landholder discussions, where possible, to obtain information on the agricultural enterprises at each property including usual agricultural productions (crops, stock etc), as well as any property specific impacts or issues to be considered for the project. These will be considered in Property Specific Management Plans (PSMPs) for individual properties impacted by the project should the project be approved.

Based on the regional land use mapping, the primary mapped land use within the project area is grazing at 86 per cent, made up of grazing in native vegetation (at 45 per cent of the project area) and grazing modified pastures (41 per cent). Other major land uses include transport (4 per cent), cropping (3 per cent) and forestry (3 per cent). The total mapped area of agricultural land use is around 9,760 hectares or 89 per cent of the project area. It is noted, however, that around 0.25 per cent of the mapped agricultural land use (26 hectares) also functions as buffer land to mining operations or is owned by mining or energy companies and leased for agricultural purposes.

Land use within the project area is outlined in Table 12.1 and Figure 12.2.

Table 12.1. Land use within the project area (sourced from NSW Land Use 2017)

Land use	Approximate area within the project area (hectares)	Approximate proportion of project area (%)
Grazing native vegetation	4,920	45.0
Grazing modified pastures	4,508	41.3
Transport	458	4.2
Cropping	331	3.0
Production native forestry	174	1.6
Plantation forests	146	1.3
Other minimal use[1]	132	1.2
Utilities	119	1.1
River	41	0.4
Reservoir/dam	40	0.4
Mining[2]	26	0.2
Lake	17	0.2
Residential and farm infrastructure	8	0.1
Managed resource protection	3	<0.1
Other[3]	3	<0.1
Services	2	<0.1
Total	**10,928**	**100%**

1 'Other minimal use' refers to areas of land that are largely unused (in the context of the main use) but may have ancillary uses (for example there may be terrain features which make use difficult or prohibitive). This includes stock routes and residual native cover.

2. Areas mapped as 'mining' includes buffer land and ancillary areas which are not in use for mining purposes.

3 'Other' includes land in transition, grazing irrigated modified pastures, intensive animal production, perennial horticulture, and nature conservation.

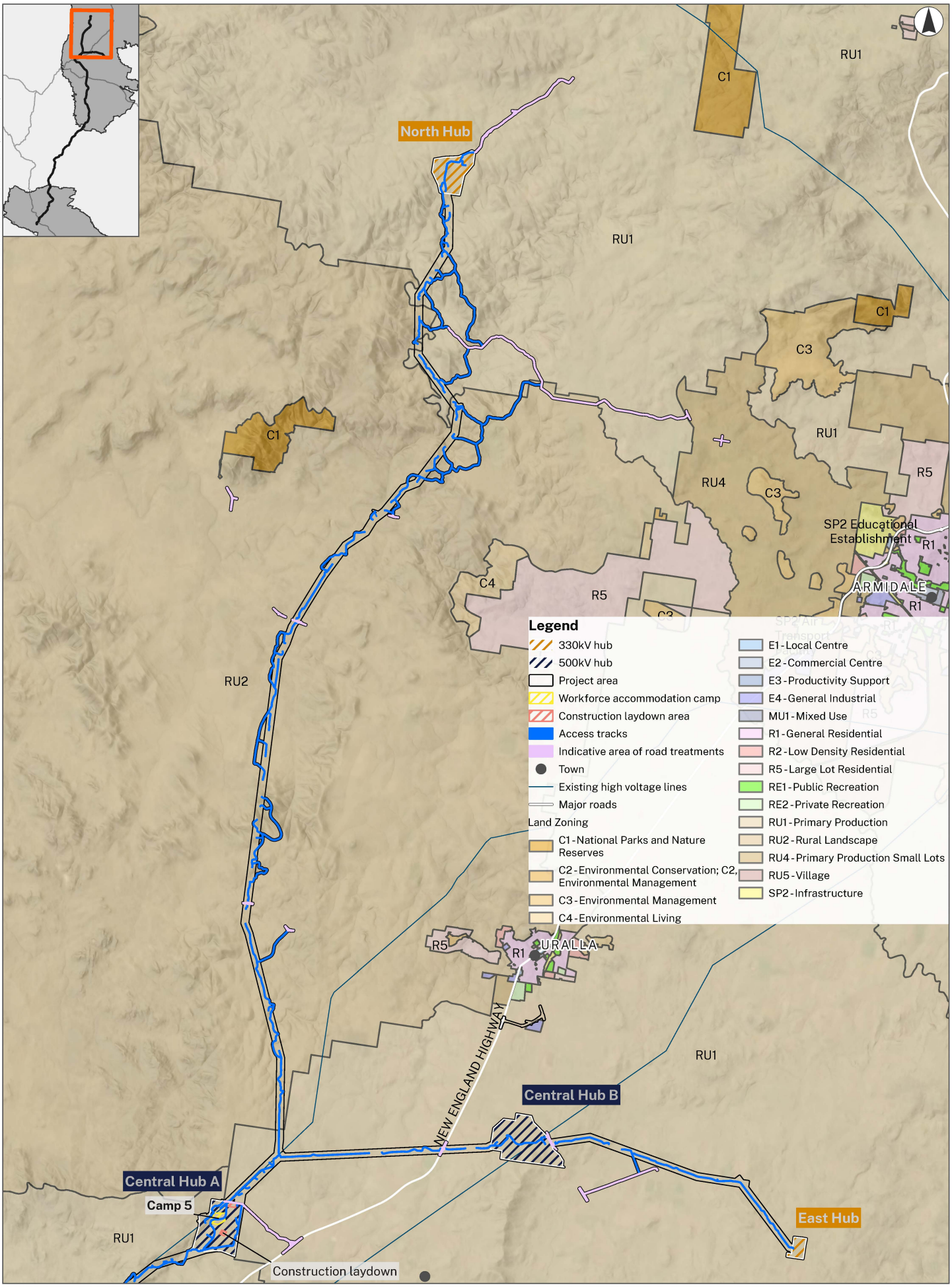


FIGURE 12.1a Land zoning within and surrounding the project area (Map 1 of 5)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

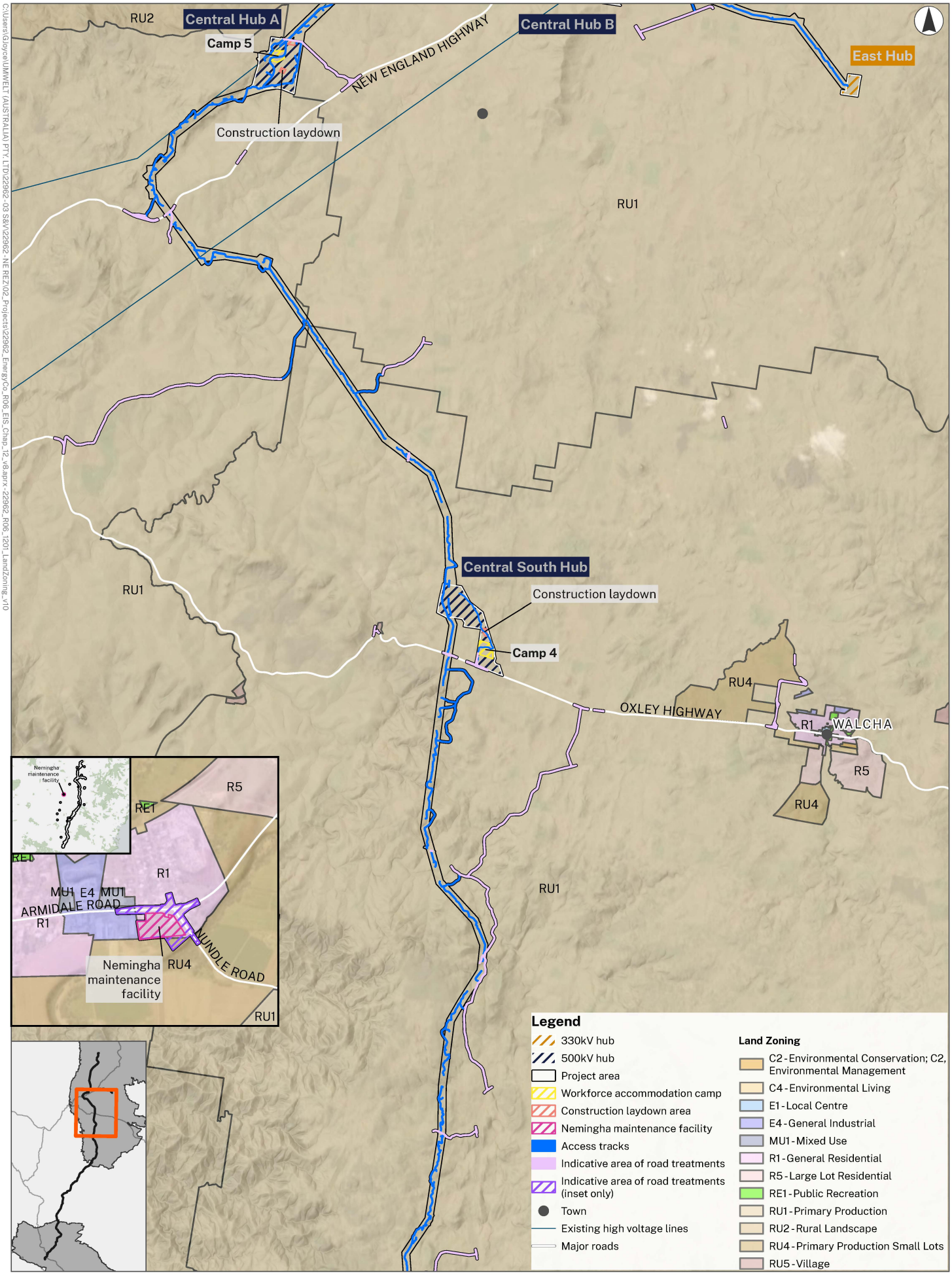


FIGURE 12.1b Land zoning within and surrounding the project area (Map 2 of 5)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

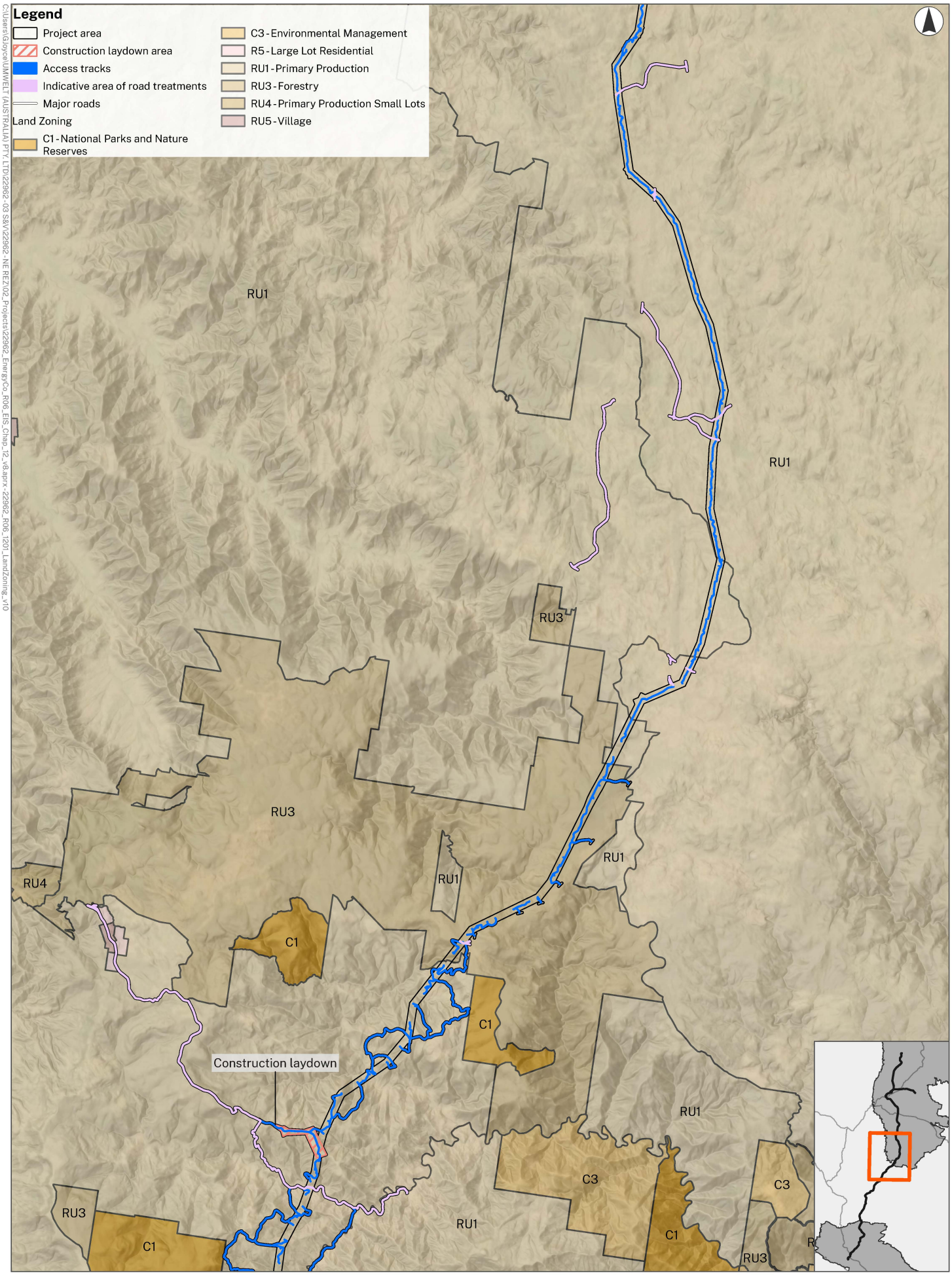


FIGURE 12.1c Land zoning within and surrounding the project area (Map 3 of 5)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

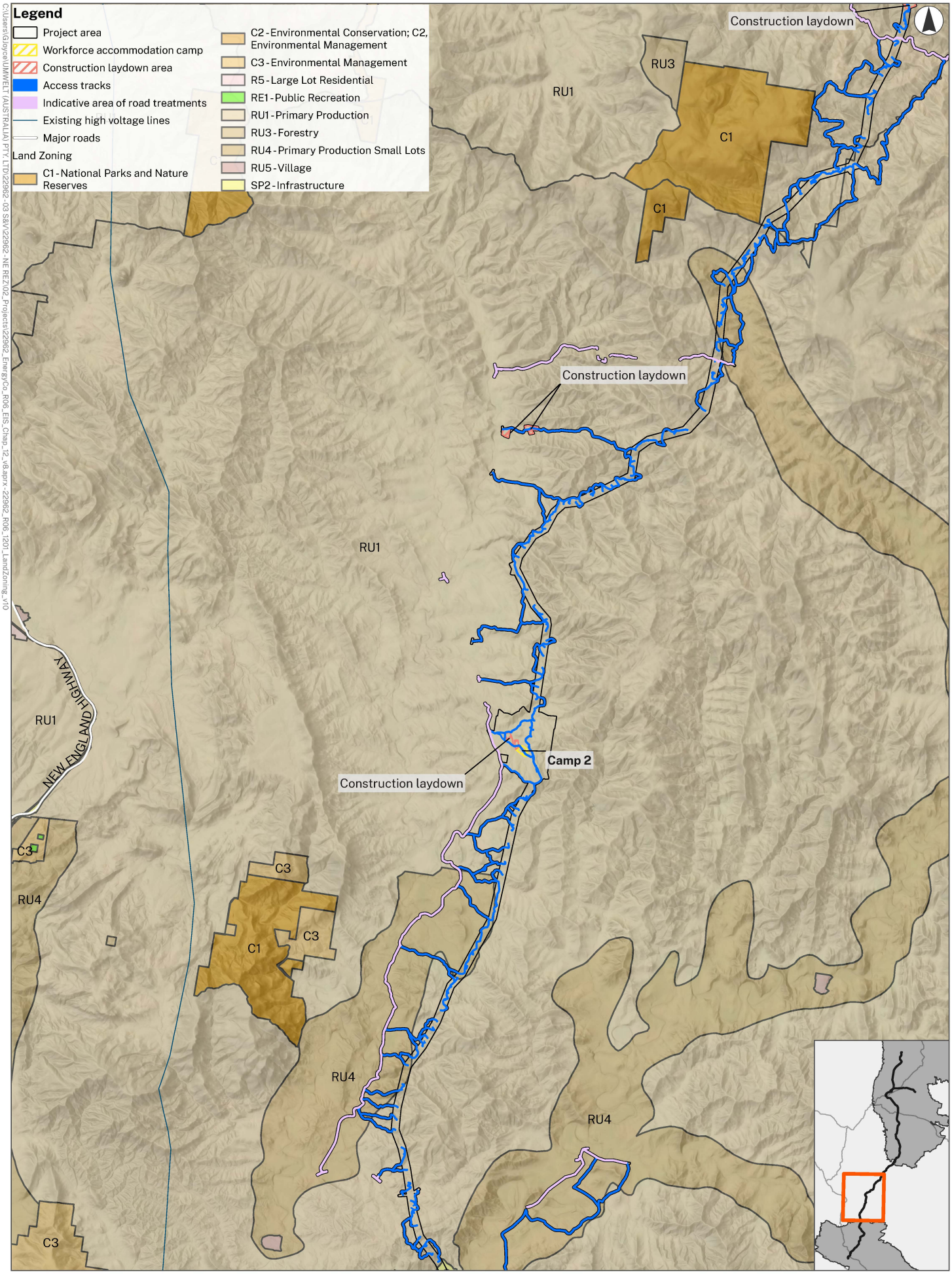


FIGURE 12.1d Land zoning within and surrounding the project area (Map 4 of 5)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

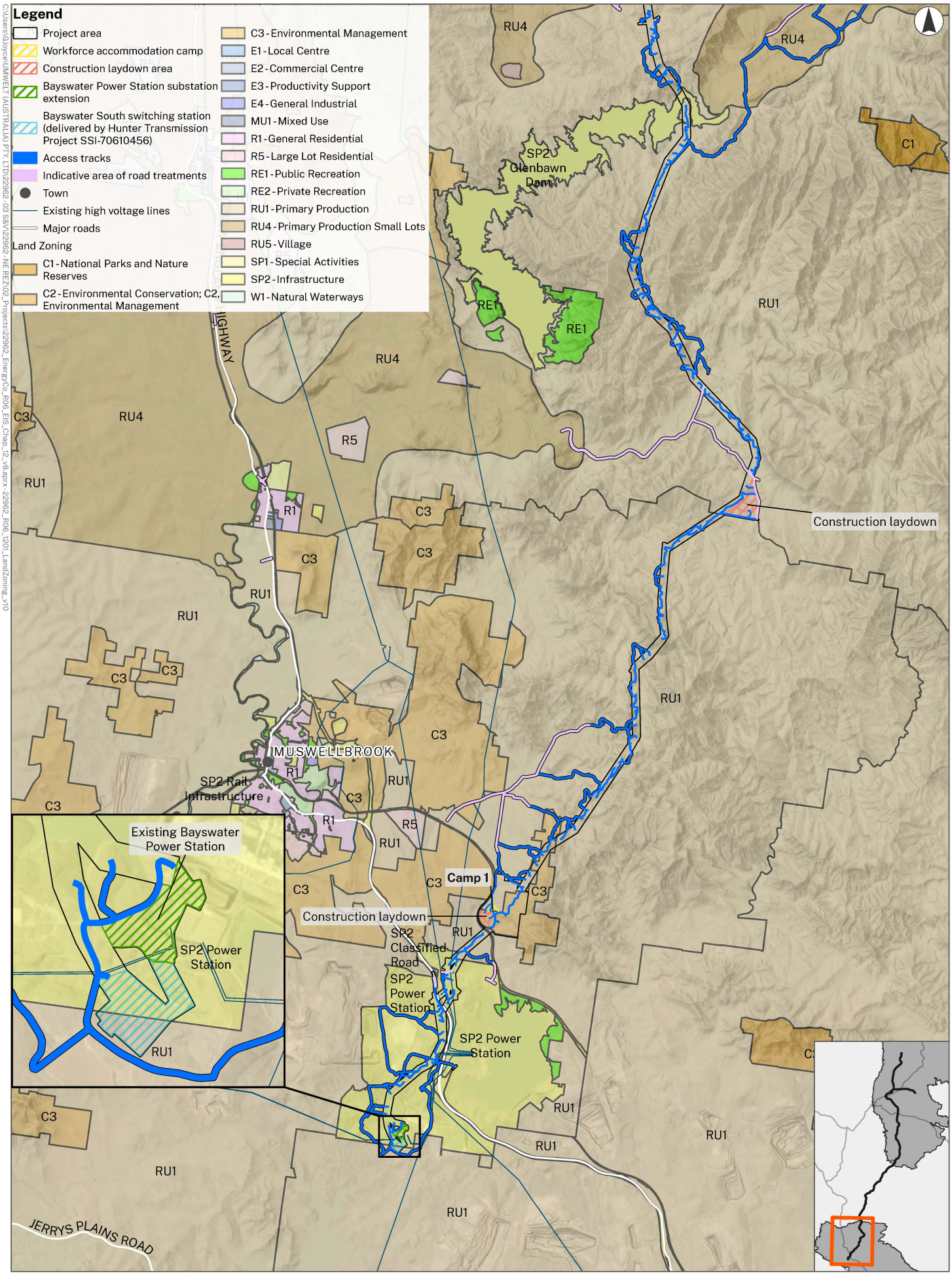


FIGURE 12.1e Land zoning within and surrounding the project area (Map 5 of 5)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

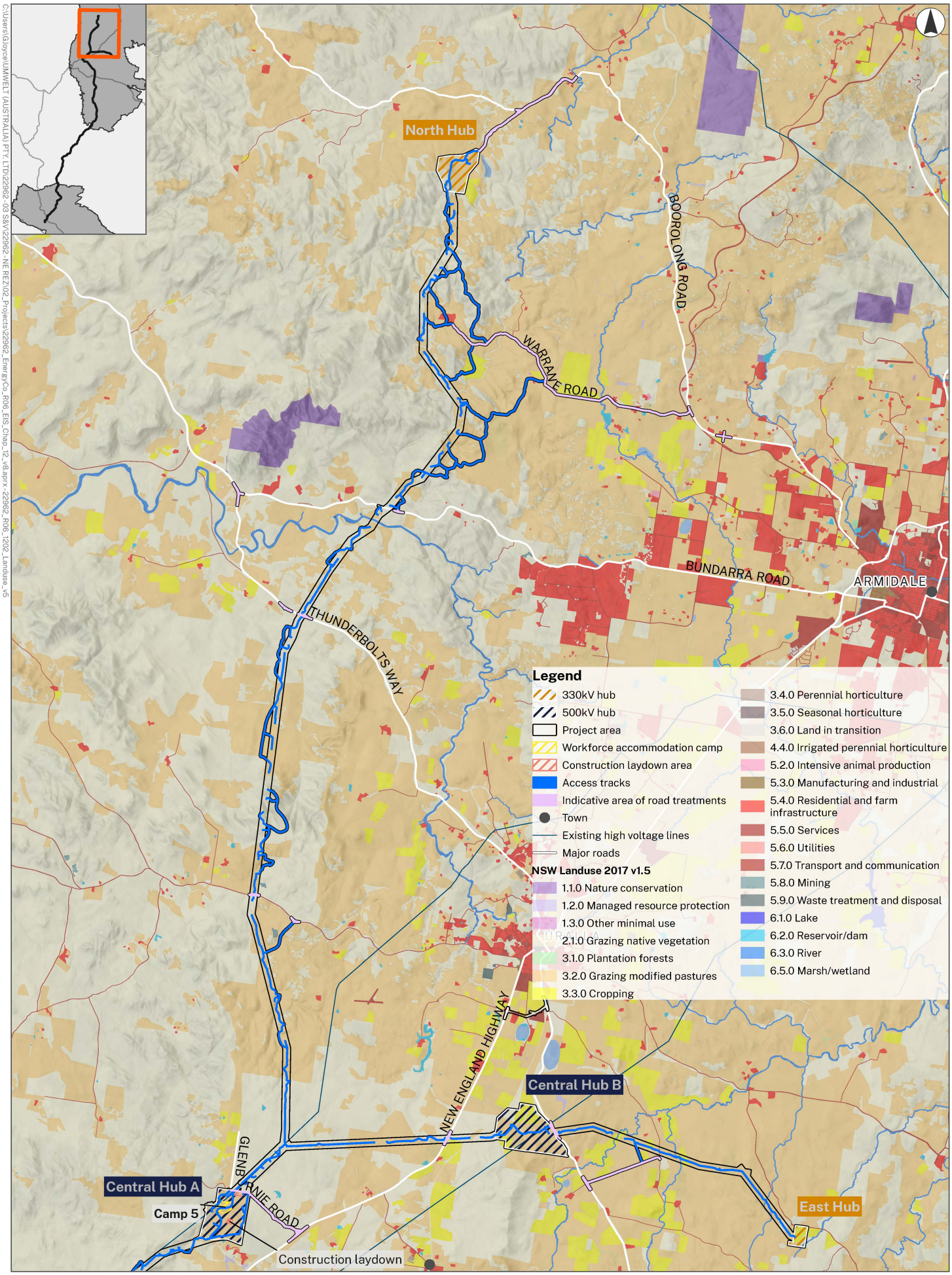


FIGURE 12.2a Land use within and surrounding the project area (Map 1 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

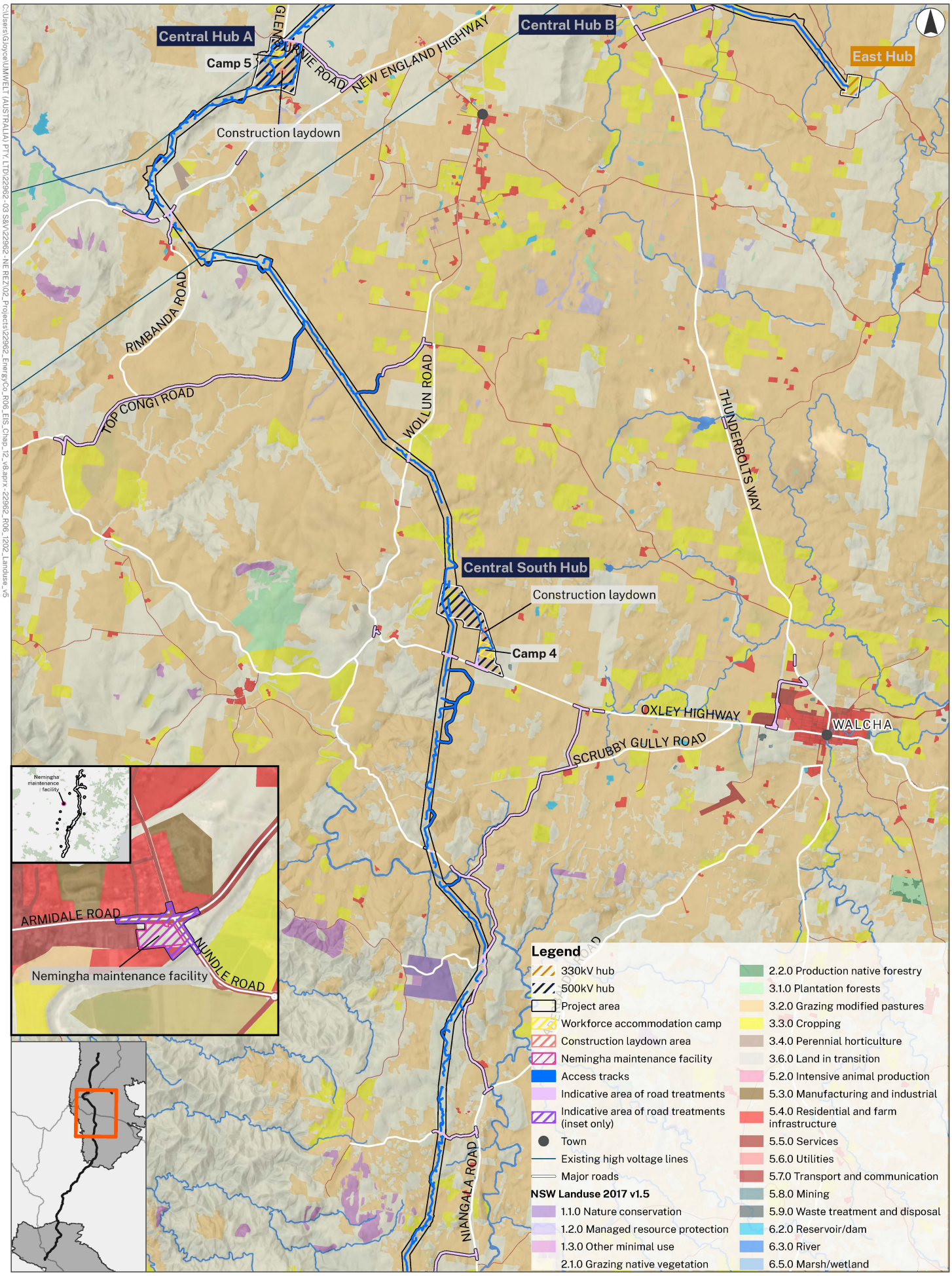


FIGURE 12.2b Land use within and surrounding the project area (Map 2 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

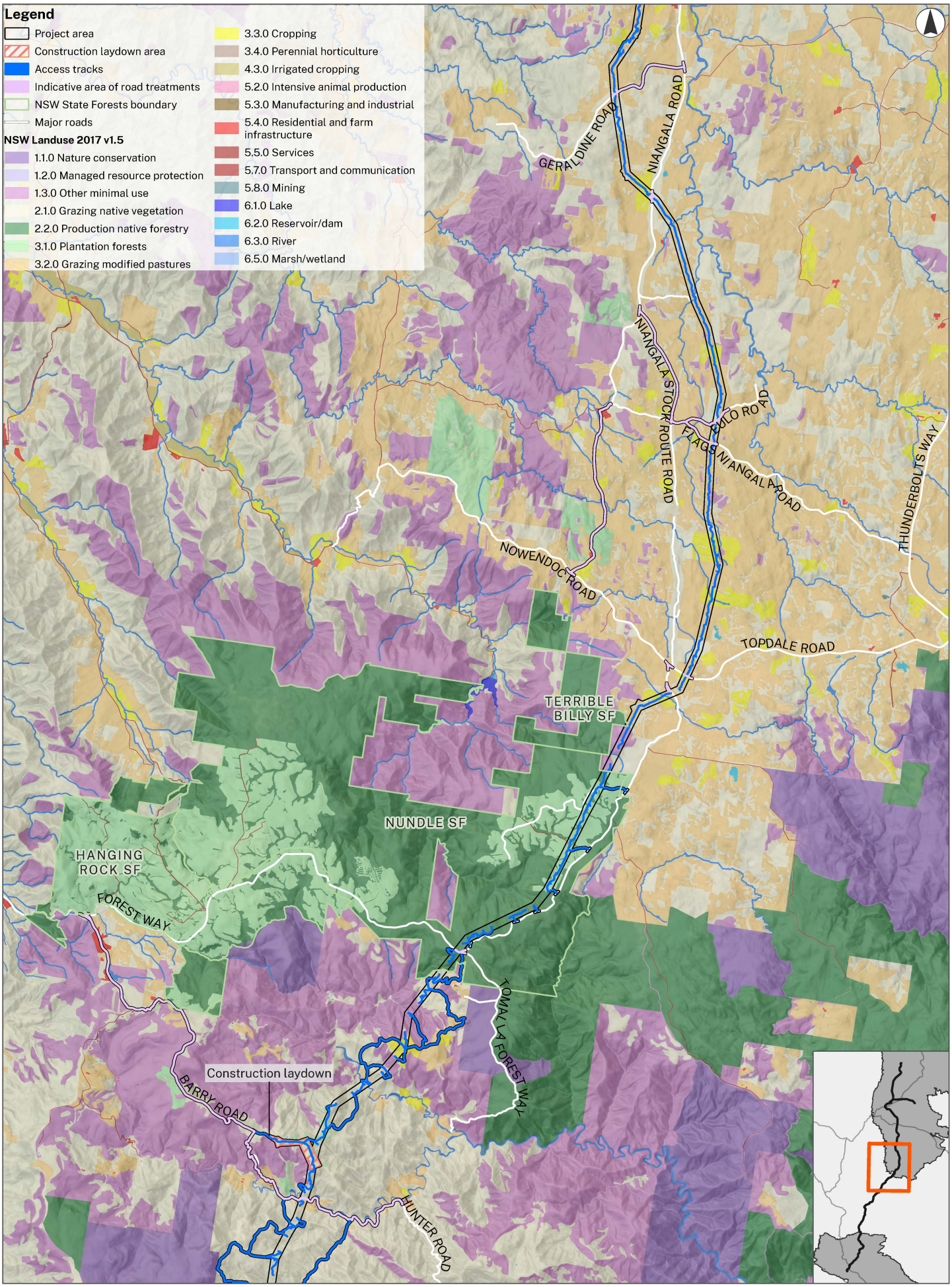


FIGURE 12.2c Land use within and surrounding the project area (Map 3 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

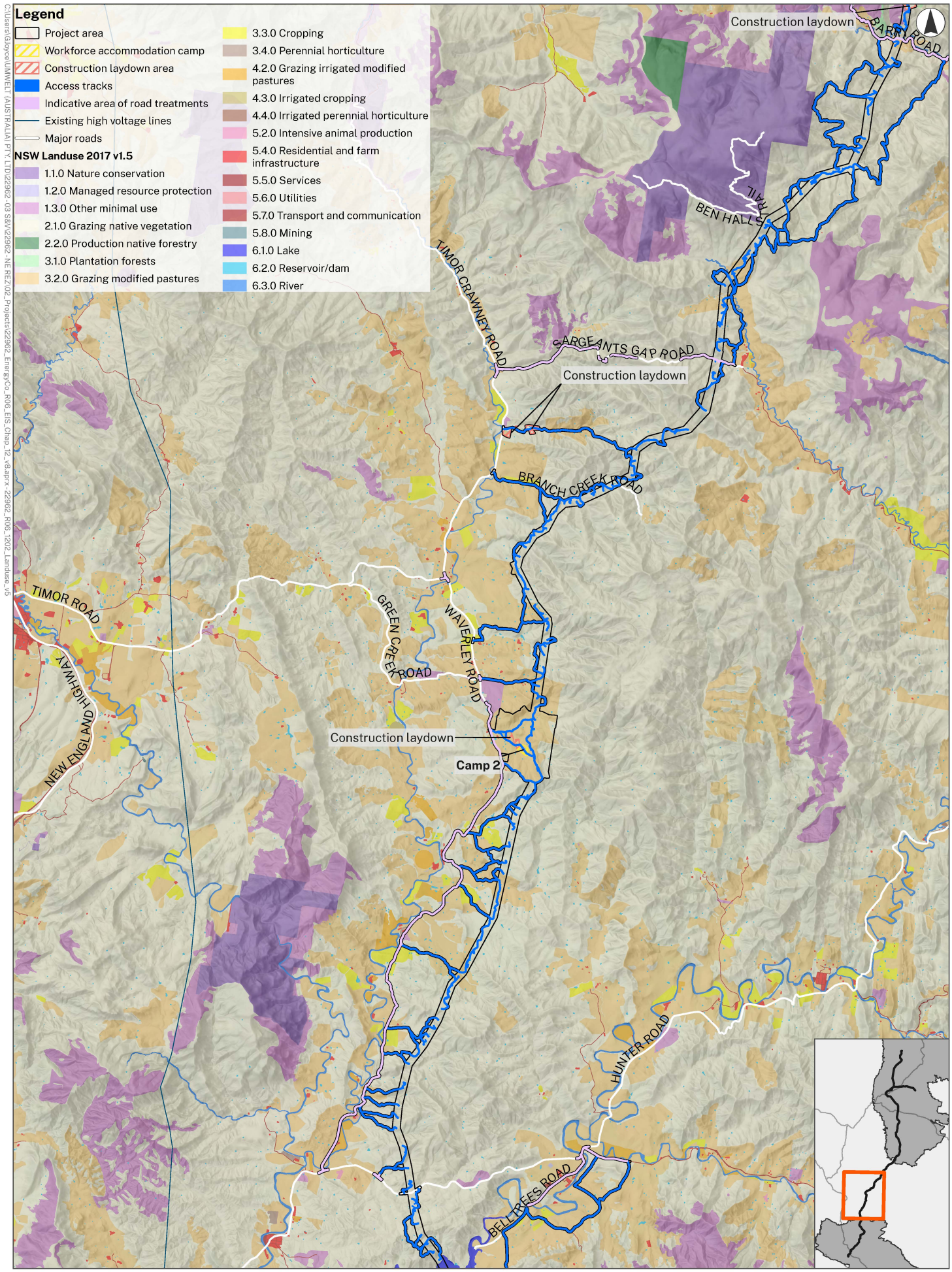


FIGURE 12.2d Land use within and surrounding the project area (Map 4 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

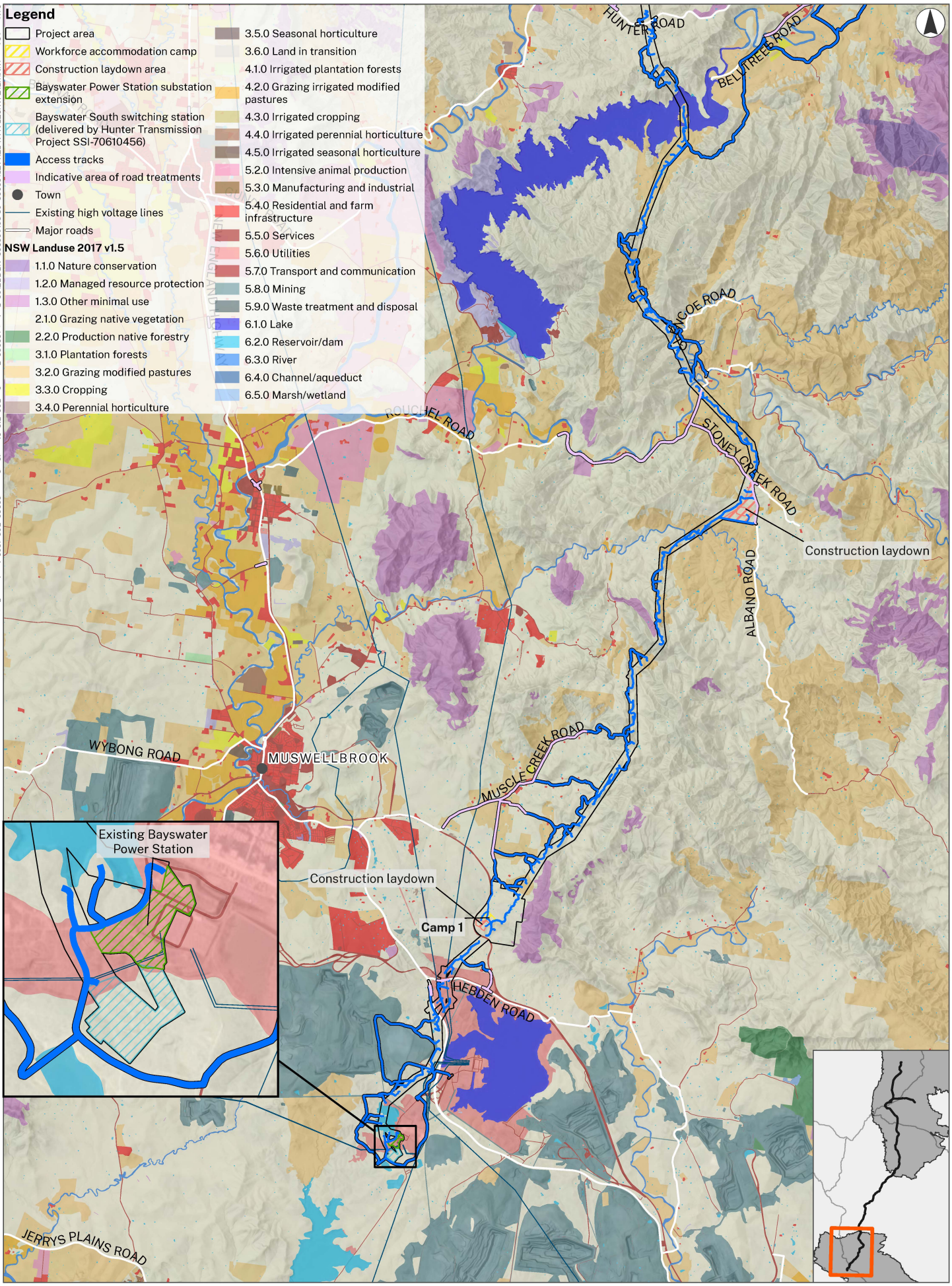


FIGURE 12.2e Land use within and surrounding the project area (Map 5 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

12.2.3 Property

Land tenure

Land tenure within the project area includes areas of freehold land, State forests, Crown land (including road reserves, crown roads, travelling stock reserves (TSRs), lakes, and waterways) and land owned by local councils. Whilst the project has sought to minimise private land disturbance and maximise the use of government land, this has proved challenging due to the absence of large areas of government land outside of the national park estate. The avoidance of national park estate was also a high priority during the design phase, and the project has successfully avoided all national park estate.

The project has successfully prioritised the use of larger areas of government land where appropriate, including WaterNSW land around Lake Glenbawn and areas of State forest. Other community proposed options such as use of TSRs south of Walcha were also considered through options assessment but were not ultimately determined as suitable.

Whilst national park estate is avoided, approximately 8 kilometre of the alignment occurs within the Glenbawn wildlife refuge, representing approximately 57 hectares within the disturbance footprint. Wildlife refuges are an area where the owner, in this case WaterNSW, has voluntarily entered into an agreement under section 68 of the NPW Act to recognise the management of this land for biodiversity values. A public authority (such as EnergyCo) must not, without the consent of the Minister for the Environment and without having given notice to the landholder, carry out development within a wildlife refuge. The Minister for the Environment may only provide consent in certain circumstances, including development that is for an essential public purpose or for a purpose of special significance to the State. As CSSI, the project has been identified as critical to the State of NSW.

Access tracks for the project intersect a Biodiversity Stewardship Site (Gundy Mountain BSA, BS0268) which was executed in mid-2026 under the BC Act (the transmission corridor portion of the project area within the property is not within the executed BSS). This is discussed further in Section 2 and Appendix D (refer to Section D.2) and as for the wildlife refuge discussed above, would require approval from the Minister for the Environment of any changes to the stewardship site.

The project would also intersect with a small section of the Bicentennial National Trail (also known as the National Trail), a multi-use horse-riding, cycling and walking route that links existing tracks, stock routes and roads, to form a continuous recreational route from Queensland to Victoria. The National Trail intersects the proposed transmission alignment in the Waverly–Gundy locality and utilises public roads which form part of the transport route for the project.

Around 9,540 hectares, or 87.5 per cent of the project area is freehold land. Around 1,274 hectares or 11.5 per cent of the project area is owned by the Crown, with 290 hectares of this owned or managed by FCNSW. The remainder is local government land (114 hectares or 1 per cent).

Land tenure throughout the project area is detailed in Table 12.2.

Table 12.2. Land tenure within the project area

Ownership	Area (ha)	Proportion (%)	Parcels of land	Landholdings
Freehold	9,540	87.5	293	243
Local Government	114	1	5	3
Crown land	1,274	11.5	52	11
Total	10,928	100	350	257

Native title

A search of the National Native Title Register, the Register of Native Title Claims, and the Register of Indigenous Land Use Agreements was completed on 10 April 2026 as part of the ACHA. The search of the National Native Title Register indicated that there are no Native Title Determinations within the project area. However, the Register of Native Title Claims identified one active registered native title claim that overlaps a portion of the project area: the Gomeroi People claim (NNTT file no. NC2011/006), this claim remains undetermined. The registered native title claimants for the Gomeroi People are stakeholders for the project and have been included in the ACHA and consultation process (refer to Section 8 and Technical Report 2).

Land claims

The project area intersects areas of granted or claimed land under the NSW *Aboriginal Land Rights Act 1983* including claims made by or on behalf of:

- New South Wales Aboriginal Land Council
- Amaroo Local Aboriginal Land Council
- Armidale Local Aboriginal Land Council
- Nungaroo Local Aboriginal Land Council
- Tamworth Local Aboriginal Land Council
- Wanaruah Local Aboriginal Land Council.

All LALCs intersected by the project area have been consulted for the project, including as stakeholders for the ACHA (refer to Section 8 and Technical Report 2).

12.2.4 Agriculture

As discussed above, grazing is the dominant land use across the project area, however, agricultural land use varies along the length of the project area. For example, sheep are mainly grazed for wool and meat in the northern portion of the project area (from North Hub to Hanging Rock) and cattle grazing is dominant in the southern section (south of Hanging Rock). There are also a range of other agricultural land uses within and adjacent to the project area. Further information on the agricultural land capability, agricultural enterprises and productivity within the project area and broader region is provided in Section 13 and Technical Report 6.

12.2.4.1 Critical Industry Clusters

CICs are concentrations of highly productive agricultural industries within a region that are related to each other, contribute to the identity of that region, and provide significant employment opportunities (DPI, 2013a). CIC areas within Upper Hunter Shire LGA and Muswellbrook Shire LGA and are associated with both the equine and viticulture industries. The equine CIC includes a highly concentrated cluster of thoroughbred and stock horse breeding centres and support infrastructure.

As discussed in Section 2.3.1, CICs form part of the NSW Government's Strategic Regional Land Use Policy (SRLUP). The SRLUP was introduced in response to land use conflict between mining and coal seam gas developments and high-value agricultural land. While the SRLUP does not relate to transmission infrastructure projects, EnergyCo has nevertheless sought to avoid or minimise, where practicable, impacts to mapped CIC land through the route selection and refinement process for the project (refer to Section 2.6 and Appendix B). As a result, the project has been designed to locate project transmission infrastructure away from existing horse studs and associated facilities that form part of the equine CIC, although some ancillary infrastructure associated with access tracks is proposed on a landholding associated with the Kitchwin Hills Horse Stud.

Through refinements to the project design, the project area was shifted further east where practicable, increasing the distance between the existing concentration of horse studs and key operational areas of the equine CIC around Scone and Aberdeen.

Due to the linear nature of the project and location and expanse of the equine CIC mapping in the Upper Hunter LGA, it was not practicable to completely avoid the mapped equine CIC area (especially when considering other key design constraints for the project). The project area therefore intersects part of the equine CIC mapped land around Rouchel, Gundy and Waverly.

Access tracks for the project that are required off Waverley Road have been designed to minimise impacts to a parcel of land that is associated with the contiguous landholding of Kitchwin Hills Horse Stud. The parcel of land that the project's access tracks interact with is located on the opposite side of Waverley Road from the main property. These access tracks have been designed to run adjacent to the existing property boundary / fence line to avoid intersecting the middle of the land parcel.

No areas of viticulture CIC overlap with the project area. Some smaller areas of viticulture CIC associated with the vineyards and wineries around Muswellbrook are located about 10 kilometres west of the project area.

12.2.5 Mining and exploration

The project area has been designed to avoid all surface mining lease areas. A small portion of the project area where road treatments are proposed intersects Coal Lease (CL) 386. CL386 is associated with the Dartbrook Mine and is limited to underground mining (from 20 metres below the ground surface) in this location, where the coal lease traverses the New England Highway.

The project area also intersects various areas covered by exploration licences. Exploration licences allow the holder to undertake exploration or prospecting for minerals and petroleum within a specified area. Most of these licences are located in the southern and central portion of the project area and EnergyCo has engaged with the relevant holders of these licences via letters, however, no responses have been received as of mid-August 2026 (refer to Section 5.4.3.2).

A summary of all exploration licences within the project area is provided in Table 12.3 and shown on Figure 12.3.

Table 12.3. Exploration licences within the project area

Exploration licence number(s)	Holder	Year of expiry	Location
EL6812	Dellworth Pty Ltd	2028	Muswellbrook
EL8692	Galaxias Metals Pty Ltd	2027	Nundle
EL8980	Lode Resources Ltd	2027	Uralla
EL9087	Lode Resources Ltd	2027	Uralla
EL9253	North American Gold Corporation Pty Ltd	2027	Scone
EL9415	LM2 Metals Pty Ltd	2028	Uralla
EL9416	LM2 Metals Pty Ltd	2028	Armidale
EL9591	Hunter Valley Geothermal Energy Pty Ltd	2028	Ravensworth
EL9656	Stanford Rocks Pty Ltd	2027	Nundle
EL9791	Metals Corp Pty Ltd	2028	Uralla
EL9824	Magnet Exploration Pty Ltd	2031	Guyra
EL9846	Magnet Exploration Pty Ltd	2031	Tamworth

Mine subsidence is a risk in areas subject to underground mining, as the land above can sink and fill the voided mine workings causing tilts and strains on the ground surface. The project transmission corridor is not located within any Mine Subsidence Districts and no project transmission infrastructure is proposed within any Mine Subsidence Districts. However, a small portion of the project area associated with road treatments is located within the Muswellbrook Mine Subsidence District.

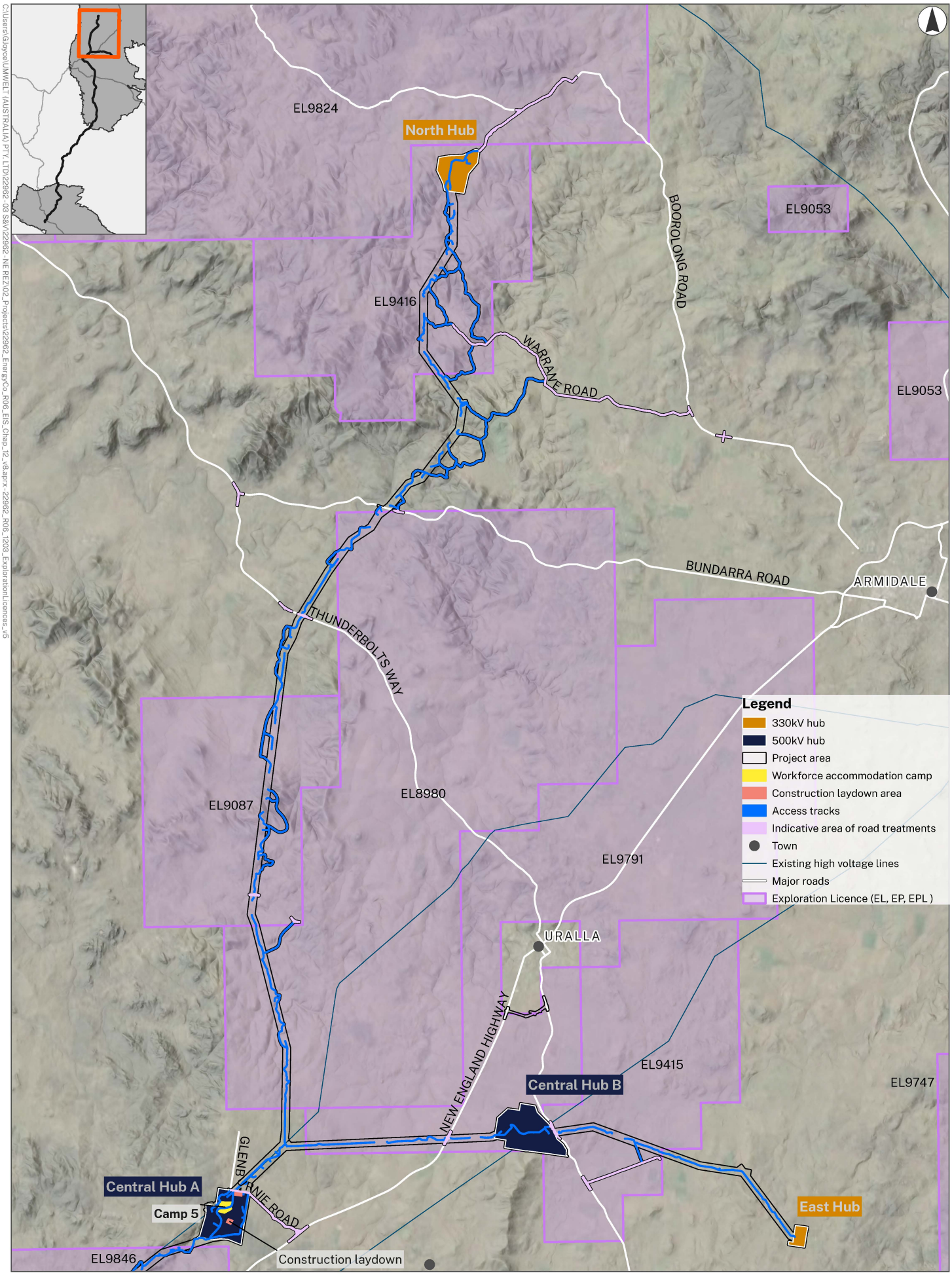


FIGURE 12.3a Exploration licences across the project area (Map 1 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

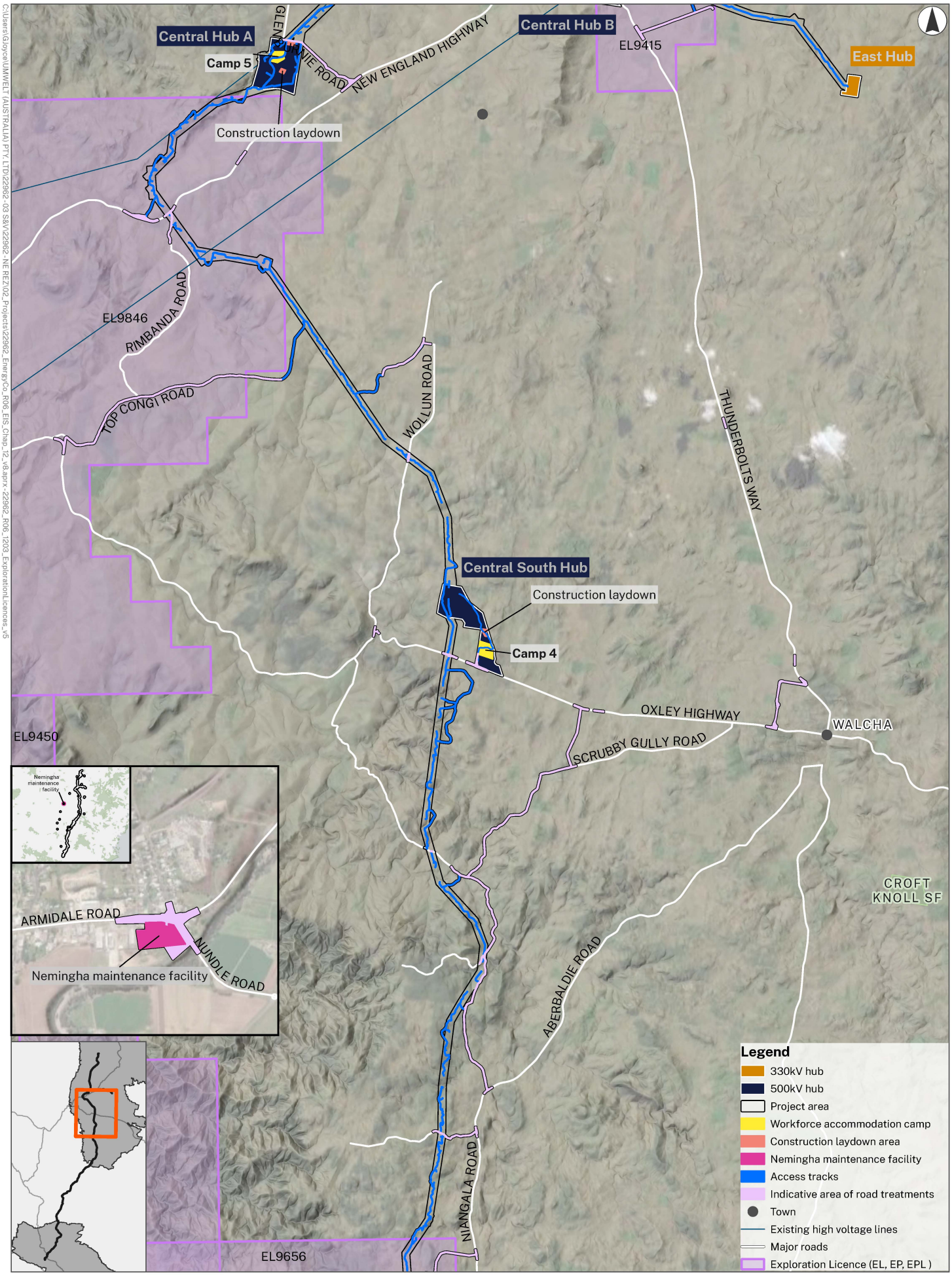


FIGURE 12.3b Exploration licences across the project area (Map 2 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

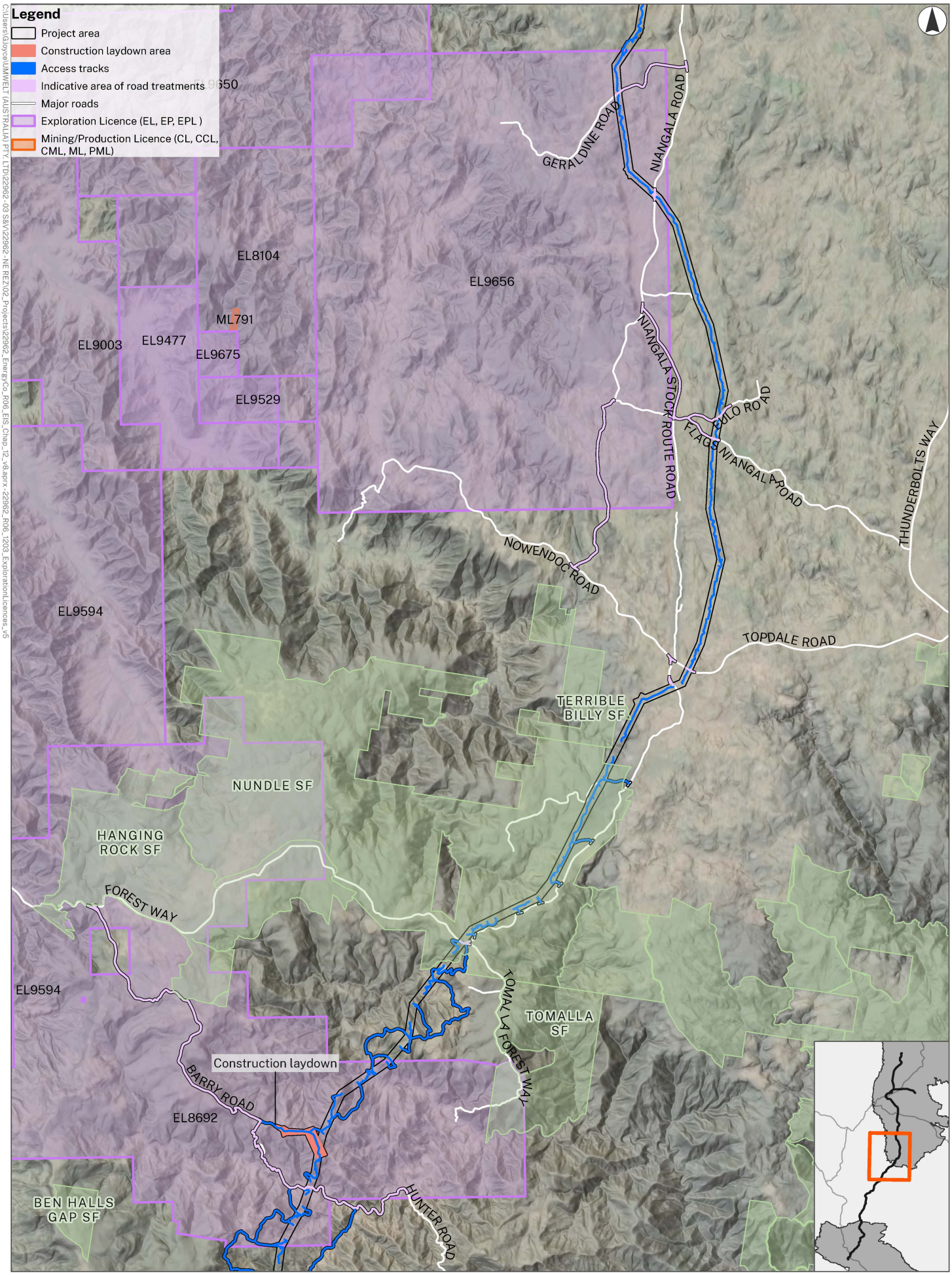


FIGURE 12.3c Exploration licences across the project area (Map 3 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)



FIGURE 12.3d Exploration licences across the project area (Map 4 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

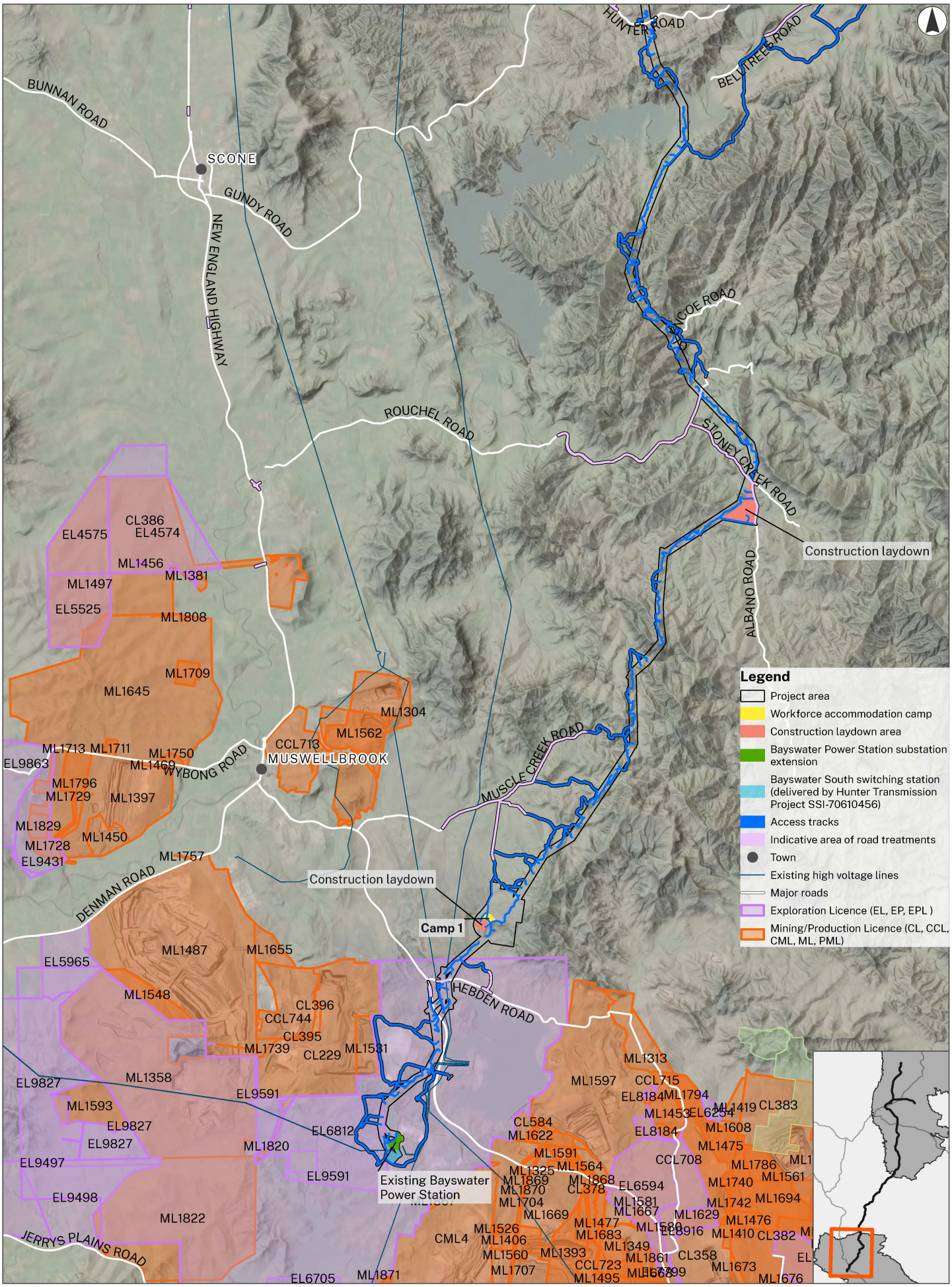


FIGURE 12.3e Exploration licences across the project area (Map 5 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

12.2.6 Crown land and Lake Glenbawn

The project area includes around 1,274 hectares of Crown land, including 58 hectares of land designated as TSR. TSRs are a network of land parcels established to allow for the movement, watering, resting and grazing of travelling livestock, including use during droughts, bushfires, floods and other emergencies. They are commonly managed by NSW Local Land Services (LLS) under the *Local Land Services Act 2013* and can be linear or associated with public road or Crown land lots. While TSRs are less frequently utilised for their original purpose, in addition to periodic use for stock, they remain important in landscape connectivity, cultural heritage, emergency management, recreation and for biodiversity conservation. Further information on the use of TSRs in the project area for agricultural purposes is provided in Section 13.

Most of the Crown land in the project area is associated with Crown roads and road reserves which run between properties. The remaining areas of Crown land are associated with TSRs or associated with watercourses, including the Hunter River, Rouchel Brook, Pages Creek, Barnard River, Back River, Macdonald River, Kentucky Creek, Salisbury Waters, Rocky River, Toms Creek, and Boorolong Creek.

12.2.6.1 State forests

The project area includes around 289 hectares of land across the Nundle State Forest, 0.6 hectares of Terrible Billy State Forest and 1.8 hectares of Hanging Rock State Forest, which are managed by FCNSW (refer to Figure 12.2c). The project area interaction with Hanging Rock State Forest is limited to proposed public road treatment works. There is an additional 29.6 hectares of plantation forest land use located near Barry which is not associated with a State forest.

FCNSW uses a classification system (Forest Management Zones 1-8) to identify how State forests are managed in NSW. The zones which the project area intersects are defined in Section 2.3.2 and include:

- Zone 2 Special Management Zone: this zone provides for selective or low impact forestry activities whilst protecting identified environmental or cultural values
- Zone 3A Harvesting Exclusion Zone: harvesting activities are excluded from this zone associated with identified constraints
- Zone 4 General Management Zone: areas of state forest where timber production is not the primary objective, but where the land is managed for a range of other forest uses and values
- Zone 5 Hardwood Plantation Zone: areas managed specifically for commercial hardwood plantation forestry, typically involving planted native hardwood species
- Zone 6 Softwood Plantation Zone: areas managed specifically for commercial softwood plantation forestry, typically involving planted pine species.

Nundle State Forest covers around 13,000 hectares in total. Of the around 289 hectares of Nundle State Forest intersected by the project area, the majority is located within Zone 4 and Zone 6, with only a small portion of Zone 2, Zone 3A and Zone 5 intersected. The 0.6 hectares of Terrible Billy State Forest that the project intersects is categorised as Zone 4. The 1.8 hectares of Hanging Rock State Forest is categorised as Zone 6.

Nundle State Forest has visitor facilities for public use including picnic areas, public toilets and fireplaces. These are located at Ponderosa Park at Hanging Rock, approximately 6.5 kilometres from the nearest part of the project area. Hunting is also a permitted activity within Nundle State Forest to relevant permit holders.

During community consultation, stakeholders provided feedback regarding the project's interactions with natural areas of high community value, including Nundle State Forest and Terrible Billy State Forest. As detailed in Appendix B, the project has been designed through an iterative process, which has sought to maximise the use of public land, while avoiding or minimising, where practicable, impacts to areas of high natural and community value (for example, by avoiding all national park estate and the public picnic areas in the State forest). This process remains ongoing, and EnergyCo will continue to refine the route in response to stakeholder feedback and technical considerations.

12.2.6.2 Lake Glenbawn

The project area intersects Lake Glenbawn (formed by the Glenbawn Dam) on the Hunter River. The main purpose of the lake is to supply water for irrigation, power generation, stock, industry and household needs in the Hunter Valley, and provide flood mitigation and environmental flows (WaterNSW, 2025). During community consultation, stakeholders raised concerns that the project may result in reduced access to public recreation and natural areas around the lake due to construction activity and concerns about potential impacts on aerial firefighting capacity. The lake is used to collect water during aerial firefighting, and the project has been designed to minimise impacts on this activity as discussed in the Aviation Impact Assessment and Bushfire Risk Assessment (refer to Section 2, Section 17.3.5, Technical Report 10 and Technical Report 11 and Appendix B).

The project transmission line spans approximately 500 metres of Lake Glenbawn in the northeastern section of the dam, approximately 11 kilometres from the dam wall and approximately 3.5 kilometres from the Lake Glenbawn holiday and recreation park facilities.

12.2.7 Infrastructure and utilities

12.2.7.1 Transport infrastructure

The State roads within and surrounding the project area include the New England Highway and the Oxley Highway. The project transmission line would span the New England Highway (at 4 locations, including 2 near Bayswater and 2 near Kentucky) and the Oxley Highway (at one location near Walcha). These State roads would also be used to access the project area during construction and operations.

Smaller regional and local roads are located throughout the project area, which would be spanned by the project as required and used by the project to provide access to the project area for construction and operations.

The northern portion of the project area intersects the main northern railway line which is managed by the Australian Rail Track Corporation (ARTC), with the project transmission line spanning it at 3 locations. This rail line runs from Sydney to Armidale NSW.

The southern portion of the project area also intersects with the private Antiene Rail Spur which is used to transport product coal from the existing Mt Arthur Coal Mine and Maxwell Underground Coal Mine to the Port of Newcastle via the main northern railway line, with the project transmission line spanning it in this location twice.

Further detail on the transport network within and surrounding the project area is provided in Section 14.

12.2.7.2 Power generation

The Bayswater Power Station is located at the southern end of the project area. Bayswater Power Station is a coal-fired power station owned and operated by AGL. The power station site contains four 132-metre-high cooling towers, generators, as well as associated infrastructure including the Bayswater substation, transmission line infrastructure and ash dam.

The project area includes around 4.2 hectares of land owned by AGL associated with the Bayswater Power Station. A portion of this area is occupied by existing energy infrastructure, with the remaining areas forming a buffer to the power station, some of which is leased for agricultural activities (grazing).

Bayswater Power Station is scheduled to close between 2030 and 2033, in line with AGL's Climate Transition Action Plan (AGL, 2022).

The project area also traverses approved power generation and associated projects including:

- Liddell Future Landuse and Enabling Works - which is the demolition and rehabilitation of the Liddell Power Station and works to enable future land uses
- Queensland Hunter Gas Pipeline – which is a high-pressure gas transmission pipeline from the NSW - Queensland border near Boomi, Queensland to Newcastle, NSW
- Bowmans Creek Wind Farm
- Thunderbolt Wind Farm Stage 1.

Cumulative impacts due to interactions with these projects are considered in Section 12.5 and Section 24.

12.2.7.3 Electrical infrastructure

Key existing electrical infrastructure within the project area is summarised in Table 12.4 with a complete list of electrical assets which are interacted with by the project provided in Appendix C. There are also numerous distribution lines that interact with the project.

Table 12.4. Key electrical infrastructure within the project area

Electrical infrastructure	Asset owner	Description
Transmission line 34	Transgrid	330 kV transmission line that runs parallel to the proposed 500 kV lines 2.1 km west of Lake Liddell
Transmission line 83	Transgrid	330 kV transmission line that would be crossed by the proposed 500 kV lines 1.2 km west of Antiene

Electrical infrastructure	Asset owner	Description
Transmission line 84	Transgrid	330 kV transmission line that would be crossed by the proposed 500 kV lines north and south of Hebden Road and 700 m west of AGL's Antiene Coal Unloader in Muswellbrook
Transmission line 85	Transgrid	330 kV transmission line that would be crossed by the proposed 500 kV lines connecting to Central Hub A 12.5 km southwest of Kentucky and also intersects Central Hub B
Transmission line 86	Transgrid	330 kV transmission line that runs parallel and would be crossed by the proposed 500 kV lines connecting to and intersects Central Hub A 9.5 km west of Kentucky
Bayswater substation	Transgrid	Substation at the Bayswater Power Station
Other transmission lines	Transgrid, Ausgrid, AGL, Essential Energy	Other lower voltage lines include: • 11 kV distribution lines • 22 kV distribution lines • 132 kV transmission lines

12.2.7.4 Communication infrastructure

The project would also interact with telecommunications infrastructure, with the project area crossing copper and optic fibre underground cables and interacting with one telecommunications tower. A complete list of all existing telecommunication infrastructure assets within the project area is provided in Appendix C.

12.3 Potential impacts – construction

The project has been designed to avoid and/or minimise potential impacts to land use and property, consistent with the planning pillars and principles that have guided the iterative route selection and design process described in Section 2. These pillars balance environmental, social, economic, strategic and technical considerations to support a corridor that is feasible, responsible and responsive to stakeholder input.

In line with this approach, key measures utilised for land use and property consideration include:

- positioning infrastructure in areas that align with current land use activities, or, where practicable, based on landholder feedback, as well as considering the location of proposed adjoining renewable energy generators or other constraints within the project area
- utilising already cleared or disturbed land.

It is acknowledged that in some locations, competing land uses, property and technical constraints are present. At these locations a balanced approach to corridor planning is required to determine the most appropriate project alignment, while minimising impacts on land use, property and the environment during construction. It is EnergyCo's preferred position that the acquisition of easements is completed by negotiated agreement with the relevant landholders.

12.3.1 Land use impacts

At the commencement of construction, the current land use within the disturbance footprint would cease, either permanently at locations where permanent infrastructure would be required (energy hubs, transmission line towers) or temporarily affected while construction activities are being carried out (stringing sites, construction ancillary sites such as laydowns, workforce accommodation camps and transmission line easements). Land use within areas of the transmission line easement would be only temporarily affected during construction and would be able to recommence following the completion of these activities, subject to some restrictions for safety and operational reasons.

Individual land use needs have been considered in the design of access tracks to minimise impacts on the landholder's continued use of the land, as well as to minimise the overall environmental impacts. In developing the access track network, preference has been given to the use of existing private roads, farm tracks and previously disturbed areas where practicable. The use of existing private roads and tracks may be temporarily affected where upgrades are required. The upgrades undertaken would also improve access for landholders. Access tracks would be retained in consultation with landholders and/or where the track is required on a permanent basis. Access tracks not retained would be rehabilitated following construction. Consultation with landholders would occur during property access negotiations and ahead of the commencement of operation of the project.

As described in Section 13, the Agricultural Impact Assessment conservatively assumes that during construction, the entire disturbance footprint would be restricted from agricultural use. In reality, this would not be the case for the majority of the project area associated with the transmission alignment, as tower construction and stringing works are likely to progress on a campaign basis. In most instances the temporary restriction of land from agriculture in these areas would be much shorter. For example, construction works at each tower would take from a few weeks to a few months depending on the location, construction program and weather conditions. As described in Section 13, these impacts would be managed with landholders through the implementation of PSMPs.

12.3.2 Property impacts

Construction of the project would require the temporary access or acquisition of land within the project area. This would require:

- securing temporary construction easements over freehold land to facilitate construction of the transmission line, including access tracks and stringing sites, road treatments and securing permanent transmission line easements (including for towers) upon completion of construction

- permanent acquisition of freehold land for the energy hubs, Bayswater Power Station substation extension and the Nemingha maintenance facility to facilitate the construction of the proposed permanent project infrastructure, and permanent acquisition of freehold land for the workforce accommodation camps and laydown areas prior to construction. Acquisitions of privately owned land would be carried out in consultation with the landholder and in accordance with the requirements of the Just Terms Act and preferably by negotiated agreement. Permanent land requirements for the project are discussed in Section 12.4.2.

During community engagement, affected landholders raised concerns regarding potential disruption to agricultural operations associated with project construction. EnergyCo has undertaken corridor refinements in response to landholder feedback. Ongoing engagement with affected landholders would continue during detailed design to minimise impacts to landholder agricultural operations during construction.

Construction of the project may require adjustments to property infrastructure (such as dams, airstrips, agricultural sheds, fencing and gates) and/or the reconfiguration of cropping lands where precision farming operations with permanent wheel tracks are undertaken. Any adjustments to fences, dams, access tracks or other property infrastructure required for the project would be undertaken in consultation with the landholder and at no cost to the landholder and managed through PSMPs.

As discussed in Section 12.2.3, the National Trail intersects part of the project area. The construction of the project would not prevent the use of the National Trail however temporary access controls may apply at specific locations during critical construction periods. The precise nature and location of any interactions would be confirmed through detailed design, and consultation with the National Trail organisation would be undertaken to provide ongoing access along the route and to provide information about planned access management at these locations.

12.3.3 Agricultural areas

As described in Section 13, the Agricultural Impact Assessment conservatively assumes that the entire agricultural disturbance area would be restricted from agricultural use for 5 years of the construction program to secure the site. Accordingly, this assessment has found that during construction around 2,233 hectares of agricultural land would be impacted. This includes around 1,042 hectares of grazing in native vegetation, around 1,094 hectares of grazing modified pastures, approximately 95 hectares of cropping agricultural land, and 2 hectares of residential and farm infrastructure. This is equivalent to approximately 0.1 per cent of the total agricultural land in the impacted LGAs within which the project is located.

Construction of the project, including land requirements, would have a range of potential impacts on agricultural areas at different stages of construction, depending on the intensity of construction activities required and the construction activities being undertaken at any given time.

Land required for temporary construction facilities such as workforce accommodation camps, site offices, construction laydown areas, concrete batch plants, stringing sites, access tracks not required during operations, and other construction ancillary infrastructure would be restored to their former use in accordance with conditions of approval and PSMPs (as relevant), unless otherwise requested by the landholder or located on freehold land acquired by EnergyCo. Pre-

condition assessments of the construction area would be undertaken to determine the general condition of the land. This would inform requirements for rehabilitation within PSMPs established with landholders.

Further information on impacts to agricultural land is provided in Section 13 and Technical Report 6 and the anticipated economic impacts of the construction of the project on agricultural land uses are discussed in Section 15 and Technical Report 8.

12.3.3.1 Critical industry cluster

As described in Section 12.2.4.1, the avoidance of impacts on highly productive agricultural land was a key consideration in the planning process for the project, however, it was not practicable to completely avoid mapped equine CIC due to the extent of the area covered in the region through which the project traverses.

Impacted areas of the mapped equine CIC would be subject to intermittent construction activity, and any areas not required for ongoing operational use would be rehabilitated (if required) after construction is completed or as agreed with the landholder. Previous land uses could continue under the conductors and transmission line structures, subject to certain restrictions such as height of machinery and exclusion zones around transmission structures.

As noted, an access track would be required to run adjacent to the existing fence line of a parcel of land associated with the landholdings of the Kitchwin Hills Horse Stud. This has been designed to minimise impacts to the use of this parcel of land. No other horse studs have been identified within the project area.

Indirect impacts of construction on equine enterprises are assessed in Section 13 and detailed within the Equine Health Assessment and Equine CIC Assessment (Technical Report 21 and Technical Report 22 respectively).

12.3.4 Mining and exploration

The proposed road treatments located partly within CL 386 are not expected to impact Dartbrook Mine and are associated with the upgrade of existing roads above the underground mining lease area. In this area the New England Highway also passes above the underground mining lease area. The proposed works would be of a temporary nature and would not impact underground operations, noting the mine is currently in care and maintenance.

Construction of the project would restrict exploration activities within the project area. Restrictions and limits to exploration activities would extend to both ground-based exploration (small scale drilling) as well as exploration undertaken via airborne survey methods, which use low flying helicopters or light aircraft with ground penetrating radar. Given the size of the exploration licence areas relative to the project area (as shown in Table 12.5) these impacts are expected to be minor. The calculation of the area of each exploration licence area affected by the project provided in Table 12.5 is considered conservative as the project area is generally based off a 250 metre-wide corridor whereas the operational easement would generally be 140 metres for dual 500 kV lines, 70 metres for the single 500 kV line and 120 metres for dual 330 kV lines (so the actual areas restricted would be much less).

Table 12.5. Size of exploration licences relative to the project area

Licence number	Licence expiry	Resource	Approximate exploration area (hectares)	Exploration area within project area (hectares)	Exploration area within project area (%)
EL6812	20 June 2028	Coal	1,622	47	2.9
EL8692	2 February 2027	Minerals	25,881	382	1.5
EL8980	14 May 2027	Minerals	23,622	267	1.1
EL9087	12 March 2027	Minerals	6,498	263	4.0
EL9253	6 August 2027	Minerals	7,859	0.01	<0.01
EL9415	31 May 2028	Minerals	7,078	212	3.0
EL9416	31 May 2028	Minerals	7,979	435	5.4
EL9591	27 July 2028	Minerals	26,813	407	1.5
EL9656	14 May 2027	Minerals	26,387	215	0.8
EL9791	16 July 2028	Minerals	17,121	493	2.9
EL9824	23 October 2031	Minerals	53,319	20	<0.04
EL9846	5 December 2031	Minerals	83,348	424	0.5

Correspondence has been provided to impacted exploration licence holders regarding potential impacts to exploration activities, however, as at mid-August 2026 no responses have been received (refer to Section 5.4.3.2). EnergyCo will continue to consult with NSW Resources and licence holders during detailed design so that opportunities to minimise impacts to exploration activities are considered.

12.3.5 Crown land and Lake Glenbawn

Construction of the project would impact around 472 hectares of Crown land (based on the reference design).

The area of impacted Crown land within the project area includes State forests, road reserves, Crown roads, lakes and waterways, and includes 30 hectares of land designated as a TSRs. Impacts to TSRs are discussed further in Section 13. Most of the Crown land impacted by construction of the project is associated with Crown roads between properties. Other Crown land is associated with waterways and the impacts on these waterways are addressed in Section 18 and Technical Report 15.

12.3.5.1 State forests

Construction of the project including the requirements of easement clearing would directly impact approximately 160.5 hectares of State forest[16] (based on the disturbance footprint). This includes approximately:

- 160 hectares of Nundle State Forest
- 0.1 hectares of Terrible Billy State Forest
- 0.4 hectares of Hanging Rock State Forest.

Based on FCNSW's Forest Management Zone classification system[17]:

- of the approximately 160 hectares of clearing required in Nundle State Forest, approximately:
  - 4 hectares is classified as Zone 2 Special Management Zone
  - 5 hectares is classified as Zone 3A Harvesting Exclusion Zone
  - 78 hectares is classified as Zone 4 General Management Zone
  - 0.01 hectares is classified as Zone 5 Hardwood Plantation
  - 73 hectares is classified as Zone 6 Softwood Plantation
- clearing required in Terrible Billy State Forest is classified as Zone 4 General Management Zone
- clearing required in Hanging Rock State Forest is classified as Zone 6 Softwood Plantation Zone.

The project has been developed in consultation with FCNSW including consultation regarding biodiversity and heritage surveys (refer to Section 5). FCNSW would continue to be consulted on construction methodologies and activities as part of continued design development, prior to and during construction activities.

Construction of the project would require vegetation clearing within Nundle State Forest. It is assumed that merchantable timber resources located within the disturbance footprint would be lost during construction. However, ongoing discussions are being held with FCNSW regarding opportunities for timber to be suitably harvested during construction for the commercial market.

The anticipated economic impacts of the construction of the project on forestry land uses are discussed in Section 15 and Technical Report 8.

12.3.5.2 Lake Glenbawn

Construction of the project over Lake Glenbawn would require stringing the transmission line over the lake at its northeastern extent.

Potential surface water impacts due to construction are assessed in Section 18 and Technical Report 15. The construction of the project is not expected to impact the use of Lake Glenbawn for water supply with potential impacts such as water quality and sediment and erosion to be managed with the measures proposed in Section 18 and Technical Report 15.

[16] Based on the NSW Government's 'NSW Dedicated State Forests' mapping.

[17] Based on the NSW Government's 'Forest Management Zones' mapping,

During community consultation, stakeholders raised issues about potential reduced access to public recreation and natural areas around Lake Glenbawn due to construction activity. As shown on Figure 6.1, the main recreational area of Lake Glenbawn is associated with the holiday and recreation park which is approximately 3.5 kilometres west of the project area (at its closest point) and 11 kilometres southwest of where the project area spans Lake Glenbawn.

The visual assessment undertaken (refer to Section 11 and Technical Report 5) identified there would be no significant visual impacts on holiday and recreation park areas at Lake Glenbawn, with intervening vegetation and topography screening views of the project, maintaining the site's secluded character. The construction work required across Lake Glenbawn is limited to stringing activities which may require temporary restrictions in this area during line stringing, however, these restrictions would be of short duration.

Noise impacts to the Lake Glenbawn holiday and recreation park area are not anticipated as it is located beyond the noise and vibration impact assessment study area (broadly defined as an area 3 kilometres from the project area where noise impacts may occur).

As part of the project development, EnergyCo has undertaken an assessment of aerial firefighting operations at Lake Glenbawn to inform the route alignment in this locality, including consideration of suitable safety buffers between aerial firefighting operations and the transmission infrastructure as defined in the project's reference design. This work was undertaken in response to stakeholder concerns that the project may obstruct water scooping operations, particularly in the landing and take-off climb-out phases. As discussed in Section 2.6, this work led to design changes to avoid these potential interactions, resulting in the transmission alignment being moved further to the east.

The project's potential impacts on aerial firefighting operations at Lake Glenbawn were considered in the Aviation Impact Assessment (refer to Section 17.2 and Technical Report 11). The assessment concluded that, based on the reference design at Lake Glenbawn and considering the aircraft of interest (Fire Boss Tractor AT-802F):

- there is no impact to north–south flight paths
- east-west operations remain feasible as:
  - there is sufficient room at the western end of the dam, noting it is also deeper
  - when landing from the east, there is sufficient clearance over the transmission line
  - when taking off from to east, there is sufficient clearance over the transmission line
  - flight times / return times are not impacted materially by using the western portion of Lake Glenbawn
- water scooping operations at Lake Glenbawn can proceed as they are not expected to be adversely impacted.

EnergyCo has consulted relevant stakeholders including the NSW RFS and the relevant project information would be provided prior to construction commencing for inclusion in formal risk management programs. Further details on interaction with aerial water scooping operations from construction of the project is provided in Section 17.2 and Technical Report 11 (Aviation Impact Assessment) and Section 17.3 and Technical Report 12 (Bushfire Risk Assessment).

12.3.6 Infrastructure and utilities

12.3.6.1 Transport infrastructure

Construction of the transmission line would require the crossing of existing roads. During stringing of the new transmission line over roads, temporary 'hurdle sites' would be established to facilitate safe stringing of conductors and protect existing infrastructure.

These activities would be carried out in consultation with the relevant roads authority and would be subject to the requirements of a road occupancy licence, where relevant.

Stringing activities during construction would also occur over rail line assets. Hurdle sites would also be established at these locations to facilitate safe stringing. These construction works would be undertaken during rail maintenance periods or during rail possessions (periods during which rail lines are not in use) in consultation with each operator. As such, no disruptions to rail services are anticipated during construction of the project.

The project area includes locations where road treatments are required to cater for the construction vehicles associated with the project. During construction of these works, some travel disruption may be experienced due to potential lane closures and/or reduced speed limits and temporary traffic control. In most cases these works would be undertaken within the existing road corridor with no additional land required. In some instances, small areas of private land may be affected by the road treatment works which would result in minor changes to existing land use at these properties.

The impacts of the project on the road and rail network, and property access during construction is further assessed in Section 14 and Technical Report 7.

12.3.6.2 Power generation

Construction of the project would not impact land use and the operations at Bayswater Power Station.

The project area has been developed in consultation with proponents and landholders associated with approved power generation projects (for example, wind farms) to avoid or minimise interactions with infrastructure and therefore minimising disruptions during construction of the project.

Notwithstanding, the construction of the project may result in some temporary short-term disruption to construction and operation of these generation projects. These impacts would be managed in consultation with proponents to minimise these temporary impacts.

Cumulative impacts due to interactions with energy generation projects traversed by the project are considered in Section 24.

12.3.6.3 Electrical infrastructure

The interaction of the project with the existing electrical infrastructure within the project area is outlined in Section 3 and Appendix C. Construction of the project would require the adjustment and upgrade of some existing transmission lines (refer to Section 12.2.7.3).

All adjustment and upgrade activities would be undertaken in consultation with individual asset owners. Where adjustments or relocations to electrical infrastructure are required, short-term disruptions to these assets may occur during this work and affected landholders would be notified in advance of any disruptions in service.

The operation of the project is not anticipated to negatively impact existing electrical infrastructure within the project area.

12.3.6.4 Communication infrastructure

As discussed in Section 12.2.7.4, existing telecommunication infrastructure within the project area is proposed to remain in place. Construction activities above and nearby underground infrastructure would be managed via standard construction procedures such as conducting enquiries with 'Before You Dig Australia' (BYDA) and demarcating infrastructure locations. An assessment of the potential impacts of the transmission line, towers and energy hubs on telecommunication services is provided in Section 17.5.

12.4 Potential impacts – operation

12.4.1 Land use impacts

Operation of the project would result in permanent changes to the existing land use to include electrical infrastructure where energy hubs, Bayswater Power Station substation extension and transmission line towers are located. For land within the project area, the final operational easement would generally be 70 metres-wide for a 500 kV transmission line, 140 metres for dual 500 kV lines and 120 metres for dual 330 kV transmission lines.

Farmers interviewed across the New England, Walcha and Upper Hunter regions consistently raised concerns that the project would permanently alter the land that has been carefully managed over decades, impacting continuity and intergenerational farming systems.

In land subject to the transmission line easement, existing agricultural land uses would be able to continue, subject to some restrictions on activities. Further details are provided in Section 13.4.1.

EnergyCo proposes to acquire approximately 1,185 hectares of land associated with the 5 energy hubs. This acquisition area exceeds the total area required for the permanent infrastructure and associated operational area for each of the energy hubs. The land would remain under the ownership of EnergyCo following commencement of operation. The future use of acquired land that is not required for operational purposes would be subject to confirmation during detailed design, however, the ongoing operation of the energy hubs is not expected to permanently preclude future use of these areas for agricultural purposes (for example for grazing).

12.4.2 Property impacts

Permanent easements registered on land titles would provide a right of way for the network operator to maintain project infrastructure and other assets such as the transmission infrastructure, easement vegetation management and access tracks. These would be obtained either by agreement or by compulsory acquisition in accordance with the requirements of the Just Terms Act, noting EnergyCo's very strong preference is to resolve all matters by agreement.

The establishment of easements would take place within:

- Crown land (including Nundle State Forest), in accordance with the *Crown Land Management Act 2016*
- freehold land.

Access to the transmission easement would be via access tracks that would be established during construction and retained for operational purposes. Wherever practicable, access for the network operator would rely on existing access gates, driveways and access tracks or as otherwise agreed with landholders. Permanent land requirements for the operation of the project are outlined in Table 12.6.

Permitted activities within easements would be in accordance with easement terms. NSW has around 13,000 kilometres of existing high-voltage transmission lines which already successfully coexist with a wide range of agricultural operations, including grazing, cropping and equine operations. Transmission easements in NSW are carefully managed to maintain safety and access while allowing ongoing productive use of the land beneath and around the infrastructure, as would be the case for the project. EnergyCo is continuing to refine the project and will continue to engage with landholders to understand how land is used on impacted properties, including details of farming and business activities and how impacts on individual properties can be minimised.

Agriculture and grazing would generally be permitted within the transmission easements, however, may be subject to certain restrictions for safety and operational reasons.

The activities not permitted within transmission line easements include:

- building houses
- erecting scaffolding
- storing materials in industrial bins and skips
- stockpiling excavated materials
- storing flammable liquids or gases
- fuelling and repairs to vehicles, plant and equipment
- moving vehicles and machinery that exceed the permitted height
- parking large trucks and caravans
- loading and unloading large trucks
- storage or detonation of explosives
- flying aircraft (such as crop dusters)
- flying kites or any remote controlled or unmanned aerial vehicles (such as drones).

The aim of the acquisition process is to reach an agreement with landholders for the required acquisition. This is known as an acquisition by agreement and is EnergyCo's preferred method for acquiring the land required for the project.

Table 12.6. Land requirements for operation of the project

Project infrastructure	Current ownership	Permanent property impact	Number of landholders impacted
Transmission line easement and access tracks	Freehold Crown land Local Government	New easements would be established by agreement, where possible. Where agreement cannot be reached with the landholder, compulsory acquisition would be undertaken in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991*.	138
Existing Bayswater Power Station substation	AGL Macquarie	The land required for the Bayswater Power Station substation extension would be acquired from AGL (including the required asset protection zone (APZ)) in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991*.	1
Energy hubs	Freehold	The land required for the energy hubs would be acquired from the landholders in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991*.	7
Nemingha maintenance facility	Freehold	The land for the Nemingha maintenance facility has been acquired by EnergyCo.	1

12.4.3 Agricultural areas

The total operational footprint (which is the area permanently occupied by project infrastructure, for example hubs, towers and access tracks, but does not include the broader transmission easement) is an estimated 471 hectares, of which agricultural land comprises approximately 438 hectares. This is equivalent to 0.02 per cent of the total area of agricultural holdings in the impacted LGAs. The broader transmission line easement has not been considered in this calculation as agricultural activities can still be conducted within the easement as discussed in the section above.

Agricultural operations would be able to continue in areas under the transmission lines and around permanent structures, subject to restrictions such as the height of farm machinery and exclusion zones around transmission towers, as outlined in EnergyCo's Living and working near easements factsheet (EnergyCo, 2026).

Further information on impacts to agricultural land is provided in Section 13 and Technical Report 6 and the anticipated economic impacts of the operation of the project on agricultural land uses including equine CIC lands are discussed in Section 13, Technical Report 8 and Technical Report 22.

12.4.4 Mining and exploration

Once operational, the project may affect future exploration activities within the transmission line easement and areas occupied by project infrastructure due to safety, structural, operational, or engineering limitations. As such, if mineral deposits were discovered within these exploration licence areas, and these deposits were of commercial viability, the development of these mineral resources would need to consider the location of project infrastructure.

12.4.5 Crown land and Lake Glenbawn

The operational footprint of the project (the area permanently occupied by project infrastructure and not including the broader transmission line easement) would affect around 11 hectares of Crown land (indicative only, based on the reference design). This includes around one hectare of land designated as TSRs due to permanent infrastructure. Land within the transmission line easement can continue to be utilised for existing purposes with some restrictions (refer to Section 12.4.2). Engagement with Local Land Services would continue to be undertaken during detailed design regarding interactions with TSRs.

12.4.5.1 State forests

The operational area (which includes the operational footprint and the operational easement) of the project would indicatively affect around 164.5 hectares of State forest land[18] (based on the reference design) primarily through Nundle State Forest. This area is based on the operational area which includes the full operational easement. It is noted that not all of the vegetation within the operational easement would be cleared for the project, however, the total area has been assessed as not being available for forestry activities during project operation. The transmission line easement through Nundle State Forest and the regional impacts associated with this level of reduced economic activity are expected to be negligible. It is acknowledged that any foregone production would have supply chain impacts for timber processing, however, based on the scale of the impact on timber production these are also not likely to be substantial.

The anticipated economic impacts of the operation of the project on forestry land uses are discussed in Section 15 and Technical Report 8.

12.4.5.2 Lake Glenbawn

During operation of the project, Lake Glenbawn would remain available for use for water supply and aerial firefighting with additional aviation management controls in place (refer to Section 17.2, Technical Report 11 – Aviation Impact Assessment, Section 17.3 and Technical Report 12 – Bushfire Risk Assessment). No impacts are predicted on the recreational areas of Lake Glenbawn during operations.

[18] Based on the NSW Government's 'NSW Dedicated State Forests' mapping.

12.4.6 Infrastructure and utilities

During operation, impacts to transport infrastructure would be limited to vehicle movements associated with the maintenance of the transmission line, energy hub and Bayswater Power Station substation extension infrastructure. Maintenance activities would be carried out infrequently. The impacts of the project on the road and rail network, and property access during operation is further assessed in Section 14 and Technical Report 7.

12.5 Cumulative impacts

The potential cumulative impacts of the project have been identified based on the scale and potential impacts of the project, in combination with the potential impacts of relevant identified future projects and broader developments supporting the New England REZ. A list of these relevant projects, including their descriptions and interfaces with the project, is provided in Section 24.

The assessment approach to cumulative impacts is also outlined in Section 24. This approach identified a potential for cumulative impacts to land use and property associated with other relevant major projects in the region such as power generation projects. Cumulative impacts on regional land use are expected to be minor during construction and operation of the project in combination with the relevant future projects within the affected LGAs and would be effectively managed through proposed mitigation measures. Across all projects considered, whilst some land use impacts would occur, agricultural activities would largely continue within project sites, with only relatively small areas of land removed from production relative to both individual sites and the broader regional agricultural area.

These impacts are discussed further in Section 13.5 due to the linkages with agricultural land as the predominant land use within the project area. Key findings are summarised in Section 24.

12.6 Mitigation and management

Mitigation and management measures proposed to avoid or minimise impacts to land use and property during construction of the project are listed in Table 12.7.

Table 12.7. Proposed mitigation and management measures – land use and property

Reference	Impact	Mitigation measure	Timing	Relevant location (s)
LP1	Direct land use impacts	The design will continue to be refined in consultation with landholders to minimise potential impacts on existing land use and properties as far as practicable.	Detailed design	All locations
LP2	Property impacts	Property Specific Management Plans (PSMPs) (as relevant) will be developed for directly impacted properties in consultation with the landholder. The PSMPs will include: • access arrangements and protocols • the process for rectification of any damage to property infrastructure caused by construction • the process for rehabilitation and stabilisation of disturbed areas following completion of construction • pre-condition assessments to determine the existing condition of assets, infrastructure, utilities that are impacted by construction activity • measures to minimise disruption to agricultural or other practices during construction, including identification of: – existing grazing and cropping activities and farm infrastructure arrangements (for example fences, access tracks) within the project area – any required adjustments to existing agricultural activities during construction, including adjustments to fencing or access tracks or adjustments to grazing or cropping activities as a result of the location of permanent infrastructure within agricultural land. This would be informed by ongoing consultation with landholders – noise intensive activities during construction that would overlap with sensitive periods of the livestock production cycle (for example lambing or calving)	Detailed design Construction	All locations

Reference	Impact	Mitigation measure	Timing	Relevant location (s)
		– vehicle movements and other construction activities in the vicinity of livestock – the need for the movement of livestock away from potential stressors created during construction activities. • specific biosecurity controls, as outlined in the Biosecurity Management Plan • contact details for the person who will liaise with landholders to provide direct avenues of enquiry for information and issues management.		
LP3	Impacts to utilities and services	The location of all services and utilities within the project area will be confirmed during detailed design, and any required protection or relocation works will be designed in consultation with utility providers and landholders.	Detailed design Construction	All locations
LP4	Direct and indirect impacts on State forests	To minimise impacts to State forests and forestry operations (including recreational uses), the FCNSW will be consulted as part of continued design development, and prior to and during construction activities.	Detailed design Construction	Nundle State Forest
LP5	Impacts to mine exploration	To minimise disruption to mining exploration activities, the Department of Primary Industries and Regional Development – NSW Resources, and holders of exploration licenses will continue to be consulted as part of ongoing design development prior to and during construction.	Detailed design Construction	Mine exploration lease areas
LP6	Impacts to transport infrastructure	To minimise disruption to road and rail corridors and operations during construction activities (stringing) impacting the New England and Oxley Highways, and rail corridors, infrastructure owners will be consulted as part of continued design development and prior to and during construction activities.	Detailed design Construction	Stringing locations

Reference	Impact	Mitigation measure	Timing	Relevant location (s)
LP7	Land disturbance	Disturbed areas not required for operations will be stabilised and appropriately reinstated back to pre-construction condition where practicable, or as agreed in consultation with the relevant landholder and documented in the PMP and PSMPs.	Construction	All locations
LP8	National Trail interaction	EnergyCo will consult with the National Trail organisation and will provide ongoing access along the National Trail route during construction.	Construction	Interface with the National Trail route

Agriculture and soils



Section 13

13 Agriculture and soils

This section provides a summary of the detailed assessment undertaken to identify the potential impacts of the project on agriculture and soils during construction and operation. It also identifies the measures to be implemented to minimise and manage these impacts.

This section provides a summary of the outcomes from the following assessments:

- Agricultural Impact Assessment prepared by Tremain Ivey Advisory - Technical Report 6
- Anthrax Assessment and Management Strategy prepared by Ausvet - Technical Report 20
- Equine Health Impact Assessment, prepared by Kannegieter Equine Specialists - Technical Report 21
- Equine Critical Industry Cluster (CIC) Assessment, prepared by HoustonKemp – Technical Report 22.

13.1 Assessment approach

The agricultural impact assessment has been prepared with reference to the SEARs as detailed in Appendix A.

This section also considers issues raised in engagement with community stakeholders relating to agriculture (refer to Section 5) including potential disruption to agricultural operations during construction and operation of the project, potential biosecurity risks, removal of productive land and potential negative economic impacts on agricultural industries. Specific issues have also been raised by community stakeholders regarding a past anthrax outbreak near Rouchel and regarding potential impacts on the equine CIC. Specific assessments have been prepared regarding these issues.

The agricultural impact assessment involved:

- reviewing the legislative and policy context for the agricultural impact assessment
- analysing and describing the existing environment as it relates to agriculture using publicly available data and data obtained for the project, including land and soil capability, agricultural use and productivity (including strategic agricultural land) and biosecurity, and conducting landholder interviews assessing potential impacts of construction and operation of the project on agriculture (including biosecurity impacts)
- preparing a land use conflict risk assessment (LUCRA) in accordance with the NSW Department of Primary Industries (DPI) Land Use Conflict Risk Assessment Guide (DPI, 2002)
- assessing cumulative impacts on agriculture as a result of the project and nearby developments
- providing recommended mitigation and management measures to minimise the potential impacts of the project on agriculture.

The study area for the agricultural impact assessment was the project area. The assessment of construction impacts used an area of 2,233 hectares of agricultural land that would be directly impacted. This area is different to the total project disturbance footprint of 3,579 hectares as the total project disturbance footprint includes clearing of the easement. The agricultural assessment did not consider easement clearing to adversely impact on agricultural land as clearing activities would be of a short duration and would likely increase/improve available grazing land not adversely impact on it. This 2,233 hectares is referred to as the agricultural disturbance area in the Agricultural Impact Assessment (refer to Technical Report 6).

The assessment of operational impacts considered the operational footprint to estimate the likely magnitude of direct impacts as a result of the operation of the project.

While the assessment of potential agricultural impacts assumed that the disturbance as a result of construction and/or operation of the project could occur anywhere within the project area, calculation of these potential impacts is based on the above defined disturbance footprint and operational footprint to appropriately quantify the estimated level of impact.

The project area encompasses 8 LGAs, however, only relatively small areas occur within Singleton LGA (for the Bayswater Power Station substation extension) and Liverpool Plains Shire LGA (small areas of public road works). These areas do not consist of agricultural land. For this reason, some aspects of the agricultural assessment have considered only the 'impacted LGAs' being the 6 LGAs that encompass larger areas of agricultural land within the project area.

The anthrax assessment involved a literature review and spatial analysis to understand the previous distribution and occurrence of anthrax in the project area, as well as a qualitative risk assessment and development of mitigation measures for both humans and livestock.

The Equine Health Assessment identified sensitive equine land uses and equine receptors in proximity to the project and assessed the potential effects of project construction and operation on equine health, welfare and management. The assessment informed the development of measures to avoid or minimise potential impacts.

The Equine CIC Assessment assessed the potential effects of the project on equine businesses within and near the Upper Hunter Equine CIC, as well as the broader equine CIC industry, including industry competitiveness and resilience. The assessment also identified measures to manage or reduce potential impacts where required.

13.2 Existing environment

The following sections describe the existing land and soil capability and regional agricultural enterprise across the project area. Additional information on agricultural land use has been discussed in Section 12. The location of airstrips used for aerial agricultural activities and the impacts of the project on aerial activities is assessed in the Aviation Impact Assessment (refer to Section 17.2 and Technical Report 11).

13.2.1 Land and soil capability

The land and soil capability across the project area has been characterised using the NSW Government's Land and Soil Capability (LSC) Assessment Scheme (OEH, 2012a). Under this scheme, land is assigned to 8 land and soil capability classes ranging from Class 1, being the highest capability land with slight or negligible limitations to Class 8 being extremely low capability land with extreme limitations (refer to Technical Report 6 for further detail).

The LSC Assessment Scheme is based on broad scale mapping and is not a site-specific assessment. Mapping units can be large and internally variable, meaning that local soil conditions may differ substantially from the mapped LSC class. The scheme does not directly measure agricultural productivity and a higher or lower LSC class does not necessarily equate to higher or lower agricultural output.

LSC across the project area is shown on Figure 13.1 and the area of each LSC class within the project area and the agricultural disturbance area is summarised in Table 13.1.

Table 13.1. Land soil capability classes within the project area and agricultural disturbance area

LSC Class	Approximate area within project area (hectares)	Per cent of project area	Approximate area within agricultural disturbance area (hectares)	Per cent of agricultural disturbance area *
1 – Extremely high capability	0	0	0	0
2 – Very high capability	25	0.2%	8.7	0.4%
3 – High capability	290	2.7%	31.2	1.4%
4 – Moderate capability	3,469	31.7%	774.3	34.7%
5 – Moderate–low capability	2,313	21.2%	445	19.9%
6 – Low capability	2,721	24.9%	585.4	26.2%
7 – Very low capability	1,997	18.3%	386.9	17.3%
8 – Extremely low capability	65	0.6%	0.3	<0.1%
Not assessed[19]	47	0.4%	0.5	<0.1%

[19] Not assessed areas include waterways, industrial areas and other which have not been mapped as having a soil class or land capability.

A review of the LSC classes across the project area indicates:

- there is no Class 1 land within the project area or agricultural disturbance area
- about 96 per cent of the project area is located on land mapped as containing very low to moderate capability land (LSC 7 to 4)
- only 2.9 per cent of the project area is located within land classified as high (Class 3) or very high (Class 2) capability land. Less than one per cent of the project area is located within land classified as extremely low capability Class 8 land
- the southern portion of the project area from Bayswater Power Station to Waverly is dominated by low capability Class 6 and very low capability Class 7 land with some areas of Class 5 land
- between Waverly and Timor there is a general increase in capability with relatively more Class 4 and Class 5 land, and less Class 6 and 7 land
- between Timor and Hanging Rock, the project area is dominated by low capability Class 6 and very low capability Class 7 land, with a small area of very high capability Class 2 land along Pages Creek
- between Hanging Rock and the Kingstown Road is typically higher than the preceding section, mostly Class 4 (moderate capability) with greater Class 5 (moderate–low capability) around Walcha Road, Woolbrook, Wollun and Kentucky
- the northern portion of the project area between Kingstown Road and Black Mountain consists mostly of Class 6 (low capability) land and Class 4 (moderate capability) land. There is a large area of Class 5 (moderate – low capability) land near Black Mountain
- the project area between Central Hub A and East Hub contains broadly similar proportions of Classes 3, 4, 5 and 6 land
- about 94 per cent of the disturbance footprint associated with the energy hubs consists of land mapped as containing moderate / moderate–low capability land (about 73 per cent Class 4 land and about 21 per cent Class 5 land). There are also small amounts of lower capability Class 6 and 7 lands.

13.2.2 Strategic Agricultural Land

The project area includes mapped areas of strategic agricultural land, including Biophysical Strategic Agricultural Land (BSAL) and equine CIC land, which form part of the NSW Government's Strategic Regional Land Use Policy (SRLUP). The SRLUP was introduced in response to land use conflict between mining and coal seam gas developments and high-value agricultural land and does not directly relate to transmission infrastructure projects. Nevertheless, EnergyCo has sought to avoid or minimise, where practicable, impacts to BSAL and the equine CIC through the route selection and refinement process for the project as described in Section 2.6 and Appendix B.

13.2.2.1 Biophysical Strategic Agricultural Land

BSAL is mapped by the NSW Government based on its high-quality soil and water resources capable of sustaining high levels of productivity. BSAL has the best quality intrinsic landforms, soil and water resources which are naturally capable of sustaining high levels of productivity and require minimal management to maintain the high quality.

There is approximately 269 hectares of mapped BSAL within the project area, as shown in Figure 13.2. This is equivalent to 2.5 per cent of the total project area.

13.2.2.2 Critical Industry Clusters

Under the NSW Government's SRLUP, CICs are those with:

- a concentration of enterprises that provides clear development and marketing advantages and is based on an agricultural product
- productive industries that are interrelated
- a unique combination of factors such as location, infrastructure, heritage and natural resources
- national and/or international importance
- an iconic industry that contributes to the region's identity
- potential and substantial impacts by coal seam gas or mining proposals.

Within NSW, CICs have been established for both the equine and viticulture industries.

The equine CIC in the Upper Hunter is a highly integrated concentration of horse breeding facilities and related infrastructure covering thoroughbred and stock horse breeding centres and numerous other equine developments and support services, such as a specialised veterinary centre. The mapped area of the equine CIC is shown on Figure 13.2. The mapped equine CIC within the project area is concentrated between McCullys Gap and Pages Creek. Notably, the total mapped area of equine CIC is considerably larger than the actual extent of established equine operations within the region.

There is also viticultural CIC land in the Upper Hunter region. None are intersected by the project area, with the closest area of viticultural CIC land is located along the Hunter River near Muswellbrook, around 10 kilometres from the project area.

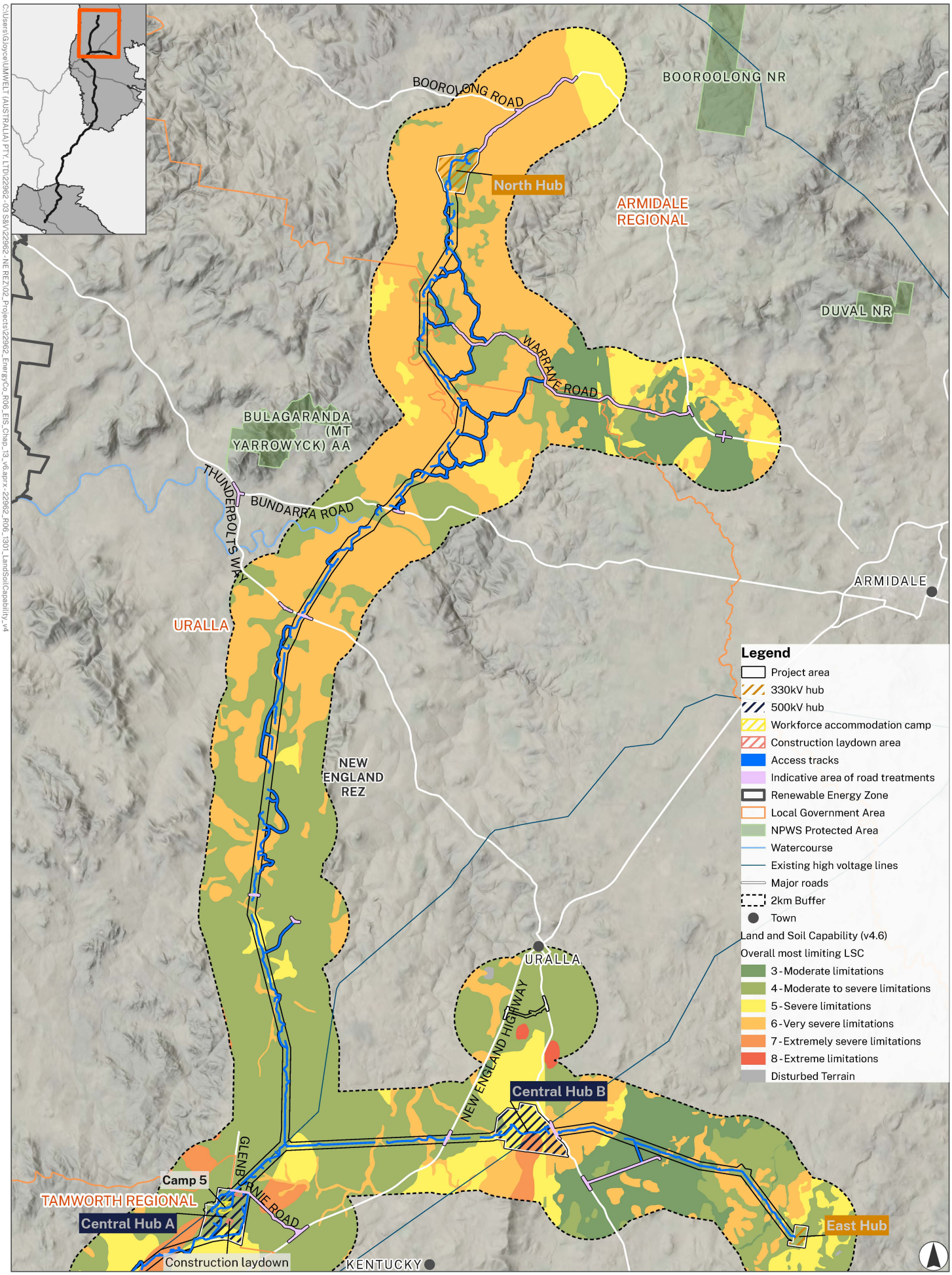


FIGURE 13.1a Land and soil capability across the project area (Map 1 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

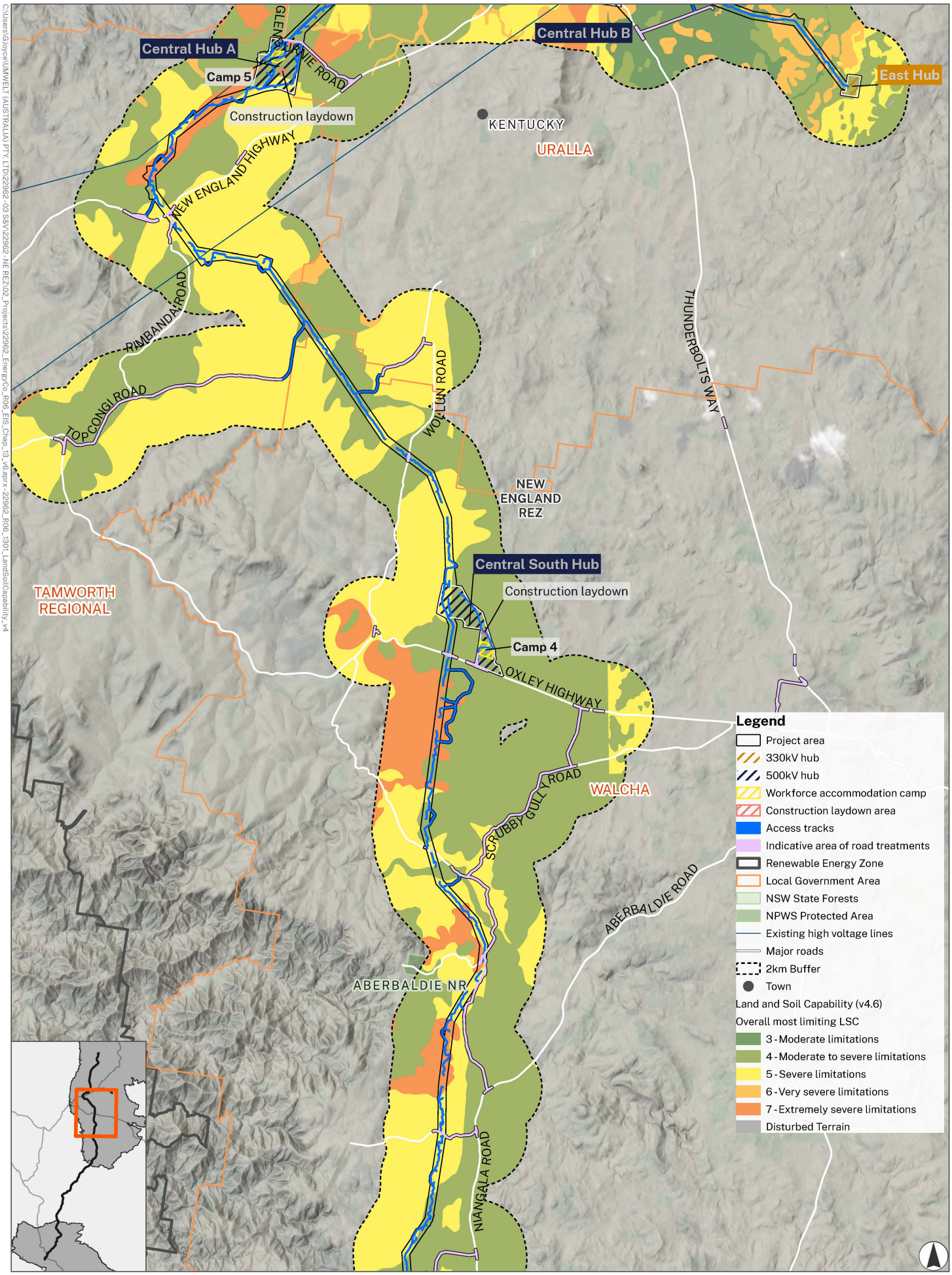


FIGURE 13.1b Land and soil capability across the project area (Map 2 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

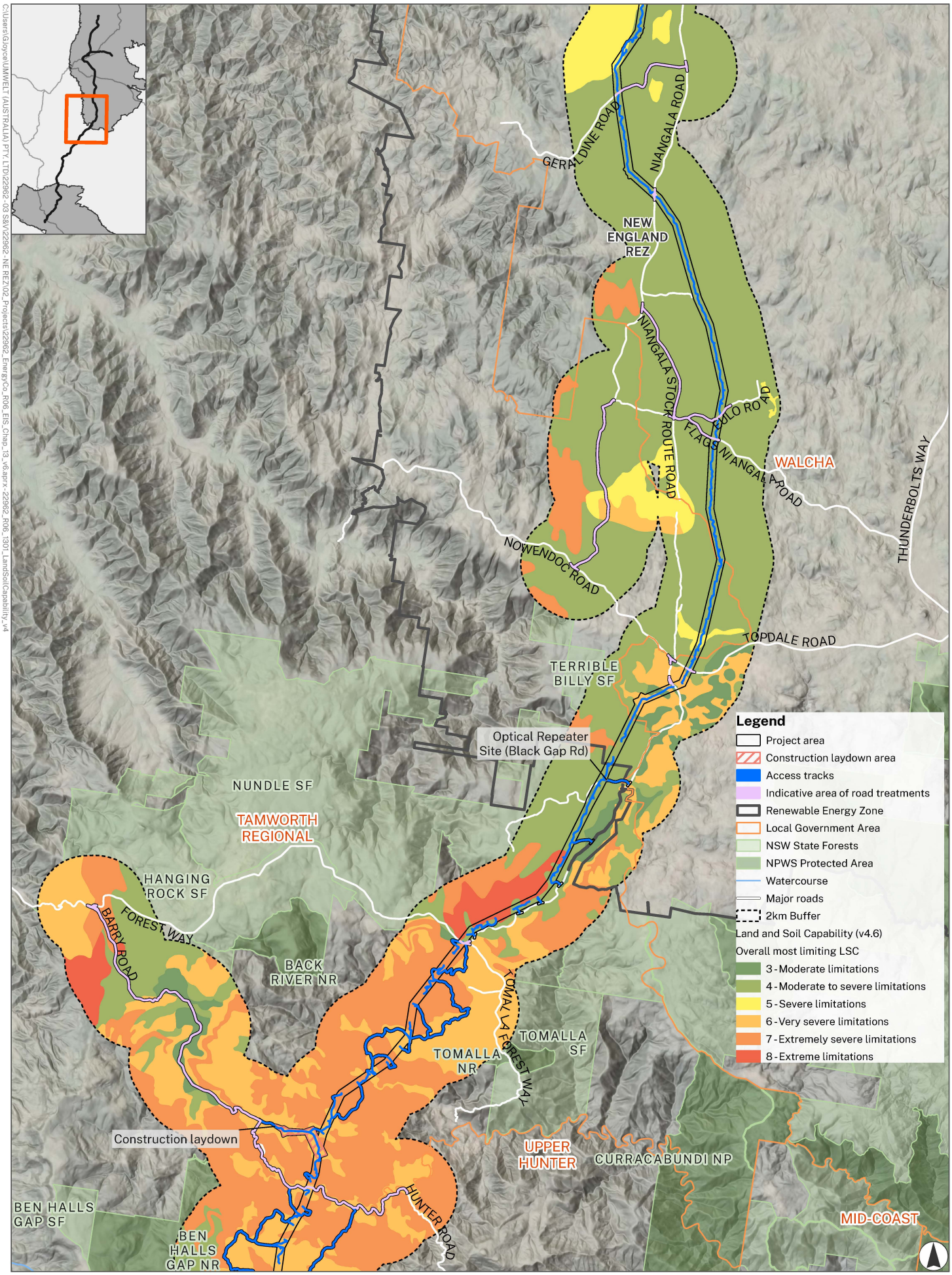


FIGURE 13.1c Land and soil capability across the project area (Map 3 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

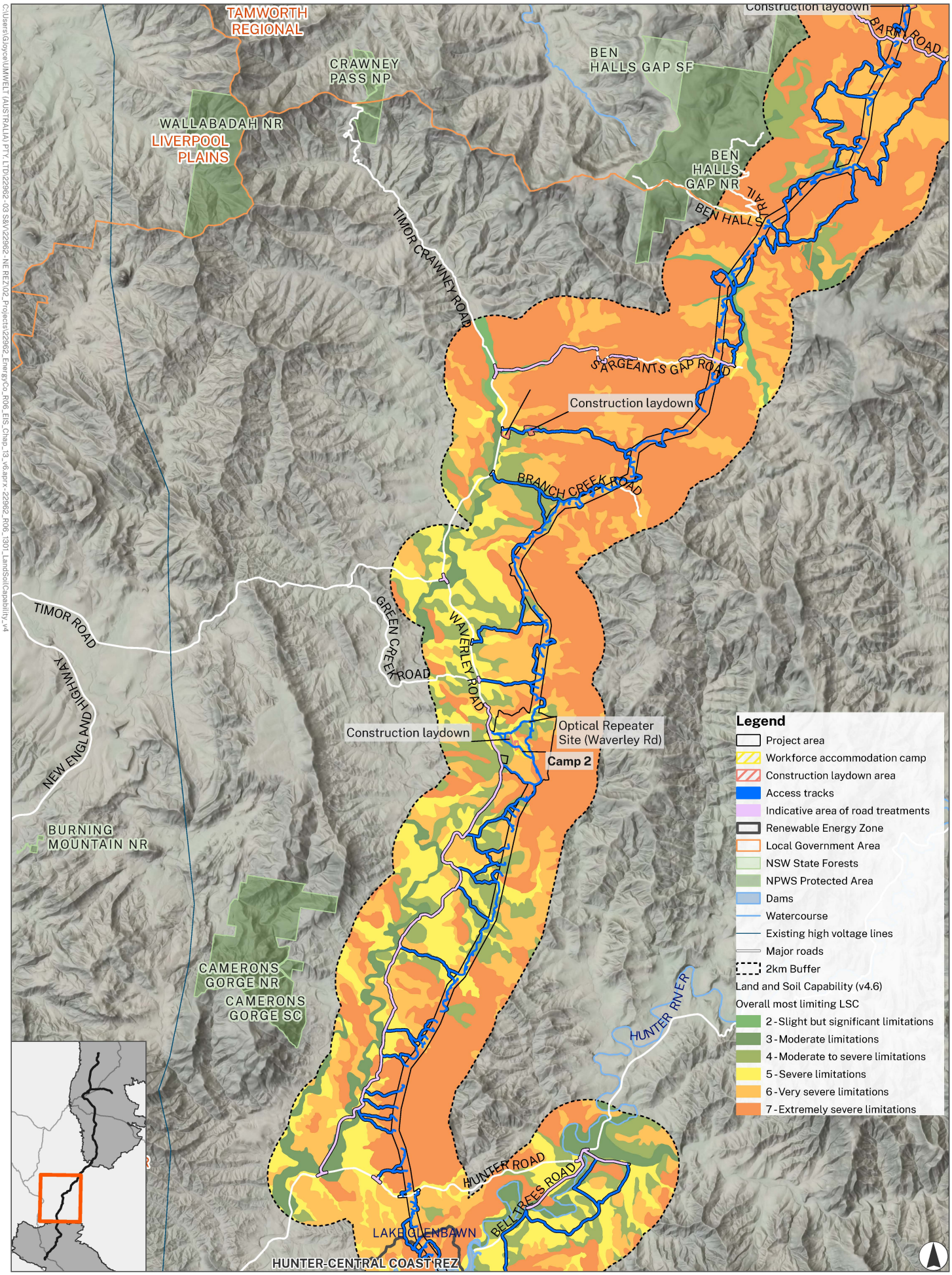


FIGURE 13.1d Land and soil capability across the project area (Map 4 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

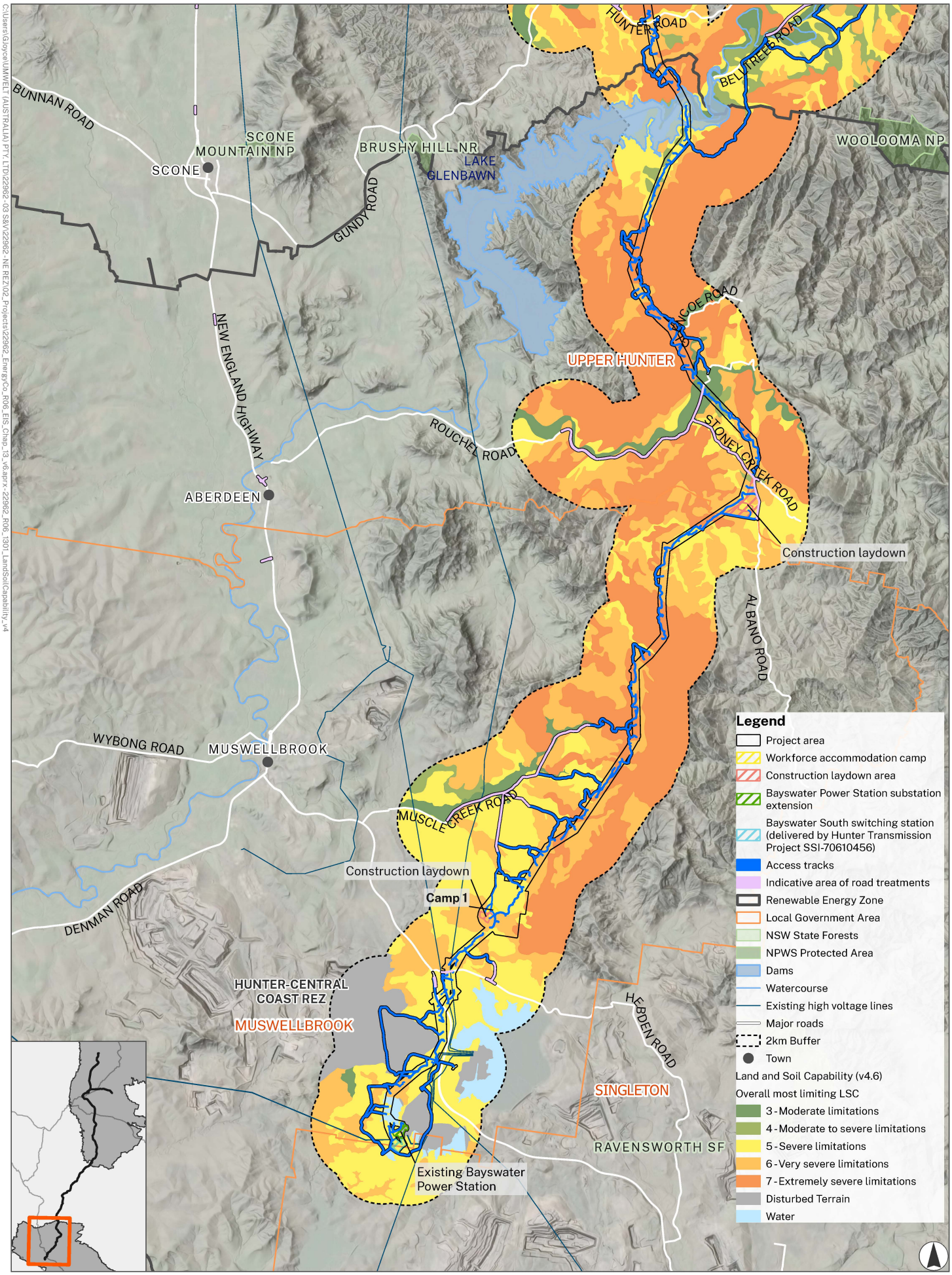


FIGURE 13.1e Land and soil capability across the project area (Map 5 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

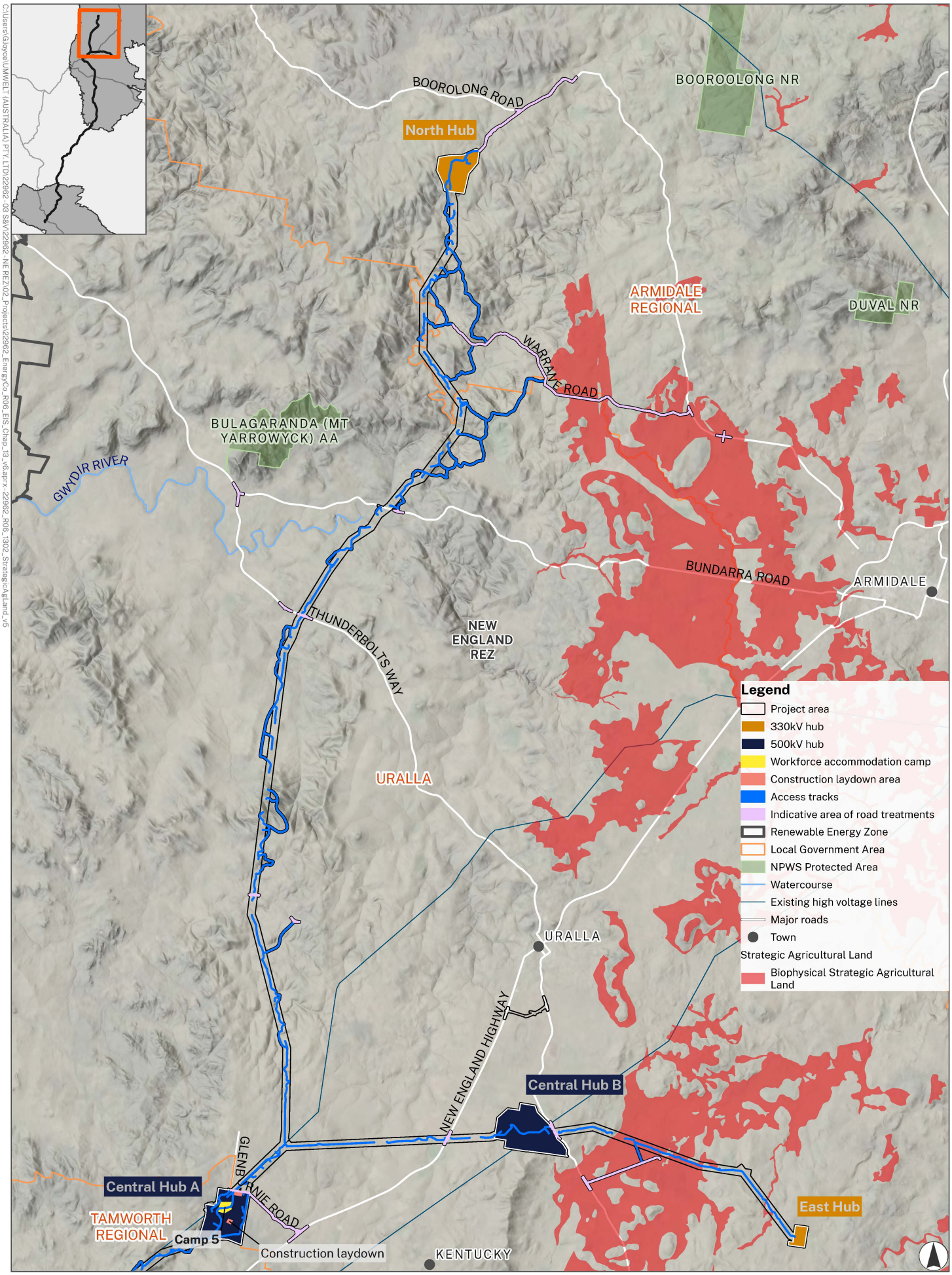


FIGURE 13.2a BSAL and Equine CIC across the project area (Map 1 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

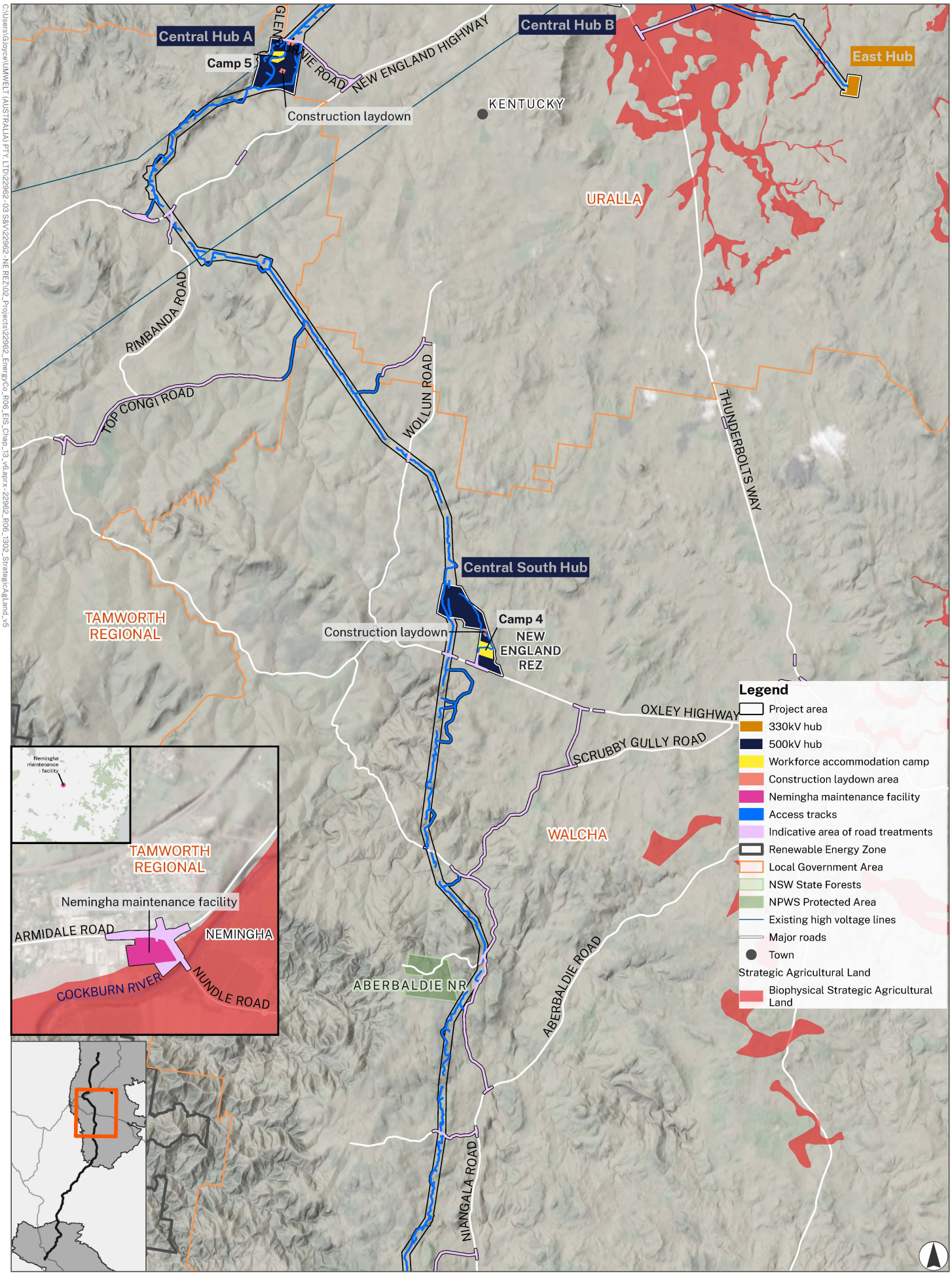


FIGURE 13.2b BSAL and Equine CIC across the project area (Map 2 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

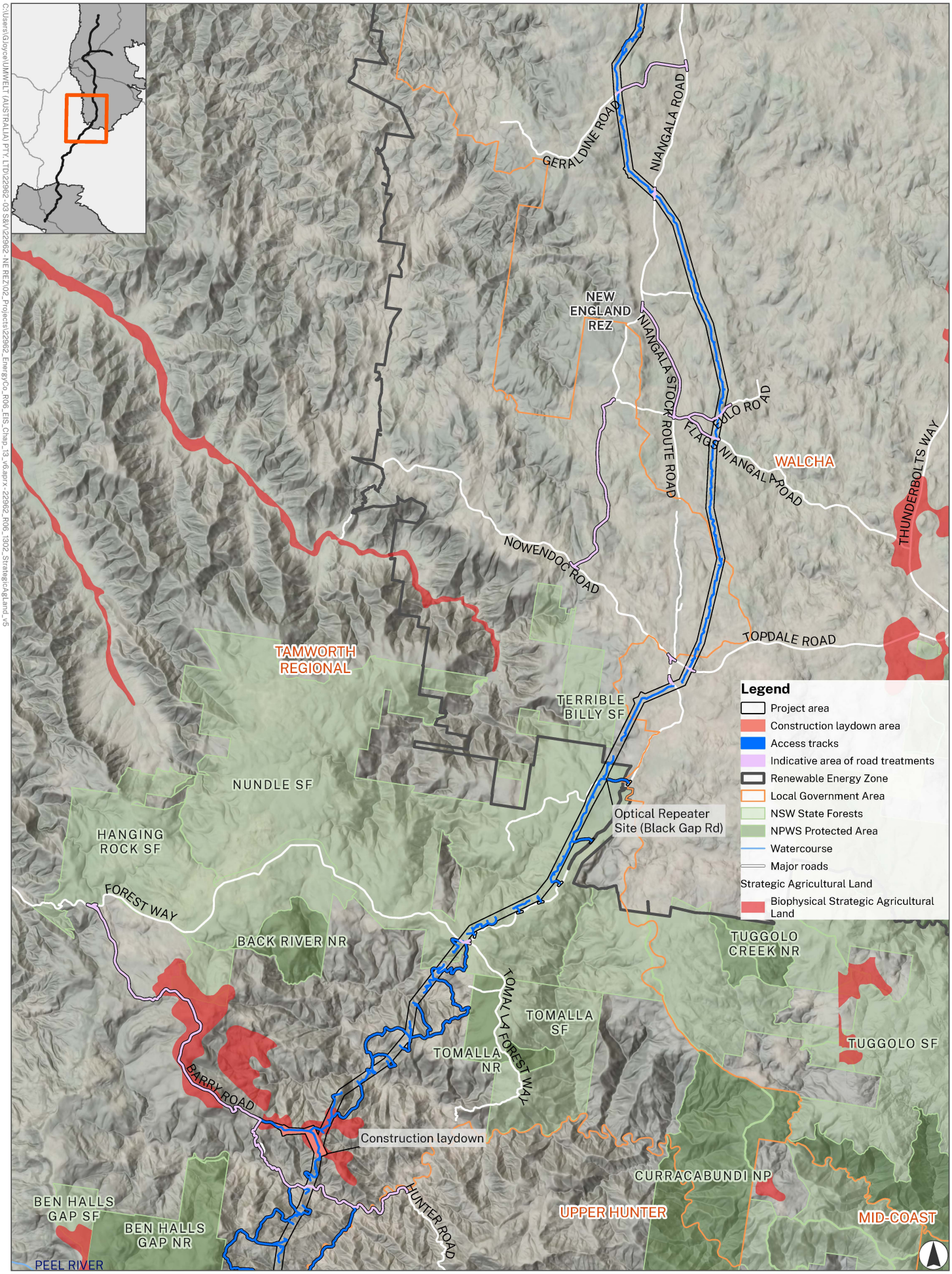


FIGURE 13.2c BSAL and Equine CIC across the project area (Map 3 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

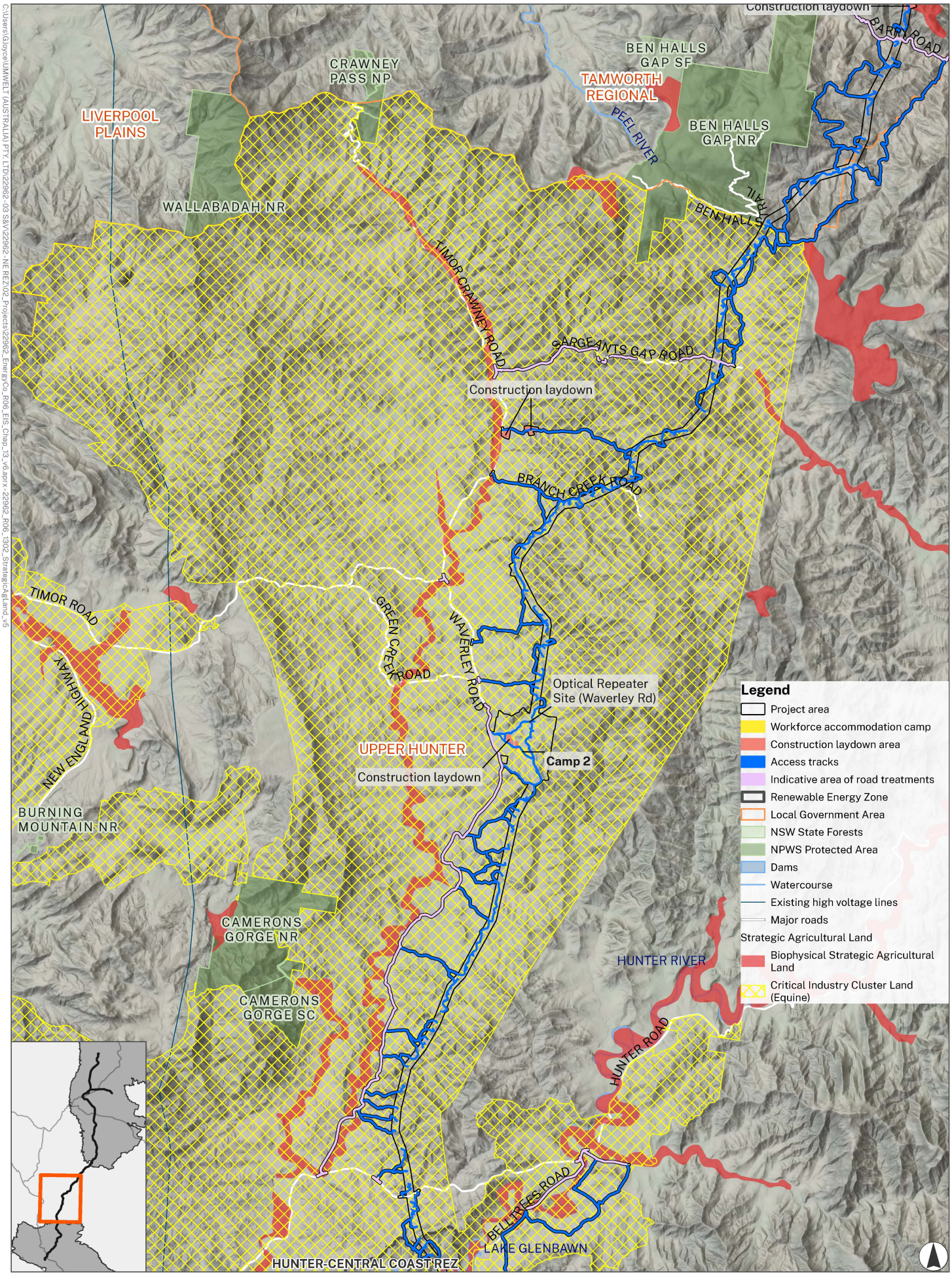


FIGURE 13.2d BSAL and Equine CIC across the project area (Map 4 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

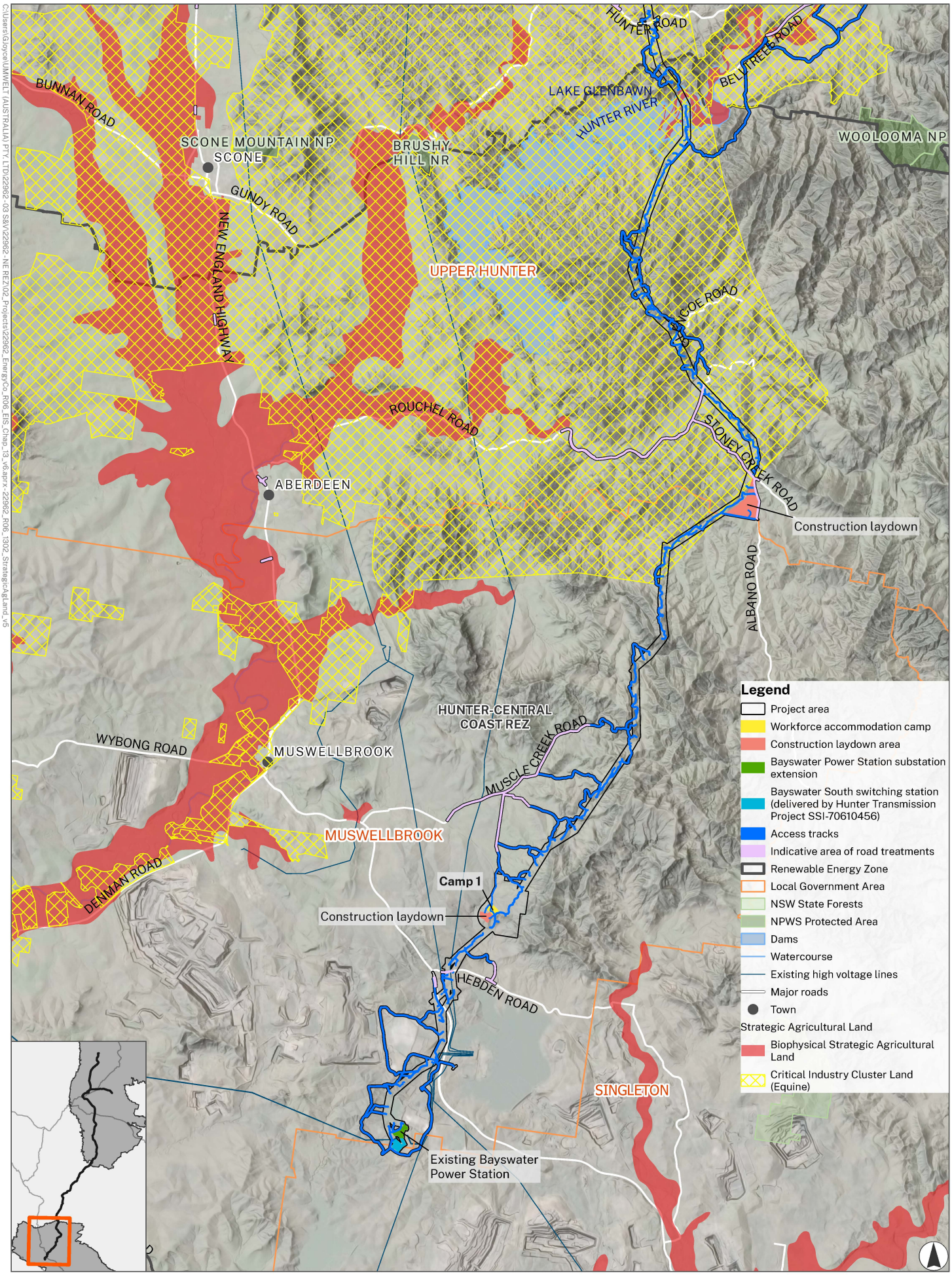


FIGURE 13.2e BSAL and Equine CIC across the project area (Map 5 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

13.2.3 Agricultural productivity and enterprise

Based on the data provided by the 2021 census, agriculture was the largest industry (by number of persons employed) in the Uralla, Walcha and Upper Hunter LGAs. Employment in agriculture was highest in the Walcha LGA, but lower in Upper Hunter and Muswellbrook LGAs, reflective of the influence of the mining industry in those LGAs (ABS, 2022a). Agricultural employment in the Armidale and Tamworth LGAs was relatively low due to the large size of other industries in these larger urban areas, including manufacturing, construction, retail, health care, accommodation and food, and education.

In 2021, across all impacted LGAs, there was a total of 5,684 persons employed in the 'agriculture, forestry and fishing' industry (ABS, 2022b) which accounts for about 9.5 per cent of the total employment of the combined LGAs. In 2021, there were 4,153 'agriculture, forestry and fishing' businesses in the impacted LGAs. This is approximately 33 per cent of all businesses, with the proportion higher at 46 to 65 per cent in the Uralla, Walcha and Upper Hunter LGAs.

The average agricultural holding was approximately 1,051 hectares across the impacted LGAs in 2020–21 (ABS, 2022b). The average agricultural holding size in the Armidale, Tamworth, Uralla and Walcha LGAs was similar at between 1,000–1,100 hectares. The average agricultural holding size in the Muswellbrook LGA was lower at 842 hectares, while in the Upper Hunter LGA it was higher at 1,230 hectares.

Table 13.2 summarises the broad land uses on agricultural holdings across the impacted LGAs of the project based on 2020-21 data.

Table 13.2. Land use on farms across impacted LGAs (2020-2021) (ABS, 2022b)

Land use	Area within impacted LGAs (hectares)
Wheat for grain	16,506
Other broadacre crops	52,380
Hay and Silage	21,512
Grapes	727
Fruit and nuts	764
Other horticulture	213
Other agriculture - mostly grazing	2,079,220
Forestry	29,327
Land not used for agricultural production	125,802

The total gross value of agricultural production across the impacted LGAs in 2020-21 (ABS, 2022c) was $861 million. Key agricultural products and their respective gross values are identified in Table 13.3.

Table 13.3. Total gross value of agricultural production across impacted LGAs in 2020 - 2021 (ABS, 2022c)

Product	Gross value
Wheat	$13,590,145
Hay	$23,581,957
Other crops	$31,176,697
Total - Broadacre crops	**$68,348,799**
Grapes	$506,868
Fruit and nuts	$4,774,460
Other horticulture	$31,697,866
Total - Horticultural crops	**$36,979,194**
Wool	$53,299,035
Sheep and lambs	$78,120,501
Cattle and calves	$445,293,104
Milk	$42,417,843
Pigs	$1,568,553
Poultry and eggs	$134,890,352
Goats and other livestock	$361,560
Total - Livestock products	**$755,950,948**
Total gross value of agricultural production across the impacted LGAs	**$861,278,941**

The value of agricultural production is greatly influenced by seasonal and market conditions and can fluctuate widely from year to year. The sale and disposals of cattle and calves (primarily for meat production) was the most valuable agricultural commodity produced in 2020-21 at over $445 million (or 51.7 per cent of total production). Production of wheat, hay and other crops was relatively low, comprising only 7.9 per cent of total production, most of which was produced in the Tamworth LGA. Horticulture contributed only 4.3 per cent of the total gross value of agricultural production in the impacted LGAs, with most of this related to tomato production in the Armidale LGA.

The total gross value of agricultural production in 2020-21 was equivalent to $397 per hectare over the total agricultural area of holdings (2,171,322 hectares). There was a large difference between the average value of broadacre cropping production ($756 per hectare), horticulture production (approximately $21,693 per hectare) and grazing production ($364 per hectare).

13.2.4 Travelling stock reserves

The grazing industry uses a network of TSRs for moving or grazing stock on foot around NSW. Some of these reserves are linear, providing a route for livestock to move from place to place. Other reserves are blocks of varying sizes providing a place for livestock to be temporarily grazed or held (for example, for overnight yarding). In addition to the TSRs, livestock can also be moved along public roads subject to a permit from LLS.

The project area intersects with, or is adjacent to, 9 TSRs (LLS, 2022), as set out in Table 13.4.

Three of the TSRs are classified as 'category 3' which is described as "rarely, if ever used for travelling stock or emergency management, but is important, valued and used for other reasons such as biodiversity conservation, First Nations Peoples' heritage or recreation" (LLS, undated). These TSRs are unlikely to be used for agricultural purposes.

The other 6 TSRs are classified as 'category 2' which is described as "TSRs that are used for travelling stock, emergency management or biosecurity purposes, but they are also important and used for other reasons, for example biodiversity conservation, First Nations Peoples' cultural heritage or recreational purposes" (LLS, undated). These TSRs may be used for agricultural purposes.

Table 13.4. Summary of travelling stock reserves within or adjacent to the project area

Crown reserve number	Local name	Category	Size of TSR (ha)	Interaction with project area	Locality	Form
R50969	Holmes (Big & Small)	2	50.77	Adjacent	Rouchel	Block
R1001958	Timor Big	2	102.94	Adjacent	Timor	Block
R57548	Sheepyards	2	8.89	Adjacent	Timor	Block
R18243	8 Mile Reserve	2	182.37	Intersected	Walcha Road	Block
R41031	8 Mile Lane	2	24.39	Intersected	Walcha Road	Linear
R71294	Congi Tin Bridge Lane	3	33.38	Intersected	Walcha Road	Linear
R71294	Congi	3	41.96	Intersected	Woolbrook	Linear
R22252	Rocky Gully	3	239.51	Intersected	Kentucky	Linear
R60692	Glendon Lane	2	51.64	Intersected	Boorolong	Linear

13.2.5 Biosecurity

Biosecurity refers to the management of weeds, pest animals and animal and plant diseases in the agricultural landscape. Agriculture around the project area is associated with comparatively high biosecurity risks, as it is located in a relatively mild, high rainfall climate, with large population centres nearby. This increases the chance of pests or weeds being introduced and becoming established.

The most common weeds identified by biosecurity officers during property inspections within or near the project area were wheel cactus (*Opuntia robusta*), broad-leaf privet (*Ligustrum lucidum*), blackberry (*Rubus fruticosus*), St. John's wort (*Hypericum perforatum*), serrated tussock (*Nassella trichotoma*) and nodding thistle (*Carduus nutans*). Of these, blackberry and St. John's wort are relatively widespread in the project area, while the other weeds are mainly found in the Northern Tablelands region which encompasses most of the project area north of Niangala.

St John's wort, Coolatai grass and lantana were mentioned by landholders and/or biosecurity officers during interviews as important weeds present on or near the project area that have the potential to become more widespread. Chilean needle grass and serrated tussock are also of particular concern, primarily in the north of the project area.

Foxes, feral pigs and wild rabbits have a widespread distribution across the project area. Foxes are generally in abundance across the whole project area, but the abundance of pigs and rabbits vary considerably. There are medium to high concentrations of pigs between Lake Glenbawn and Walcha Road, and varied concentrations of rabbits between Muscle Creek and Hanging Rock and between Walcha Road and Black Mountain.

Feral goats are also present within the project area, but generally in low numbers. Wild dogs have medium to high abundance between Bayswater and Niangala and landholders in the Rouchel Brook and Muscle Creek areas have raised particular concerns about their prevalence. Both red deer and fallow deer are found in medium numbers between Timor and Niangala, with high numbers of fallow deer around Armidale.

Animal diseases under the *Biosecurity Act 2015* such as sheep footrot and Ovine Johne's disease (OJD) are notifiable diseases. The occurrence of sheep footrot in the vicinity of the project area has been very low in recent years, with DPI reporting no flocks infected with virulent footrot as of December 2023 across the Northern Tablelands, North West and Hunter regions (DPI, 2024). Little recent data is available on the prevalence of OJD in NSW. However, the project area was in a low prevalence area in 2010 with less than 0.8 per cent of flocks estimated to be infected.

Anthrax is also a notifiable disease under the *Biosecurity Act 2015*. Although anthrax is otherwise very uncommon in the Hunter Valley, a large outbreak occurred at Rouchel in 2007-2008, highlighting that anthrax remains a potential risk in the Rouchel area. Anthrax risks are further discussed in Section 13.3.5 and a specific assessment of this issue has been undertaken for the project (refer to Technical Report 20).

The project area is within the Phylloxera Exclusion Zone to which movement of grapes and grape vine material is prohibited, and other movement restrictions apply. This is relevant as parts of the project area are located in proximity to viticulture regions in the Hunter Valley and near Armidale. The nearest mapped viticulture CIC is located approximately 10 kilometres from the project area.

The entire state of NSW is also a potato biosecurity zone. Potatoes are grown at Guyra near the northern end of the project area. The potato biosecurity zone restricts the movement of any restricted potato biosecurity matter (including Solanaceae plants and certain material that has been in contact with a Solanaceae plant) into the potato biosecurity zone.

13.3 Potential impacts – construction

13.3.1 Agricultural land use and value of production loss

Impacts to agricultural land use and the expected changes within the project area during construction of the project are discussed in Section 12.3. The overall construction program for the project is expected to be around 6 years, however, most construction activities at any one location would be intermittent and short-term (such as transmission line tower construction) and would occur progressively along the project alignment. The calculation of agricultural production loss has used a conservative assumption that there would be restriction of agricultural activities across the agricultural disturbance area for a period of 5 years. Typical construction activities at a transmission tower site (excluding stringing) are expected to take from several weeks to a few months, depending on construction difficulty, whereas the length of construction at other structures such as energy hubs would be longer. Intermittent grazing (which is the dominant agricultural activity occurring over approximately 86 per cent of the project area) would be possible across much of the project area between various construction activities, subject to construction safety and relevant biosecurity requirements.

The agricultural disturbance area considered in the Agricultural Impact Assessment (refer to Section 13.1) representing the likely area that may be highly impacted and or temporarily restricted from its current agricultural use is 2,233 hectares. However, it may be necessary in some instances to exclude livestock from the entire paddock in which the construction is taking place, not just the area impacted by construction. This can be influenced by varying landholder management preferences regarding the level of disturbance to livestock caused by construction activities.

The gross value of production across the agricultural disturbance area has been assessed at a weighted average of $381 per hectare, based on the average value of broadacre cropping production ($756 per hectare) and grazing production ($364 per hectare), and the much larger proportion of the construction used for grazing (95.8 per cent) than cropping (4.2 per cent). The loss of production is calculated to be a total of $4,254,000 which is equivalent to $850,773 per year and approximately 0.1 per cent of the total gross annual value of agricultural production across the impacted LGAs over the same period. Importantly, as discussed above this is a conservative assessment based on restriction to agricultural activities for a full 5 years when this time may be shorter in many circumstances and does not account for the implementation of proposed management measures provided in Section 13.7.

13.3.2 Land and soil capability

Project construction would not generally affect the intrinsic capability or physical characteristics of the land in or adjacent to construction activity, except in small areas subject to heavy traffic or earthworks. Areas subject to heavy traffic or earthworks which are not required to be part of the operational footprint would be rehabilitated following construction.

13.3.3 Impacts to agricultural productivity and enterprise

The impact on crop and pasture operations as a result of construction activities may be major at certain places and times, but would be limited to localised areas where construction impacts are occurring. On a regional scale the impacts would be minor due to the relatively small size of the agricultural disturbance area in a regional context and the relatively short construction period at each location. There is approximately 95 hectares of cropping land within the agricultural disturbance area which equates to approximately 4 per cent of the agricultural disturbance area and represents a negligible proportion of the total agricultural area in the impacted LGAs.

The main potential impact from construction of the project on livestock enterprises would be disturbance of sheep and cattle caused by noise and vehicle movements, and disruption to grazing management. The project would also involve construction vehicle movements of various sizes, and other unfamiliar construction activities, in the proximity of livestock.

The agricultural impact assessment also considered potential impacts on livestock from construction activities including noise from aircraft and helicopters, drones, and blasting activities. The assessment concluded that the impact on livestock production is likely to be small, if any, due to the short impact periods, limited affected areas, applied mitigation measures including Property Management Plans (PMPs), and the propensity of livestock to habituate to disturbances.

Noise and movement produced by construction activities could impact on livestock in specific circumstances, especially during calving and lambing periods. The degree of impact would depend on the level of noise, the timing of the activity and the location relative to sensitive livestock. Livestock can be panicked, particularly if they are new to the area near the project (such as relocated, agisted or newly purchased animals) or if they are not accustomed to human contact. This could lead to injury, disruption to grazing and mismothering.

The impact on livestock can be minimised by implementing appropriate management measures for construction activities, including consultation with landholders regarding the location of sensitive livestock and the timing of crucial periods such as calving and lambing. These measures are summarised in Section 13.7. Subject to the implementation of these measures, impacts to livestock productivity during project construction are expected to be minor.

13.3.4 Impacts to Strategic Agricultural Land

13.3.4.1 Impacts to Biophysical Agricultural Land

Of the approximately 269 hectares of mapped BSAL within the project area, around 54.6 hectares would be precluded from agricultural production by construction, scattered across several parts of the project area. The BSAL area directly affected is equivalent to 2.4 per cent of the agricultural disturbance area. The impact on BSAL would be minor due to the small area involved and because agricultural production would only be temporarily restricted across much of this area during construction and it is expected that the overall soil properties would be largely retained. Areas affected during construction not occupied by permanent infrastructure or otherwise required for operations would be rehabilitated and returned to its former land use after construction is completed.

13.3.4.2 Impacts to Equine Critical Industry Cluster and equine facilities

The project has been designed to minimise potential impacts on sensitive equine land uses within the equine CIC and more broadly on equine facilities. Due to the linear nature of the project, the extent of mapped equine CIC land in the Upper Hunter and the range of other project design constraints (refer to Section 2.6), it was not practicable to completely avoid all mapped equine CIC land. Route selection and corridor refinement have largely avoided direct impacts to identified equine facilities, paddocks and horse stud infrastructure.

The Equine Health Impact Assessment, prepared by Kannegieter Equine Specialists (refer to Technical Report 21), identified a limited number of equine receptors in proximity to the project, including Kitchwin Hills, Scone Polo Club, Walcha Polocrosse Grounds and Jockey Club, and Gundy Park Equine. While additional equine enterprises were identified within the wider equine health study area, these additional enterprises are located at sufficient distance from the project area and associated project activities that they are not expected to be affected by project construction or operation. The assessment found that the vast majority of major thoroughbred breeding operations within the Upper Hunter equine CIC are located several kilometres or more from the project area and would experience negligible construction and operational impacts.

Of the assessed receptors, Kitchwin Hills, a thoroughbred breeding stud within the Upper Hunter equine CIC, was identified as having the greatest potential to experience project-related impacts due to the location of the transmission corridor and associated access tracks within and adjacent to the property and the resulting interaction with construction activities. Detailed design and construction planning for works affecting Kitchwin Hills would be undertaken in consultation with the landholder to minimise impacts on equine operations where practicable. Any direct impacts to land or property interests resulting from project works on the property would be addressed in accordance with the applicable land access, acquisition and compensation framework for the project. The principal construction interactions are expected to be associated with construction traffic on Waverley Road, nearby access track works and construction activities occurring closest to the equine operation. Consultation and property-specific management measures would be implemented to reduce risks during sensitive periods, including breeding and foaling activities.

Potential impacts to the assessed equine receptors are primarily associated with construction noise, dust generation, vehicle and machinery movements, and helicopter operations where activities occur in proximity to equine operations. Due to its proximity to the project area, Kitchwin Hills is expected to experience the highest level of interaction with these activities, while impacts to the remaining assessed receptors would be low to negligible.

Temporary dust exposure was assessed as presenting a low risk to equine health and welfare, while construction noise, vehicle and machinery movements may result in short-term behavioural responses in horses. Helicopter operations are primarily relevant to the southern portion of the Kitchwin Hills property nearest the project area, where startle and avoidance behaviours may occur during construction. The potential for these responses and associated impacts was considered in the Equine Health Impact Assessment. However, any impacts are expected to be temporary and localised.

The Equine Health Impact Assessment concluded that potential impacts to equine receptors would be low, localised and temporary and, with implementation of the mitigation and management measures outlined in Section 13.7, are not expected to result in adverse long-term effects on equine health, welfare, breeding activities or management practices. Consistent with these findings, the Equine CIC Assessment found that construction impacts would be concentrated at the small number of equine businesses located closest to construction access routes and activity areas. Stakeholder concerns primarily related to construction traffic, temporary changes in access, noise, amenity and biosecurity, however, traffic assessments indicate access to equine businesses and clubs would be maintained during construction, and any amenity impacts would be intermittent and limited in duration. With implementation of property-specific consultation and management measures, the assessment found that construction is not expected to materially affect the operation of equine businesses and facilities within the Equine CIC.

13.3.5 Biosecurity

13.3.5.1 Weeds

Weeds that are present in the region and present a potential biosecurity threat are discussed in Section 13.2.5.

Landholders and biosecurity officers also identified parthenium weed (*Parthenium hysterophorus*), tropical soda apple (*Solanum viarum*) and sticky nightshade (*Solanum sisymbriifolium*) as weeds with the potential to be introduced from outside the project area by construction activities.

There is a moderate risk of weed spread associated with the project, and the maximum potential risk would occur during earthworks, given the frequency of vehicle and personnel movements, and the likelihood of increased weed growth due to disturbance of ground cover and soil. However, the Agricultural Impact Assessment found that the implementation of the mitigation measures outlined in Section 13.7 would be effective in mitigating this risk and managing the spread of weeds.

13.3.5.2 Vertebrate pests

The project is unlikely to significantly change the number or movement patterns of vertebrate pests such as pigs, foxes and rabbits. The project is also unlikely to substantially alter the movement patterns of native herbivores, including kangaroos. The main risk would be associated with the potential for food waste to attract predators such as foxes and pigs. However, the likely impacts from vertebrate pest increasing in numbers or spreading due to the project would be very low.

The landholders interviewed as part of the Agricultural Impact Assessment did not identify any significant risk of vertebrate pests arising from construction activities.

13.3.5.3 Livestock pests and diseases

Sheep lice, OJD and ovine footrot were identified in the Agricultural Impact Assessment as likely to be the most important livestock pest and disease risks for consideration in regard to the project. Vehicle movements and foot traffic are not recognised as significant factors in the transmission of ovine footrot, however, transmission is possible under ideal conditions which include wet soil, moderate temperatures and actively growing pastures.

The risks associated with these diseases are small due to the low probability of spread being caused by project activities and the low prevalence of disease in the area. The main risks would be the uncontrolled movement of livestock through fence damage or improper gate management, and the spread of footrot by vehicles or foot traffic. Other diseases, such as bovine respiratory disease, cheesy gland, clostridial diseases, ovine brucellosis, pinkeye, 3-day sickness, trichomoniasis and vibriosis, are very unlikely to be spread by proposed construction activities.

A landholder interviewed as part of the Agricultural Impact Assessment raised concerns regarding exotic disease introduction from overseas. This highlights the importance of measures to prevent the introduction of exotic animal diseases by personnel and equipment entering the project area.

Anthrax

The Anthrax Assessment and Management Strategy (refer to Technical Report 20) considered the potential impacts of anthrax on livestock and human health near Rouchel during the construction of the project, noting a historic outbreak of anthrax in livestock in the Rouchel area in 2007/2008.

The qualitative risk based assessment concluded that without mitigation strategies in place, the overall risk of anthrax to construction workers is considered generally low, but still above an acceptable level. Construction workers are more likely to contract anthrax from touching an infected animal carcass than from contact with contaminated soil, as carcasses contain much higher spore concentrations. However, repeated exposure to lower spore levels in soil over long periods of time still presents a risk. Higher-risk construction activities are those where there may be contact with deceased animals (for example vegetation clearing), activities that may cause abrasions (for example scratches from vegetation) or activities where workers are in closer contact with soil or dust, frequently and over long durations.

These risks to construction workers can be reduced to an acceptable level (that is, very low to negligible risks) with the implementation of practical mitigation measures. Key mitigation measures to reduce outbreak risk include avoiding direct contact with animals and soil, managing livestock risks, reducing dust and spore dispersal, following infection prevention and control measures, disease surveillance and governance structures to advise on and oversee implementation of mitigations. As landholders are not present on active construction sites, their risk of direct transmission (but not zoonotic risk, that is transmission from a sick animal or carcass) is assumed as lower than construction workers.

The assessment indicates that the risk to human health from anthrax during construction activities can likely be effectively managed, provided that appropriate mitigation strategies are implemented.

With respect to anthrax risk to livestock, the assessment noted that while mitigation measures can markedly reduce the risk of anthrax to livestock in most circumstances, a modest risk of anthrax in livestock remains in the Rouchel area during and after construction, noting specific environmental conditions, such as extreme weather events like drought or flooding, can create ideal conditions for spore distribution, as previously seen in the Rouchel area. Transmission risks are particularly associated with surface groundworks (for example access roads) and deep soil excavations (for example pile excavations). To mitigate these risks, key control measures include avoidance of known historical anthrax sites (via GPS locations), prophylactic vaccination of livestock, exclusion fencing, water and soil management, grazing management and ongoing extension to local landholders.

For livestock, risks can be reduced to appropriate levels across most scenarios through the proper application of mitigation measures. However, elevated risk of outbreaks remains possible under specific, realistic worst-case scenarios, such as extreme weather events (for example drought and heavy rain) that promote spore dispersal in the environment. Should this occur, a rapid outbreak response would be deployed to ensure effective control.

Management measures to mitigate livestock pest and disease risks, including specific measures for the management of anthrax, are outlined in Section 13.7.

13.3.5.4 Plant diseases and pests

As the project area contains only a very small area of horticultural land (less than 0.1 per cent of the total project area), the risk of spreading plant diseases and pests would be limited. However, there are horticultural enterprises in the broader area, including wine and potato operations, and a large tomato growing enterprise near Armidale.

Plant diseases or pests are not a substantial issue for most grazing enterprises which dominate agriculture in the region. However, there are several important crop diseases in the region and pathogens such as rusts can be spread on vehicles, footwear and clothing (Plant Health Australia, 2017). Activity associated with the project has the potential to result in the spread of crop or pasture diseases or pests in the absence of appropriate management controls, but the Agricultural Impact Assessment found that risk appears to be lower than for the horticultural industry due to the extensive and annual nature of production. The landholders interviewed did not identify any significant risk of plant disease or pest problems arising from construction activities and therefore no specific mitigation measures are required.

Management measures for plant diseases and pests are outlined in Section 13.7.

13.3.5.5 Biosecurity risks to organic producers

Organic producers face similar pest, weed and disease biosecurity risks as non-organic producers discussed in the sections above. However, there is an additional risk associated with the introduction of non-organic plants or materials to an organic property, which can affect the property's organic certification. To manage risks to organic producers, any proposed rehabilitation of construction areas would not use genetically modified plants and the risk of the accidental introduction of genetically modified plants by construction activities would be very small. Measures to manage risks to organic producers are outlined in Section 13.7.

13.3.6 Travelling stock reserves

The project area intersects 6 ‘category 2’ TSRs that could be used for agricultural purposes (refer to Section 13.2.4). Some movement of livestock along these TSRs or public roads may be temporarily affected by restricted access during construction. Three of the 6 impacted TSRs (Glendon Lane, 8 Mile Lane and Congi Tin Bridge Lane) appear to be rarely, if ever, used for public livestock movements. The remaining TSRs which interact with the project area are likely to be infrequently used for livestock movements, and any restrictions caused by construction would be usually of a short duration.

Therefore, project construction is not expected to significantly prevent or hinder livestock movements and grazing on TSRs and livestock routes.

13.4 Potential impacts – operation

13.4.1 Land use and value of production loss

Where operation of the project involves permanent infrastructure, there would be a permanent change in land use, from the existing agricultural land use to electrical infrastructure (for example, transmission line structures, permanent access tracks and energy hubs). The soil and land capability, and agricultural production in these areas would be lost during the operational life of the project. Land required for temporary construction facilities such as workforce accommodation camps, site offices, laydown areas, concrete batch plants, stringing sites, temporary access tracks, and other construction ancillary infrastructure would be restored to its former use, unless otherwise requested by the landholder.

The total operational footprint (the area permanently occupied by project infrastructure) is an estimated 471 hectares, of which agricultural land comprises approximately 438 hectares. This is equivalent to 0.02 per cent of the total area of agricultural holdings in the impacted LGAs.

The value loss of this land is calculated to be $166,878 per annum. This is equivalent to approximately 0.02 per cent of the total gross value of agricultural production across the impacted LGAs.

Grazing and cropping operations would be able to continue in other areas, such as the land under the conductors and transmission line structures, subject to certain restrictions such as height of machinery, and exclusion zones around transmission structures. For example, cropping is permitted up to 30 metres from the base of a transmission structure (EnergyCo, 2026). No horticultural land would be taken out of production by the operation of the project.

13.4.2 Land and soil capability

The operation of the project would not generally affect the intrinsic capability or physical characteristics of the land outside the operational footprint. As approximately 3 per cent of the project area comprises high-quality agricultural land (LSC Class 3 and above), a similar proportion of the land permanently removed from production is expected to be high-quality land.

13.4.3 Impacts to agricultural productivity and enterprise

The presence of transmission line structures or other facilities on arable crop and pastureland would, to some extent, disrupt routine on-ground animal husbandry operations. However, the impacts on crop production are expected to be minor due to the small areas directly affected, the low proportion of cropping land use in the easement, and the ability to continue cropping across most of the transmission line easement during operation.

The main potential impact on livestock enterprises would be noise and movement disturbance of sheep and cattle, as discussed in Section 13.3.3. These impacts would be lower during operation than construction and are expected to be minimal due to a low intensity of personnel and vehicle movements required for maintenance activities. The potential for damage to fences and other livestock infrastructure and gates being left open, would also be reduced due to the reduced activity and personnel.

Operational requirements for the transmission lines would potentially restrict the siting of electric fences and may require the realignment and/or earthing of some fences. However, this is unlikely to result in major impacts on the operation of grazing enterprises or the movement of livestock.

Fences within or near a transmission line easement must be earthed and isolated for safety reasons. Metal fences must be at least 25 metres from a transmission structure (EnergyCo 2025). The requirements for relocation of fencing (both metal and electrified) would be managed with the implementation of property management plans in consultation with affected landholders.

The impact of electro-magnetic fields generated by transmission lines on livestock has been raised in relation to transmission projects such as Central West Orana REZ and the Victoria to New South Wales Interconnector West. A review of relevant studies is provided in the Agricultural Impact Assessment (refer to Technical Report 6). In summary, the body of scientific evidence indicates that there is not an increased risk of adverse health events to livestock when exposure occurs to extremely low-frequency electric and magnetic fields, such as those associated with power transmission and distribution lines. Scientific sources and studies indicate that electric and magnetic fields have no adverse effect on livestock health.

There are several private airstrips located in proximity to the project that are used for agricultural purposes such as aerial spreading of fertilisers and aerial pesticide spraying. Impacts to aerial agriculture operations are assessed in the Aviation Impact Assessment and discussed in Section 17.2 and Technical Report 11.

Landholders undertaking cropping activities may utilise GPS guided cropping equipment. An assessment of the potential impact of the project on GPS signals has been undertaken as part of the EMI and telecommunications assessment (Technical Report 13). GPS operate on higher frequencies than transmission lines and it is anticipated that the project would have limited interaction and interference with GPS signalling.

No large-scale cropping enterprises have been identified within the operational area. Consequently, potential impacts on GPS-guided cropping operations are considered unlikely. If the project was to cause nuisance interference, a range of mitigation measures are available such as signal boosting equipment or antenna enhancement (refer to Section 13.7).

13.4.4 Impacts to Strategic Agricultural Land

13.4.4.1 Impacts to Biophysical Agricultural Land

The area of BSAL within the operational footprint is approximately 6.4 hectares. This is equivalent to approximately 1.4 per cent of the total operational footprint. The overall impacts to BSAL during operation are considered small, noting that loss of agricultural production would be limited to the area occupied by permanent infrastructure elements, as cropping and grazing could continue within most of the transmission line easement.

13.4.4.2 Impacts to Equine Critical Industry Cluster

The operation of the project would not result in direct impacts to the majority of equine facilities, paddocks, horse stud infrastructure or other equine enterprises within the Upper Hunter equine CIC.

The main operational impacts on equine receptors relate to periodic inspection and maintenance activities, including helicopter inspections, vegetation management and vehicle access along the transmission corridor. Kitchwin Hills has the greatest potential for interaction with these activities due to its proximity to the transmission corridor and is the receptor most likely to experience operational impacts associated with helicopter inspections. While helicopter inspections and other maintenance activities may result in temporary behavioural responses in horses, these activities would be infrequent, short-term and limited in extent. The remaining assessed receptors are located at greater distances from the transmission corridor and would experience low to negligible operational impacts.

Operational noise and vibration, dust, EMF/EMI, fencing and lighting were assessed as part of the Equine Health Impact Assessment and are not expected to affect equine health, welfare, breeding activities or management practices. The assessment found that operational impacts would be negligible to low and that the project is not expected to result in long-term impacts on equine enterprises within the Upper Hunter equine CIC.

Consistent with the findings of the Equine CIC Assessment, operational interactions with equine businesses and clubs would principally relate to infrequent inspection and maintenance activities, including aerial inspections and ground-based maintenance works. These activities are unlikely to materially affect equine operations, particularly where advance notification and consultation procedures are implemented.

The Equine CIC Assessment also concluded that the project is unlikely to materially affect the ongoing operation, viability or attractiveness of equine businesses within the Upper Hunter equine CIC, with the key factors underpinning the region's competitiveness and reputation remaining unchanged during operation. Changes to visual amenity at Kitchwin Hills, including the bottom farm where broodmares are agisted or received from neighbouring studs for covering, are expected to be minimal due to project design measures that reduce the visual prominence of the transmission line. Mitigation and management measures to minimise potential impacts to equine receptors during operation are provided in Section 13.7. These measures include ongoing consultation with affected equine businesses where operational activities have the potential to interact with sensitive equine operations. Further information is provided in the Equine Health Impact Assessment (refer to Technical Report 21) and Equine CIC Assessment (Technical Report 22).

13.4.5 Biosecurity

The biosecurity risks and potential impacts outlined in Section 13.3.5 in relation to construction are also applicable to the operational phase of the project. However, vehicle, machinery and personnel activity would be less intense and more infrequent during operation, and therefore the risk of weed, pest or disease spread would be much lower. Biosecurity management measures as provided in Section 13.7 will continue to be implemented during operation of the project.

13.4.6 Travelling stock reserves

It is unlikely that movement of livestock along TSRs or public roads would be affected by the operation of the project.

13.5 Land use conflict risk assessment

A Land Use Conflict Risk Assessment (LUCRA) has been undertaken for the project and is presented in the Agricultural Impact Assessment report (refer to Technical Report 6). The LUCRA process has been established by the NSW Department of Primary Industries (DPI) to identify and assess the potential for land use conflict to occur between neighbouring land uses.

The LUCRA identifies 13 potential land use conflicts for the project that present a 'high risk' activity without the implementation of any mitigation. These potential 'high risk' activities are associated with pastures and crops (including temporary disruption to cropping and grazing and dust impacts), biosecurity, disruption to agricultural activities (including restricted movement, disruption to on-ground operations and livestock enterprises), noise, fire, damage to infrastructure and fencing restrictions, long term loss of agricultural land and impacts to aerial agricultural operations. Each of these aspects have been assessed within the Agricultural Impact Assessment, with the key findings set out in the sections above.

Subject to the implementation of the mitigation measures outlined in Section 13.7, the mitigated risk rating for all but one potential 'high risk' activity was found to have reduced, being the temporary disruption to cropping and grazing due to construction, which remains a 'high risk' activity. While the consequence of this activity is reduced from moderate to minor with the implementation of appropriate mitigation, the probability of this occurring would remain certain which is the reason for the high risk for this activity remaining under the LUCRA process. Section 13.7 provides further detail regarding the proposed management of these temporary disruptions, including the development of individual property management plans, in consultation with landholders.

13.6 Cumulative impacts

The potential cumulative agricultural impacts of the project have been identified based on the scale and potential impacts of the project, in combination with the potential impacts of relevant identified future projects and broader developments supporting the New England REZ. A list of these relevant projects, including their descriptions and interfaces with the project, is provided in Section 24. Some projects were found to have limited likelihood of contributing to cumulative agricultural impacts, as they had little impact on land use and agriculture or were distant from the project and therefore did not require further consideration in the cumulative assessment.

The assessment approach to cumulative impacts is outlined in Section 24. This approach identified a potential for cumulative impacts to land use, property and agriculture associated with relevant future projects, and these impacts are also summarised in Section 24. Across all projects considered, agricultural activities would largely continue within project sites, with only small areas of land removed from production relative to both individual sites and the broader regional agricultural area. As a result, cumulative impacts on overall agricultural production and employment are anticipated to be negligible. Construction-related cumulative impacts, including livestock disturbance, dust and biosecurity risks were assessed as minor where works overlap or occur in close proximity, and negligible for more distant projects.

13.7 Mitigation and management

Mitigation and management measures proposed to avoid or minimise impacts to agriculture during construction of the project are listed in Table 13.5.

Table 13.5. Proposed mitigation and management measures – agriculture

Reference	Impact	Mitigation measure	Timing	Relevant location (s)
AG1	Access impacts (construction)	Where possible, the location of any additional access tracks (temporary and permanent) will be confirmed in consultation with landholders to minimise impacts on agricultural activities. Where new permanent tracks are required, a single access track will be designed to serve both temporary and permanent purposes, where possible.	Detailed design Construction	All locations
AG2	Impact of structures	Where the positioning of transmission line structures and other associated permanent structures will impact: • cropping land • areas used for set up and pack up of agricultural equipment, entry points and turning areas • farm dams • locations of high biosecurity risk, consultation will be undertaken with the affected landholder to identify opportunities to avoid or minimise these impacts, where practicable, prior to the commencement of relevant works which will impact the applicable area, equipment and/or property infrastructure.	Detailed design Construction	All locations
AG3	Disruption (property management plans)	Individual property management plans will be developed in consultation with each landholder directly affected by construction activities. The intent of the plans is to provide a flexible approach which balances the needs of existing agricultural operations and construction activities. The plans will address relevant matters including: • access arrangements and protocols	Detailed design Pre-construction Construction	All relevant properties

Reference	Impact	Mitigation measure	Timing	Relevant location (s)
		• proposed timing and location of construction works, particularly where some restriction on vehicular, equipment, grazing or livestock movements will be necessary • grazing and cropping activities on and adjacent to the construction disturbance footprint during the construction period • farm infrastructure arrangements • any required adjustments to property infrastructure (fences, access tracks, etc) • noise intensive activities during sensitive periods of the livestock production cycle (for example, lambing and calving) • vehicle movements and other activities within the vicinity of livestock • movement of stock away from potential stressors created by construction activities • details of the rehabilitation of any temporary construction facility to be returned to its former land use after construction is completed if possible, or as agreed with the landholder • details of any access tracks or other infrastructure provided for temporary construction activities that are to be retained and not restored to the pre-existing condition (where requested by the landholder prior to the completion of construction within the applicable area) • biosecurity requirements • contact details for the person who will liaise with landholder to provide direct avenues of enquiry for information and issues management.		

Reference	Impact	Mitigation measure	Timing	Relevant location (s)
		Property management plans and property access plans will be developed prior to the commencement of relevant works which will impact the applicable property, activity, equipment and/or property infrastructure. The requirements of the plans will be adhered to and implemented throughout the construction period.		
AG4	Disruption (general)	To minimise disruption to agricultural activities during construction: • property infrastructure (such as gates) will be managed in accordance with landholder requirements • any damage to property infrastructure caused by construction will be repaired in a timely manner in consultation with the landholder • use of existing roads, tracks and other existing disturbed areas will be prioritised over the construction of new access tracks where practicable • fencing on and near the disturbance footprint will be modified (for example, earthing and isolation) according to requirements • where access is required across open spaces, care will be exercised to ensure that surface disturbance is minimised by confining vehicular and plant movements, as far as practicable, to a single route.	Detailed design Construction	All relevant properties
AG5	Biosecurity (construction)	Biosecurity controls will be implemented during construction to minimise the risk of the spread of disease, pests or weeds. These will be based on a general Biosecurity Management Plan for the project. The biosecurity management plan will consider all potential biosecurity risks and identify appropriate strategies to prevent, eliminate or minimise those risks. Construction activities will be assessed in relation to potential agricultural and biodiversity impacts (including weeds, pests, and emergency animal diseases such as Japanese encephalitis and foot and mouth disease) including a risk assessment outlining the likely plant, animal, and community risks.	Pre Construction Construction	All locations

Reference	Impact	Mitigation measure	Timing	Relevant location (s)
		Property -Specific Biosecurity Management Plans will also be developed. The property-specific biosecurity management plans will address the various protocols and matters including the following: • weed management controls, including inspection and cleaning of plant and equipment, and management of earthworks and clearing activities • development of specific controls where high biosecurity risks are identified. For example, appropriate measures will be implemented with respect to foot and mouth disease to control any risk of introduction of the pathogen because of project activities • the property-specific controls applicable will be consistent with property biosecurity plans where they are in place. Agreed protocols will be documented in the biosecurity management plan • management of gates in accordance with landholder requirements • protocols for repairs of any damage to property infrastructure. • a monitoring program to track the effectiveness of the controls identified in the biosecurity management plan • consultation with the owners of organic certified properties will be carried out to identify the property-specific risks and controls required to be implemented. The property-specific biosecurity management plans will be prepared in consultation with relevant local council biosecurity officers in relation to the distribution of important weeds and the location of high biosecurity risk areas.		
AG6	New weed infestations	In the event of new infestations of priority weeds because of construction activities, the relevant control authority will be notified in accordance with the requirements of the *Biosecurity Act 2015* and *Biosecurity Regulation 2017*. Weeds will be managed in accordance with the *Biosecurity Act 2015.*	Construction	All locations

Reference	Impact	Mitigation measure	Timing	Relevant location (s)
AG7	Water	Water required for the construction of the project will be obtained from sources that do not affect the amount of water available for agricultural activities, where practicable.	Construction	All locations
AG8	Accommodation camps	Accommodation camps will be designed and located to minimise potential land use conflicts with landholders undertaking agricultural practices nearby. They will be located away from cropping areas and farm infrastructure, if possible, with an appropriate buffer. Consultations will be undertaken with neighbouring landholders and a management plan for the accommodation developed.	Construction	All locations
AG9	Access impacts (operation)	Fencing and access arrangements, such as locked gates and requirements for opening and closing of gates, will be determined in consultation with landholders. Any damage caused by maintenance activities will be repaired promptly.	Operation	Transmission line
AG10	GPS impacts	If impacts on agricultural precision farming GPS signals arise due to operation of the project, the cause of any such interference will be investigated. Any disruption due to operation of the project will be addressed in consultation with the affected landholder and may include measures such as signal boosting equipment or antenna enhancements (where applicable).	Operation	Transmission line
AG11	Biosecurity (operation)	Biosecurity controls set out in the biosecurity management plan will be implemented during operation to minimise the risk of transport or spread of disease, pests or weeds during maintenance activities.	Operation	All locations

Reference	Impact	Mitigation measure	Timing	Relevant location (s)
AG12	Weed management	Where present within the transmission line easement and associated areas for permanent infrastructure, weeds will be managed in accordance with the *Biosecurity Act 2015*.	Operation	All locations
EH1	Equine management	Prior to construction, the location and extent of equine facilities and paddocks associated with identified equine receptors will be verified through consultation with landholders, property managers and/or field verification. This information will be used to confirm receptor locations, refine construction management measures and inform notification and consultation requirements where construction activities may occur in proximity to equine facilities and paddocks.	Detailed design	All equine facilities and paddocks located within 800 m from the project area
EH2	Equine management	Consultation with affected landholders or property managers will be undertaken during detailed design, construction and operation where activities have the potential to affect equine management, access or property operations.	All stages	All equine facilities and paddocks located within 800 m from the project area
EH3	Equine management	Where construction activities are proposed within, or immediately adjacent to, actively managed paddocks at identified equine receptors, consultation will be undertaken with the relevant landholder or property manager regarding the timing of works and any temporary horse management measures considered necessary.	All stages	Kitchwin Hills (top and bottom farm)
EH4	Construction noise	At least 72 hours' notice will be provided for substantial noise-generating activities, for example helicopter stringing occurring in proximity to identified equine receptors, allowing property owners or managers to implement horse management measures where considered necessary.	Construction	All equine facilities and paddocks located within 800 m from the transmission corridor

Reference	Impact	Mitigation measure	Timing	Relevant location (s)
EH5	Construction and operational noise	Where reasonably practicable and identified through consultation with affected landholders or property managers, the timing of substantial noise-generating activities, for example helicopter stringing, helicopter inspections and or conductor washing will consider sensitive equine activities, including breeding, foaling and the management of young stock.	Construction Operation	All equine facilities and paddocks located within 800 m from the transmission corridor
EH6	Construction Dust	Implement the dust management measures identified in the project CEMP, including watering, speed restrictions and management of exposed surfaces where required.	Construction	Active construction areas
EH7	Erosion and sediment control	Implement erosion, sediment and water quality management measures in accordance with the project CEMP to minimise the risk of sediment, contaminants and construction-related runoff entering grazing areas.	Construction	Active construction areas
EH8	Fencing	In the event that construction or maintenance activities result in damage to fences, gates or other livestock management infrastructure, the affected landholder or property manager will be notified as soon as practicable and the damaged infrastructure repaired, reinstated or replaced to its pre-existing condition.	Construction Operation	As required
EH9	Induced voltages on conductive infrastructure	Ensure metallic fences, gates, water troughs and other conductive infrastructure within and adjacent to the easement are appropriately earthed in accordance with transmission network operator requirements.	Construction	Conductive infrastructure located within or adjacent to the transmission easement within the Equine CIC

Reference	Impact	Mitigation measure	Timing	Relevant location (s)
EQ1	Disruption (property management plans)	An individual property management plan will be developed in consultation with each landholder affected by construction and operation activities. The purpose of the plan is to provide a flexible approach that balances the needs of the existing equine operation with construction and operation activities. The plan will address relevant matters including: • access arrangements and protocols • proposed timing and location of construction works • any required adjustments to property infrastructure (fences, access tracks, etc) • noise intensive activities during sensitive periods of the equine production cycle (for example, breeding and foaling) • movement of horses away from potential stressors created by construction activities • biosecurity requirements. • contact details for the person who will liaise with landholder to provide direct avenues of enquiry for information and issues management. The individual property management plan will be developed before the commencement of works that may affect the relevant property, activities, equipment or infrastructure. The requirements of the plan will be implemented and maintained throughout the construction and operation period.	Detailed design Pre-construction Construction Operation	Kitchwin Hills The Barn Scone
EQ2	Disruption (property management plans)	Where construction activities are expected to have an impact on the equine operation, consultation will be undertaken with the affected landholder to identify opportunities to avoid or minimise these impacts, where practicable, prior to the commencement of relevant works which will impact the applicable area, equipment and/or property infrastructure.	Pre-construction Construction	Gundy Park Equine Scone Polo Club

Reference	Impact	Mitigation measure	Timing	Relevant location (s)
AT1	Reduces likelihood of an anthrax outbreak	An Anthrax Management Plan will be prepared as part of the Property Specific Management Plan (AG5). The plan will be prepared in consultation with relevant stakeholders and landholders and will include: • engagement with the construction workforce and affected landholders • livestock management measures during construction, such as exclusion fencing in areas of soil disturbance during construction and any water retention or erosion areas that could contain contaminated collected runoff water or sediments; including provisions for retention of fencing until ground cover is established • livestock vaccination program • dust suppression measures (in accordance with AQ1) • soil management, including measures to manage the movement of excavated or disturbed soil from the immediate construction site and prevent distribution to other locations of the project area • water runoff and erosion management (in accordance with SW1) • grazing management • construction management processes and protocols to: – avoid soil disturbance to known historic anthrax sites – reduce spore dispersal – reduce construction worker exposure to animals and contaminated soil • infection prevention and control measures, including personal protective equipment (PPE) • biosecurity measures	Prior to construction and during construction. Operation	Rouchel area subject to historic anthrax outbreak

Reference	Impact	Mitigation measure	Timing	Relevant location (s)
		• disease surveillance protocol • reporting protocol • emergency response.		
AT2	Reduces likelihood of an anthrax outbreak	Notification to residences in the Rouchel area will be undertaken to provide awareness of anthrax and associated risks.	Prior to construction and during construction.	Rouchel area

Traffic and transport



14

Section

14 Traffic and transport

This section provides a summary of the detailed assessment undertaken of the potential impacts of the project during both construction and operation. This section also identifies mitigation and management measures to be implemented to minimise potential impacts.

The detailed Traffic and Transport Impact Assessment (TTIA) prepared by Aurecon is provided in full in Technical Report 7.

14.1 Assessment approach

The TTIA has been undertaken with reference to relevant guidelines including the *Guide to Transport Impact Assessment* (TfNSW, 2024), the Austroads Guides to Traffic Management (2020) and Road Design (2023), and TfNSW Traffic Control at Work Sites Standard (2026a).

The assessment was also prepared with reference to the SEARs as detailed in Appendix A.

The section considers issues raised in engagement with community stakeholders and relevant regulatory authorities including TfNSW and councils relating to traffic and transport impacts (refer to Section 5). This includes increased traffic movements on local and regional roads, damage to local road infrastructure, deterioration of existing poor road conditions from additional construction traffic, safety of local roads for public use and livestock movement, and the suitability of local roads for heavy vehicle movements.

The assessment of potential traffic and transport impacts of the project involved the following:

- desktop mapping analysis and field inspections to identify the existing condition of the proposed construction access routes including road classification, lane configuration, speed limit, pavement type, pedestrian/cyclist facilities, the existing heavy vehicle restrictions, crash history, traffic operating performance, and public transport provisions
- traffic counts and surveys at key locations to understand the performance of these roads under existing traffic conditions
- review of the proposed construction activities and methodology to derive the expected traffic generation and traffic distribution during construction
- assessment of the potential impacts during construction of the project with regards to road capacity and efficiency (including level of service), road condition, road safety, heavy vehicle movements, property access, active transport and public transport
- assessment of potential impacts during operation of the project including consideration of road capacity and efficiency, road condition, road safety, active transport, public transport and property access

- assessment of cumulative traffic and transport impacts during construction and operation
- identification of mitigation and management measures to avoid, minimise and manage the potential traffic and transport impacts of the project, as far as practicable.

The assessment of traffic generation for the project adopted a scenario-based approach considering different time periods, including enabling works, to reflect the progressive and distributed nature of works across the project area. The study area for the TTIA has been identified as the transport networks that would be used and/or may be impacted by the project construction and/or operation related traffic movements. The TTIA study area is shown on Figure 14.1.

It is noted that the project's traffic and transport impacts can be appropriately managed using the existing road network and project specific mitigation measures. The project is not reliant on the future upgrade programs proposed as part of the Port to REZ project, however these works would provide beneficial upgrades that the project would use once complete.

14.2 Existing environment

14.2.1 Road network

The road network in the TTIA study area comprises State roads, regional roads and local roads that connect population centres, businesses, mining sites and properties with a network of sealed and unsealed roads. In NSW, roads are formally classified under the *Roads Act 1993*, which defines responsibilities for ownership, funding and management. There are 3 key road classifications being State roads (managed by TfNSW), regional roads (managed by local councils often with State government funding) and local roads (managed by local councils).

The existing roads making up the proposed project transport routes are described in Table 14.1. The proposed project transport routes are shown on Figure 3.13 and Figure 3.14. Further detail of road conditions and classification is provided in the TTIA (refer to Technical Report 7).

Table 14.1. Road network condition

Road classification (relevant road authority)	Road description
NSW State roads (TfNSW or local council, as relevant)	The key State roads within the TTIA study area include the New England Highway and Oxley Highway. The Oxley Highway between Bendemeer and Walcha is predominantly a single carriageway, two-lane road. Sections of the New England Highway widen to include auxiliary lanes (for example turning and climbing lanes) and wider cross-sections through town centres. The widths of both roads increase in townships to accommodate kerbside parking and, in some locations, pedestrian and cycling facilities. For both roads, lane and shoulder widths vary, with narrow shoulders common in rural areas. Speed limits are typically 100 km/h in rural areas, reducing to 80 km/h on town approaches and 50–60 km/h within town centres, reflecting changes in land use, access density and roadside activity.

Road classification (relevant road authority)	Road description
Regional roads (Local council, often with TfNSW funding support)	The regional road network includes Thunderbolts Way, Hunter Road, Gundy Road, Nundle Road, Ogunbil Road, Nowendoc Road, Topdale Road, Bundarra Road and Lindsays Gap Road, providing key connections between towns, rural communities and the State road network. These roads support local traffic, agricultural and tourism movements, with periodic heavy vehicle use. Thunderbolts Way and Lindsays Gap Road provide regional connections, while Nundle Road and Ogunbil Road link Tamworth, Nundle and surrounding rural localities. The regional roads are predominantly sealed, single-carriageway, two-lane roads with generally narrower lane widths and limited or narrow shoulders compared to State highways. Road geometry reflects hilly terrain, including steep grades, curves and limited sight distance. Posted speed limits are typically 80–100 km/h in rural areas, reducing to 50–60 km/h near townships or where geometry and roadside activity are constrained.
Local roads (Local council)	Local roads form the lowest tier of the road network and provide access to rural properties, farming operations, small settlements and local destinations. They are generally single-carriageway roads with narrow pavements and a mix of sealed and unsealed sections. Local roads within the project area typically have limited or no sealed shoulders and variable surface conditions. While posted speed limits are often 100 km/h in rural areas, operating speeds are commonly lower (approximately 60–80 km/h) due to constrained geometry, surface condition and roadside hazards, and around 50 km/h within town centres.

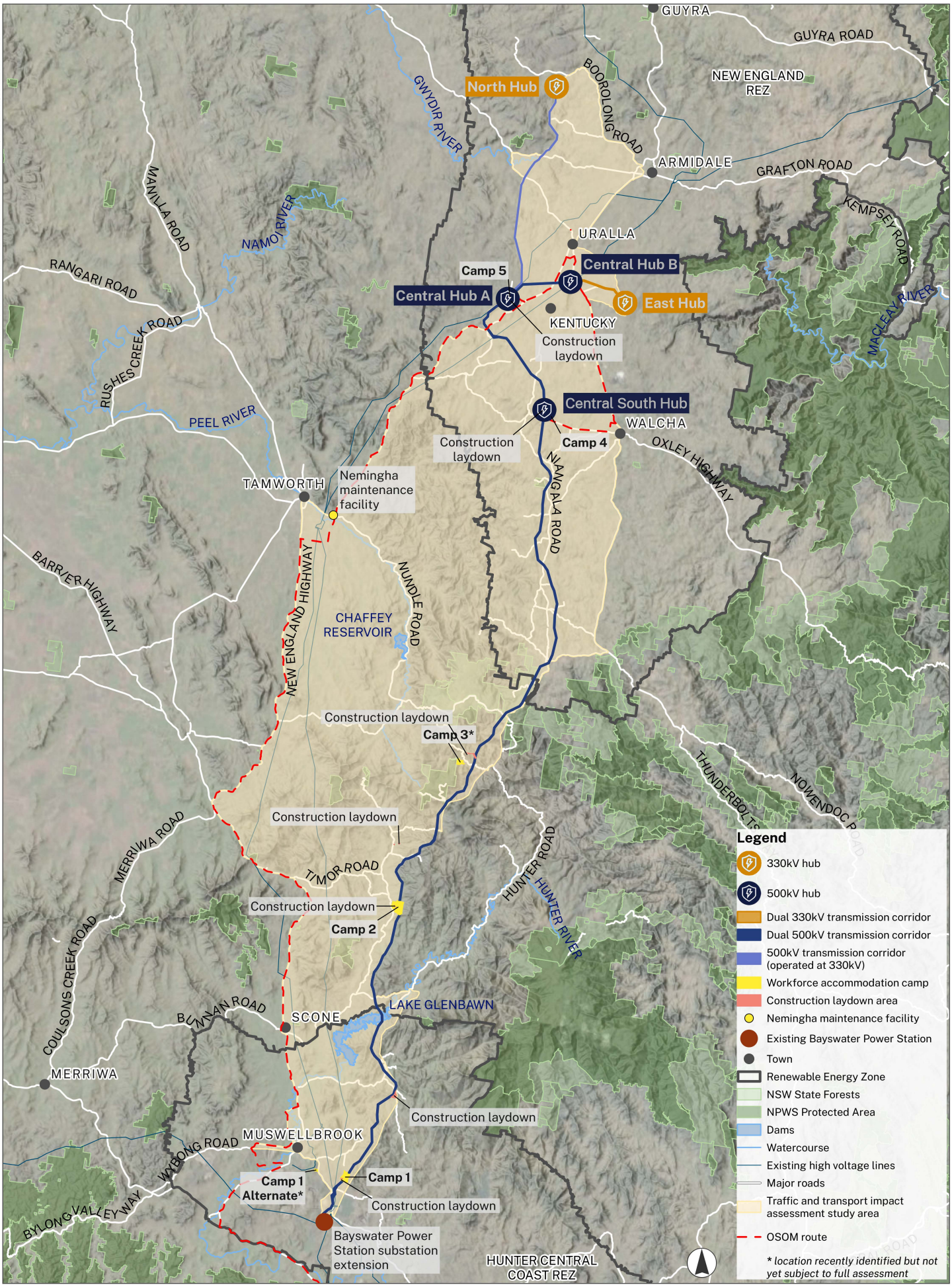


FIGURE 14.1 Traffic and transport impact assessment study area

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

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

14.2.2 Traffic volumes

Based on existing traffic volume data, all roads making up the proposed project transport routes currently operate at Level of Service (LoS) A (indicating unrestricted flow and minimal driver delay) during a typical peak hour. This indicates that the road network currently performs at an acceptable level of service or better during typical peak hours.

Within the TTIA study area the highest traffic volumes occur on the New England Highway. The total average daily traffic in 2025 on the New England Highway near Aberdeen was about 11,400 vehicles per day and near Bendemeer about 4,500 vehicles per day. Heavy vehicle per centages typically range between 19 per cent and 24 per cent. The New England Highway and Oxley Highway both exhibit substantial spare capacity under existing conditions, with no identified operational constraints or performance deficiencies.

Most intersections are currently operating satisfactorily, with existing turn treatments meeting relevant warrant thresholds for both existing and forecast future baseline traffic demands. In these locations, turning volumes remain below critical thresholds and no upgrade to the existing intersection treatment is required to accommodate forecast future baseline traffic conditions. This outcome applies across most intersections on the New England Highway, Oxley Highway and associated regional and local road connections.

Some intersections were identified where one or more turning movements did not meet warrant criteria, predominantly associated with right turn movements on high-speed rural highways or at access points subject to increased turning demand. In most cases it is a specific turning movement that does not meet the relevant criteria, rather than the whole intersection operation. Examples of these intersections include:

- New England Highway / McAdam Street Aberdeen, where current traffic conditions indicate that the existing treatment is not suitable
- selected intersections on Hunter Road, Niangala Road, Wollun Road and Thunderbolts Way, where right turn or left turn warrants are exceeded under peak conditions.

14.2.3 Road safety

A review of the crash history along the proposed project transport routes was undertaken utilising the TfNSW Crashes Map. This tool captures recorded crash history in the 5-year period between 2020 to 2024. Crashes along the project transport routes have been analysed holistically to identify the most common type of crash, depending on the severity. Community consultation raised the concern of potential changes to levels of public safety due to increased traffic on local roads and the potential inability of the existing road network to service the project, particularly during construction. The potential project impact on road safety is addressed in Section 14.3.6.

In the 5-year period, a total of 567 crashes were recorded across the project transport routes, ranging from minor injuries to fatalities. Of these, 46 per cent resulted in moderate injuries and 38 per cent in serious injuries. The 2 most common crash types were vehicles striking roadside objects and rear-end collisions. Other notable crash types included head-on collisions between opposing directions, off-carriageway crashes into objects or parked vehicles on right bends, off-carriageway crashes into objects or parked vehicles, and cross-traffic collisions at intersections.

The observed crash patterns and severity are likely influenced by a combination of factors related to speed, driver behaviour, road design, and environmental conditions such as:

- the road network of the project transport routes typically has posted speeds of 80 kilometres per hour or higher. These higher operating speeds increase the likelihood of lane departure crashes and significantly amplify crash severity, which likely contributes to the high proportion of crashes which involve vehicles leaving the roadway and hitting objects
- long travel distances on rural roads associated with a portion of the project transport routes contribute to driver fatigue, reducing alertness and reaction times. Fatigue is a common factor in single-vehicle run-off-road crashes and head-on collisions
- roads of the project transport routes are often undivided, single carriageways with limited recovery zones, unsealed shoulders, and occasional loose gravel. Sharp curves that exceed design standards for 100 kilometres per hour require speed adjustment, and the absence of safety features such as barriers or adequate lighting reduces crash forgiveness. These conditions increase the risk of lane departure crashes and head-on collisions
- risky driver behaviours such as speeding, distraction, and impaired driving due to alcohol or drugs are significant contributors to crash severity. These behaviours increase the likelihood of same-direction crashes and head-on collisions.

14.2.4 Heavy vehicle routes

Within the TTIA study area, the New England Highway, Oxley Highway and Thunderbolts Way are part of the existing over size over mass (OSOM) network. Regional roads such as Rouchel Road to Glenbawn Road, Gundy Road, Hunter Road, Timor Road, Timor Crawney Road, Garoo Road, Lindsays Gap Road and Nundle Road provide for restricted access vehicles (specifically 25 to 26-metre-long B-Double trucks). Other roads which are approved for restricted access vehicles with conditions include Kentucky Road.

Lower order regional and local roads often have constrained geometry, reduced pavement and bridge capacity, limited recovery zones and a greater proximity to sensitive land uses, which restrict their suitability for routine OSOM movements.

14.2.5 Rail network

Two rail networks operate in the broader region of the project area being the Australian Rail Track Corporation (ARTC) network and the Country Regional Network (CRN). The ARTC network is primarily the Hunter Valley rail corridor, particularly in the Muswellbrook region where the ARTC main line supports high volume bulk freight movements associated with coal export to the Port of Newcastle. The CRN provides regional rail connectivity between Werris Creek, Tamworth and Armidale. These CRN lines generally support lower frequency freight and passenger services compared with the ARTC corridor and have localised interaction with the road network at level crossings.

The ARTC Main North Line extends from Sydney to Armidale, with only the northern sections between Werris Creek and Armidale being within the broader TTIA study area. This section supports lower volume regional freight and passenger services and has limited interaction with the road network within Tamworth Regional LGA, rather than functioning as a continuous interstate freight route.

The Hunter Line and Sandy Hollow – Gulgong Line serve as key freight rail corridors and would interact with the project transport routes. These lines support the transport of predominantly coal and associated mining products from the Upper Hunter to the Port of Newcastle, as well as building materials and agricultural commodities. These lines pass through Muswellbrook and connect with the broader ARTC Main North rail corridor, with freight operations undertaken by private rail operators including Pacific National and Aurizon. The project area crosses the private Antiene Rail Spur used to transport product coal from the existing Mt Arthur Coal Mine and Maxwell Underground Coal Mine to the Port of Newcastle via the main northern railway line.

14.2.6 Public transport

There are several bus services within the LGAs which intersect the project area. Most of these services operate at varying frequencies, from one or 2 services per week to weekday peak frequencies typically between 30 and 60 minutes. There are also school buses which use roads in the TTIA study area to service local schools and the community. Further detail on bus routes along the project transport routes is outlined in the TTIA (refer to Technical Report 7).

Regional passenger trains and buses also operate within the LGAs which intersect the project area. Train services provide the public transport connection from Armidale and Moree to Sydney. Coaches provide the primary public transport service between towns, and are available for travel between Grafton, Moree, Tenterfield and Armidale, as well as between Dubbo, Walcha and Port Macquarie/Wauchope. The route and service frequency of regional trains and coaches, as well as services timetable for the buses within each LGA is provided in the TTIA (refer to Technical Report 7).

14.2.7 Active transport

Active transport includes infrastructure to facilitate movement of pedestrians and cyclists, on an on-road or off-road environment. In terms of footpath networks, they are generally provided in and around town centres such as Muswellbrook, Tamworth, and Armidale. In such cases, footpaths are generally provided on both sides of the road adjacent to the travel lanes.

Cycling facilities are generally limited along the project transport routes and, similar to the footpath networks, they are generally centred around town centres. It is noted that cycling is permitted along road shoulders along parts of the State road network, mainly along the New England Highway. There is generally sparse cycling infrastructure along roads through town centres, with a notable exception being Muswellbrook which has a mix of bicycle paths, road shoulders and shared paths.

The project would intersect with a small section of the Bicentennial National Trail (also known as the National Trail), a multi-use horse-riding, cycling and walking route that links existing tracks, stock routes and roads, to form a continuous recreational route from Queensland to Victoria. The National Trail intersects the proposed transmission alignment in the Waverly–Gundy locality and utilises public roads which form part of the transport route for the project.

14.3 Potential impacts – construction

14.3.1 Road capacity and efficiency

Workforce numbers during the enabling works phase are relatively modest, resulting in a low traffic impact. The highest level of activity is expected in early 2028, with around 200 personnel working across all regions, while the average enabling works workforce would generate approximately 28 vehicles per day. This results in a low impact during AM and PM peaks which can be accommodated across the broader road network, especially where traffic is concentrated near workforce accommodation camps which would be under construction traffic management controls during this period.

The size of the construction workforce would vary throughout the project lifecycle. The peak construction generation is expected to be late 2030, when multiple work fronts are active concurrently across transmission line sections and energy hub sites. This includes approximately 2,568 light vehicles, 188 shuttle buses and 912 heavy vehicles two-way movements (refer to Section 3.3.6). Traffic activity would be concentrated around workforce accommodation camps, energy hubs and key transport corridors including the New England Highway. Across the main construction period (May 2029 to October 2034), the average workforce would be approximately 880 personnel, representing typical staffing levels outside the peak construction period.

During peak construction, the project is predicted to generate approximately 300 additional one-way vehicle trips per hour during the AM and PM peak and dispersed across the whole project area. Of these, 230 would be light vehicles and 70 would be heavy vehicles, based on the assumption that 30 per cent of workforce movements would be via shuttle bus. This estimate assumes that the construction workforce would mobilise to construction sites within the hour preceding the start of the shift and the hour following its completion, and all other construction traffic would be uniformly distributed throughout the day.

Construction traffic would be progressive in nature, moving with construction fronts rather than concentrating at a single location with volumes varying across the construction program. During the enabling works phase, construction traffic represents a relatively small and short-term component of overall project activity. Impacts would generally be localised, temporary and limited to areas where works interface directly with the road network.

Considering the existing road network volumes, the TTIA concluded that the increase in construction traffic throughout the extent of the project is not expected to have a major impact as follows:

- for NSW State roads, this increase is considered moderate due to the high available capacity where the lane capacity per direction is up to 1,800 vehicles per kilometre per hour, while observed peak traffic volumes are generally well below this level, indicating substantial available capacity
- for regional roads, this increase is considered low due to the high available capacity where the lane capacity per direction is 1,400 vehicles per kilometre per hour and the maximum existing traffic volume identified as less than 150 vehicles per direction

- for local roads, this increase is considered low due to the high available capacity where the lane capacity per direction is between 900 to 1,000 vehicles per kilometre per hour and the maximum existing traffic volume identified as less than 65 vehicles per direction.

Construction traffic generation is closely linked to the location and scale of workforce accommodation camps. Camp 5 would accommodate the largest workforce and would operate as the primary construction node due to its co-location with Central Hub A. It also supports Central Hub B, East Hub, and associated transmission line sections, and later provides access to North Hub.

As a result, Camp 5 generates the highest volume of construction traffic. The greatest construction traffic volumes would occur along Glenburnie Road and the New England Highway between Glenburnie Road and Uralla, with about 200 construction vehicles travelling northbound in the AM peak. Existing AM peak flows are mainly southbound (about 200 vehicles), with around 60 northbound, leaving substantial northbound spare capacity. With construction traffic, while the number of northbound vehicle movements increases, the corridor remains at LoS A (indicating unrestricted flow and minimal driver delay).

In the PM peak, flows are more balanced (150 southbound, 160 northbound); construction traffic is mainly southbound as workers return to Camp 5, and midblock capacity continues to accommodate about 200 construction vehicles while maintaining at LoS A with adequate capacity. It is noted that impacts would be temporary as the construction traffic peak is expected to decline after 2030 due to the progressive nature of the construction program.

Across the broader TTIA study area, the majority of transmission line access points are located on lower order local roads, which typically carry between 50 to 80 vehicles per hour during peak periods and remain low throughout the day. These roads operate under uncongested rural conditions, generally consisting of two-way, single lane carriageways with an unposted limit of 100 kilometres per hour, but where operational speeds are lower due to constrained geometry and road condition. Given the low background volumes and dispersed nature of tower construction activities, the additional construction traffic does not materially affect operational performance. These corridors are expected to continue operating at LoS A throughout the construction period.

Reductions in road LoS during construction are limited and highly localised, with only a small number of low-capacity local roads experiencing measurable impacts. These include Barry Road, Waverley Road and Forest Way, where increased construction traffic lowers the performance to LoS B or C during AM and PM peak hours (meaning freedom to manoeuvre within the traffic stream is slightly to noticeably restricted, and at worst, lane changes require more care and vigilance on the part of the driver). It is noted that these impacts would be temporary, occurring during peak hours within the peak construction period at each location, with the construction traffic peak expected to decline after 2030. All other assessed road segments, including the New England Highway and other higher-order roads, continue to operate at LoS A during AM and PM peak conditions.

Road treatments on local roads would be required based on geometric limitations and to ensure safe passing of construction vehicles. Further information on the proposed treatments are provided in the TTIA (refer to Technical Report 7).

14.3.2 Intersections

The assessment of potential impacts to intersections adopted a risk-based approach, recognising that intersection treatments are driven not only by traffic volumes, but also by safety, geometry and operational constraints. For this reason, some intersections require treatments while others do not, despite similar increases in construction traffic. This assessment considered the intersections of 2 or more public roads as well intersections of roads with access tracks. Overall, most public road intersections experience low to moderate impacts, with around 57 requiring treatments. The majority of locations can be effectively managed through temporary traffic management measures, reflecting the short-term and dispersed nature of construction activity. Across the TTIA study area, the primary factors influencing treatment requirements include:

- sight distance limitations, often due to vegetation and terrain
- narrow pavements and unsealed shoulders, limiting heavy vehicle interaction
- constrained intersection geometry, particularly at rural intersections
- high-speed environments, increasing safety risk
- existing traffic numbers
- existing basic intersection treatments, which may not support increased turning demand.

Table 14.2 summarises the types of intersection impacts and how they are addressed.

Table 14.2. Work duration and intersection

Impact Level	Typical Conditions	Key Constraints	Response / Treatment	Outcome
Low Impact	Minor increase in traffic, short duration	Minimal constraints, adequate width and visibility	Temporary traffic management (signage, speed reductions, traffic control)	No change to network function
Moderate Impact	Increased turning movements (for example access points, compounds)	Narrow pavements, basic priority control (BAL/BAR), localised geometry constraints	Targeted minor treatments (BAL/BAR improvements, sealing, shoulder widening)	Maintains safe and efficient operation
High Impact	Significant traffic increase, OSOM movements or sustained demand	Sight distance deficiencies (ASD/SISD), high-speed environment, geometric constraints	Permanent or semi-permanent treatments (AUL, CHR, widening, sight distance improvements)	Improves safety and long-term operational performance

To accommodate project construction traffic, works required at intersections are predominantly temporary and include traffic management controls, reduced speeds, signage and delineation, and minor widening or stabilisation works. Permanent treatments where safety or operational requirements necessitate intervention include treatments such as:

- intersection treatments including:
  - basic left/right turn (BAL/BAR)
  - auxiliary left turn lane (AUL)
  - channelised right turn (CHR).
- localised widening and sealing
- sight distance improvements.

Intersection treatments for key project intersections such as access to energy hubs and workforce accommodation camps are listed in Table 14.3.

Table 14.3. Energy hubs and workforce accommodation camp intersections and recommended treatments

Project component	Location	Proposed treatment
North Hub	Romani Road, Boorolong	BAL at Romani Road and Boorolong Road intersection Driveway at Romani Road site access
Central Hub A **Workforce Accommodation Camp 5**	Glenburnie Road, Kentucky	CHR and AUL at Glenburnie Road and New England Highway intersection Driveway at Glenburnie Road site access
Central Hub B	Thunderbolts Way, Uralla	BAL and BAR at Thunderbolts Way site access
East Hub	Hillview Road, Salisbury Plains	AUL at Salisbury Plains Road and Thunderbolts Way intersection Driveway at Hillview Road site access
Central South Hub **Workforce Accommodation Camp 4**	Oxley Highway, Walcha Road	CHR and AUL at Oxley Highway site access
Workforce Accommodation Camp 3	Barry Road, Barry	BAL and BAR may be required, subject to further assessment*
Workforce Accommodation Camp 2	Waverley Road, Waverly	BAL and BAR at Waverley Road site access

Project component	Location	Proposed treatment
Workforce Accommodation Camp 1	Inglewood Road, Muscle Creek	BAR at Muscle Creek Road and Inglewood Road intersection Driveway at Inglewood Road site access

* Camp 3 has been subject to limited assessment as part of the TTIA as its location was only recently identified. The TTIA notes a BAL and BAR treatment may be required and would need to comply with the performance outcomes assessed in the TTIA. This would be confirmed as part of further detailed assessment in an updated TTIA as part of the Submissions Report / Amendment Report.

14.3.3 Over size over mass vehicles

OSOM transport of network operator equipment represents a critical but low-frequency component of construction traffic for the project. Due to their size, mass and operational requirements the focus of the assessment of OSOM movements was on those that meet the TfNSW criteria for being high risk OSOM movements such as deliveries that exceed certain vehicle dimensions, mass or route characteristics and therefore require specific management measures.

Relevantly for the project, high risk OSOM movements are likely to include:

- very large loads requiring multi-axle transport configurations and extended vehicle lengths greater than 50 metres
- high-mass components requiring specialised transport vehicles with a total expected combination weight greater than 184.5 tonnes.

Approximately 53 high-risk one-way movements of large equipment such as transformers, shunt reactors and synchronous condensers are likely to be required. The proposed OSOM route for the project is along established regional corridors including the New England Highway, Thunderbolts Way, Oxley Highway and key connecting routes as shown on Figure 14.1. OSOM movements would be intermittent and occur over an extended construction period, resulting in minimal cumulative demand on the broader road network, with road treatments and/or traffic management measures proposed to facilitate OSOM movements.

Impacts would generally be limited to temporary traffic disruption, reduced travel speeds and the need for road treatments to accommodate localised geometric constraints. Proposed road improvement works to support safe and compliant OSOM movements include intersection widening, pavement and shoulder strengthening, vegetation and utility adjustments, and the provision of pull-over or passing opportunities. These treatments have been identified on the basis of the proposed OSOM design vehicles and a conservative, worst case transport scenario.

The final detail of individual treatments would be confirmed as part of the detailed design, informed by detailed OSOM vehicle selection and consultation with TfNSW and the National Heavy Vehicle Regulator (NHVR).

14.3.4 Stringing activities

Line and conductor stringing activities would be undertaken across the road and rail network in consultation with the relevant asset owners. Where stringing is required over public roads, short-term traffic interruptions or temporary road closures may be implemented to facilitate the safe installation of protective measures and the passage of conductors. These controls would be brief and localised and managed through approved traffic control arrangements, advance notification and relevant permit approvals to maintain road user safety.

Where stringing is required over road and rail infrastructure, preparation works would include the erection of hurdles and protective nets. For rail infrastructure, this would be scheduled during periods of lighter rail traffic. Protective nets would be installed over the tracks to prevent damage due to dropped conductors and associated safety risks. These works would be undertaken by small crews and limited to short stringing runs to minimise disruption. Where rail infrastructure is affected, works would be undertaken during rail possessions or otherwise in consultation with the relevant rail operator to avoid or minimise disruption to rail operations.

14.3.5 Road condition

Road pavement condition may progressively deteriorate during construction due to cumulative structural loading, environmental exposure and material ageing, with heavy vehicle traffic being a primary contributor to pavement fatigue as axle loads and load repetitions increase. The roads most susceptible to construction-related deterioration are local and unsealed roads used to access workforce accommodation camps, energy hubs and transmission line work areas including Glenburnie Road, Barry Road, Waverley Road, Scrubby Gully Road, Niangala Road, Forest Way, Ruby Hills Road and Wollun Road. On these roads, construction traffic may result in:

- accelerated degradation of unsealed surfaces, including rutting, corrugation and loss of material
- increased potholing and reduced pavement integrity following wet weather
- cumulative structural weakening where heavy vehicle movements are repeated over prolonged periods.

Road condition impacts relating to the project would be managed through a proactive framework including preconstruction dilapidation surveys, pre-emptive pavement works where required to ensure adequate pavement capacity, ongoing inspections (particularly following wet weather or periods of high heavy vehicle activity), and targeted maintenance during construction. Post construction reinstatement of any impacts resulting from the construction of the project would be undertaken in consultation with the relevant road authorities to ensure affected roads are returned to a safe and serviceable condition. With these measures in place, construction impacts on road condition due to the construction of the project are expected to be predictable, localised and temporary, with no long-term degradation of the road network beyond acceptable operational standards.

14.3.6 Road safety

The majority of roads subject to increased construction traffic are expected to continue operating at comparable levels of service, with free flow or reasonably free flow conditions maintained. As a result, the construction traffic uplift is not expected to lead to a measurable increase in crash risk under normal operating conditions. Where construction activities interact with the existing road network, both proactive geometric treatments and temporary traffic management measures would be implemented to manage safety risks.

Where construction activities temporarily alter existing road operations, such as during partial closures, short term stoppages, or lane reductions, appropriate temporary traffic management measures would be required to reduce the risk of accidents. These controls would manage short-term traffic interactions and are expected to result in a negligible to minor impact on road safety outcomes. All proposed treatments and traffic management scenarios would be designed and assessed in accordance with Austroads guidance and TfNSW's temporary traffic management requirements to ensure that these works are safely managed.

Intersection performance and safety were assessed with consideration to sight lines and distances, crash history, signage and line marking, longitudinal grades and Austroads turn warrants. This assessment identified locations where increased construction traffic could elevate conflict risks and to address these risks, a series of treatments ranging from basic (BAR/BAL) to auxiliary or channelised treatments (AUL/CHR) have been recommended.

The treatments proposed at these intersections would improve intersection safety during construction of the project.

14.3.7 Other impacts on transport network and services

Construction of the project would potentially impact on other aspects of the transport network and services as summarised in Table 14.4.

Table 14.4. Other construction traffic impacts

Transport aspect	Summary of impact
Rail network	Construction of the project is not expected to have any notable impact on rail network operations as project construction traffic would use the existing road network and approved railway crossings for access. The rail network would maintain priority at all times. Localised short delays to vehicles may occur on approach to rail crossings due to increased road traffic. Given the low frequency of construction related crossings relative to rail operations, and the existing control measures in place, impacts to rail network performance and safety are expected to be minor.
Public transport	Short duration temporary road closures are anticipated primarily for stringing of transmission lines at limited road locations and where there are new access points onto public roads. These types of works, including holding traffic for OSOM movements, would look to occur outside of school bus times to minimise impacts. Activities would be assessed on a case-by-case basis through the road occupancy approval process, with measures refined in consultation with stakeholders to minimise disruption.

Transport aspect	Summary of impact
	With controls in place, impacts to bus and school bus services are expected to be temporary, localised and manageable, with no significant disruption to service reliability or safety. As part of the ongoing design process, a temporary or permanent relocation of bus facilities may be required. This would occur in consultation with the relevant authority and ensure that an appropriate facility is in place before the existing one is unavailable.
Active transport	The potential for the interaction of active transport users with construction traffic would largely be isolated to towns and scattered sections of New England Highway where high-speed shoulders are provided. The impact on such roads is expected to be negligible, considering the low volume of additional construction traffic and presence of off-road active transport facilities which separate active transport users from vehicles. The construction of the project would not prevent the use of the National Trail however temporary access controls may apply at specific locations during critical construction periods. The precise nature and location of any interactions would be confirmed through detailed design, and consultation with the National Trail organisation would be undertaken to provide ongoing access along the route and to provide information about planned access management at these locations.
Access to private property	Access to residential properties would be preserved throughout the construction phase. In certain limited instances, temporary restrictions on access to specific properties may be necessary, subject to prior consultation with the affected parties. It is anticipated that the impacts on property access would be minimal due to the rural context of the project; however, some properties along the proposed transmission line may experience temporary disruption. PSMPs will be developed for easement affected properties in consultation with the landholder and will outline the protocols that will be implemented to address landholder concerns during construction. Protocols will include a communication process that will be established with landholders, ensuring they are kept informed about the construction staging and work schedule and appropriate measures agreed.
Impact on emergency services	Access for emergency vehicles would be maintained throughout the construction phase. This includes ensuring that emergency vehicles can navigate through the construction zones without obstruction. Temporary restrictions on access may be implemented in limited circumstances, however, these would only occur following prior consultation with relevant emergency services to minimise disruption. Nevertheless, in the event of temporary disruptions, a robust communication strategy would be established to keep emergency services informed about construction schedules and staging, ensuring they can effectively respond to any emergencies during construction.

14.3.8 Construction impacts – summary

The assessment demonstrates that traffic and transport impacts associated with the project are temporary, localised and manageable, with required treatments being targeted rather than network-wide. While the project results in a material increase in construction traffic across a large and diverse road network, these impacts are spatially dispersed and remain well within the available capacity of the existing network. Where impacts arise, they are primarily driven by local safety and geometric constraints rather than capacity limitations, and are effectively addressed through targeted mitigation and upgrade measures. Overall, the assessment confirms that the project can be integrated into the surrounding transport network without unacceptable impacts, subject to the implementation of the proposed mitigation measures, while maintaining safe and efficient operation throughout all phases of delivery.

14.4 Potential impacts – operation

During operation, there is limited potential for traffic and transport impacts associated with anticipated routine maintenance. Access to the energy hubs and maintenance facility would be as per existing access arrangements, or via the access points and intersections upgraded for the project. For transmission lines, access would largely relate to inspection and maintenance activities, which would be infrequent and would not result in significant vehicle movements. Access to the transmission lines would be via existing access tracks or those constructed specifically for the project. A summary of the potential impacts which would occur during the operation of the project is provided in Table 14.5.

Table 14.5. Summary of operational traffic and transport impacts

Project component	Summary of impact during operation
Maintenance workers	The energy hubs would not accommodate full-time staff or contractors. Maintenance at the energy hubs would typically include routine and ad hoc attendance by maintenance teams ranging from 5 to 10 personnel. Routine maintenance would be conducted by rotating through the asset field where workers undertake planned and unplanned maintenance activities. It is expected that these activities would only require light vehicles and/or intermittent heavy vehicles (depending on the work required). Vegetation management within the transmission line easement would be conducted on a cyclic management period of every 2 to 5 years depending on vegetation growth. Other vegetation management on access tracks would be on an as needed basis.
Maintenance traffic	The proposed maintenance facility is at the intersection of Nundle Road, New England Highway and Railway Street in Nemingha, as shown on Figure 14.1, and is situated centrally for convenient access via the New England Highway. The facility is expected to include an office space accommodating a team of up to 10 personnel, with the capacity to expand for additional staff during short-term maintenance activities.

Project component	Summary of impact during operation
	The maintenance team is likely to utilise 4WD light vehicles to travel to the sites. Assuming a minimum of 2 personnel per vehicle, this would equate to a maximum of 5 vehicle trips across the road network. Additional traffic generated by the maintenance crew are low in volume and are expected to have minimal impact on the road network performance.
Impact on road network	Operational traffic may cause temporary increases in traffic movements at inspection/maintenance locations for the duration of maintenance activities. These impacts vary, however they would be expected to be negligible and most likely imperceptible to the general transport users due to the low number of trips generated. Maintenance activities along the transmission line would be at isolated locations at any given time and the risk of traffic and access impacts from operational traffic at sensitive receivers would be minimal.
Impact on road safety	Road treatments undertaken during construction would likely provide improved safety outcomes from which operational traffic would benefit. The anticipated low volume of traffic associated with operation and maintenance activities is expected to have minimal impact on the existing road network's safety.
Impact on active transport	The maintenance facility is located in an urban setting at the corner of Nundle Road and the New England Highway at Nemingha. In this location, active transport facilities comprise footpaths within the township and road shoulders that may be used by cyclists along sections of the highway. Maintenance related vehicle movements to and from the facility would be low in volume, intermittent in nature, and would utilise existing intersections and road infrastructure designed to accommodate mixed road users. Given the limited number of vehicle trips and the short duration of access movements, the increase in traffic due to operation and maintenance of the project is expected to have a negligible impact on active transport facilities, including in the vicinity of the maintenance facility.
Impact on public transport	The low traffic generated for operation and maintenance of the project combined with the infrequent nature of the traffic movements would have very limited interaction with public transport services such as regional trains, regional coaches, local bus services or school bus services. Therefore, operational traffic is anticipated to have a negligible impact on public transport.
Impact on access to private property	Access to properties is expected to be maintained during the maintenance activities. In the event that a temporary restriction is required for a specific property, consultation with the affected party would be undertaken prior to commencing vehicle movements.

Project component	Summary of impact during operation
Impact on emergency services	Access for emergency vehicles would be maintained throughout the operational phase. This includes ensuring that emergency vehicles can navigate without obstruction. Temporary restrictions on access may be implemented in limited circumstances; however, these would only occur following prior consultation with relevant emergency services to minimise disruption. Nevertheless, in the event of temporary disruptions, a robust communication strategy would be established to keep emergency services informed about maintenance schedules ensuring they can effectively respond to any emergencies during maintenance activities.

14.5 Cumulative impacts

The potential cumulative impacts of the project have been identified based on the scale and potential impacts of the project, in combination with the potential impacts of relevant identified future projects and broader developments supporting the New England REZ. A list of these relevant projects, including their descriptions and interfaces with the project, is provided in Section 24.

The cumulative assessment is detailed in the TTIA (refer to Technical Report 7), with the key findings summarised in Section 24. While cumulative impacts may occur where nearby projects overlap temporally, the assessment indicates that these impacts are not expected to result in a significant or unacceptable impact on the performance of the surrounding road network. Any increases in traffic associated with cumulative conditions are expected to be localised, temporary and within the available capacity of the network.

14.6 Mitigation and management

Mitigation and management measures proposed to avoid or minimise traffic and transport impacts during construction and operation of the project are listed in Table 14.6.

Table 14.6. Proposed mitigation and management measures – traffic and transport

Reference	Impact	Mitigation Measure	Timing	Relevant location(s)
TT1	Construction traffic	A Traffic and Transport Management Plan (TTMP) will be prepared and will include: • confirmation of haulage routes • access to the project area, including entry and exit locations • preferred times of transport to and from the project area to minimise impacts on the road network • measures to minimise the number of workers using private vehicles • management of OSOM vehicles • site-specific traffic control measures (including signage) to manage and regulate traffic movement • relevant traffic safety measures, including driver induction, training, safety measures and protocols • requirements for, and placement of, traffic barriers • requirements and methods to consult and inform the local community of impacts on the local road network due to the development-related activities • consultation with TfNSW, National Heavy Vehicle Regulator (NHVR) and local council on the traffic management plans • consultation with the emergency services to ensure that procedures are in place to maintain safe, priority access for emergency vehicles • a response plan for any construction-related traffic incident • monitoring, review and amendment mechanisms • individual traffic management requirements at each stage of construction.	Pre-construction	All locations

Reference	Impact	Mitigation Measure	Timing	Relevant location(s)
TT2	Construction traffic	Group transport, such as buses for workstreams of more than 12 persons as well as ride sharing systems (for example, organised carpooling arrangements for workers travelling to and from the site), will be implemented, where practicable, to reduce the number of traffic movements on the local road network.	Construction Decommissioning	All locations
TT3	Construction traffic	Dedicated and demarcated parking areas for light and heavy vehicles will be provided. Vehicles associated with the project will not be permitted to park on the surrounding public road network, unless performing public road works.	Pre-construction	All locations
TT4	Construction traffic	Heavy vehicle movements to and from the project area will be scheduled to minimise traffic disruption to the surrounding road network. This may include, but is not limited to: • scheduling the movement of construction material, equipment and waste to occur outside of peak periods where practical • scheduling heavy vehicle deliveries to be evenly dispersed as far as practical to minimise convoying or platoons and queuing outside the project area or on the road network.	Pre-construction Construction	All locations
TT5	Heavy vehicles	The TTMP will govern OSOM vehicle movements including: • identification of the final OSOM route • measures to provide an escort for the loads • times of transporting to minimise impacts on the road network • location of rest areas and required rest stops along the route • the maximum parameters of the materials to be transported to and from the project area • communication strategy and liaising with emergency services and police	Pre-construction	All locations

Reference	Impact	Mitigation Measure	Timing	Relevant location(s)
		• any minor temporary civil infrastructure work (vegetation trimming, relocation of roadside assets (for example signs or barriers) and minor intersection modifications) which may be required to accommodate OSOM movements • safety measures to directly address OSOM vehicles passing through towns and include a 48-hour minimum public notification protocol of the presence of OSOM vehicles • consultation with the relevant Council on the TTMP and proposed OSOM movements prior to the commencement of works.		
TT6	Heavy vehicles	A vehicle access permit will be sought for all B-doubles and OSOM vehicle movements where required. The heavy and OSOM movements will be in accordance with the permit requirements and be outside of peak traffic periods where possible.	Pre-construction	All locations
TT7	Heavy vehicles	Dilapidation reports will be prepared for relevant local roads affected by OSOM movements or construction traffic, where required by the relevant road authority, to document preconstruction conditions and inform any reinstatement requirements if there is damage caused by the project's OSOM movements.	Pre-construction	All locations
TT8	Heavy vehicles	A NHVR exemption permit will be obtained for any parts of the final OSOM route which requires access through roads which are restricted or conditionally approved for OSOM vehicles.	Pre-construction	All locations
TT9	Road safety	A Driver Code of Conduct will be prepared as part of the TTMP and will be used to outline the rules and behaviours which drivers associated with the project will be required to adhere to. The Driver Code of Conduct will outline arrangements for light and heavy vehicle drivers, including: • general requirements, including site induction requirements • travelling speeds and safe driving practices, particularly through residential areas and school zones	Pre-construction Construction Operation Decommissioning	All locations

Reference	Impact	Mitigation Measure	Timing	Relevant location(s)
		• fatigue management • adherence to designated haulage routes and heavy vehicle noise • public complaint resolution and penalties and disciplinary action.		
TT10	Road safety	Public roads and Crown roads where applicable, will not be obstructed by any materials, parked vehicles, skip bins or similar, unless a relevant road occupancy or works permit is in place and the obstruction is managed in accordance with approved traffic management arrangements.	Construction Operation Decommissioning	All locations
TT11	Road safety	'Trucks Turning' warning, potential speed reduction and other temporary traffic management signs will be implemented on both approaches to relevant intersections during construction to advise existing road users of the increased heavy vehicle volumes. The signs will be removed upon the completion of construction work.	Construction Decommissioning	All locations
TT12	Road safety	All vehicles transporting loose materials will have the entire load covered and/or secured to prevent any large items, excess dust or dirt particles depositing onto the roadway during travel to and from the project area.	Construction Decommissioning	All locations
TT13	Road safety	Speed reductions, use of fog lights (where fitted) during periods of low visibility, stop work and site shutdowns will be implemented as required during periods of adverse weather.	Construction Operation Decommissioning	All locations
TT14	Road safety	Road treatments will re-mark traffic control line marking and reinstate all associated signage to relevant intersections to ensure safety is not impacted.	Pre-construction Construction	All locations
TT15	Road safety	Operational controls (for example reduced speeds, suspension of activities) will be implemented during adverse weather conditions to maintain safety where feasible.	Construction	All locations

Reference	Impact	Mitigation Measure	Timing	Relevant location(s)
TT16	Access	Affected parties including emergency services will be notified in advance of any disruptions to traffic and restriction of access impacted by project activities.	Pre-construction Construction Operation Decommissioning	All locations
TT17	Access	On constrained local roads, passing opportunities (for example local widening) will be implemented to safely accommodate interactions between construction vehicles, school buses and general traffic.	Construction	All locations
TT18	Access	Where bus stops are directly affected, temporary relocation or alternative arrangements will be implemented in consultation with operators and authorities, ensuring safe and accessible facilities prior to any disruption.	Construction	All locations
TT19	Access	Access points will be treated based on their function, duration of use and traffic demand. Permanent and frequently used access points (for example energy hubs, compounds and high-use construction access locations) will be designed in accordance with Austroads and TfNSW guidance, including provision of appropriate turn treatments and compliance with Safe Intersection Sight Distance (SISD). Temporary or low-use access points where traffic volumes are limited or usage is short-term, including select existing constrained locations that are non-compliant, will be managed through site-specific traffic control measures (for example Traffic Control Plans, signage, speed management and spotters), rather than full geometric upgrades. Traffic control will be applied where it is sufficient to safely manage vehicle movements without the need for permanent or semi-permanent infrastructure upgrades.	Pre-construction Construction	All locations

Reference	Impact	Mitigation Measure	Timing	Relevant location(s)
TT20	Access	Construction traffic will be managed to prioritise forward entry and exit to sites. Reversing movements onto or from public roads will be avoided where practicable, with spotters and controls implemented where reversing cannot be avoided.	Construction	All locations
TT21	Access	Access for emergency services will be maintained at all times. Any temporary restrictions will be managed in consultation with emergency services and communicated in advance.	Construction	All locations
TT22	Access	Ongoing consultation will be undertaken with TfNSW, local councils, public transport operators, and the community to coordinate traffic management and respond to issues.	Pre-construction Construction	All locations
TT23	School bus operations and safety	Consultation will be undertaken with school bus operators to identify routes, stops and timetables. Construction activities (including OSOM movements and traffic control) will be scheduled to minimise interaction during school peak periods.	Pre-construction Construction	All locations
TT24	Active transport	Where construction traffic interacts with pedestrians or cyclists, mitigation measures such as reduced speed limits, warning signage, temporary controls and activity scheduling will be implemented to maintain safety.	Construction	All locations

Economic



Section 15

15 Economic

This section provides a summary of the assessment undertaken to identify the potential economic impacts of the project during both construction and operation. It also identifies measures to be implemented to maximise the positive economic impacts (benefits) of the project, including to regional communities, and to minimise any negative economic impacts.

This summary has been prepared using information from the Economic Assessment undertaken by Gillespie Economics which is provided in full in Technical Report 8.

The project forms part of the broader New England REZ and supports the NSW Government's strategy to deliver reliable, affordable and clean electricity. The project would provide up to 6 GW of additional network transfer capacity in the New England region and enable substantial private sector investment. This investment is expected to support a large construction workforce and ongoing operational employment and contribute to regional economic activity. The project would also provide direct financial benefits to landholders through lease payments.

In addition, the project supports Commonwealth and NSW Government objectives for energy security, affordability and sustainability. This includes reducing greenhouse gas emissions and supporting the transition to net zero and supporting the Roadmap's objective of delivering more affordable electricity. The project is also intended to provide longer term regional benefits, including support for local businesses, investment in infrastructure and positive legacy outcomes associated with the New England REZ development.

The economic assessment has been undertaken within this broader regional context but specifically focuses on the economic impacts of the project itself and does not consider these broader economic impacts. That is, this assessment does not extend to the consideration of the broader economic benefits for the project and New England REZ which are addressed through other NSW Government processes, and as discussed in Section 2.

15.1 Assessment approach

The project's predicted economic impacts on regional and NSW economies were assessed using Input-Output (IO) analysis. The assessment was prepared with reference to the SEARs as detailed in Appendix A.

This section also considers issues raised in engagement with stakeholders relating to economic impacts (refer to Section 5). Key issues raised have included potential impacts on productive land, implications for agricultural productivity and effects on regional economic activity including the need to balance regional economic activity benefits with the protection of agricultural land and ongoing farm viability.

As required by the SEARs the assessment has specifically considered the potential impacts on existing agricultural operations and areas of State forest located within the project area. Qualitative consideration was also given to potential cumulative impacts associated with the project in combination with other relevant projects. Potential cumulative impacts identified in the Economic Assessment included increased demand for construction labour, accommodation, goods and services, potential wage and housing market pressures, and cumulative impacts on agricultural activity. While these effects may occur in the short term, they would be influenced by labour market responses, workforce accommodation provision, regional population movements and broader market adjustment mechanisms. Detailed cumulative impact assessment is provided in Section 24 and Technical Report 8.

Broader project economic benefits were assessed qualitatively, recognising the role of the project as an integral component of the NSW Electricity Strategy which aims to deliver a reliable, affordable and sustainable electricity system for NSW.

The study area for the Economic Assessment comprises the 2 regional economies within which the project infrastructure and economic activity are located, being the New England and Upper Hunter regions. Both regions have the potential to provide inputs to, and derive economic activity from, the construction and operation of the project. While the economic study area is the focus of the analysis, the impacts on the wider NSW economy were also assessed.

Further detail on the methodology and characterisation of the existing regional economies within the economic study area is provided in Technical Report 8 – Economic Assessment.

15.2 Predicted impacts – construction

15.2.1 Construction expenditure and workforce

Construction of the project would generate demand for regional labour and production inputs which are direct impacts. The direct impacts associated with construction activity would primarily affect the heavy and civil engineering construction, construction services and non-residential building construction sectors. Indirect flow-on effects are also anticipated across a range of industries within the regional and NSW economies associated with linked supply chains and supporting services.

The predicted direct and indirect (flow-on) economic impacts associated with average annual construction expenditure for the New England region, Upper Hunter region and NSW are presented in Table 15.1, Table 15.2 and Table 15.3, respectively.

The flow-on economic impacts comprise production-induced and consumption-induced effects estimated using IO analysis. Production-induced effects represent the additional economic activity generated as businesses involved in the project purchase goods and services from other businesses to support construction activities. Consumption-induced effects arise from the expenditure of income earned by workers engaged in the project and related industries, which is spent within the economy and supports further economic activity.

Table 15.1. Average annual economic impacts of the construction on the New England region

	Direct	Indirect (flow-on): production induced	Indirect (flow-on): consumption induced	Total indirect flow-on	Total effect
Output ($ million)	403	203	25	229	632
Value added ($ million)	118	150	23	173	291
Income ($ million)	80	27	4	31	111
Employment (no. FTE)	628	314	67	381	1,009

Note: [1] Output represents total economic activity; Value added represents the net contribution to the economy; Income represents wages and earnings; and Employment is expressed as full-time equivalent (FTE) jobs.

[2]Totals may have minor discrepancies due to rounding.

Table 15.2. Average annual economic impacts of the construction on the Upper Hunter region

	Direct	Indirect (flow-on): production induced	Indirect (flow-on): consumption induced	Total indirect flow-on	Total effect
Output ($ million)	173	72	5	77	250
Value added ($ million)	51	50	4	54	105
Income ($ million)	34	7	1	7	42
Employment (no. FTE)	270	110	12	122	392

Note: [1] Output represents total economic activity; Value added represents the net contribution to the economy; Income represents wages and earnings; and Employment is expressed as FTE jobs.

[2]Totals may have minor discrepancies due to rounding.

Table 15.3. Average annual economic impacts of the construction on NSW

	Direct	Indirect (flow-on): production induced	Indirect (flow-on): consumption induced	Total indirect flow-on	Total effect
Output ($ million)	576	503	191	694	1,270
Value added ($ million)	168	386	167	553	722
Income ($ million)	115	73	30	103	218
Employment (no. FTE)	898	759	426	1,184	2,082

Note: [1] Output represents total economic activity; Value added represents the net contribution to the economy; Income represents wages and earnings; and Employment is expressed as FTE jobs.

[2]Totals may have minor discrepancies due to rounding.

Economic impacts are greatest in the New England region and NSW with average annual economic impact associated with the construction workforce totalling $632 million and $1,270 million respectively. This reflects the larger size of these economies relative to the Upper Hunter region and their capacity to capture a greater share of direct expenditure. These economies also experience stronger indirect effects, including production-induced and consumption-induced flow-on impacts.

15.2.2 Agriculture

Construction would result in temporary economic impacts to agriculture as some areas of currently productive agricultural land would be occupied for construction activities. The assessment has quantified this impact using relevant information from the Agriculture Impact Assessment (refer to Technical Report 6).

The assessment has conservatively assumed that the entire disturbance footprint would be directly impacted and/or temporarily unavailable for agricultural use for the duration of the construction program. In reality this would not be the case for the majority of the transmission alignment as works would progress on a campaign basis to construct towers and complete stringing. As a result, the duration of temporary impacts to agricultural use in a particular area along the transmission alignment would generally be limited in extent and duration. For example, construction works at each tower would take from a few weeks to a few months depending on the location, construction program and weather conditions. As described in Section 13 these impacts would be managed with landholders through the implementation of property specific management plans.

Over the planned 6-year construction period, approximately 2,233 hectares would be (at some stage) directly impacted and/or temporarily restricted from agricultural use. As described in Section 13 the assessment conservatively assumes that the disturbance footprint would be temporarily removed from agricultural use during construction to secure the work area. Of this, 95.8 per cent comprises grazing land, with the remainder cropping land.

The weighted average loss of agricultural production (gross revenue) is estimated at $381/hectare/year, equating to approximately $850,773 per annum (Tremain Ivey Advisory, 2026). Of this, $532,669 would occur in the New England region and $318,104 in the Upper Hunter region. Overall, direct and indirect impacts on the agricultural sector during construction represent less than 0.09 per cent of regional agricultural activity and are considered negligible relative to the broader economic impacts of the project.

Any impacts to existing agricultural operations, including foregone production or increased operating costs would be considered as part of the easement acquisition process under Just Terms Act, with compensation determined in accordance with the Act by EnergyCo.

15.2.3 Forestry

Construction would impact approximately 100.4 hectares of production native forest and 62.6 hectares of plantation forest (softwood), all within the New England region. The economic assessment only considers land managed for timber production. As a result, the area differs slightly from the total State forest impact area reported in Section 12, which also includes other land use categories such as transport and communications infrastructure located within the State Forests.

Based on FCNSW (2024), approximately 1.834 million hectares of hardwood native forests and hardwood plantations in NSW generated $89 million in revenue from timber and extractive resources, equivalent to approximately $49/hectare/year. In comparison, 230,000 hectares of softwood plantations generated $257 million in revenue, equivalent to approximately $1,117/hectare/year. Applying these indicative revenue rates, foregone forestry revenue (output) during construction is estimated at approximately $74,844 per annum, excluding any salvage value associated with cleared timber.

At this scale, the reduction in forestry production represents an immaterial impact at the regional and State levels. Flow-on effects to the timber processing value chain may occur but are not expected to be substantial given the limited extent of impact.

Any impacts to FCNSW, including foregone production and potential increased operating costs, would be considered as part of the easement acquisition process under Just Terms.

15.3 Predicted impacts – operation

15.3.1 Operational expenditure and workforce

The operation of the project is most likely to directly affect the electricity transmission, distribution, on-selling and electricity market operation sector. Flow-on effects are likely across a range of different sectors in the regional and NSW economies including construction services, professional, scientific and technical services and finance.

The predicted direct and indirect economic impacts of the project operation on the New England region, Upper Hunter region and NSW are reported in Table 15.4, Table 15.5 and Table 15.6, respectively.

Section 3 identifies an operational workforce of up to 100 personnel, comprising both site-based and office-based roles. For the purposes of the economic assessment, a conservative estimate of 65 full time equivalent (FTE) positions was adopted for the modelling of economic benefits from construction worker employment and expenditure.

Table 15.4. Annual economic impacts of the project operation on the New England region

	Direct	Indirect (flow-on): production induced	Indirect (flow-on): consumption induced	Total indirect flow-on	Total effect
Output ($ million)	37	19	4	23	59
Value added ($ million)	15	14	3	17	32
Income ($ million)	4	1	1	2	6
Employment (no. FTE)	25	13	10	22	47

Note: [1] Output represents total economic activity; Value added represents the net contribution to the economy; Income represents wages and earnings; and Employment is expressed as FTE jobs.

[2] Totals may have minor discrepancies due to rounding.

Table 15.5. Annual economic impacts of the project operation on the Upper Hunter region

	Direct	Indirect (flow-on): production induced	Indirect (flow-on): consumption induced	Total Indirect flow-on	Total effect
Output ($ million)	16	8	1	9	25
Value added ($ million)	6	6	1	6	13
Income ($ million)	2	0	0	0	2
Employment (no. FTE)	11	5	2	7	18

Note: [1] Output represents total economic activity; Value added represents the net contribution to the economy; Income represents wages and earnings; and Employment is expressed as FTE jobs.

[2]Totals may have minor discrepancies due to rounding.

Table 15.6. Annual economic impacts of the project operation on NSW

	Direct	Indirect (flow-on): production induced	Indirect (flow-on): consumption induced	Total Indirect flow-on	Total effect
Output ($ million)	97	70	20	90	187
Value added ($ million)	39	53	17	71	110
Income ($ million)	10	7	3	10	20
Employment (no. FTE)	65	61	45	106	171

Note: [1] Output represents total economic activity; Value added represents the net contribution to the economy; Income represents wages and earnings; and Employment is expressed as FTE jobs.

[2]Totals may have minor discrepancies due to rounding.

As with construction, the predicted impacts during operation of the project are greater in the larger economies of the New England region and NSW with annual impacts (output) associated with the operational expenditure and workforce totalling $59 million and $187 million respectively. This is because a greater share of direct and indirect expenditure is retained, compared to the smaller economy of the Upper Hunter region. Operational demand for labour and inputs is low relative to construction and is not expected to compete materially with other sectors for labour and supplies.

15.3.2 Agriculture

Operation of the project would result in a permanent reduction of approximately 438 hectares of agricultural land, which is associated with the footprint of permanent infrastructure, of which 93.7% is grazing land with the remainder cropping land. Land associated with the operational easement would be returned to agricultural use with required woodland vegetation clearing likely to increase areas available for grazing in a number of areas.

The weighted average loss of production (gross revenue) is estimated at $381/ha/year, equivalent to approximately $166,878 per annum (Tremain Ivey Advisory, 2026). Of this, $113,477 would occur in the New England region and $53,401 in the Upper Hunter region.

Overall, the direct and indirect impacts on the agricultural sector during operation represent less than 0.02 per cent of regional agricultural activity and are negligible relative to the broader economic impacts of the project.

15.3.3 Forestry

During operation, the project would impact approximately 100.4 hectare of production native forest and 62.6 hectares of plantation forest (softwood), all within the New England region. Based on the assumptions in Section 15.2.3, this equates to an estimated foregone revenue (output) of approximately $74,844 per annum, excluding salvage value, which represents an immaterial impact at the regional scale.

Flow-on effects to the timber processing value chain are not expected to be substantial given the limited extent of impact. Impacts to FCNSW, including foregone production or potential increased operating costs would be considered as part of the easement acquisition process under Just Terms.

15.3.4 Benefit sharing

In addition to the economic impact discussed above, positive economic impacts for the regional economies and individual LGAs would be enhanced through economic benefits from the easement acquisition processes and strategic benefits payments as well as the preparation and implementation of a benefits scheme delivered separately by EnergyCo in its role as Infrastructure Planner under the EII Act. An outline of these relevant benefit sharing initiatives is presented below:

- acquisition process undertaken in line with the *Land Acquisition (Just Terms Compensation) Act 1991* and application of Strategic Benefits Payment Scheme
- increasing income and employment opportunities for local Aboriginal groups under the NSW Government First Nations Guidelines to a minimum value of 1.5 per cent of the contract value of the project
- maximising the employment of locals and the purchase of local goods and services
- funding delivered for local infrastructure, services and employment initiatives through EnergyCo's CEBP, delivered separately by EnergyCo in its role as Infrastructure Planner under the EII Act (not as part of this project). The CEBP will be funded by access fees, paid by generators in the New England REZ that connect to the project.

15.4 Mitigation and management

Mitigation and management measures proposed to enhance positive economic impacts, benefits and opportunities and avoid or minimise adverse economic impacts during construction and operation of the project are listed in Table 15.7.

Table 15.7. Proposed mitigation and management measures – economic

Ref.	Impact	Mitigation measure	Timing	Relevant location(s)
EC1	Local employment opportunities	A Local Workforce Development Plan, Local Industry Participation Plan and an Australian Industry Participation Plan will be developed for the project to promote local worker participation. These plans will identify opportunities to develop skills required for the project within the regional labour force.	Detailed design Construction Operation	All locations
EC2	Local business opportunities	Consultation will be undertaken with local councils, economic development organisations and local chambers of commerce to: • inform local business of the goods and services required for the project, procurement opportunities and compliance requirements of business to be able to secure contracts • encourage and support local businesses to meet the requirements of the project for supply contracts • develop and implement relevant networks to assist qualified local and regional businesses to tender for the provision of goods and services to support the project.	Detailed design Construction	All locations

Noise and vibration



Section 16

16 Noise and vibration

This section provides a summary of the assessment undertaken to identify the potential noise and vibration impacts of the project during both construction and operation. This section also identifies mitigation and management measures to be implemented to minimise potential impacts.

The Noise and Vibration Impact Assessment (NVIA) was prepared by SLR and is provided in full in Technical Report 9.

16.1 Assessment approach

The NVIA has been undertaken with reference to relevant guidelines including the *Interim Construction Noise Guideline* (DECCW, 2009) (ICNG), *NSW Road Noise Policy* (DECCW, 2011) (RNP) and the *NSW Noise Policy for Industry* (EPA, 2017) (NPfI). The assessment was also prepared with reference to the SEARs as detailed in Appendix A.

The section considers issues raised in engagement with community stakeholders relating to noise and vibration (refer to Section 5) including potential noise impacts associated with construction activities, including helicopter movements, increased traffic movements and the operation of workforce accommodation camps.

The assessment of potential noise and vibration impacts of the project involved the following:

- identification of the noise and vibration study area based on the expected extent of impacts
- identification and classification of potential noise and vibration sensitive receivers based on a combination of publicly available datasets, aerial imagery and on-ground verification
- monitoring of ambient noise at 11 representative locations across the project
- processing the monitored noise data in accordance with relevant guidelines to determine the ambient environment and project specific noise management levels
- modelling the construction and operation of the project infrastructure to predict noise and vibration levels at the surrounding sensitive receivers
- comparison of the predicted levels to the project noise and vibration management levels to determine the likely level of impact
- identification of mitigation measures to minimise and manage any predicted noise and vibration impacts.

The project area includes all project elements including transmission lines and towers, access tracks, upgrades to public roads, energy hubs, Bayswater substation extension, stringing sites, communications infrastructure, workforce accommodation camps, construction ancillary sites and the Nemingha maintenance facility. The study area for the NVIA is broadly defined by the area around the project where noise impacts may occur and extends up to 3 kilometres from the project area.

16.1.1 Construction noise and vibration impact assessment approach

16.1.1.1 Construction scenarios

Representative construction scenarios were used to assess the likely impacts from construction activities. The representative scenarios considered a range of activities including:

- establishment and use of construction ancillary sites and workforce accommodation camps
- vegetation clearing, earthworks and levelling works
- road and intersection upgrades and access track formation
- foundation works, tower assembly and stringing of the transmission lines.

Full details of representative scenarios, equipment lists and sound power level data are provided in the NVIA (refer to Technical Report 9).

Construction of the project would generally be carried out during the ICNG recommended standard construction hours, being 7 am to 6 pm Monday to Friday and 8 am to 1 pm Saturday with no construction work on Sundays or public holidays. Extended construction hours across a 7-day work week between 7 am and 7 pm would be implemented where there are no sensitive receivers that would be impacted by the construction work. However, some project specific constraints would require out of hours (OOH) work for some construction activities and the workforce accommodation camps would be in use on a 24-hour basis, 7 days a week.

16.1.1.2 Noise management levels

The assessment of construction noise impacts used the ICNG approach for determining noise management levels (NMLs) at residential and other sensitive receivers (for example non-residential occupied buildings and recreation areas). The construction NMLs for residential receivers were determined using the results from the noise monitoring and are shown in Table 16.1.

Table 16.1. Residential receiver construction noise management levels

Representative area	Period	NML – Standard Construction (RBL +10 dB) at $L_{Aeq(15\ min)}$ dB(A)	NML – Out of Hours (RBL + 5 dB) at $L_{Aeq(15\ min)}$ dB(A)
Nemingha	Day	49	44
Nemingha	Evening	-	43
Nemingha	Night	-	35
All other receivers	Day	45	40
All other receivers	Evening	-	35
All other receivers	Night	-	35

Note 1: RBL refers to the Rating Background Level and dB refers to decibels.
Note 2: Daytime out of hours is 7 am to 8 am and 1 pm to 6 pm on Saturday, and 8 am to 6 pm on Sunday and public holidays.
Note 3: Where the measured RBL is lower than the minimum, the NPfI minimum RBL value has been used.

As shown in Table 16.1, higher NMLs apply to receivers in the Nemingha area. This is due to higher ambient noise levels in Nemingha associated with road traffic noise during the day and evening (refer to Section 16.2).

Where construction work is planned to extend over more than 2 consecutive nights, such as the workforce accommodation camps, the ICNG recommends that an assessment of sleep disturbance impacts from maximum noise levels should be completed at residential receivers. The NPfI defines sleep disturbance criteria above which a detailed maximum noise assessment should be conducted. These criteria are 52 dB(A) L_{Amax} or the prevailing background level plus 15 dB, whichever is the greater.

The NMLs adopted for other sensitive receiver types are as follows:

- places of worship, schools, educational institutions – 45 $L_{Aeq\ 15\ min}$ dBA (internal noise levels)
- active recreation areas – 65 $L_{Aeq\ 15\ min}$ dBA (external noise levels)
- passive recreation areas – 60 $L_{Aeq\ 15\ min}$ dBA (external noise levels)
- commercial – 70 $L_{Aeq\ 15\ min}$ dBA (external noise levels)
- industrial – 75 $L_{Aeq\ 15\ min}$ dBA (external noise levels).

The NMLs are not mandatory limits. However, where construction noise levels are predicted or measured to be above the NMLs, feasible and reasonable mitigation measures to minimise noise emissions should be investigated.

16.1.1.3 Construction traffic noise

Potential impacts from project construction traffic travelling on public roads are assessed under the RNP. An initial screening test is first applied to evaluate if existing road traffic noise levels are expected to increase by more than 2 dB due to construction traffic. Where an increase in noise levels is considered likely, further assessment is required using the RNP criteria detailed in Table 16.2. These are external noise levels for road traffic noise only and exclude ambient noise from other sources.

Table 16.2. Traffic noise criteria for construction traffic on public roads

Road Category	Daytime (7 am – 10 pm) Assessment Criteria (dB(A))	Night-time (10 pm – 7 am) Assessment Criteria (dB(A))
Freeway / arterial / sub-arterial roads	$L_{Aeq(15\ hour)}$ 60 (external)	$L_{Aeq(9\ hour)}$ 55 (external)
Local roads	$L_{Aeq\ (1\ hour)}$ 55 (external)	$L_{Aeq(1\ hour)}$ 50 (external)

In addition to the assessment criteria presented in Table 16.2, any increase in the traffic noise level at a location due to a traffic generating development must be considered. Residences experiencing increases in total traffic noise level above the relative increase criteria (Table 16.3) should also be considered for mitigation.

Table 16.3. Relative traffic noise increase criteria

Road Category	Daytime (7 am – 10 pm) Assessment Criteria (dB(A))	Night-time (10 pm – 7 am) Assessment Criteria (dB(A))
Freeway / arterial / sub-arterial roads and transitways	Existing traffic $L_{Aeq(15\ hour)}$ + 12 dB (external)	Existing traffic $L_{Aeq(9\ hour)}$ + 12 dB (external)

16.1.1.4 Aircraft noise during construction

The proposed laydown areas would potentially include a helicopter landing pad to enable helicopter use (including heavy lift helicopters) during construction. The assessment has considered the following scenarios:

- helicopter arrival and departure at the laydown areas
- helicopter flight between potential helicopter landing pads and the transmission line construction work area
- helicopter/drone flight within the corridor for stringing activities.

Noise emissions arising from aircraft flight operations are regulated under the Commonwealth *Air Navigation Act 1920* and the Air Navigation (Aircraft Noise) Regulations 2018. The regulations require that a noise certificate be issued for aircraft that meet the relevant standards. Accordingly, aircraft flight noise is not regulated under the NSW *Protection of the Environment Operations Act 1997.* Any ground activity associated with aircraft operation such as refuelling or maintenance at helicopter landing pads within the construction ancillary sites would, however, fall within ICNG assessment requirements and landing, take off, parking and servicing of helicopters may require an environment protection licence under the *Protection of the Environment Operations Act 1997* depending on the frequency of flight movements and the distance to nearby dwellings.

16.1.1.5 Construction vibration

The assessment of potential vibration impacts to human comfort and building damage is made with consideration to the minimum safe working distances for various vibration intensive construction equipment. Minimum working distances for typical vibration intensive construction equipment are provided in the *Construction Noise and Vibration Guideline - Roads* (TfNSW 2023) (CNVG) and are based on empirical data which suggests that where works are further from receivers than the quoted minimum distances then the impacts are not likely.

Different minimum working distances apply for assessing cosmetic damage to residential and light commercial, cosmetic damage to heritage buildings and human response. Minimum working distances also vary depending on the particular item of equipment and local geotechnical conditions. Further details of assumed minimum distances for assessment purposes are provided in Section 16.3.7.

16.1.1.6 Blasting noise and vibration

Ground vibration and airblast overpressure levels from construction blasting have been considered based on the methodology contained within Australian Standard (AS) 2187.2-2006. At this stage of the project, specific construction work locations where blasting may be required have not yet been determined. Blasting may be selected as a preferred excavation methodology in particular situations including foundations for transmission line towers or access tracks with difficult geotechnical conditions.

The ICNG requires vibration and overpressure from blasting to be assessed against the ANZECC *Technical Basis for Guidelines to Minimise Annoyance Due to Blasting Overpressure and Ground Vibration* (ANZECC, 1990). The ANZECC criteria recommends the following vibration and overpressure limits:

- the recommended maximum level for airblast is 115 dB Linear
- the level of 115 dB Linear may be exceeded on up to 5 per cent of the total number of blasts over a period of 12 months and the level should not exceed 120 dB Linear at any time
- the recommended maximum level for ground vibration is 5 millimetres per second, peak particle velocity (PPV)
- the PPV level of 5 millimetres per second may be exceeded on up to 5 per cent of the total number of blasts over a period of 12 months and the level should not exceed 10 millimetres per second at any time.

Conservative 'safe' blasting levels without more detailed analysis for infrastructure items potentially present in the study area are presented in *Effect of blasting on infrastructure* (ACARP, 2008). The relevant vibration limits on infrastructure items are shown in Table 16.4.

Table 16.4. Blast vibration limits for infrastructure

Infrastructure item	Vibration PPV (millimetres per second (mm/sec))
Roads	100 mm/s
Transmission lines	50 mm/s
Telecommunications cables	100 mm/s

Note: ACARP document "Effect of blasting on Infrastructure" (2008) lists thresholds of 100 mm/s for surface transmission lines. This value has been reduced by 50 per cent and a nominal threshold of 50 mm/s has been adopted for this assessment

16.1.2 Operational noise impact assessment approach

16.1.2.1 Transmission lines

Operation of high-voltage transmission lines has the potential to generate audible noise (typically a broadband hum or crackling noise) which is generally higher during certain meteorological conditions such as rain and mist. The assessment of potential noise impacts from the project transmission lines utilised audible noise emission calculations from *NEREZ Reference Design Report – Overhead Transmission Lines* (Aurecon, 2025). To account for detailed design changes, the

assessment conservatively assumed that the transmission line easement may be anywhere within the project area. The noise assessment considered fair weather and worst case weather (light rain or mist) conditions.

16.1.2.2 Energy hubs

Assessment of operational noise from the energy hubs assumed that all noise generating equipment, with the exception of circuit breakers, was operating in a continuous steady state nature on a 24 hours a day, 7 days a week basis. Operation of the circuit breakers would result in the generation of a high sound power level for a short duration. Given the short duration of the noise, the operation of the switching stations was assessed against the sleep disturbance L_{Amax} criteria.

16.1.2.3 Maintenance facility

The assessment of the Nemingha maintenance facility assumed that it would operate during the daytime period with noise generating activities being heavy vehicles entering and exiting the site, general maintenance using hand tools, and loading/unloading operations.

16.1.2.4 Operational maintenance and traffic generation

The energy hubs and transmission lines would be inspected on a regular basis with maintenance of these components occurring as and when required. This may include:

- line inspection via light vehicles or by air via helicopter or drone
- maintenance activities with a small crew in light and heavy vehicles
- vegetation removal to maintain required clearances.

Operational road traffic movements would not be significant or occur for extended periods of time. Vehicle movements would generally be associated with periodic inspections, maintenance activities and vegetation management, and would typically comprise light vehicles with occasional truck movements where required.

16.1.2.5 Operational noise criteria

The Project Noise Trigger Levels (PNTLs) determined for operation of the project are shown in Table 16.5. In general terms, the NPfI sets out procedures for establishing the project intrusiveness $L_{Aeq(15minute)}$ and project amenity $L_{Aeq(period)}$ noise levels, with a view to determining the lower (that is, the more stringent) being the PNTL:

- the intrusive trigger level essentially means that the equivalent continuous noise level (L_{Aeq}) of the source should not be more than 5 dBA above the measured (or default) Rating Background Level (RBL), based on ambient noise monitoring
- the amenity assessment is based on amenity noise levels specific to the land use and associated activities, being residential receptors (which are categorised as ‘rural’, ‘suburban’ or ‘urban’) or other sensitive non-residential receptors.

As shown in Table 16.5, the PNTLs for residential receivers are based on the intrusiveness trigger level, being the lower or more stringent of the intrusiveness and amenity trigger level for each period as shown in bold.

Table 16.5. Operational project noise trigger levels

Representative area	Period	Measured RBL (dB(A))	PNTL – Intrusiveness $L_{Aeq(15\ min)}$ (dB(A))	PNTL – Amenity $L_{Aeq(15\ min)}$ (dB(A))
Nemingha	Day	39	**44**	48
Nemingha	Evening	38	**43**	43
Nemingha	Night	30	**35**	38
All other residential receivers	Day	35	**40**	48
All other residential receivers	Evening	30	**35**	43
All other residential receivers	Night	30	**35**	38

Note: The recommended amenity noise levels have been reduced by 5 dB to give the project amenity noise levels due to other sources of industrial noise being present in the area, as outlined in the NPfI.
Note: The project amenity noise levels have been converted to a 15-minute level by adding 3 dB, as outlined in the NPfI.
Note: The NPfI minimum RBL value has been used due to the measured RBL being lower than the minimum value.

PNTLs for other non-residential receivers are based on the project amenity noise levels, which vary by land use and are discussed further in Technical Report 9.

Given there are elements of the project that are proposed to operate 24 hour per day, 7 days per week, the potential for sleep disturbance from maximum noise level events during the night-time period from the project is required to be considered.

The NPfI defines the sleep disturbance screening level as:

- $L_{Aeq(15\ min)}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or
- L_{AFmax} 52 dB(A) or the prevailing background level plus 15 dB, whichever is greater.

16.2 Existing environment

Ambient noise levels from monitoring locations within the study area are representative of quiet rural areas. The ambient noise environment at these locations is generally dominated by natural noise sources as expected in rural areas. The exception is the proposed maintenance facility location in Nemingha, where ambient noise levels were dominated by road traffic noise during the day and evening, with the night-time period being significantly quieter. This is typical of more built up areas near major roads.

Full details of background noise monitoring from the unattended monitoring locations is provided in the NVIA (refer to Technical Report 9). This background noise monitoring has informed the development of the NMLs and PNTLs, as outlined in Section 16.1.1.2 and Section 16.1.2.5. To identify sensitive receivers within the study area, aerial imagery was reviewed supported by government databases and targeted field verification. These have been categorised as residential buildings, commercial/industrial buildings, or 'other sensitive' land uses. All sensitive receivers considered within the study area are shown in Figure 16.1.

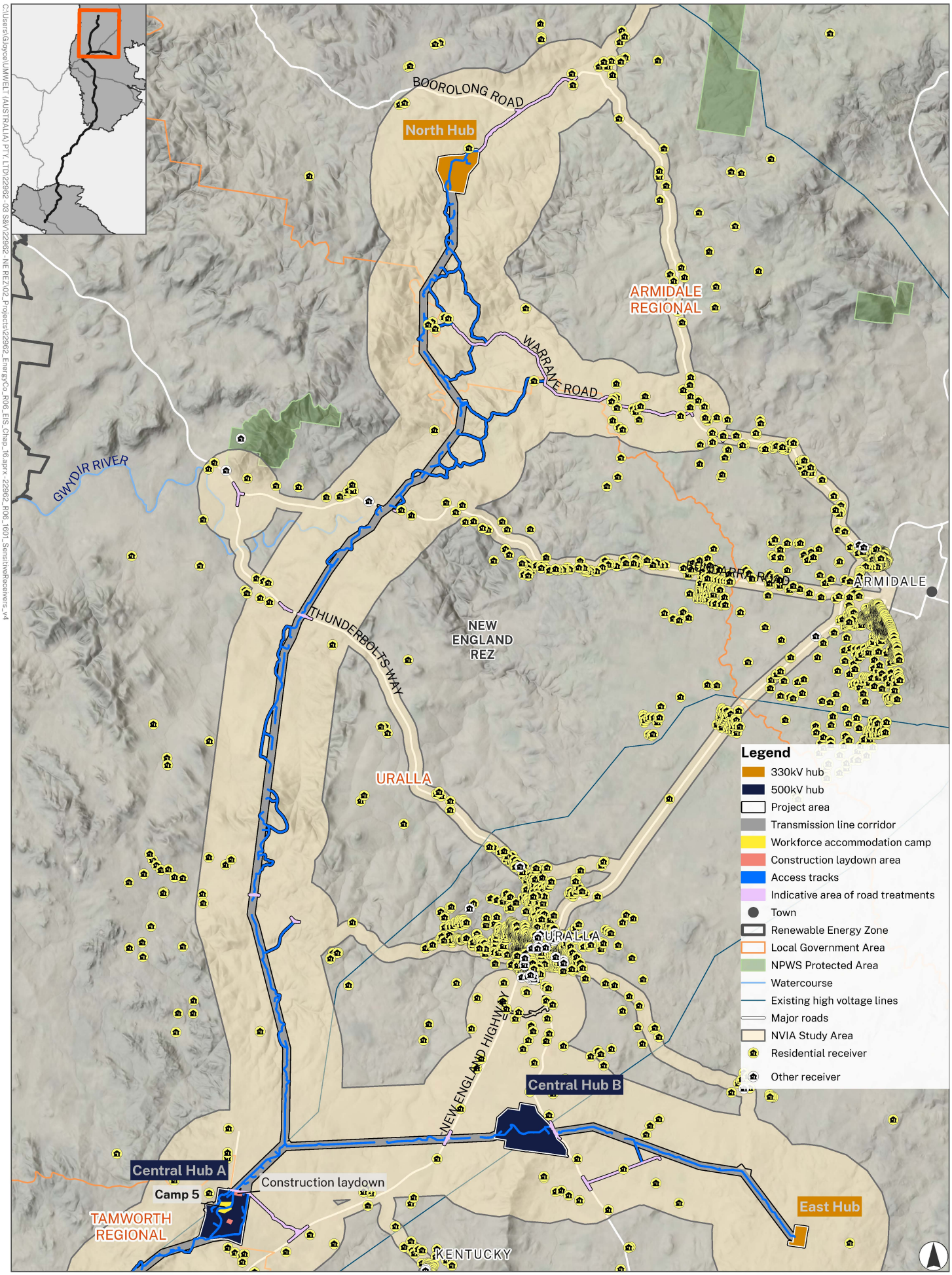


FIGURE 16.1a Sensitive receivers considered in the study area (Map 1 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

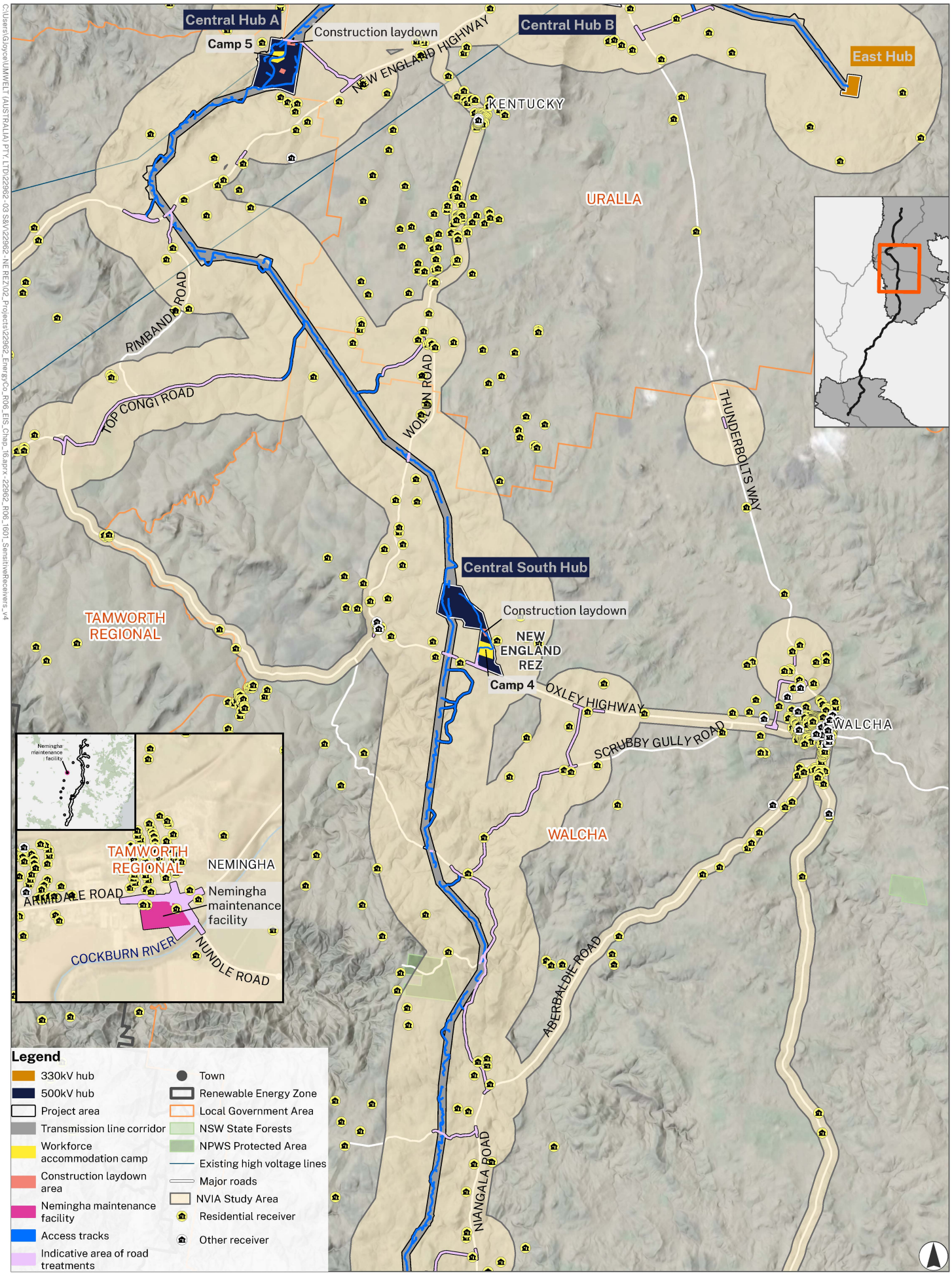


FIGURE 16.1b Sensitive receivers considered in the study area (Map 2 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

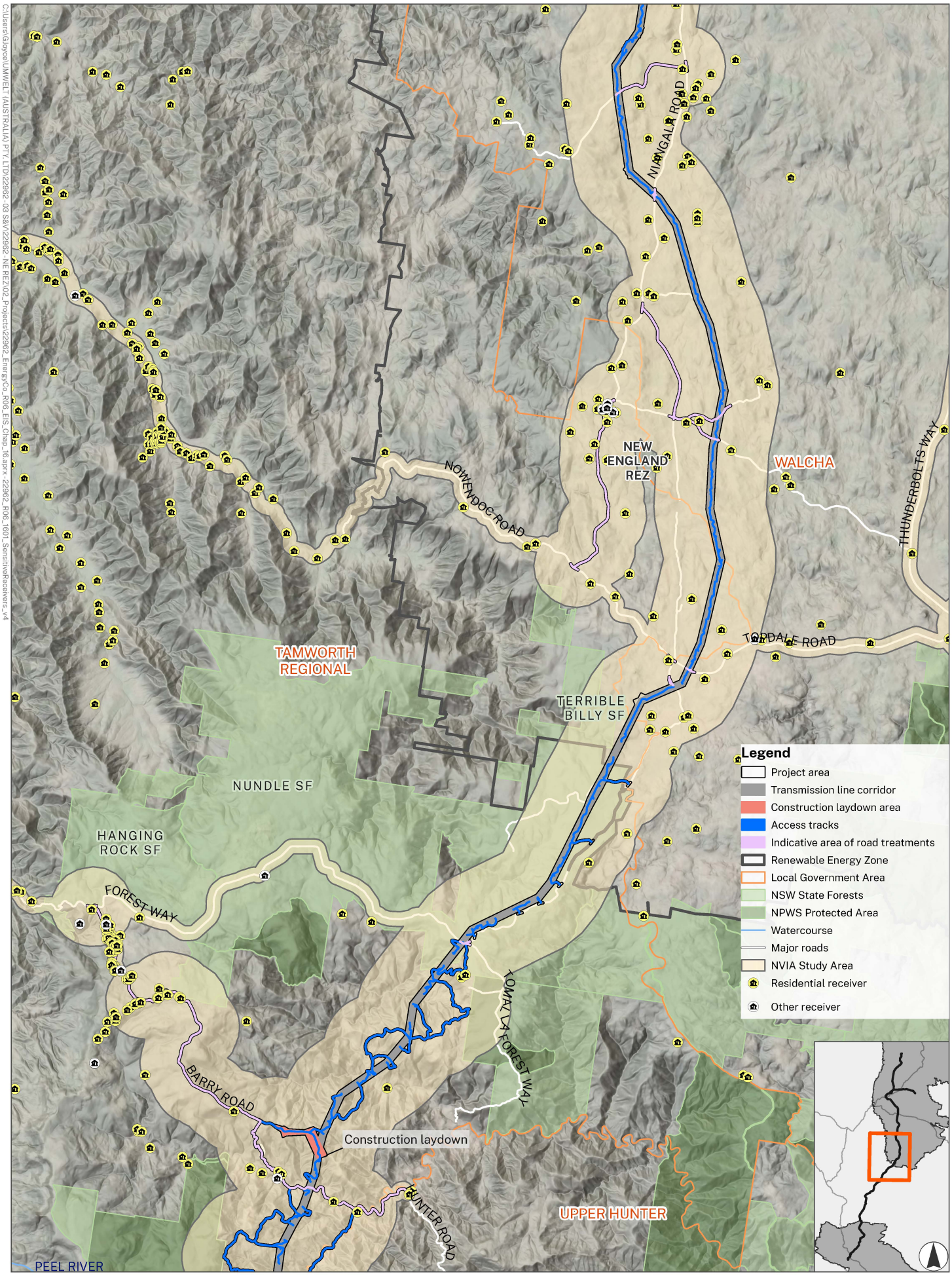


FIGURE 16.1c Sensitive receivers considered in the study area (Map 3 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

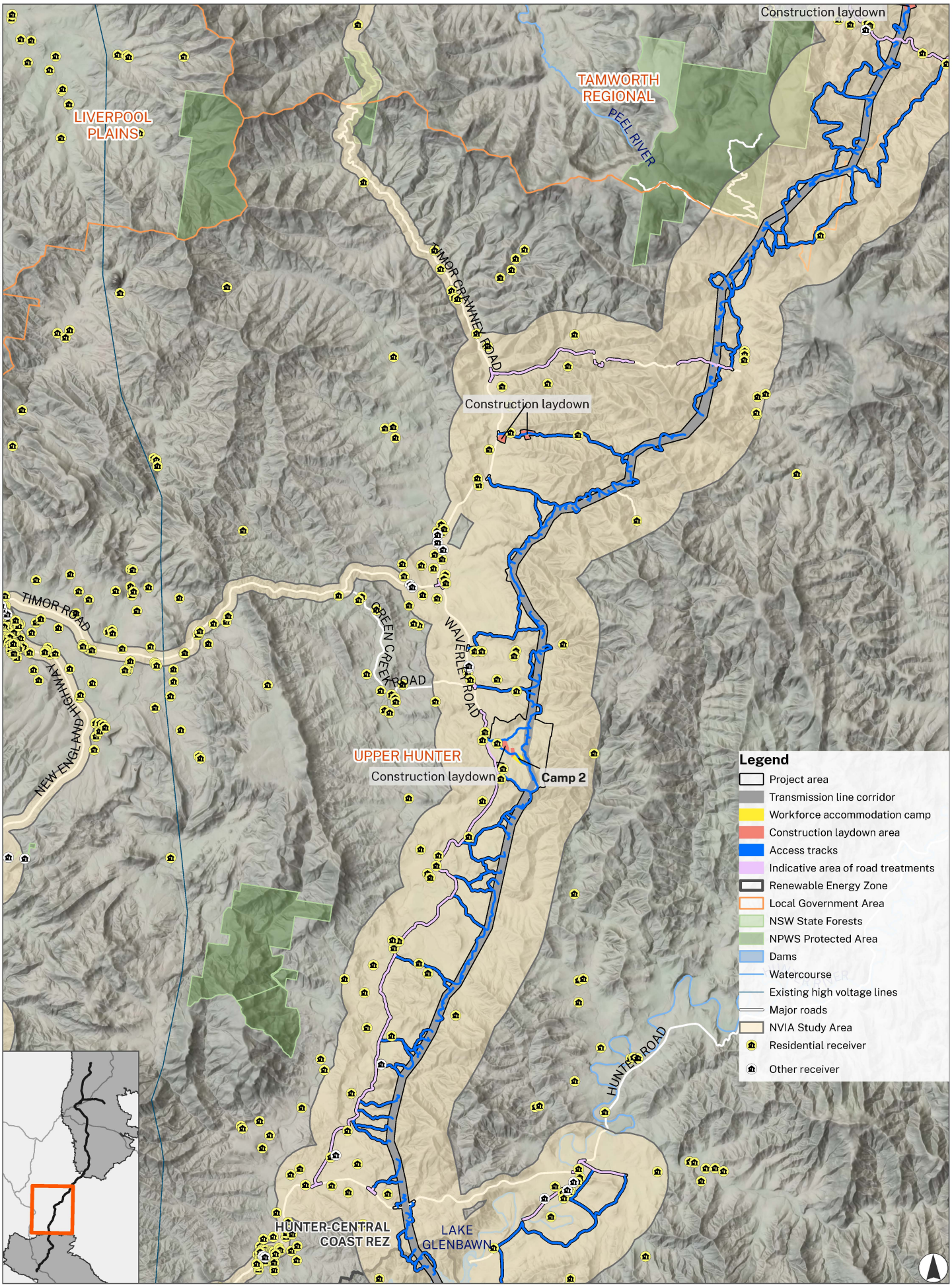


FIGURE 16.1d Sensitive receivers considered in the study area (Map 4 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

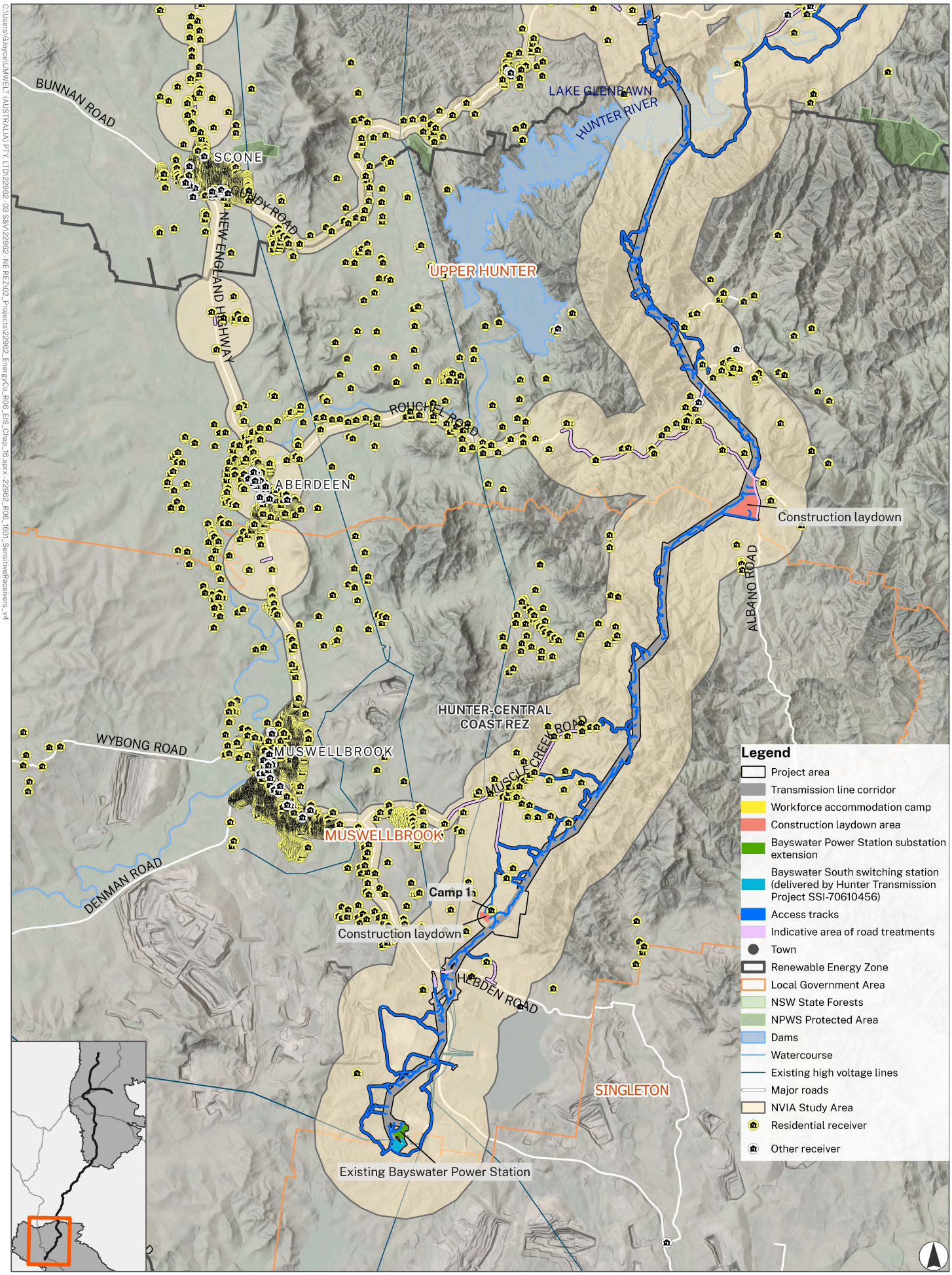


FIGURE 16.1e Sensitive receivers considered in the study area (Map 5 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

16.3 Potential impacts – construction

Construction noise impacts have been assessed based on the exceedance of the NMLs (refer to Section 16.1.1.2). Exceedances of the NMLs are presented as per the ICNG exceedance categories in Table 16.6.

For most construction activities, it is expected that the construction noise levels would frequently be lower than predicted, as the noise levels presented are based on each scenario occurring at the work site boundary which is the closest point to each sensitive receiver. The assessment is generally considered conservative as the calculations also assumed several items of construction equipment are in use at the same time within individual scenarios. In reality, there would frequently be periods when construction noise levels are much lower than the worst-case levels predicted as well as times when no equipment is in use. As discussed in Section 16.3.1 and Section 16.3.4 below, construction noise modelling for construction ancillary sites, workforce accommodation camps and the transmission lines has considered both 'intensive' and 'typical' construction scenarios.

This assessment presents the predicted noise impacts prior to the application of mitigation. Implementation of mitigation measures as proposed in Section 16.6 would reduce the predicted construction noise levels.

Table 16.6. Construction noise exceedance categories

Subjective classification	Exceedance of NML – Day	Exceedance of NML – Out of hours	Impact Colouring
Negligible	No exceedance	No exceedance	No colour
Noticeable	-	1 to 5 dB	Green
Low Impact (clearly audible)	1 to 10 dB	6 to 15 dB	Yellow
Moderate Impact (moderately intrusive)	11 to 20 dB	16 to 25 dB	Orange
High Impact (highly intrusive)	> 20 dB	> 25 dB	Red
Very High Impact	>75 dB(A) Highly noise affected (HNA)	>75 dB(A) HNA	**Bolded**

16.3.1 Construction ancillary sites and maintenance facility

The number of residential receivers where NML exceedances are predicted for the construction ancillary sites, workforce accommodation camps and the maintenance facility is summarised in Table 16.7 for standard construction hours and Table 16.8 for OOH work. The assessment considered representative scenarios including the use of both 'intensive' noise generating equipment and 'typical' noise generating equipment.

Table 16.7. Residential standard construction hours NML exceedances - construction ancillary sites, workforce accommodation camps and maintenance facility

Scenario	Number of residential receivers - HNA	Number of residential receivers – 1-10 dB NML exceedance	Number of residential receivers – 11-20 dB NML exceedance	Number of residential receivers - >20 dB NML exceedance
Camp 1 laydown area - site establishment and construction (intensive)	-	4	-	-
Camp 1 laydown area - site establishment and construction (typical)	-	-	-	-
Camp 1 laydown area – site operation	-	-	-	-
Camp 1 workforce accommodation camp area – site establishment and construction (intensive)	-	5	1	1
Camp 1 workforce accommodation camp area – site establishment and construction (typical)	-	3	1	-
Camp 1 workforce accommodation camp area – site operation	-	-	1	-
Rouchel Brook (Albano Road) laydown area - site establishment and construction (intensive)	-	3	2	-
Rouchel Brook (Albano Road) laydown area - site establishment and construction (typical)	-	2	-	-
Rouchel Brook (Albano Road) laydown area – site operation	-	2	-	-
Camp 2 laydown area - site establishment and construction (intensive)	-	4	-	-
Camp 2 laydown area - site establishment and construction (typical)	-	1	-	-
Camp 2 laydown area – site operation	-	1	-	-
Camp 2 workforce accommodation camp area – site establishment and construction (intensive)	1	1	2	1
Camp 2 workforce accommodation camp area – site establishment and construction (typical)	1	-	2	1
Camp 2 workforce accommodation camp area – site operation	-	2	1	1
Timor laydown area - site establishment and construction (intensive)	-	2	-	-
Timor laydown area - site establishment and construction (typical)	-	1	-	-
Timor laydown area - site operation	-	1	-	-

Scenario	Number of residential receivers - HNA	Number of residential receivers – 1-10 dB NML exceedance	Number of residential receivers – 11-20 dB NML exceedance	Number of residential receivers - >20 dB NML exceedance
Camp 4 laydown area - site establishment and construction (intensive)	-	-	1	-
Camp 4 laydown area - site establishment and construction (typical)	-	1	-	-
Camp 4 laydown area – site operation	-	1	-	-
Camp 4 workforce accommodation camp area – site establishment and construction (intensive)	-	1	1	-
Camp 4 workforce accommodation camp area – site establishment and construction (typical)	-	1	-	-
Camp 4 workforce accommodation camp area - site operation	-	1	-	-
Camp 5 laydown area - site establishment and construction (intensive)	-	3	-	-
Camp 5 laydown area - site establishment and construction (typical)	-	-	-	-
Camp 5 laydown area – site operation	-	-	-	-
Camp 5 workforce accommodation camp area – site establishment and construction (intensive)	-	1	-	-
Camp 5 workforce accommodation camp area – site establishment and construction (typical)	-	1	-	-
Camp 5 workforce accommodation camp area - site operation	-	-	-	-
Maintenance facility - site establishment and construction (intensive)	**4**	86	39	8
Maintenance facility - site establishment and construction (typical)	**2**	60	18	2

Table 16.8. Residential OOH NML and sleep disturbance exceedances from construction ancillary sites, workforce accommodation camps and maintenance facility

Scenario	HNA	NML exceedance 1–5 dB	NML exceedance 6–15 dB	NML exceedance 16–25 dB	NML exceedance >25 dB	Sleep disturbance exceedance 1–5 dB	Sleep disturbance exceedance 6–15 dB	Sleep disturbance exceedance 16–25 dB	Sleep disturbance exceedance >25 dB
Camp 1 workforce accommodation camp operation	-	2	2	1	-	-	1	-	-
Camp 2 workforce accommodation camp operation	-	1	1	2	1	1	2	1	-
Camp 4 workforce accommodation camp operation	-	1	1	-	-	1	-	-	-
Camp 5 workforce accommodation camp operation	-	-	1	-	-	-	-	-	-

The results of the assessment identify that construction noise impacts are generally limited to residential receivers closest to each site, with one highly noise affected receiver from Camp 2 and construction ancillary site and 4 at the Nemingha maintenance facility. Noise levels from the OOH operation of the workforce accommodation camps during the construction phase of the project are predicted to exceed the OOH NML at residential receivers closest to each site, with 6 receiver locations exceeding the sleep disturbance screening level. While the sleep disturbance screening level has been exceeded, the maximum noise levels from OOH operation of the workforce accommodation camps are not predicted to cause awakening reactions.

The specific camp locations are subject to change in the detailed design phase of the project, with this assessment assuming that noise sources considered within the workforce accommodation camp area are located at the closest extent of the project area to each receiver location. Therefore, the results shown in Table 16.7 and Table 16.8 are considered conservative and not all receivers are likely to experience the worst-case construction noise impacts presented. In detailed design, considered placement of camps within the project area would minimise potential noise impacts. It is expected that the camps would be located further from sensitive receivers than the current conservative assumptions which place them generally near the edge of the project area. In cases where the camps can be placed further than 1,080 metres from residential receivers, no exceedance of NMLs from the operation of workforce accommodation camps is predicted. The threshold distances presented in Table 16.9and Table 16.10 for Camp 3 are also considered applicable to the Camp 1 Alternate workforce accommodation camp and construction ancillary site and may be used to indicate the approximate distances at which residential receivers could experience standard construction hours and out-of-hours NML exceedances.

No noise impacts are predicted at 'other sensitive' receivers (schools, hospitals, places of worship) from the construction of the workforce accommodation camps, laydown areas or the maintenance facility.

As discussed in Section 3, the location of workforce accommodation Camp 3 was identified after completion of the majority of technical studies prepared for the EIS, therefore has not been assessed in detail as part of the NVIA. Detailed assessment of the proposed location for Camp 3 will be undertaken as part of the Submissions Report / Amendment Report. Based on preliminary analysis undertaken in the NVIA, the offset distance from the final camp location at which residential receivers are expected to exceed the standard construction hours and nighttime OOH NMLs are show in Table 16.9 and Table 16.10 respectively.

Table 16.9. Approximate distance at which residential standard construction hours NML exceedances are expected from Camp 3 workforce accommodation camp

Scenario	Distance from work where receiver exceedances occur – HNA (metres)	Distance from work where receiver exceedances occur – NML 1-10 dB (metres)	Distance from work where receiver exceedances occur – NML 11-20 dB (metres)	Distance from work where receiver exceedances occur – NML >20 dB (metres)
Camp 3 workforce accommodation camp – site establishment and construction	**65**	1,300	490	175
Camp 3 workforce accommodation camp – site operation	**22**	400	140	50

Table 16.10. Approximate distance at which residential OOH NML and sleep disturbance exceedances are expected from Camp 3 workforce accommodation camp

Scenario	HNA (metres)	NML exceedance 1–5 dB (metres)	NML exceedance 6–15 dB (metres)	NML exceedance 16–25 dB (metres)	NML exceedance >25 dB (metres)	Sleep disturbance exceedance 1–5 dB (metres)	Sleep disturbance exceedance 6–15 dB (metres)	Sleep disturbance exceedance 16–25 dB (metres)	Sleep disturbance exceedance >25 dB (metres)
Camp 3 workforce accommodation camp operation	22	1080	660	235	85	325	195	82	28

16.3.2 Energy hubs

The number of residential receivers where NML exceedances are predicted during construction of the energy hubs is summarised in Table 16.11. No exceedances of the NML are predicted for the Bayswater Power Station Substation extension works.

Table 16.11. Residential standard construction hours NML exceedances at energy hubs

Scenario	Number of residential receivers - HNA	Number of residential receivers – 1-10 dB NML exceedance	Number of residential receivers – 11-20 dB NML exceedance	Number of residential receivers - >20 dB NML exceedance
Central South Hub - Earthworks	-	2	-	-
Central South Hub - Civil works	-	-	-	-
Central South Hub - Vegetation clearing	-	1	-	-
Central South Hub - Installation and commissioning	-	-	-	-
Central Hub A - Earthworks	-	6	1	-
Central Hub A - Civil works	-	1	-	-
Central Hub A - Vegetation clearing	-	5	-	-
Central Hub A - Installation and commissioning	-	-	-	-
Central Hub B - Earthworks	-	5	1	-
Central Hub B - Civil works	-	1	-	-
Central Hub B - Vegetation clearing	-	1	1	-
Central Hub B - Installation and commissioning	-	1	-	-
East Hub - Earthworks	-	-	-	1
East Hub - Civil works	-	-	1	-
East Hub - Vegetation clearing	-	-	-	1
East Hub - Installation and commissioning	-	-	-	-

Scenario	Number of residential receivers - HNA	Number of residential receivers – 1-10 dB NML exceedance	Number of residential receivers – 11-20 dB NML exceedance	Number of residential receivers - >20 dB NML exceedance
North Hub - Earthworks	-	1	-	1
North Hub - Civil works	-	-	1	-
North Hub - Vegetation clearing	-	-	1	-
North Hub - Installation and commissioning	-	1	-	-

The predicted impacts are generally limited to residential receivers closest to each site, with no receivers predicted to be highly noise affected. Noise levels from construction of the energy hubs are predicted to have low impact at the Central South Hub, moderate impacts at Central Hub A and Central Hub B, and high impacts at East Hub and North Hub.

No noise impacts are predicted at 'other sensitive' receivers from the construction of the energy hubs.

16.3.3 Access tracks and public road upgrades

The number of sensitive receivers where NML exceedances are predicted during construction of the access tracks and public road upgrades is summarised in Table 16.12 for standard construction hours.

Table 16.12. Standard construction hours NML exceedances – access tracks and public road upgrades

Receiver type	Scenario	HNA	NML exceedance 1–10 dB	NML exceedance 11–20 dB	NML exceedance >20 dB
Residential receivers	Access track – Track formation	**9**	123	49	16
Residential receivers	Public road – Road upgrade	**45**	651	215	64
Other sensitive receivers	Access track – Track formation	-	3	-	-
Other sensitive receivers	Public road – Road upgrade	-	10	2	1

Note: The HNA level is not applicable to 'other sensitive' receivers.

Predicted impacts are generally limited to sensitive receivers closest to the access track and public road upgrade areas, with highly noise affected receivers located immediately adjacent to proposed work areas. Typically, receivers would only experience high noise levels for a limited time as construction occurs in proximity to these receivers before moving further away as construction progresses.

16.3.4 Transmission line and stringing sites

The number of sensitive receivers where NML exceedances are predicted for standard hours during construction of the transmission lines is summarised in Table 16.13. The number of residential receivers where NML exceedances are predicted during the night-time for the potential OOH operation of stringing sites over key infrastructure such as the New England Highway, Oxley Highway, Thunderbolts Way, railway lines and transmission lines is summarised in Table 16.14.

Table 16.13. Standard construction hours NML exceedances –transmission line and stringing sites

Receiver type	Scenario	HNA	NML exceedance 1–10 dB	NML exceedance 11–20 dB	NML exceedance >20 dB
Residential receivers	Vegetation clearing	-	103	14	1
Residential receivers	Levelling works	-	76	6	1
Residential receivers	Foundation works (intensive)	-	126	23	1
Residential receivers	Foundation works (typical)	-	23	1	-
Residential receivers	Tower assembly	-	1	1	-
Residential receivers	Stringing	-	5	-	-
Other sensitive receivers	Vegetation clearing	-	1	-	-
Other sensitive receivers	Levelling works	-	-	-	-
Other sensitive receivers	Foundation works (intensive)	-	1	-	-

Receiver type	Scenario	HNA	NML exceedance 1–10 dB	NML exceedance 11–20 dB	NML exceedance >20 dB
Other sensitive receivers	Foundation works (typical)	-	-	-	-
Other sensitive receivers	Tower assembly	-	-	-	-
Other sensitive receivers	Stringing	-	-	-	-

Table 16.14. Residential NML exceedances at OOH stringing sites

Scenario	HNA	NML exceedance 1–5 dB	NML exceedance 6–15 dB	NML exceedance 16–25 dB	NML exceedance >25 dB	Sleep disturbance exceedance 1–5 dB	Sleep disturbance exceedance 6–15 dB	Sleep disturbance exceedance 16–25 dB	Sleep disturbance exceedance >25 dB
OOH Stringing	-	8	7	-	-	3	-	-	-

The predicted impacts are generally limited to noise sensitive receivers closest to the construction works. Low impacts are predicted at one other sensitive receiver (the Rouchel Uniting Church) during vegetation clearing and intensive foundation works. Given the transmission line project area near the church is predominantly cleared agricultural land, it is not expected that vegetation clearing or intensive foundation works would be required for extended periods of time in this area.

Maximum noise levels from the potential OOH use of the stringing sites are predicted to exceed the night-time NML at 15 receivers with exceedance of the sleep disturbance screening level predicted at 3 receivers. The highest predicted noise level at any residence is less than 65 dB(A). The OOH operation of the stringing sites across major roads and railways is considered unlikely to cause sleep disturbances.

16.3.5 Aircraft noise

16.3.5.1 Helicopter landing pads

Proposed laydown areas would potentially include a helicopter landing pad to enable helicopter use during construction. Helicopter LAmax noise levels were predicted for all potential helicopter landing pad locations for H1.1 group helicopters (take off mass 1,000 kilograms to 3,000 kilograms) and H2.1 group heavy lift helicopters (take off mass 5,000 kilograms to 10,000 kilograms). The only predicted helicopter L_{Amax} noise level exceeding 75 dBA is at a single residential receiver near the laydown area at Central South Hub. The predicted helicopter L_{Amax} noise levels at the remaining laydown areas are unlikely to cause any significant impacts to the noise amenity in the area due to the distance to receivers.

16.3.5.2 Flights outside the project area

Helicopters would be required to fly from the relevant helicopter landing pad to and from the transmission line work sites. This component of helicopter use would typically include flight over areas outside of the project area. Since flight paths are not known at this stage, indicative L_{Amax} noise levels have been predicted for sensitive receivers near potential helicopter flight paths. Helicopters would generally be flown at a minimum height of 305 metres (1,000 feet) above ground level (AGL) over towns and 152 metres (500 feet) AGL over unpopulated areas when travelling outside of the project area. The ground offset distances at which various L_{Amax} noise levels are predicted during regular flight are shown in Table 16.15.

Consideration of potential noise impacts to livestock is considered in the agricultural assessment (refer to Section 13).

Table 16.15. LAmax helicopter noise levels and flight path ground offset distance

LAmax noise level (dB(A))	Ground offset distance for H1.1 group helicopter – 152 metre flight (metres)	Ground offset distance for H1.1 group helicopter – 305 metre flight (metres)	Ground offset distance for H2.1 group heavy-lift helicopter – 152 metre flight (metres)	Ground offset distance for H2.1 group heavy-lift helicopter – 305 metre flight (metres)
65 dB(A)	700	700	950	1150
70 dB(A)	450	350	700	700
75 dB(A)	250	-	450	350
80 dB(A)	150	-	250	-

Note: Ground offset is the 2D distance at ground level from the flight path centreline. Distances are indicative and are rounded to the nearest 50 metres for display.

Helicopter noise from flights outside of the project area are expected to be relatively short-term and would likely be apparent from less than a minute to a few minutes per flight at any individual sensitive receiver depending on flight path and relative location of the receiver.

16.3.5.3 Flights within the project area

Aircraft use within the project area would include helicopters or drones for stringing work and potentially transporting or lifting transmission towers into position. Aircraft may also be used to install final components such as conductor spacers on the newly installed transmission lines. Heavy lift helicopters would only be used along the project area generally between Nundle State Forest and Sargeants Gap Road and between Rouchel Road and Hunter Road.

The predicted noise levels for helicopter and drone flights within the transmission line easement when stringing are based at a height of 52 metres (170 feet) AGL, which is representative of the height required to access the lower conductors of the transmission line tower. The predicted noise levels for heavy lift helicopters within the transmission line easement are based on a height of 52 metres (170 feet) AGL and 152 metres (500 feet) AGL as being representative of heavy lifting operations.

The number of sensitive receivers where various LAmax noise levels are predicted during aircraft flight at 52 metres (170 feet) AGL and 152 metres (500 feet) AGL along the transmission line alignment are shown in Table 16.16.

The LAmax noise level contours are provided in Technical Report 9.

Table 16.16. Number of receivers with L_{Amax} noise levels from transmission line easement flights

L_{Amax} noise level (dB(A))	Number of receivers for H1.0 group drone – flight at 52 metres AGL	Number of receivers for H1.1 group helicopter – flight at 52 metres AGL	Number of receivers for H2.1 group heavy-lift helicopter – flight at 52 metres AGL	Number of receivers for H2.1 group heavy-lift helicopter – flight at 152 metres AGL
65 dB(A) – 70 dB(A)	-	15	4	11
70 dB(A) – 75 dB(A)	-	7	3	2
75 dB(A) – 80 dB(A)	1	2	1	2
80 dB(A) – 85 dB(A)	-	-	-	-
Greater than 85 dB(A)	-	1	-	-
Total	1	25	8	15

The use of heavy lift helicopters would result in up to 15 receivers outside of the project area experiencing L_{Amax} noise levels above 65 dBA. No receivers would experience noise levels greater than 80 dBA. Use of a drone along the length of the transmission line would result in one receiver outside of the project area experiencing L_{Amax} noise levels above 65 dBA.

16.3.6 Road traffic noise

Construction related traffic has the potential to temporarily increase road traffic noise levels at receivers which are adjacent to construction routes. Several construction routes include sections of unsealed roads. A correction of +7 dB has been applied to the predictions for these unsealed roads to account for increased pass-by noise levels.

The forecast peak construction traffic volumes have been used to determine where potentially noticeable increases in road traffic noise (that is, a greater than 2 dB increase above the existing noise level) are likely. Where potential 2 dB increases are identified, the total road traffic noise levels are compared to the RNP L_{Aeq} criteria for local or arterial and sub arterial roads as appropriate.

The key findings of the construction road traffic noise assessment are:

- on major arterial roads such as the New England Highway, Uralla Road and Thunderbolts Way south of Uralla, peak construction traffic would not increase existing road traffic noise levels by more than 2 dB

- peak construction related traffic on the Rouchel Road, Hunter Road and Boorolong Road sub arterial road construction routes are predicted to result in a noticeable increase in noise levels (>2 dB) due to relatively low existing traffic volumes on these roads, however compliance with the RNP daytime and night-time criteria is predicted for all residential receivers from arterial and sub arterial roads
- peak construction traffic would likely result in a noticeable increase in noise levels (>2 dB) on all local roads
- peak construction traffic on local roads is predicted to exceed the RNP criteria at a total of 111 residential receivers.

The proposed mitigation measures to minimise and manage the predicted impacts are discussed in Section 16.6.

16.3.7 Vibration

The assessment of potential vibration impacts considered construction activities at various work sites and the typical vibration intensive equipment that would be used at these locations. The minimum distances to avoid vibration impacts from the typical equipment to be used at work sites is presented in Table 16.17. The number of sensitive residential receivers and heritage items that fall within the minimum distance to avoid impact are discussed in Section 16.3.7.1 and Section 16.3.7.2 respectively.

Table 16.17. Adopted minimum working distances from vibration intensive equipment

Construction work area	Vibration-intensive equipment	Minimum distance – Cosmetic damage (Residential and light commercial) (metres)	Minimum distance – Heritage items (metres)	Minimum distance – Human response (metres)
Earthworks at tower sites, energy hubs and access track construction	Large hydraulic hammer 1,600 kg (18 tonne to 34 tonne excavator)	22	44	73
Earthworks at workforce accommodation camps, laydown areas, maintenance facility and public road upgrades	Medium vibratory roller - 8 tonne to 10 tonne	15	31	100

16.3.7.1 Residential receivers

The number of residential receivers that would be within the minimum working distances for each work area are shown in Table 16.18. A total of 21 receivers closest to construction areas would be within the minimum working distance for cosmetic damage. A total of 118 receivers would be within the human comfort minimum working distance. These predictions represent a worst-case situation where a large hydraulic hammer or 8–10 tonne vibratory roller is in use at the boundary of the project area. The use of a small hydraulic hammer and a 2–4 tonne vibratory roller in place of the larger vibratory rollers would result in 2 impacted receivers within the cosmetic damage minimum working distances. The number of residential receivers within the minimum working distance for human comfort would be reduced to 28.

Depending on the final location of the transmission line, which will be determined during detailed design, the separation distance from vibration intensive equipment to receivers may be increased which would also likely reduce the number of impacted receivers.

Table 16.18. Overview of vibration impacts to residential receivers

Construction work area	Number of receivers within working distance – cosmetic damage	Number of receivers within working distance – human comfort
Earthworks at tower sites, energy hubs and access track construction	5	16
Earthworks at workforce accommodation camps, construction ancillary sites, maintenance facility and public road upgrades	16	102

16.3.7.2 Historical heritage

The assessment of heritage buildings and structures should be considered on a case-by-case basis as structures should not be assumed to be more sensitive to vibration, unless structurally unsound. Where the heritage building or structure is structurally sound the vibration guide values for cosmetic damage in BS 7385 would apply. Where a heritage building is deemed to be sensitive, the more stringent DIN 4150 guideline values would be applied.

An assessment of potential vibration impacts on structures contained within the curtilage of heritage items considered to be potentially sensitive to vibration was undertaken considering distances to work locations where vibratory intensive equipment would be used.

The assessment found that depending on the structural condition of the heritage structure and construction methodology, different vibration offset distances would be required to avoid the potential for vibration impacts. These distances ranged up to 44 metres from the structure depending on the construction methodology and structural condition. Prior to construction, the structural integrity of the heritage items would be further assessed to allow the appropriate selection of construction equipment to minimise potential vibration impacts.

The project involves localised widening of Sargeants Gap Road in the heritage listed Timor Caves geological area. The exact location of the caves, depth of cover to the proposed road widening, geotechnical condition of the caves and presence of potentially vibration sensitive karst formation such as helictites is not known at this stage. Works proposed on Sargeants Gap Road are expected to include localised widening of sections of existing unsealed road. These works typically require an excavator, grader, water carts and vibratory rollers operating in either static or vibratory mode for material compaction along with heavy vehicle movements to deliver road base and remove excavated material. If vibratory construction equipment is required, the location of the works and proximity to the caves (entrance and extents) would be confirmed to understand separation distance from the construction works. In the absence of further geological information for caves that may contain sensitive formations such as helictites, the vibration criteria for sensitive heritage structures has been adopted for construction within the Timor Caves geological area and the safe working distances for plant and equipment listed in Table 3 of Technical Report 9 may need to be applied for construction works.

Based on a (rubber-tyred) heavy vehicle travelling at 60 kilometres per hour, vibration levels are predicted to be below 3 millimetres per second at a distance of approximately 1.5 metres. Unless there are severe irregularities (such as potholes and bumps), vibration levels from heavy vehicle movements on Sargeants Gap Road are unlikely to cause vibration related damage (that is damage not relating to increased static or dynamic loads) to the cave system.

16.3.7.3 Aboriginal heritage

Vibration impacts to Aboriginal sites has also been considered as part of the noise and vibration assessment for the project. These include impacts that may occur beyond the immediate area of ground disturbance or vegetation removal resulting from project construction activities.

For the purpose of this assessment, a conservative approach has been employed and ‘vibration-sensitive site types’ are considered those that are structural in nature and would theoretically have the potential to crack or topple if subject to a certain threshold of vibration. These types comprise Aboriginal rock shelters, grinding groove sites located on bedrock (that is, non-portable), and standing, dead CMTs.

The NVIA has identified indicative safe minimum working distances for vibration-sensitive Aboriginal archaeological sites. For culturally modified trees, the assessment conservatively adopts the DIN 4150 Group 3 vibration criterion as a proxy, noting that DIN 4150 does not specifically provide guidance for these site types, noting that Aboriginal heritage items are diverse in nature and not all may be particularly sensitive to vibration. A review of all Aboriginal sites within the project area and within the adopted minimum working safe working distances for heritage items as per Table 16.17 identified 5 Aboriginal sites with the potential to be impacted by vibration. These are set out in Table 16.20.

Table 16.19. Summary of potential vibration impacts to Aboriginal Sites

Site name	Item Number	Locality	Distance to nearest structure (metres)[1]	Comment on sensitivity
NEREZ_AtchesonsCk_ST1	21-4-0544	Kentucky	Within project area	CMT located within the project area within a no-impact area. Refer to Note 2 for construction vibration techniques to be employed to ensure avoidance of potential impacts.
NEREZ_MuddyCk_ST1	20-6-0213	Yarrowyck	Within project area	CMT located within the project area within a no-impact area. Refer to Note 2 for vibration controls.
NEREZ_SandyCk_ST1	20-6-0211	Yarrowyck	Within project area	CMT located within the project area within a no-impact area. Refer to Note 2 for vibration controls.
NEREZ_SpringCk_RockshelterPAD1	20-6-0206	Gostwyck	Within project area	Rockshelter located within the project area within a no-impact area. Refer to Note 3 for vibration controls.
NEREZ_OxleyHwy_ST3	20-6-0212	Walcha	<12 m	CMT located within 12 m of the disturbance footprint, but outside the project area. Refer to Note 2 for vibration controls.

Note 1: Approximate minimum horizontal distance from the disturbance footprint to the nearest structure of the listed heritage sites.

Note 2: A large hydraulic hammer can be used up to within 44 metres or a medium hydraulic hammer up to within 15 metres of the tree. An 8-10 tonne roller can be used up to within 31 metres or a 2-4 tonne roller up to within 13 metres of the tree. Alternative construction methods would need to be used where construction is required within these distances.

Note 3: A large hydraulic hammer can be used up to within 16 metres or a medium hydraulic hammer up to within 5 metres of the rockshelter. An 8-10 tonne roller can be used up to within 11 metres or a 2-4 tonne roller up to within 4 metres of the rockshelter. Alternative construction methods would need to be used where construction is required within these distances.

16.3.8 Blasting

A review of nearby sensitive receivers was undertaken based on areas where blasting may potentially be used during construction (refer to Appendix B of the NVIA, Technical Report 9). The closest sensitive receivers to each potential controlled blasting area are residential receivers. It is important to note that controlled blasting would be limited to specific locations and would only be required if the preferred construction method requires blasting.

If blasting is required, compliance with blasting vibration and overpressure limits can be achieved by appropriately scaling the Maximum Instantaneous Charge (MIC) of each blast based on the site location. Blasting impacts would be readily managed through good blasting practices and implementation of a Noise, Vibration and Blast Management Plan to ensure potential airblast and vibration impacts are minimised.

Similarly, suitable blast design or alternative construction methods would be employed to avoid potential impacts to heritage items located in areas where blasting may potentially be used during construction. There is one historical heritage item and 3 Aboriginal heritage items in proximity to where blasting may be undertaken. It is noted that Aboriginal heritage items are diverse in nature and not all may be particularly sensitive to vibration from controlled blasts. Blast and vibration controls would be implemented during construction to ensure direct and indirect impacts to identified vibration sensitive Aboriginal objects and sites of high archaeological significance and their immediate environment (≥55 metres) in designated 'no-impact' areas would be avoided. Appropriate criterion for these items can be revised based on performance outcomes and field observations of the heritage item condition.

16.4 Potential impacts – operation

16.4.1 Transmission line

Noise generated from the operation of transmission lines is typically associated with electrical discharge around the conductors (known as corona noise). The potential for noise generation can vary depending on meteorological conditions and generally increases with moisture content in the air. The operational noise assessment considered both fair weather conditions and worst-case weather conditions (light rain or mist).

Under fair weather conditions, noise levels are predicted to be up to 42 dB(A) at the edge of the project area. As such, compliance with the PNTLs would be achieved for all receivers at a distance of 130 metres or greater from the project area.

Predicted operational noise under the worst-case scenario were compared against the night-time PNTL as this is the most stringent operational criteria for all sensitive receivers. The number of receivers with exceedances of the night-time PNTL across the length of the project area are shown in Table 16.21 and the location of these receivers is shown on Figure 16.2.

Table 16.20. Number of receivers with operational exceedance of night-time PNTL under worst-case meteorological conditions

Location along transmission line	Number of receivers with night time exceedance ≤2 dB	Number of receivers with night time exceedance ≥3 but ≤5 dB	Number of receivers with night time exceedance >5 dB
Entire transmission line easement	23	15	10

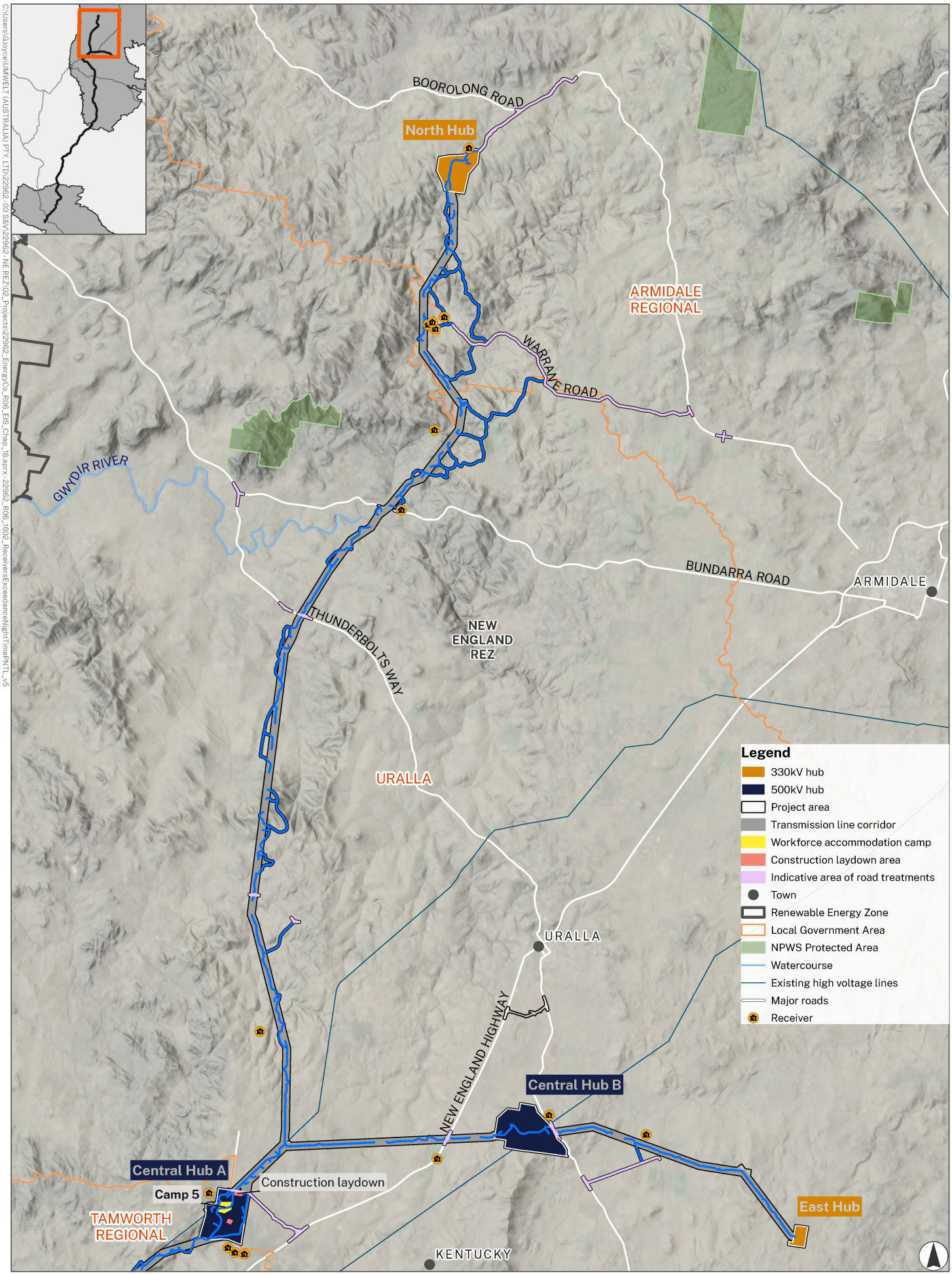


FIGURE 16.2a Receivers with exceedance of the night-time PNTL during operation (Map 1 of 5)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

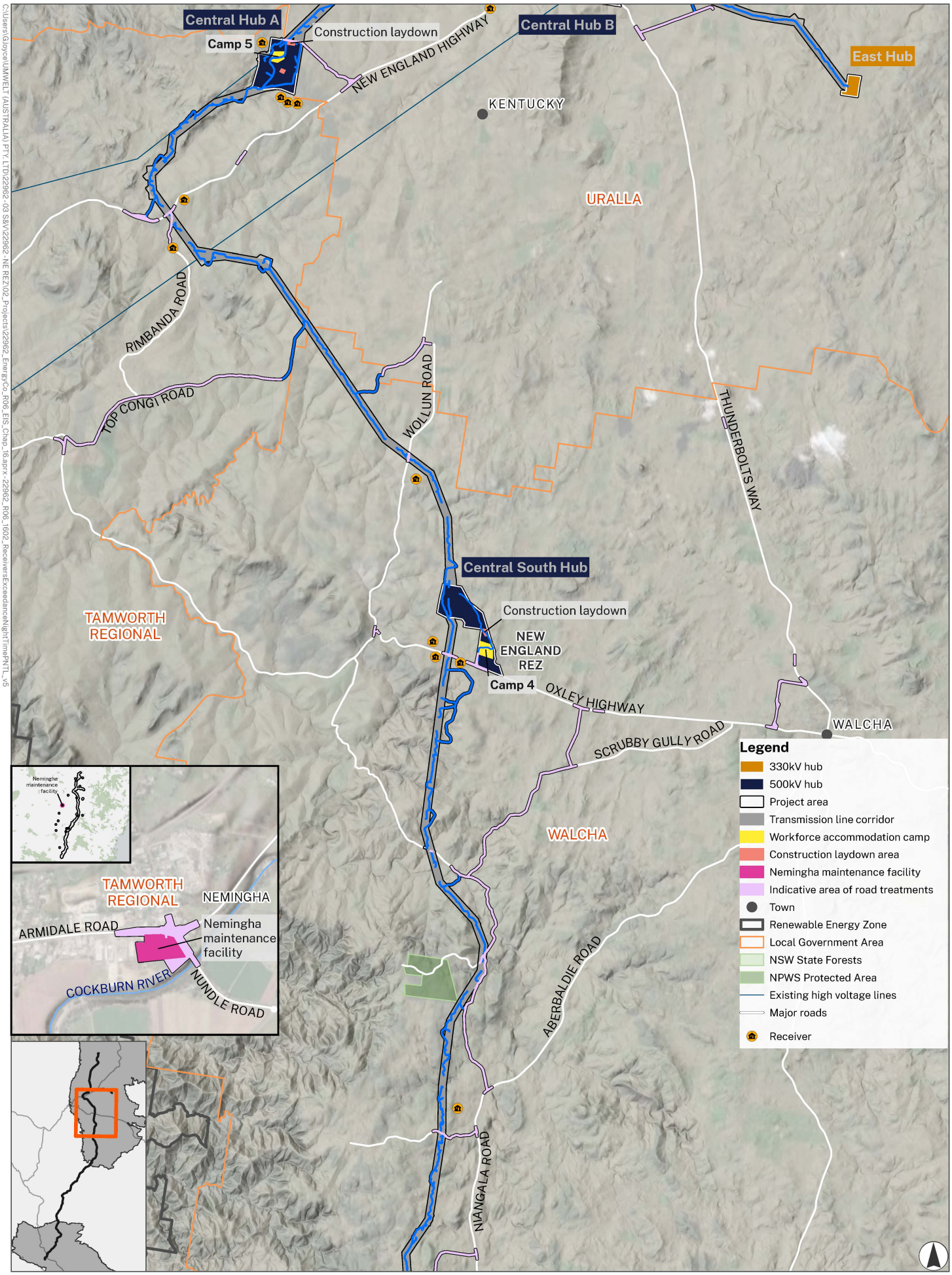


FIGURE 16.2b Receivers with exceedance of the night-time PNTL during operation (Map 2 of 5)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

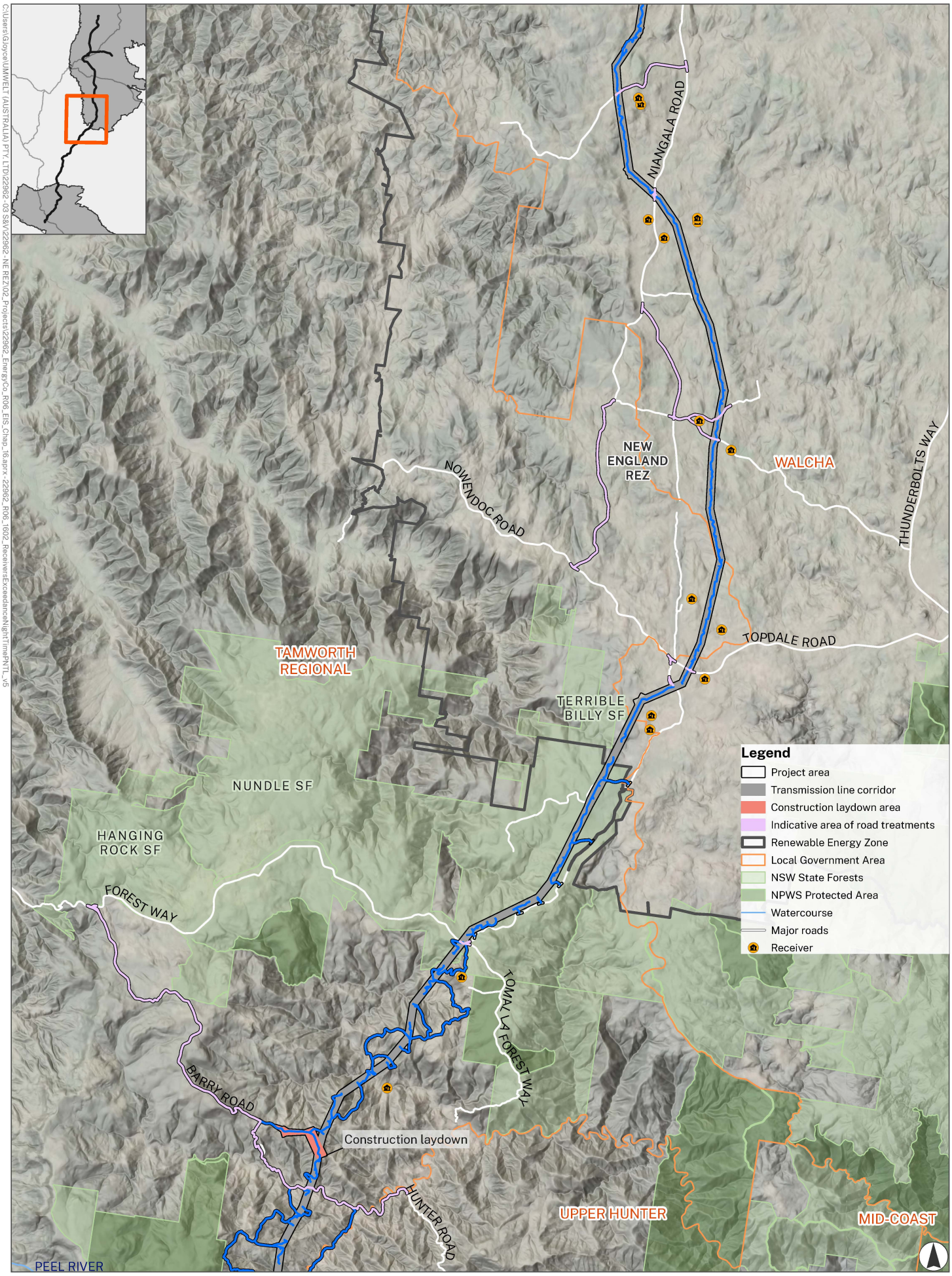


FIGURE 16.2c Receivers with exceedance of the night-time PNTL during operation (Map 3 of 5)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

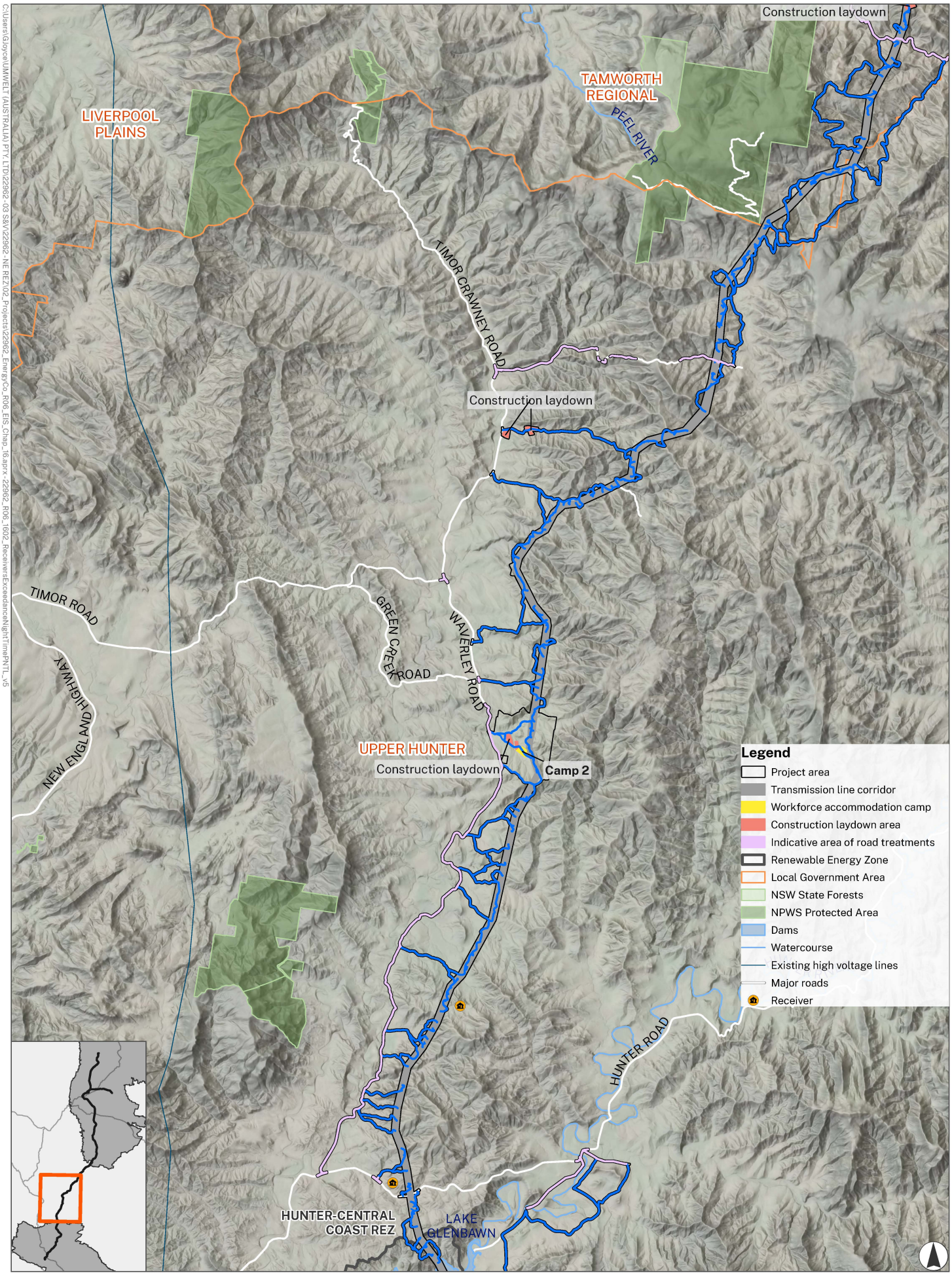


FIGURE 16.2d Receivers with exceedance of the night-time PNTL during operation (Map 4 of 5)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

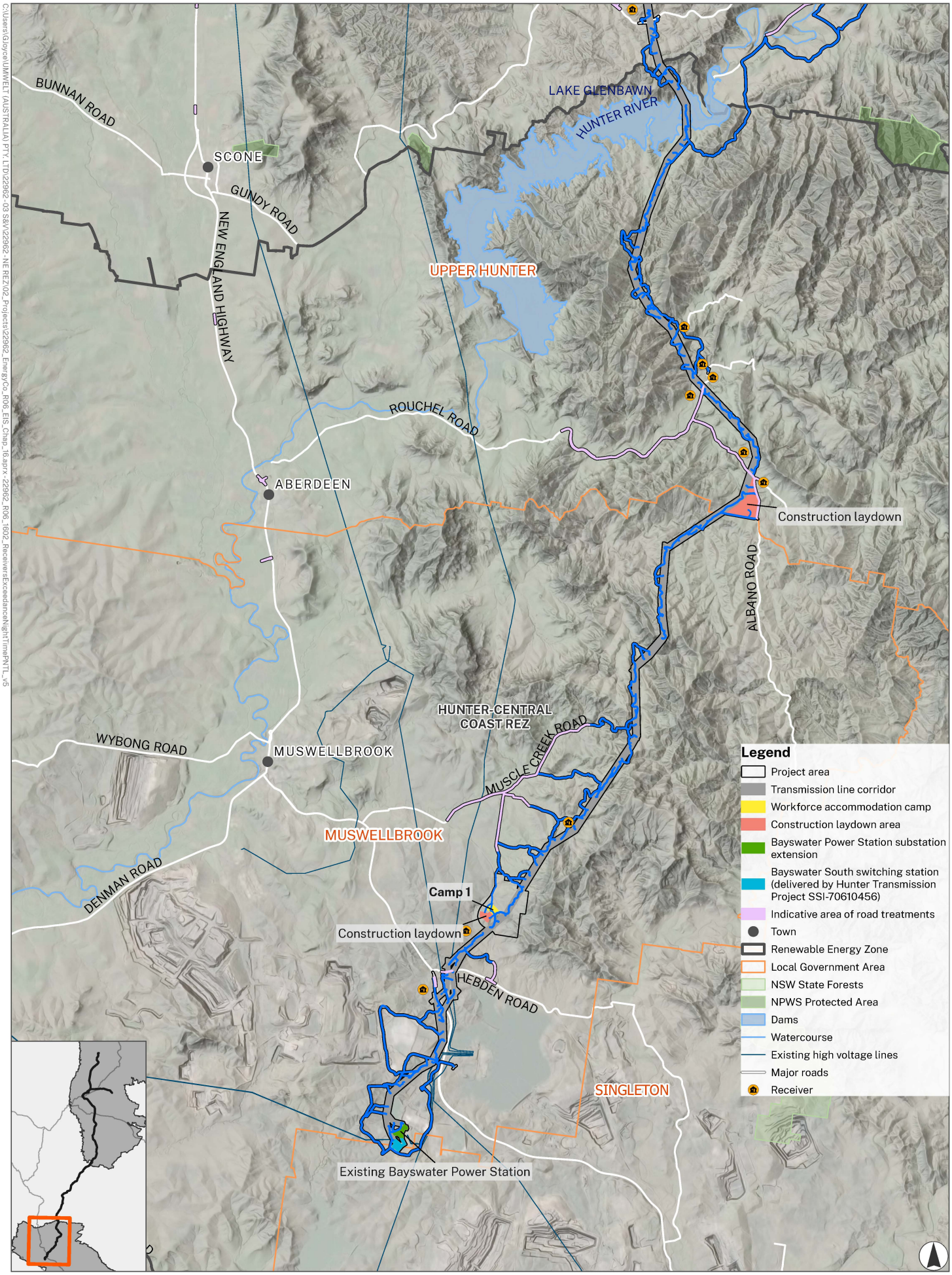


FIGURE 16.2e Receivers with exceedance of the night-time PNTL during operation (Map 5 of 5)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

The assessment identifies that during light rain or mist conditions, representing the worst-case condition for audible noise impacts, 48 residential receivers closest to the project area are predicted to experience noise levels exceeding the most stringent night-time PNTL. No other noise sensitive receivers are predicted to have transmission line noise levels above the PNTLs. As the transmission lines (and hence the noise source) would be significantly elevated above the ground, mitigation options are limited to reduce noise levels at potentially impacted receivers.

The NPfI categorises residual noise impacts where noise from a development remains above the PNTLs after consideration of feasible and reasonable mitigation. In accordance with the NPfI, the residual operational noise impacts during worst-case light rain or mist conditions are:

- considered ‘significant’ at 10 residential receivers
- considered ‘moderate’ at 15 residential receivers
- considered 'negligible’ at 23 residential receivers.

It should be noted that this assessment is based on the horizontal distance between the project area and sensitive receivers and does not consider intervening terrain and sound propagation factors that are expected to reduce the noise levels. Further to this, distances have been calculated from the edge of the 250 metre project area, whereas distances from the edge of the final easements (140 metres for dual 500 kV lines, 70 metres for the single 500 kV line and 120 metres for the dual 330 kV lines) would be greater (that is,. at least 30–35 metres inside the project area). Hence the significance of the impacts should be regarded as indicative and is expected to be reduced when further detailed design of the project is undertaken.

16.4.2 Energy hubs

In operation there are no predicted exceedances of the PNTLs during the most stringent night-time period under noise enhancing meteorological conditions for Central Hub B, Central South Hub, East Hub and Bayswater Power Station substation extension. Central Hub A and North Hub have predicted exceedances of 1 dBA and 2 dBA respectively at one receiver location each under the most stringent night-time period and noise enhancing weather conditions scenario.

L_{Amax} noise levels from the energy hubs and Bayswater Power Station substation extension are predicted to be below 52 dBA at all receivers.

To reduce noise levels at the potentially impacted receivers, indicative 4 metre high noise barriers were incorporated into the noise model adjacent to the transformers at Central Hub A and the harmonic filters at North Hub. In this scenario, operational noise from both energy hubs was predicted to be below the PNTLs at all residential receivers during the most stringent night-time period under enhancing meteorological conditions. It is expected that noise from energy hubs could be mitigated through refinements during further detailed design including layout and positioning, the selection of equipment with lower sound power levels and/or increased barrier length and height. It is also noted that the modelled sound power levels represent the maximum potential levels for all equipment and would be reviewed as further detailed design is finalised.

16.4.3 Nemingha maintenance facility

The number of receivers surrounding the Nemingha maintenance facility with potential exceedances of the PNTL during the day, evening and night periods under noise enhancing meteorological conditions is provided in Table 16.22.

Table 16.21. Maintenance facility operational noise assessment

Project component	Period	Number of receivers with daytime exceedance of PNTL - ≤2 dB	Number of receivers with daytime exceedance of PNTL - ≥3 but ≤5 dB	Number of receivers with daytime exceedance of PNTL - >5 dB
Nemingha maintenance facility	Day	1	0	0
Nemingha maintenance facility	Evening	0	0	0
Nemingha maintenance facility	Night	0	0	0

The above assessment shows that one residential receiver closest to maintenance facility is predicted to exceed the PNTLs during daytime operation by up to 1 dB. It is expected that this exceedance could be mitigated through common refinements during further detailed design including layout and positioning, and inclusion of noise barriers where reasonable and feasible.

16.4.4 Operational maintenance and traffic

As described in Section 16.1.2, the energy hubs and transmission lines would be inspected on a regular basis with maintenance of these components occurring as and when required. This would involve small crews and few vehicles with potential noise impacts from operational maintenance not considered likely to be significant.

16.5 Cumulative impacts

The potential cumulative impacts of the project have been identified based on the scale and potential impacts of the project, in combination with the potential impacts of relevant identified future projects and broader developments supporting the New England REZ. A list of these relevant projects, including their descriptions and interfaces with the project, is provided in Section 24. The assessment approach to cumulative impacts and key findings are also outlined in Section 24.

The assessment concluded that if project-related construction works coincide with the construction of the Bowmans Creek Wind Farm and the Thunderbolt Wind Farm in the vicinity of sensitive receivers, then cumulative noise impacts would have the potential to occur and would require mitigation. Should this overlap in timing occur, additional consideration of reasonable and feasible mitigation measures would be undertaken, noting some landholders are subject to private agreements associated with noise impacts from these other projects.

Further details regarding cumulative impacts are detailed in the NVIA (refer to Technical Report 9), with the key findings summarised in Section 24.

16.6 Mitigation and management

A Noise, Vibration and Blast Management Plan (NVBMP) would be prepared to provide the framework and mechanisms for the management and mitigation of all potential noise and vibration construction impacts from the project. The NVBMP will include:

- confirmation of nearby sensitive receivers
- confirmation of work, construction equipment and hours of work would be completed and quantify resulting impacts at sensitive receivers.
- applicable noise and vibration criteria for the project
- procedures and mitigation measures for potential impacts during out-of-hours work
- requirements for noise and vibration monitoring
- details of how community consultation in relation to noise and vibration would be completed
- procedures for handling complaints
- details on how respite would be applied where ongoing high impacts are expected at certain receivers.

Mitigation and management measures proposed to avoid or minimise noise and vibration impacts during construction and operation of the project are listed in Table 16.23.

Table 16.22. Proposed mitigation and management measures – noise and vibration

Reference	Impact	Mitigation measure	Timing	Relevant location (s)
NV1	Prolonged construction noise impact from fixed work areas	Noise path control, such as hoarding or earth bunds, will be investigated and implemented where practicable and required. Positioning of site structures will be considered to act as barriers between noisy work and receivers where practical.	Detailed design Construction	Construction ancillary sites workforce accommodation camps and energy hubs where receivers are predicted to be noise affected and near fixed work areas with long work durations
NV2	Out of hours construction works	An out of hours (OOH) work protocol that details how the project will identify, assess and approve out of hours work outside standard construction hours will be developed and implemented. The protocol will include provisions to: • carry out additional assessments for work proposed outside standard construction hours, to confirm noise levels at potentially affected sensitive receivers and determine suitable mitigation measures to minimise noise levels • notify and engage with potentially noise affected receivers about upcoming work outside standard construction hours and address any associated complaints • identify appropriate respite for noise affected receivers (where required).	Detailed design Construction	Stringing locations across main roads and railways Other works that may need to be conducted out of standard construction hours
NV3	Construction noise impacts	Where construction is likely to result in exceedances of NMLs at sensitive receivers, mitigation and management measures will be implemented where practicable and appropriate. This will include (but is not limited to) the following measures: • select quieter plant and equipment and use alternative construction methods to minimise noise levels	Construction	All locations

Reference	Impact	Mitigation measure	Timing	Relevant location (s)
		• plan and schedule concurrent noisy activities to minimise the number of items of noisy plant operating at one time and cumulative noise levels • install screens or use barriers to mitigate noise from stationary noise sources • maximise the offset distance between noisy plant and sensitive receivers • orient noisy plant and equipment away from sensitive receivers • use noise source controls, such as residential class mufflers, to reduce noise from all regularly used plant including cranes, excavators and trucks • use non-tonal reversing alarms in place of traditional beeper reversing alarms during OOH where noise impacts are predicted • turn off machinery when not in use • confirm equipment is maintained in accordance with manufacture's requirements to minimise generation of excessive noise • operate machinery in a manner which reduces occurrence of maximum noise level events, such as excavator bucket impacts, material drop heights, steel on steel impacts and dragging materials across hard surfaces • provide awareness training regarding noise mitigation measures to be implemented as part of regular toolbox meetings • notify and consult with potentially noise affected receivers about upcoming noisy activities • confirm that noise affected receivers outside standard construction hours and highly noise affected sensitive receivers are managed with consideration to the CNVG additional mitigation measures such as notifications, verification, and respite where appropriate.		

Reference	Impact	Mitigation measure	Timing	Relevant location (s)
NV4	Construction noise validation	Monitoring will be carried out at representative locations during noise intensive activities that have the potential to cause noise exceedances at sensitive receivers, to confirm that actual levels are consistent with the predictions and that appropriate mitigation measures have been implemented.	Construction	All locations
NV5	Noise levels from construction traffic	All construction vehicle movements will adhere to the following measures: • out-of-hours vehicle movements will be minimised where practicable • construction delivery vehicles will be fitted with straps rather than chains for unloading, wherever possible • use of engine compression brakes will be avoided at night and in residential areas • site access points and access tracks will be located as far as practical away from sensitive receivers • traffic flow, parking and loading/unloading areas will be planned to minimise reversing movements • construction inductions will include driver behaviour requirements to minimise vehicle noise emissions.	Construction	Public roads and access tracks used for the project
NV6	Vibration	Where vibration intensive work is required within the recommended minimum working distances and is considered likely to exceed the cosmetic damage criteria: • different construction methods with lower source vibration levels will be investigated and implemented, where feasible • confirm any vibration-sensitive heritage structures that could potentially be impacted by the proposed works including confirming the structural integrity of the structure and applying appropriate vibration criteria	Construction	All locations

Reference	Impact	Mitigation measure	Timing	Relevant location (s)
		• vibration monitoring will be undertaken at the start of work to determine actual vibration levels at the receiver • work will be ceased if the monitoring indicates vibration levels are likely to, or do, exceed the relevant criteria • potential direct and indirect impacts to all identified Aboriginal objects and sites of high significance in the vicinity of vibration intensive work will be reviewed and subject to avoidance and mitigation measures described in the Aboriginal Cultural Heritage Management Plan.		
NV7	Blasting	If blasting is required, a Blast Management Plan will be developed to minimise the potential for impacts. Maximum Instantaneous Charge (MIC) calculations will be undertaken for specific sites where blasting is required. Individual blast designs will be based on meeting the relevant criteria. All blasts, including initial trial blasts will be monitored to obtain data which can be used to confirm site constants and compliance with blasting criteria. Landholder notification and consultation requirements will be identified in the Blast Management Plan.	Construction	All locations
NV8	Construction aircraft noise	Management measures will be implemented to minimise aircraft noise at sensitive receivers where practicable and appropriate, including: • notifying nearby sensitive receivers of upcoming work involving aircraft. This will include use of helicopter landing pads within construction ancillary sites, flight paths outside of the project impact area and stringing or other work within the transmission line easement. Notification will include scheduled dates, locations, indicative hours and a description of the proposed work.	Construction	Transmission line easement, helicopter landing pads at construction ancillary sites and established flight paths

Reference	Impact	Mitigation measure	Timing	Relevant location (s)
		• prioritising use of helicopter landing pad locations at the construction ancillary sites with the maximum distance offset from sensitive receivers • varying flight paths between helicopter landing pads and the transmission line easement to avoid repeated helicopter noise at sensitive receivers. • operating aircraft in accordance with Airservices Australia Environmental Principles and Procedures for Minimising the Impact of Aircraft Noise (2002) and the Helicopter Association International (HAI) Fly Neighbourly Guide.		
NV9	Operational transmission line noise	Operational transmission line noise impacts will be reviewed during detailed design, once the transmission line placement, conductor arrangement and any property acquisitions are known. For each residence where potential operational noise levels are predicted to exceed the PNTL, noise monitoring to confirm actual operational noise levels will be carried out at representative locations following commencement of project operation. The noise monitoring will occur during representative L50 (median occurrence) weather/atmospheric conditions conducive to generating noise from corona discharge. For residences where the monitoring identifies corona discharge levels above PNTLs, consultation will be undertaken with the landholder of the affected residence to identify reasonable and feasible mitigation measures. Once the appropriate measures have been agreed with the landholder, these will be implemented as soon as reasonably practical.	Operation	Transmission line easement

Reference	Impact	Mitigation measure	Timing	Relevant location (s)
NV10	Operational energy hub noise	Operational noise impacts from the energy hubs will be reviewed during detailed design. The design will consider the following measures with a view to minimising noise impacts: • selection of equipment with consideration of operating sound power levels where feasible • incorporation of transformer, synchronous condenser, harmonic filters and reactor barriers where reasonable and feasible.	Detailed design Operation	Energy hubs
NV11	Operational maintenance facility noise	Operational noise impacts from the maintenance facility will be reviewed during detailed design. The design will consider the following measures with a view to minimising noise impacts: • maximise the offset distance between noisy plant and sensitive receivers by unloading/loading equipment and performing maintenance works away from sensitive receivers • positioning of site structures such as offices, will be considered to act as barriers between noisy work areas and receivers where practical • noisy activities would be conducted within enclosed workshop areas where reasonable and feasible • installation of noise barriers where reasonable and feasible.	Detailed design Operation	Nemingha maintenance facility
NV12	Vibration impacts associated with Sargeants Gap Road construction works in the vicinity of Timor Caves	EnergyCo will seek geotechnical and vibration advice to inform the construction vibration limits to be applied to works on Sargeants Gap Road to avoid vibration impacts to Timor Caves. Construction works will be designed to not exceed these vibration limits (as per the approach in NV6).	Construction	Sargeants Gap Road construction works in the vicinity of Timor Caves

Hazards and risks



Section 17

New England REZ Network Infrastructure Project

17 Hazards and risks

This section discusses the assessment of potential hazards and risks relevant to the project. The section includes discussion of the preliminary risk screening undertaken to identify risks that may require further assessment, along with discussion of key risk focus areas including interactions with aviation, bushfire, electric and magnetic fields and telecommunications. The section also identifies mitigation measures to be implemented to avoid, minimise and manage these impacts, where practicable. This section is informed by the following assessments:

- Preliminary Risk Screening prepared by Aurecon – Technical Report 10, and summarised in Section 17.1
- Aviation Impact Assessment prepared by Aviation Projects – Technical Report 11 and summarised in Section 17.2, including impacts to aerial firefighting
- Bushfire Risk Assessment prepared by GHD – Technical Report 12, and summarised in Section 17.3
- Electric and Magnetic Field Study (including telecommunications) prepared by Aurecon – Technical Report 13, and summarised in Section 17.4 and Section 17.5 respectively.

17.1 Preliminary risk screening

This section provides a summary of the preliminary risk screening undertaken for the project and with reference to the SEARs, provided in full in Technical Report 10. The purpose of the preliminary risk screening was to determine if the project should be considered 'potentially hazardous' or 'potentially offensive' as defined in the Resilience and Hazards SEPP.

17.1.1 Assessment approach

The risk screening process was undertaken following *Applying SEPP 33 — Hazardous and Offensive Development Application Guidelines* (NSW Department of Planning, 2011) (the Hazardous and Offensive Development Guideline). The key steps in the application of the Hazardous and Offensive Development Guideline included:

- identification of the type and quantities of dangerous goods and hazardous materials to be stored on-site for the project (including raw materials, intermediates, and products)
- review of the transportation schedule for delivery of dangerous goods and otherwise hazardous materials to the project (including quantities)
- review of the project area with consideration of the distance to property boundaries and sensitive receiver locations
- consideration of potential for the project to emit a polluting discharge which, in the absence of safeguards, would cause a significant level of offence.

The preliminary risk screening assessed the entire project area, with a focus on the energy hubs, Bayswater Power Station substation extension and Nemingha maintenance facility locations where hazardous materials may be stored during project operation. While the screening process in the Hazardous and Offensive Development Guideline applies to the operation of the project only, consideration was also given to the storage and handling of hazardous materials during construction. To address the SEARs, an additional assessment of potential impacts to an approved but not yet constructed high-pressure gas pipelines and associated risks to public safety was also undertaken.

17.1.2 Potential impacts – construction

As for any construction project, various hazardous materials and dangerous goods would be used and/or stored within the project area during the construction phase. Based on the project's likely construction methods and activities, the following would be stored and/or used during construction:

- fuels (petrol and diesel), oils, lubricants and hydraulic fluids for use in equipment (flammable and combustible liquids)
- various corrosive substances, including cleaning agents
- oxyacetylene gas for welding (flammable gas and oxidising substance)
- flammable liquids, such as adhesives, glues, epoxies etc.
- pesticides and herbicides (toxic substances)
- explosives for blasting.

During construction the storage and handling of hazardous chemicals/dangerous goods would be appropriately managed to avoid risks associated with these materials. These risks can be controlled through the application of standard management controls that are well tested and understood and that have been shown to be effective. The management measures to be implemented during the construction phase of the project are listed in Table 17.1.

All hazardous chemicals would be stored and handled in line with the SafeWork NSW Code of Practice: Managing risks of hazardous chemicals in the workplace, Part 7.1 of the NSW Work Health and Safety Regulation 2025, and the relevant Australian Standards. Further detail on the management of hazardous and contaminated waste during construction is provided in Section 22 and Section 23, including appropriate methods of disposal.

Transportation of dangerous goods to and from the project area would be undertaken in accordance with the *Dangerous Goods (Road and Rail Transport) Act 2008*, the Dangerous Goods (Road and Rail Transport) Regulation 2022 and the Australian Dangerous Goods Code.

Explosives would not be stored in the project area during construction and would be transported to the project area in minor quantities for immediate use. All explosives and/or explosive precursors would be handled in accordance with the requirements of the NSW *Explosives Act 2003* and the NSW Explosives Regulation 2024, and in compliance with the associated codes and standards.

The assessment of potential construction interactions between the project and the approved but not yet constructed Queensland Hunter Gas Pipeline project, concluded that, with the implementation of additional mitigation measures (refer to Section 17.1.5), the project would not result in a material impact to the pipeline or a material risk to public safety.

17.1.3 Potential impacts – operation

In operation, dangerous goods may be stored at the energy hubs, Bayswater Power Station substation extension, and the Nemingha maintenance facility. The types of dangerous goods to be stored includes:

- flammable gases (acetylene gas, LPG)
- non-flammable gases, non-toxic gases, sub-risk oxidising agents
- flammable liquids (petrol, various solvents)
- pesticides and herbicides (toxic substances)
- corrosive substances (nickel cadmium / lead acid batteries, cleaning chemicals).

Certain classes of dangerous goods, such as combustible liquids (for example diesel) would also likely be stored in operation, however, these are not subject to the screening requirements of the Hazardous and Offensive Development Guideline.

The exact nature and quantities of dangerous goods to be stored at the hubs, Bayswater Power Station substation extension and the Nemingha maintenance facility during operation of the project would be further developed as part of detailed design. Therefore, for assessment purposes conservative estimates were used in applying the Hazardous and Offensive Development Guideline screening thresholds.

The proposed storage quantities for operations of all dangerous goods classes would be below the screening thresholds (refer to Table 5.1 in Technical Report 10) and therefore the project is not considered to be potentially hazardous. The transport of dangerous goods to the project area during operation was also determined to be below the screening thresholds in the Hazardous and Offensive Development Guideline and is therefore not considered potentially hazardous. As the project is not considered potentially hazardous, a preliminary hazard analysis is not required for the EIS.

Whilst the project is not considered a potentially hazardous development, appropriate controls for the storage and handling of dangerous goods are important to minimise risk and are proposed as part of the project. The storage and handling of dangerous goods during operation would be managed via the measures listed in Table 17.1.

As defined in the Hazardous and Offensive Development Guideline, a project may be considered 'potentially offensive' if *"in the absence of safeguards, the proposal would emit a polluting discharge which would cause a significant level of offense"*. This includes consideration of air and water pollution, odour, and noise. A project may be considered 'potentially offensive' if the project requires a licence under any pollution control legislation, such as an EPL.

It has been assessed that the project may require an EPL during the construction phase. In operation, without the implementation of appropriate mitigation and management measures as proposed by EnergyCo, there could be the potential for a discharge to cause offense (for example, generation of noise or spill of a hazardous chemical). For these reasons, the project would be considered 'potentially offensive' as defined in the Hazardous and Offensive Development Guideline.

To ensure that appropriate mitigation and management measures are identified and implemented to manage these potential impacts to an acceptable level, a range of technical assessments have been prepared for the project as part of this EIS and the necessary controls identified. These technical reports are summarised in Section 7 to Section 23 of this EIS and presented in full in the technical reports.

During operation, transmission infrastructure has the potential to interact with the Queensland Hunter Gas Pipeline, including electromagnetic and electrical interference effects associated with transmission lines. Potential impacts were assessed in Technical Report 10 and Technical Report 13, with the key findings summarised as part of the cumulative impact assessment in Section 24. Consistent with these findings, an updated risk assessment will be completed for the gas pipeline as part of the detailed design process. The final design will include mitigation measures as required to mitigate any identified hazards (refer to Table 17.1).

17.1.4 Cumulative impacts

The potential cumulative impacts of the project have been identified based on the scale and potential impacts of the project, in combination with the potential impacts of relevant identified future projects and broader developments supporting the New England REZ. A list of these relevant projects, including their descriptions and interfaces with the project, is provided in Section 24 along with a summary of key findings of the cumulative impact assessment for the storage and handling of hazardous chemicals.

The cumulative assessment concluded that no impacts from hazardous chemicals storage are anticipated due to adequate separation of the project areas where hazardous chemicals are stored. Potential cumulative impacts from the concurrent use of explosives for blasting may occur if construction of the Thunderbolt Wind Farm overlaps with the construction of the project and both require blasting in that area. These impacts would be mitigated through construction planning, engagement with the Thunderbolt Wind Farm (if there is concurrent construction) and through compliance with relevant blasting limits.

17.1.5 Management and mitigation measures

The management and mitigation measures relevant to the storage and transport of dangerous goods during construction and operation of the project are outlined in Table 17.1.

Table 17.1. Management and mitigation measures – preliminary risk screening

Reference	Impact	Mitigation	Timing	Relevant location (s)
HR1	Storage and use of dangerous goods	All hazardous chemicals will be stored and handled in line with the NSW Code of Practice: Managing risks of hazardous chemicals in the workplace, Part 7.1 of the NSW Work Health and Safety Regulation 2025, and the relevant Australian Standards, including but not limited to: • AS 1940:2017 The storage and handling of flammable and combustible liquids • AS 3780:2023 The storage and handling of corrosive substances • AS 4332-2004 The storage and handling of gases in cylinders • AS 4452:2025 The storage and handling of toxic substances • AS/NZS 4681:2000 The storage and handling of Class 9 (miscellaneous) dangerous goods and articles • AS/NZS 3833:2024 The storage and handling of mixed classes of dangerous goods • AS 2067:2016 Substations and high voltage installations exceeding 1 kV alternating current If required by the NSW WHS Regulation 2025, an Emergency Plan (EP) will be developed for the construction and operation phases. All personnel required to handle hazardous chemicals will be appropriately trained in their safe use and handling.	Construction Operation	All locations
HR2	Transport of dangerous goods	The transport of all dangerous goods to and from the project area will comply with the requirements of the *Dangerous Goods (Road and Rail Transport) Act 2008*, the Dangerous Goods (Road and Rail Transport) Regulation 2022 and the Australian Dangerous Goods Code.	Construction Operation	All locations

Reference	Impact	Mitigation	Timing	Relevant location (s)
HR3	Storage, handling and use of explosives	• Explosives will not be stored within the project area. Explosives and/or explosive precursors will be transported to each blast locations for immediate use and handled only by appropriately licenced persons. All explosives and/or explosive precursors will be handled in accordance with the requirements of the NSW *Explosives Act 2003* and the NSW Explosives Regulation 2024. For use of explosive for blasting, this specifically includes: • obtaining a 'blasting explosive user licence' • lodgement of a 'notification of blasting activity' form with SafeWork NSW at least 7 days before blasting works commence • compliance with the following codes and standards: – AS 2187 series of standards - Explosives storage, transport and use – The Australian Code for the Transport of Explosives by Road and Rail – AS 4326-2008 The storage and handling of oxidising agents (if relevant).	Construction	All locations
HR4	Construction impacts on the Queensland Hunter Gas Pipeline Project	• Prior to undertaking excavation or other ground-disturbing works in proximity to the Queensland Hunter Gas Pipeline Project pipeline easement, the project will implement the Dial Before You Dig process, confirm the pipeline location, and consult with the pipeline operator. • Where works are required near the pipeline, appropriate exclusion zones, permit-to-work requirements, supervision, and non-destructive digging or potholing will be implemented to avoid damage to the buried pipeline. • Construction vibration impacts will be managed in accordance with the Noise, Vibration, and Blast Management Plan (NVBMP).	Construction Operation	Area of intersection between the project and the Queensland Hunter Gas Pipeline Project

Reference	Impact	Mitigation	Timing	Relevant location (s)
		• Blasting is not currently anticipated in the area of the Queensland Hunter Gas Pipeline Project interface. If blasting is required, this will be addressed in the NVBMP to minimise the potential for impacts. • Ongoing consultation with Queensland Hunter Gas Pipeline Project will be required to allow consideration of the impacts of any interactions between the 2 projects due to potential overlapping construction periods.		
HR5	Operation of transmission lines near Queensland Hunter Gas Pipeline Project	An updated risk assessment will be completed for the gas pipeline as part of the detailed design process in accordance with AS 4853 – Electrical Hazards on Metallic Gas Pipelines. The final design will include mitigation measures as required to mitigate any identified hazards.	Detailed design	Area of intersection between the project and the Queensland Hunter Gas Pipeline Project

17.2 Aviation

This section provides a summary of the detailed aviation assessment undertaken for the project and identifies mitigation and management measures to be implemented to minimise and manage these risks. This section includes information from the Aviation Impact Assessment (AIA) undertaken by Aviation Projects to assess potential impacts to aviation, including both certified and uncertified aerodromes, aerial firefighting and aerial agricultural activities, provided in full in Technical Report 11.

17.2.1 Assessment approach

The AIA has been prepared with reference to relevant legislation and guidelines as they apply to aviation. Regulations and standards administered by the Civil Aviation Safety Authority (CASA), Airservices Australia, International Civil Aviation Organization and National Airports Safeguarding Advisory Group have been considered.

The assessment was also prepared with reference to the SEARs as detailed in Appendix A.

This section considers issues raised in engagement relating to aviation (refer to Section 5) including potential impacts to aerial firefighting ability, transmission line alignment in proximity to key dams that are used as water sources during firefighting activities and potential impacts to landholder airstrips and the ability to continue with aerial application processes for agricultural purposes.

EnergyCo has undertaken a staged and targeted program of consultation with the NSW RFS, aerial firefighting operators and relevant government agencies, including CASA, Airservices Australia, Commonwealth Department of Defence and NPWS, to understand and manage potential interactions with aviation activities including for bushfire response. In parallel, EnergyCo has sought to engage with local NSW RFS brigades and Fire Control Centres, as well as individual landholders and Bendemeer Community Group to ensure local knowledge and operational experience is captured. Consultation has occurred with some local representatives, however, it is recognised that these brigades are volunteer based and regionally distributed. EnergyCo will continue engaging with NSW RFS and Fire Control Centres as the project progresses.

To gain further knowledge on local airfields (uncertified aerodromes), EnergyCo also engaged a local aerial operator to provide local knowledge that was used to inform the assessment of uncertified aerodromes in the project area and enable an understanding of feasible and reasonable mitigation measures.

The key tasks undertaken for the AIA involved:

- review of the project and establishment of the appropriate aviation compliance framework
- preparation of an Aviation Impact Assessment, including:
  - identification and assessment of the Obstacle Limitation Surface (OLS) and Procedures for Air Navigation Services - Aircraft Operations (PANS-OPS) surfaces at certified aerodromes within 30 nautical miles (55.56 kilometres) of the project
  - review of the potential effect of the project in relation to the operational airspace of aerodromes within 30 nautical miles (55.56 kilometres) of the project

  - assessing the likely impacts of the project on aeronautical navigation facilities and air routes
  - identifying relevant civil aviation safety requirements and standards with respect to existing aerodrome conditions
- identification of uncertified aerodromes within 10 kilometres of the project
- assessment of low-level flight operations including agricultural spraying operations, aerial baiting and culling, and aerial firefighting within and surrounding the project area
- consultation with key aviation stakeholders (as discussed above and in Section 5)
- provision of recommendations to avoid or minimise identified impacts and ensure aviation safety is maintained throughout construction and operation of the project.

The AIA was independently peer reviewed by T070. The review considered the adequacy of the assessment and compliance with relevant guidelines and made recommendations. The assessment was updated to address the recommendations by T070, which concluded that the AIA provides a comprehensive assessment the key aviation matters relevant to the project, including appropriate consideration of certified aerodromes, uncertified aerodromes, and aircraft landing areas, published air routes, minimum safe altitudes, aerial application operations, aerial firefighting operations, aviation facilities and broader aviation safety considerations. The peer review is provided as an appendix to Technical Report 11.

17.2.2 Existing environment

Certified aerodromes are aerodromes certified by CASA under the Civil Aviation Safety Regulations 1998. Part 139 of the Civil Aviation Safety Regulations 1998 sets out requirements for certified aerodromes including standards for facilities, obstacle control, operational procedures and safety management.

There are 3 certified aerodromes located within 30 nautical miles (55.6 kilometres) of the project. These are:

- Scone Aerodrome (YSCO) – approximately 11.6 nautical miles (21.6 kilometres) west of the project
- Tamworth Aerodrome (YSTW) – approximately 29.8 nautical miles (55 kilometres) west of the project
- Armidale Aerodrome (YARM) – approximately 8.9 nautical miles (16.5 kilometres) east of the project.

Uncertified aerodromes are defined by CASA as aerodromes not certified under the Civil Aviation Safety Regulations 1998. Uncertified aerodromes include private airstrips, aircraft landing areas, helicopter landing sites, and all other airstrips other than certified aerodromes. Uncertified aerodromes are not regulated by CASA and instead the suitability to land and operate an aircraft surrounding the aerodrome is the sole responsibility of the pilot.

In accordance with the SEARs, uncertified aerodromes within 10 kilometres of the transmission line were identified using published sources as well as consultation with landholders and local operators. Sixty-seven uncertified aerodromes were identified. The locations of the certified and uncertified aerodromes surrounding the project are included on Figure 17.1.

Aerial operations that may occur within and surrounding the project area include:

- agricultural aerial application operations, including activities such as fertiliser, pest and crop spraying
- aerial baiting in national parks and other estate managed by NPWS, typically using helicopters
- emergency services operations, including aerial firefighting and aeromedical services.

The project is located within Class G (uncontrolled) airspace and is not located in any prohibited, restricted or danger areas.

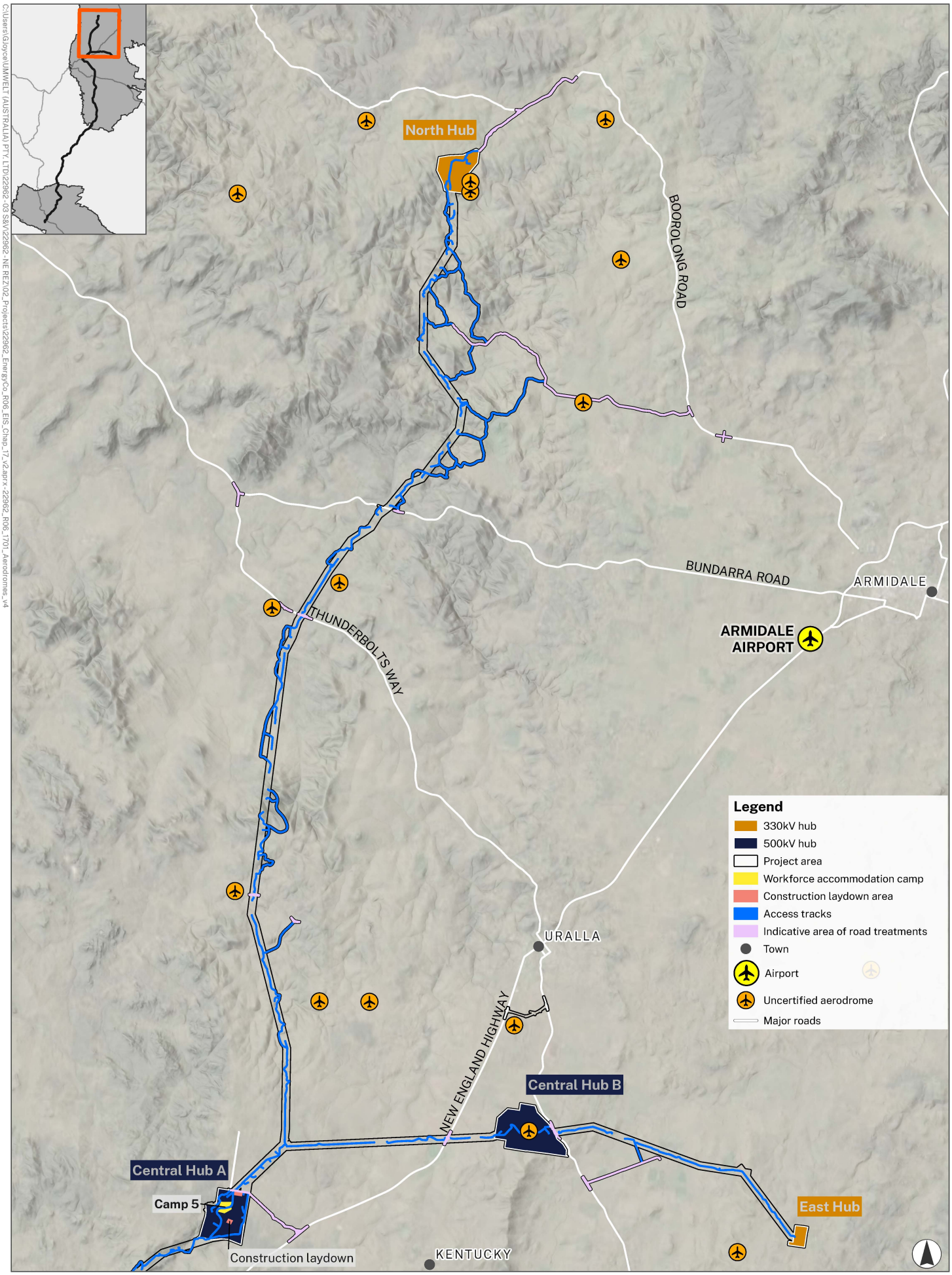


FIGURE 17.1a Aerodromes in proximity to the project (Map 1 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

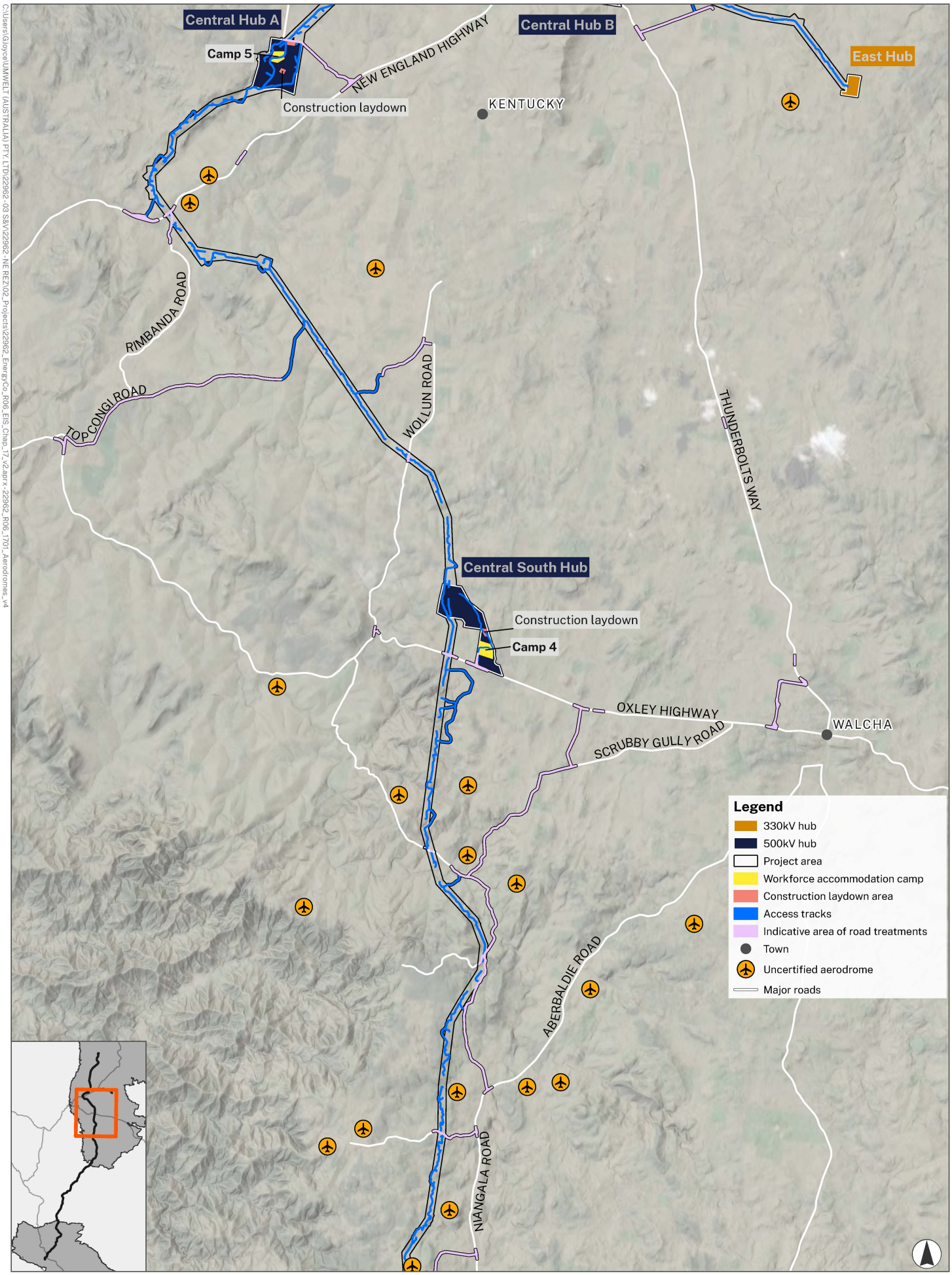


FIGURE 17.1b Aerodromes in proximity to the project (Map 2 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

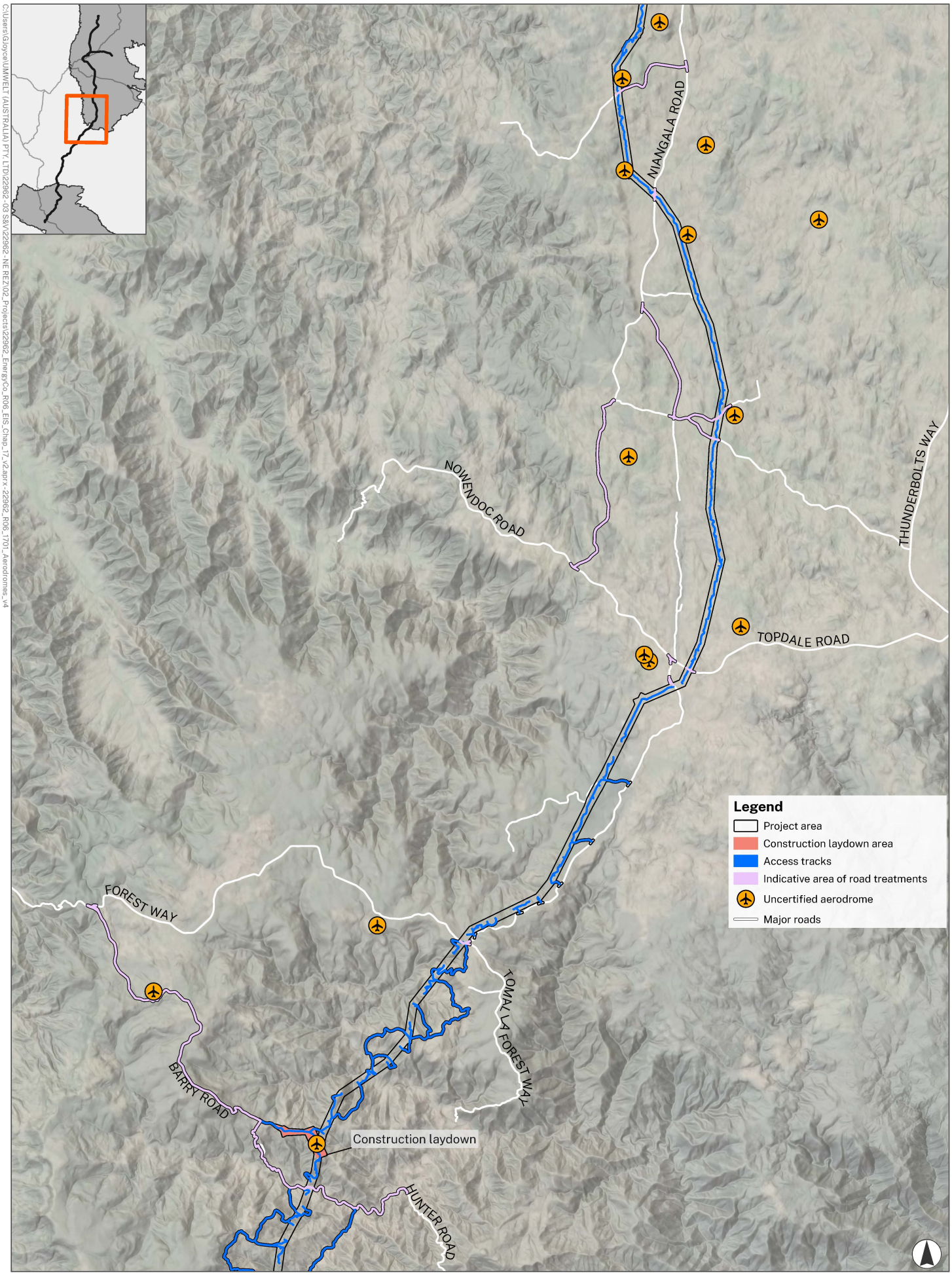


FIGURE 17.1c Aerodromes in proximity to the project (Map 3 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

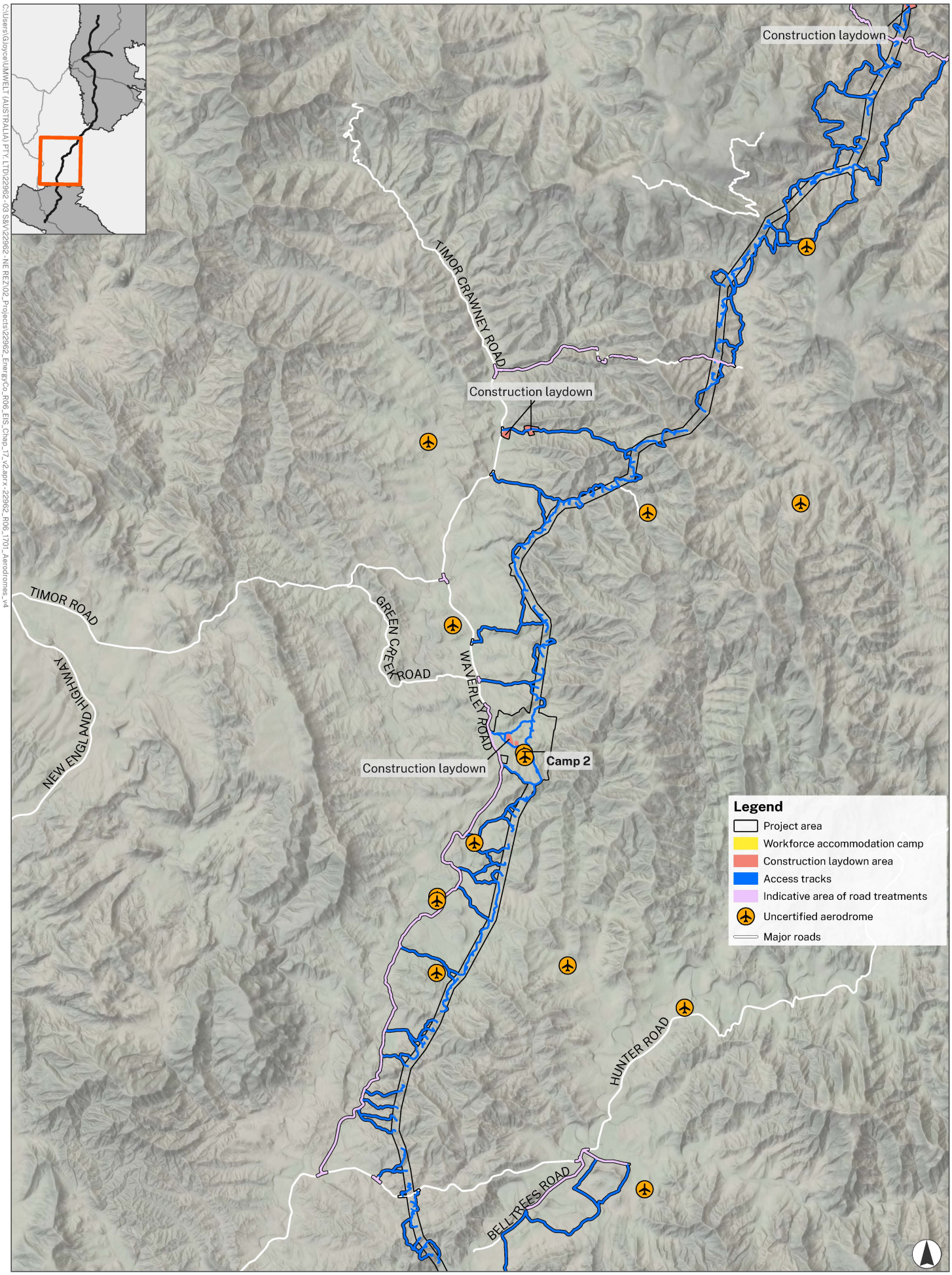


FIGURE 17.1d Aerodromes in proximity to the project (Map 4 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

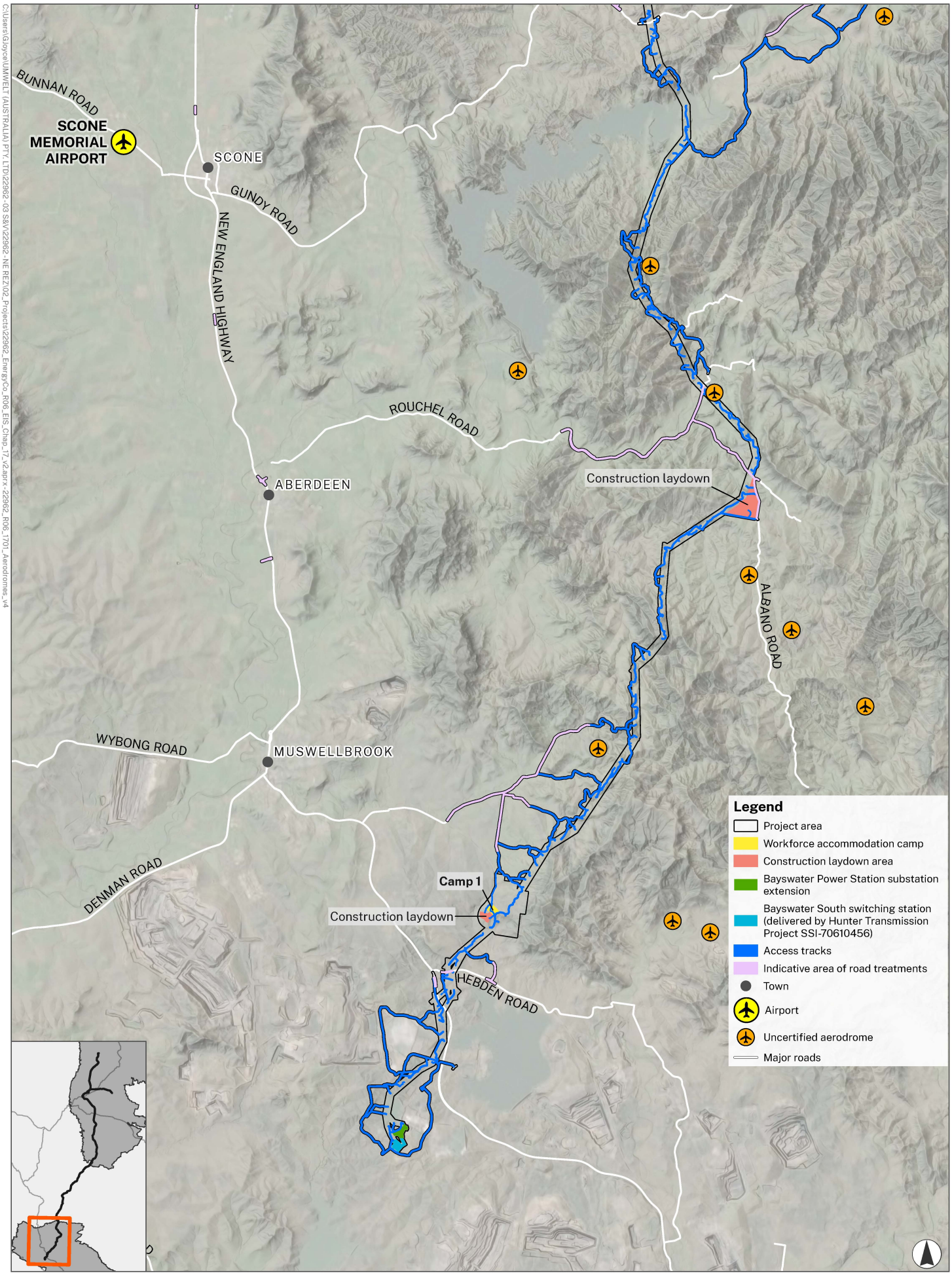


FIGURE 17.1e Aerodromes in proximity to the project (Map 5 of 5)

Scale 1:200,000 at A4
GDA2020 MGA Zone 56

0 4 8
Kilometres

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

17.2.3 Potential impacts - construction

The key risk to aviation safety during construction is associated with the process of constructing the transmission towers and the use of cranes. Transmission towers have been assessed at a maximum height of 80 metres above ground, with cranes required to a height of around 15 metres above this. The energy hubs may also require the use of cranes during construction.

The construction process would not infringe on the OLS or PANS-OPS of the certified aerodromes of Scone, Tamworth or Armidale due to the separation distance of these airports from the project area. Construction would not impact flight operations from the certified aerodromes conducted in accordance with the visual flight rules and instrument flight rules as prescribed in the Civil Aviation Safety Regulations 1998. The use of cranes during construction would not infringe on the protection surfaces or lowest safe altitudes (LSALTs) of air routes above the project area.

The construction process and the use of cranes may impact on some aerial operations in the vicinity of the project area, such as aerial application of fertilisers and pesticides and aerial baiting operations. The transmission towers and cranes would create additional obstacles which may increase risks to aerial operations if not managed by pilots operating in the vicinity of the project area. These risks would be minimised by the implementation of measures identified in Section 17.2.6 including notifying relevant stakeholders of construction of the project. Helicopters and drones may be used during construction for stringing of the transmission lines. These operations are considered to be normal aviation activities and would be undertaken in compliance with the Civil Aviation Safety Regulations applicable to the type of operation.

17.2.4 Potential impacts - operation

17.2.4.1 Certified aerodromes

The key operational risk of the project for certified aerodromes relates to potential infringement of the OLS and PANS-OPS. Due to the distance of the project from the 3 nearest certified aerodromes, there would be no impact to the OLS or PANS-OPS surfaces during operation for Scone, Tamworth and Armidale aerodromes.

17.2.4.2 Uncertified aerodromes

The potential for the project to impact on uncertified aerodromes depends on several factors including the distance and orientation of the airstrip relative to the project. The type of aircraft and flight maneuvers required at each location as well as local topography would also influence the potential for impact.

Generally, an area of interest within a 3 nautical mile (5.56 kilometre) radius of an uncertified aerodrome is used to assess potential impacts of a proposed development. In accordance with the SEARs, a 10-kilometre radius of the project was used to identify potentially impacted uncertified aerodromes. All identified uncertified aerodromes were assessed to determine the potential impact on operations from the proposed transmission lines. The level of impact and number of uncertified aerodromes affected is presented in Table 17.2.

Table 17.2. Potential impacts to uncertified aerodromes within 10 kilometres of the project

Level of impact	Impact description	Number of uncertified aerodromes impacted
Nil	The project is unlikely to have an impact upon flight operations as the uncertified aerodrome is far enough away from the transmission line or oriented, in relation to the transmission line, so that flight operations are unlikely to be impacted if pilots are aware of the location of the transmission line.	30
Minor	The project would result in some flights paths to require a minor adjustment to avoid the transmission line and associated infrastructure for some types of flight operations	3
Moderate	The project would result in some flight paths not being available or requiring a moderate adjustment to avoid the transmission line and associated infrastructure for most types of flight operations	19
Major	The use of the uncertified aerodrome would be compromised by the nearby location of the transmission line and associated infrastructure. This may include the aerodrome being unusable or a significant modification to its layout being required to enable aviation operations to continue	15

Further detail on the individual uncertified aerodromes impacted is provided in the AIA (refer to Technical Report 11).

Of the 67 uncertified aerodromes assessed, 30 are considered to be unaffected by the project. Those identified as having a minor or moderate impact can still be used but would likely have some level of restriction to flight paths or require some adjustment. Based on proximity and orientation, 15 uncertified aerodromes are considered to be subject to a major impact and may not be usable or would require significant modification to the layout to continue to be used.

For easement-affected properties there are 27 uncertified aerodromes which have been identified to have a major or moderate impact. The major or moderate impacts on uncertified aerodromes would be considered as part of the easement acquisition and compensation process and addressed in the Property Specific Management Plan (PSMP) for the property.

For non-easement-affected properties, where an uncertified aerodrome is impacted to a major or moderate degree, an Uncertified Aerodrome Management Plan would be prepared in consultation with the owner to determine the approach to mitigation and management actions to address the impacts on a case by case basis. This may include measures such as relocation or realignment of the aerodrome, support for alternative aerial application arrangements, or alternative measures agreed with the landholders.

17.2.4.3 Aviation navigation and communication facilities

The project is located far enough away from nearby aviation navigation aids that it is not expected to affect them. The nearest radar facility, Mount Berrico, is located about 64 kilometres east of the project and is outside the line of sight from the project. The nearest aviation communication site, Porters Camp, is about 38 kilometres from the project and outside the area of interest for very high frequency (VHF) communication sites.

The final project design will be provided to Airservices Australia and the Commonwealth Department of Defence so it can be shown on aeronautical charts, helping pilots identify the infrastructure when planning and undertaking low-level flight operations.

17.2.4.4 Aerial operations

The LSALT is provided for aircraft to maintain a safe altitude above obstacles when an aircraft is not flying along a published air route or flying with instruments only where visibility is poor and the pilot cannot maintain visual contact with the ground or avoid obstacles. This is provided as a Grid LSALT for when pilots are not flying on a published air route, or Air Route LSALT for air routes between airports. The highest point of the project is below both Grid LSALT and Air Route LSALT and would have no impact on these parameters.

Agricultural aerial application

For some aerial operations from uncertified aerodromes, the project would be additional infrastructure in the landscape that would need to be considered in planning and execution of aerial application of agricultural products. The existence of transmission infrastructure in rural landscapes is common and such infrastructure is required to be considered in aerial application activities. The project would add new infrastructure to the local landscape, however, the techniques for managing interactions with such infrastructure are readily available.

Due to the nature of the operations conducted, aerial application pilots are subject to rigorous training and assessment requirements to obtain and maintain their licence to operate under these conditions. The Aerial Application Association of Australia has a formal risk management program (which is recommended for use by its members) to assess the risks associated with their operations and implement applicable treatments to ensure an acceptable level of safety can be maintained. The inclusion of the project transmission lines on aeronautical charts will enable the pilots conducting aerial application flights to be aware of the presence of the transmission lines and to consider its impact during the planning of their low-level flights. The provision of the project's final design to Airservices Australia will ensure that they are marked on aeronautical charts, enabling pilots to be aware of them when planning and conducting low-level flight operations.

Aerial baiting and culling

The project is located near a number of nature reserves/state forests where aerial baiting and culling may occur. These include Booroolong Nature Reserve, Aberbaldie Nature Reserve, Terrible Billy State Forest, Hanging Rock State Forest, Nundle State Forest, Tomalla Nature Reserve and Ben Halls Gap Nature Reserve. Aerial baiting managed by NPWS and FCNSW may occur within these reserves and forests and neighbouring public and private property where agreements are in place with landholders. Aerial baiting and culling operations in national parks are generally undertaken in helicopters which can operate closer to obstacles and at lower speeds than fixed

wing aircraft. The use of helicopters also enables precise delivery of the baits to the required target area.

Due to the inherent nature of helicopter operations, it is unlikely that the transmission line would have an adverse impact on aerial baiting flight operations, noting that the transmission line would be published on aeronautical charts, allowing the pilot to be aware of the location of the transmission line. The final design of the project will be provided to NPWS and FCNSW so they are aware of its location relative to their managed land and for consideration of the project during flight planning for aerial baiting operations.

Aeromedical services

When required, medical emergency evacuations may occur throughout the area surrounding the project. If a helicopter emergency medical service is required at a location other than an aerodrome or helicopter landing site, the pilot will engage with local emergency services personnel and/or landholders to discover what local hazards are in the vicinity of the proposed landing site and take appropriate mitigation action. It is not anticipated that medical emergency operations would be impacted by the project.

Aerial firefighting

Aerial firefighting operations (firebombing in particular) are generally conducted under visual flight rules during the day. Most aerial firefighting organisations have formal risk management programs to assess the risks associated with their operations and implement applicable treatments to ensure an acceptable level of safety can be maintained. For example, pilots require specific training and approvals, additional equipment is installed in the aircraft, and special procedures are developed. The project, with transmission line structures up to a maximum height of 80 metres AGL would not create an adverse impact upon aerial firefighting operations.

Potential impacts on aerial firefighting (including water scooping operations and aerial firefighting near transmission lines) as a result of the project are discussed in Section 17.3.5, with further detail provided in Section 17.2, Technical Report 11 and Technical Report 12.

17.2.5 Cumulative impacts

Transmission lines generally do not give rise to cumulative impacts on nearby aerodrome operations due to their relatively low height and linear configuration. However, cumulative impacts may arise when considered in combination with surrounding proposed wind farm developments. A full cumulative assessment is included in Technical Report 11 and key findings are summarised in Section 24.

The cumulative assessment concluded that there is potential for impacts on the operation of uncertified aerodromes arising from the combined presence of wind turbines at Bowmans Creek Wind Farm, Thunderbolt Wind Farm and the project's transmission line infrastructure. However, aviation safety risks would be mitigated through the measures required under the respective approvals for both wind farms and the commitments for the project, including through the provision of coordinates and elevations for key components to relevant agencies. This process enables project details to be reflected in aeronautical information databases, maps and charts to allow avoidance of obstacles.

17.2.6 Management and mitigation measures

Mitigation and management measures that will be implemented as part of the project to minimise potential impacts on aviation are listed in Table 17.3.

Table 17.3. Management and mitigation measures - aviation

Reference	Impact	Mitigation	Timing	Location
AV1	Aerial application operations	At locations where the transmission lines will impact existing aerial application operations, consultation will be undertaken with relevant landholders and or operators to identify appropriate mitigation arrangements such as the installation of aerial warning markers on the transmission lines (where feasible). Where the project will result in majorly and moderately affected uncertified aerodromes, EnergyCo will consult with the owners and operators regarding mitigation. This may include relocation or realignment of the aerodrome, support for alternative aerial application arrangements, or alternative measures agreed with the owners. For easement-affected properties the major or moderate impacts on uncertified aerodromes will be considered as part of the easement acquisition and compensation process and addressed in a Property Specific Management Plan for individual properties. For non-easement-affected properties where an uncertified aerodrome is impacted to a major or moderate degree, there will be an Uncertified Aerodrome Management Plan prepared in consultation with the owner to determine the approach to mitigation and management actions to address the impacts on a case by case basis.	Detailed design	Operation area
AV2	Safety of aircraft movements	The final design of the transmission line structures with coordinates and elevations will be provided to the following stakeholders once the final design is confirmed and prior to construction commencing: • Airservices Australia • Commonwealth Department of Defence • NSW Ambulance Service • NPWS • Forestry Corporation of NSW	Pre-construction	Operation area

Reference	Impact	Mitigation	Timing	Location
		• NSW Rural Fire Service • Certified aerodromes within 55.56 km of the project • Uncertified aerodromes within 10 km of the project • Landholders of any property within 10 km of the project. This is so that, when asked for hazard information on their property, the landholder may provide the aerial application or visiting commercial or private pilots with all relevant information. • Further notification to identified stakeholders will occur if the finalised design of the project is altered.		
AV3	Safety of aircraft movements	The following stakeholders will be notified of the scheduling of the use of cranes, drones and helicopters for construction of the project, prior to the commencement of relevant works: • Airservices Australia (including NOTAM officer) • Commonwealth Department of Defence • NSW Ambulance Service • NSW Parks and Wildlife Service • Forestry Corporation of NSW • NSW Rural Fire Service.	Pre-construction	Construction area
AV4	Safety of aircraft movements	Helicopters and/or drones used for stringing will be operated in accordance with the applicable Civil Aviation Safety Regulations for their operations.	Construction	Construction area

17.3 Bushfire

This section provides a summary of the detailed assessment of bushfire risks undertaken for the project and identifies mitigation and management measures to be implemented to minimise and manage these risks. This section includes information from the Bushfire Risk Assessment undertaken by GHD, provided in full in Technical Report 12.

17.3.1 Assessment approach

The project is located on bushfire prone land (mapped in accordance with Section 10.3 of the EP&A Act) and must therefore conform to the specifications and requirements under *Planning for Bush Fire Protection 2019* (PBP) (NSW RFS, 2019).

The assessment was also prepared with reference to the SEARs as detailed in Appendix A.

The section considers issues raised in engagement with community stakeholders and relevant regulatory authorities including NSW RFS, CASA, FCNSW and NPWS relating to bushfire (refer to Section 5) including potential for increased bushfire risk associated with project infrastructure, impacts on bushfire response and access, impacts to aerial firefighting water scooping activities at Lake Glenbawn, and the need for collaboration with emergency services (including NSW RFS) and landholders.

The Bushfire Risk Assessment considered bushfire hazards and risks on a local landscape scale, defined as within a 2-kilometre buffer of the project area, including road and intersection treatments and ancillary construction facilities. For the purpose of landscape-level bushfire risk assessment, the study area was divided into 3 landscape zones: Upper Hunter, Northern Slopes and New England Tablelands.

Bushfire risks to the project have been assessed according to the requirements for conformance with PBP and using the following methodology:

- conducting a desktop assessment and accessing a range of databases, reports and websites to determine key inputs for the risk assessment
- undertaking potential bushfire behaviour modelling using fire behaviour modelling equations specified in AS3959, which are also used in the development of PBP. This modelling used fuel input assumptions derived from NSW RFS document Comprehensive Vegetation Fuel Loads Factsheet (NSW RFS, 2019).
- undertaking bushfire attack level (BAL) and asset protection zone (APZ) requirement assessments using the site assessment methodology published in Appendix 1 of PBP.
- consulting with a range of stakeholders during the preparation of the bushfire risk assessment, including:
  - NSW RFS State Operations Division, North Western Area Command and Tamworth Fire Control Centre
  - Specialist aviation subcontractors, Kennedy Air and Pay's Air Services
  - Civil Aviation Safety Authority (CASA)
  - Forestry Corporation of NSW
  - National Parks and Wildlife Service (NPWS)
  - Bendemeer Community Group.
- identification of a range of measures to avoid or minimise bushfire risk both from and to the project.

17.3.2 Existing environment

17.3.2.1 Elevated bushfire risk communities

Four statutory Bush Fire Risk Management Plan (BFRMP) areas cover the project area: New England, Tamworth Regional, Liverpool Range, and Hunter Valley. These plans identify communities with elevated bushfire public safety risk. Within 10 kilometres of the project area, no high-risk "focus areas" occur in the Hunter Valley, Liverpool Range, or Tamworth Regional sections.

On the New England Tablelands, elevated-risk communities include Invergowrie/West Invergowrie, Rocky River, and West Uralla residential area. Existing high-voltage transmission lines within the BFRMP regions have no history of bushfire causation.

17.3.2.2 Bushfire History

Throughout the New England Tablelands area, large bushfire events in the vicinity of the project area are rare, principally due to a combination of extensively cleared and grazed agricultural land, high elevation, and peak seasonal rainfall onset timing in spring and continuing through summer. Historically, bushfires within 10 kilometres of the project area have been relatively small with exception of some large fires in forested upland areas.

Throughout the Northern Slopes area, forest, woodland and pine plantation cover with complex terrain is conducive to supporting large bushfires. Historically large bushfires have occurred in the Northern Slopes area, typically during severe drought-affected fire seasons.

Throughout the Upper Hunter area, large bushfire events in the vicinity of the project area have historically been uncommon, with the exception of the rugged forested slopes and foothills east and south of Ben Hall's Gap Nature Reserve which has a history of large recurrent fire events and a high likelihood of supporting bushfires in the future. Further south, through the Isis River valley and the hills and valleys north and east of Glenbawn Dam, fire history has historically been comprised of uncommon and relatively small-scale fires, largely attributable to the highly fragmented vegetation cover and prevalence of cleared agricultural land.

17.3.2.3 Bushfire prone vegetation

Bushfire behaviour is dependent upon the quantity, structure, arrangement, and condition of vegetation fuel available. Vegetation classes relevant to the project area, and their attendant fuel loads are summarised in Table 17.4. As shown in Table 17.4, the majority of the project area is comprised of grassland and grassy woodland areas associated with agricultural land.

Table 17.4. Project fuel hazard assumptions

Vegetation class (Vegetation formation)	Surface & elevated fuel load (t/ha)	Overall fuel load (t/ha)	Per centage of land cover in project area (%)[1]	Location
Western Slopes Grassy Woodland (Grassy Woodland)	10.5	18.3	4	Upper Hunter and Tamworth Regional LGAs
New England Grassy Woodland (Grassy Woodland)	10.5	20.2	9	Walcha, Uralla and Armidale LGAs
New England Dry Sclerophyll Forest (Dry Sclerophyll Forest – shrub/grass)	14	25.23	8	Walcha, Uralla and Armidale LGAs

Vegetation class (Vegetation formation)	Surface & elevated fuel load (t/ha)	Overall fuel load (t/ha)	Per centage of land cover in project area (%)[1]	Location
Western Slopes Dry Sclerophyll Forest (Dry Sclerophyll Forest – shrub/grass)	15	18.86	7	Upper Hunter and Tamworth Regional LGAs
Hunter Macleay Dry Sclerophyll Forest (Dry Sclerophyll Forest – shrub/grass)	14	24.6	2	Upper Hunter LGA
Northern Tableland Wet Sclerophyll Forest (Wet Sclerophyll – grassy)	20	31.53	4	Tamworth Regional LGA (Barnard River to Nundle)
Western Slopes Grassland (Grassland)	6[2]	6[2]	52	All

Notes:

1. Other fuel types including heaths, shrubland, bogs and fens are not captured so the total does not equal 100 per cent coverage

2. The 'Grasslands' fuel load published by NSW RFS is a worst-case fuel load for all grassland types in NSW including high-rainfall areas in coastal/hinterland location east of the Great Dividing Range. Grasslands in the Upper Hunter, along the northern slopes, and on the New England tableland rarely if ever reach average fuel loads of 4.5 tonnes per hectare (t/ha).

The different fuel characteristics associated with different types and structural forms of vegetation influence the fire behaviour characteristics and potential for fire impact, as described below:

- Forest fires – While forests are variable in their structure and fuel load/arrangement, in general they have the potential to support the highest fire intensities and flame lengths during fires spreading in adverse fire weather conditions. The flame fronts of fires burning through forests typically have longer burnout times than other vegetation types. Transmission line routes through forests typically require managed easements from which the overstorey and mid stratum vegetation is cleared where flames have the potential to reach conductors. Forest cover can be retained in the lower parts of deeper gullies and areas where minimum vertical clearance above canopy vegetation exists (10 metre clearance to the lowest conductor at maximum sag a) and where fire is likely to burn as a surface fire below the forest canopy
- Woodland fires – Due to the open nature of woodlands, fires typically burn through the woodland understorey/groundcover vegetation which can take the form of grassland, or shrubland, or a mix of the two. The presence of overstorey trees can increase spotting potential (principally from burning bark fragments) but typically does not contribute significantly to the flame front intensity. Managed easements of transmission line routes through woodlands typically require removal of woody vegetation to a degree such that minimum vertical clearance between conductors and woodland vegetation is achieved

- Shrublands/scrub fires – Whether natural or the result of active vegetation management, shrubland/scrub vegetation from 2 metres to 4 metres in height, in adverse fire weather conditions will typically support fires involving the full shrubland/scrub vertical profile (including the canopy). Due to wind exposure, shrubland fires typically spread and burn out faster than forest fires but slower than grassfires
- Grass fires – When sufficiently cured and dry, in windy conditions grassfires can burn rapidly, spreading more quickly than fires in other vegetation types, but with flame height potential constrained by the lower height of the grassland fuel bed (typically around 3 times the height of the grassland height in natural/ungrazed grasslands). Grass cover is a preferred easement cover type in many transmission line easements though not always achieved or maintained, with many easements supporting a shrub/scrub vegetation layer.

17.3.3 Potential impacts – construction

17.3.3.1 Construction bushfire risk from the project

Some construction activities have the potential to start fires and, as such, diligent control of potential fire ignition risks would be required, as outlined in Table 17.5. With these risk reduction measures in place, the likelihood of bushfire ignition during the construction phase is very low and the construction phase of the project would have no material impact on bushfire public safety risk in the landscape areas where project construction would occur.

The construction phase of the project would have a negligible impact on the factors which affect bushfire severity in the landscape (fuels, landform and weather). Although vegetation clearance and modification works would be undertaken within parts of the project area, at energy hub sites, Bayswater Power Station substation extension, camps, and access tracks (including regular vegetation management for maintenance), these works are not at a scale which would materially alter the consequences of bushfires on public safety.

Table 17.5. Construction activities with potential to cause fire if not mitigated

Construction activity	Fire cause potential	Ignition risk reduction measure
Hot works	Sparks from metal grinding, cutting, welding or other works capable of producing hot metal sparks in the open which can land in dry fine vegetative fuels starting a fire in weather conditions conducive to fire ignition and spread	Site and job-specific risk assessment to identify works and sites with 'hot works' fire ignition risk A project-specific hotworks permit-based system of hotworks risk controls including: • forecast fire danger rating-triggered system for when 'hotworks' are prohibited or restricted • outdoor hotworks site clearing and preparations conditions specified for hotworks • on-site fire extinguishing equipment requirements enabling reliable fire extinguishment at-source, mandated for all outdoor hotworks • post-hotworks site check procedure to ensure no smouldering material remains

Construction activity	Fire cause potential	Ignition risk reduction measure
Earthworks / vegetation clearance works	Substandard earthmoving/vegetation clearing equipment maintenance, or equipment defects/faults, or sparks from metal track friction with rock release hot particles/sparks capable of starting a fire in weather conditions conducive to fire ignition and spread	• Mandated system of pre-start checks to ensure combustible fines hygiene for machinery • Forecast fire danger rating-triggered system for restricting machinery use in vegetated areas when sparks could potentially cause fire ignition
Rock drilling	Substandard drilling equipment maintenance, or equipment defects/faults/failures, produce hot metal spark liberation capable of starting a fire in weather conditions conducive to fire ignition and spread	• Mandated system of pre-start checks to ensure serviceability and lubrication for rock drilling equipment, and oil/grease/flammable fluids hygiene at the drill site • Rock drilling site vegetation debris clearing and preparations conditions specified for rock drilling works • Forecast fire danger level-triggered system for restricting rock drilling works
Off road / track vehicle operation	Vehicles driven or parked off road in vegetation which can be ignited if contact with hot engine parts such as exhaust system components occurs	• Provision of designated parking areas (cleared of vegetative fuels) at work sites and workforce accommodation camps • Off road/track vehicle operation specifically included in job safety assessments • Provision of fire extinguishers in all vehicles/plant
Smoking onsite	Cigarette butts discarded by smokers into vegetative fuels	• Provision of designated smoking areas at work sites and workforce accommodation camps • Prohibition of smoking at work sites and workforce accommodation camps except in designated areas • Provision of fire extinguishers at worksites and accommodation camps
Occupation / operation of workforce accommodation camps	Accommodation related activities such as cooking, heating appliances, electrical faults, and improper storage or disposal of combustible materials	• Maintaining electrical equipment and appliances in safe working condition • Enforcing designated smoking areas. • Providing appropriate waste disposal facilities. • Installing and maintaining smoke alarms and fire extinguishers • Implementing housekeeping practices to minimise fuel loads within and around accommodation areas. • Workforce accommodation camps will have APZ

Construction activity	Fire cause potential	Ignition risk reduction measure
Unauthorised fire use	Lighting of fires for heating water, food or for warmth	Prohibition of open fires at work sites, or alternatively a permit system incorporating site-specific risk assessment
Use and storage of dangerous goods	The types, quantities and storage locations of hazardous chemicals would be further defined as the project progresses (refer to Section 17.1)	All hazardous chemicals shall be stored and handled in line with the NSW Code of Practice: Managing risks of hazardous chemicals in the workplace, Part 7.1 of the NSW Work Health and Safety Regulation 2025, and the relevant Australian Standards

17.3.3.2 Construction bushfire risks to the project

As the project is located in bushfire-prone landscapes, construction workers may be exposed to bushfire risks while travelling to, from, and working at project sites, particularly in remote and forested sections of the corridor where evacuation to safe areas may take 20 to 60 minutes via unsealed roads.

As PBP measures are not intended to manage construction workforce safety, a project-specific workforce bushfire safety system is required to ensure risks are managed to be as low as reasonably practicable. This system would include restrictions on work during elevated fire danger conditions, monitoring of weather and fire incidents while work crews are in the field, clear communication and evacuation procedures, daily workforce briefings, and training and equipment to manage potential ignition sources, and would apply to all worksites, construction support areas, and workforce accommodation camps.

Under PBP, fenced outdoor compounds and laydown areas do not require BAL assessment and no performance criteria are established for the protection of such areas. BAL assessment considers regional fire weather and danger potential (as determined by the RFS), surrounding vegetation types, slope under the vegetation, and the separation distance between proposed assets and vegetation. The assessed BAL represents the potential severity of exposure to ember attack, radiant heat and direct flame contact during a bushfire.

An APZ is a fuel-reduced area around a built asset that provides a buffer between the asset and nearby bushfire hazards. The recommended width of the APZ is based on the BAL to be achieved and the types of activities to be carried out within each site. For example, higher risk activities and locations such as site offices or workforce accommodation are required to achieve lower BAL ratings, which therefore requires a larger APZ.

The Bushfire Risk Assessment recommended that APZs are utilised to reduce the likelihood of fire spreading to and from the project. At each planned construction ancillary site, an APZ achieving BAL 12.5 would be implemented for site offices, amenities buildings and dangerous goods storages located within laydown areas. An APZ achieving BAL 29 would be implemented for laydown areas without site offices where there is an increased risk of ignition from construction activities. Where construction ancillary sites incorporate temporary office buildings an APZ to Special Fire Protection Purpose (SFPP) APZ specification would be established and maintained.

The temporary workforce accommodation camps would be comprised of commercially available modular portable building types that are assumed to not be constructed to BAL standards. The construction ancillary sites selected to incorporate the workforce accommodation camps would also incorporate other facilities including laydown areas, helicopter landing pads and portable site office buildings. The temporary accommodation buildings would require establishment and maintenance of a SFPP APZ at each of the 5 workforce accommodation camp locations, with minimum setbacks ranging from 36 metres to 100 metres, based on the vegetation and slope classes present.

17.3.4 Potential impacts – operation

17.3.4.1 Operational bushfire risks from the project

During engagement, stakeholders expressed concern that the project would strain emergency services and reduce public safety because of increasing bushfire risks and reduced ability to fight fires.

The bushfire risk assessment indicates that the operation of the project would have no material impact on bushfire public safety risk in the landscape areas where the project would operate as it would not materially alter the potential consequences of bushfire or the bushfire ignition likelihood.

Likelihood of bushfire ignition during operation

There can be a general public perception that overhead powerlines constitute a high bushfire risk and have been the cause of numerous high-consequence bushfires. These concerns were raised by the community through consultation and are discussed further in Section 5. However, such general perceptions often lack appreciation of the differences in fire causation history between transmission and distribution networks.

In Australia, the history of bushfire ignitions from electrical infrastructure is overwhelmingly associated with distribution network infrastructure (network voltages up to 66 kV). There are no records of a 500 kV transmission line starting a fire in Australia and they have the lowest bushfire risk of all powerline infrastructure (transmission and distribution lines) (EnergyCo, 2024). Additionally, existing 330 kV transmission networks which have been in continuous operation in the Hunter Valley and on the New England Tableland since at least the 1980s, have no history of bushfire ignition.

The high voltage (500 kV and 330 kV) transmission lines proposed for the project consist of tall, robust, steel lattice tower designs suspending very heavy-duty conductors at heights above ground exceeding 13.5 metres for 500 kV and exceeding 11.5 metres for 330 kV. These structures traverse along dedicated maintained easements through vegetation to maintain minimum regulated clearances between vegetation and conductors. Inspection for hazardous trees beyond the easement edge is also undertaken to identify and remove, or reduce the height, of defective trees of sufficient height to reach transmission lines if they fail. High reliability centred maintenance programs are applied to these networks to ensure very high supply reliability through minimising the potential for system faults. Individual transmission lines (conductors) are separated by minimum clearances and are not likely to clash during weather events.

Additionally, 330 kV and 500 kV transmission networks incorporate sophisticated protection and control systems which are continuously monitored and allow for rapid fault detection and clearance. In the rare event of a conductor failing, the system can turn off power within milliseconds of detecting a fault. As such, the Bushfire Risk Assessment concluded that bushfire ignition from the project transmission lines is unlikely.

Lightning fires

The project transmission lines would have a lightning protection system which would aim to reduce the number of lightning strikes on trees in the immediate vicinity of the project area, reducing the potential for bushfire ignition. The additional access tracks provided by the project would also facilitate improved access for fire authorities responding to lightning-struck trees outside but near the project area.

Ground firefighting

In the forest and woodland environments traversed by the project, fire suppression commonly involves indirect attack from existing roads and trails. To the extent practicable, the project area has been designed to minimise compromising the utility of existing roads and strategic fire trails for fire suppression. The project does not intersect with any of the fire trails registered by the NSW RFS.

The nearest registered fire trails are Ryans and Hanging Rock Village fire trails (accessed via Hanging Rock Village near Nundle) which are located more than 10 kilometres west of the project's transmission corridor.

The project would provide additional access tracks (for accessing transmission towers and easements) and some upgrading of existing public roads to provide improved access for construction. The final location and nature of new access tracks and public upgrade works would be determined at the detailed design stage in consultation with landholders. These works would improve access in the area surrounding the project, and would have benefits for improved response time and emergency egress.

17.3.4.2 Operational bushfire risks to the project

Project workforce bushfire safety risk

During project operation on-site work activities would be largely limited to asset and easement inspection, maintenance activities, and fault investigation/response. A substantial proportion of planned inspection and maintenance activities would be scheduled to occur outside of the Bushfire Danger Period. For urgent works/investigations during this period, work activity-specific bushfire safety precautions would be planned and implemented, as occurs routinely for such operational activity across transmission networks traversing bushfire-prone areas in NSW.

Impacts to transmission lines

During above average bushfire seasons, bushfires impacting 330 kV and 500 kV easements have the potential to cause power supply interruption. Instances of such interruptions on 500 kV networks are relatively rare (330 kV interruptions from bushfire are also uncommon) but may occur during bushfires.

The NSW RFS is the lead agency responsible for directing multi agency responses to bushfires, including coordination with other emergency services and relevant infrastructure operators.

At any given time, control rooms operated by NSW RFS, the AEMO, and electricity transmission and distribution network service providers continuously monitor bushfire activity, forecast weather conditions, and the operational status of the electricity network. This monitoring enables proactive management of the system, including the re-classification of transmission lines to adjust operating limits or electricity flows where required, supporting safe operation of the network while maintaining electricity supply.

In the unlikely event that de-energisation is required to enable firefighters to undertake operations on, within, or adjacent to a transmission easement, NSW RFS, as the lead agency, would direct the transmission network service provider and AEMO through established bushfire emergency communication and escalation protocols.

Once a transmission line is verified through the AEMO and transmission network service provider control rooms as being taken out of service, that confirmation is communicated through established emergency management pathways to NSW RFS. Operational decisions regarding access and firefighting activity are then made by the appointed Incident Controller in accordance with emergency service procedures.

The bushfire impact likelihood during operation of the project is summarised in Table 17.6. Bushfire impact likelihood is considered in 3 distinct landscape segments across the project area:

- elevated agricultural lands across the New England tablelands
- forested ranges and partially cleared valleys from the southern edge of the New England plateau to Lake Glenbawn
- mostly cleared agricultural land from Lake Glenbawn to Bayswater Power Station.

Table 17.6. Bushfire impact likelihood during operation

Landscape	Likelihood of impact during operation
New England Tablelands	Within the New England Tablelands, the historical occurrence of bushfires impacting the project area is rare. Historically, fires igniting in predominantly cleared agricultural areas of the tablelands have been controlled to small areas. The very low historical incidence of high-consequence bushfires on the New England is largely attributable to land-use and high elevation climate factors, in particular the widespread prevalence of grazed, elevated pastures which serve to fragment combustible vegetation cover across the northern project landscape and thus constrain the potential for bushfires to spread across the agricultural landscape. Bushfire impact on the New England Tablelands would most likely be in the form of a grassfire, with very limited opportunity for forest fire impact.

Landscape	Likelihood of impact during operation
New England plateau to Lake Glenbawn	The long steep slopes above (north) of the Barnard River have a history of supporting significant bushfires in (including the Pearson's Trail Complex fire during the severe 2019/20 fire season) which are difficult to control due to the rugged terrain. Large fires in this area typically occur during severe drought years. From Barry, the corridor heads south-west, into the Pages Creek valley. This section of the corridor traverses partially cleared foothills in the valley with more heavily timbered hills above, this line route section has significant potential for large bushfires, noting the occurrence of the Gulf Gogs fire complex in 2002/03 and the Pages Creek Road fire in 2019/20, both of which directly impacted parts of the corridor. From Pages Creek the line route turns west, traversing partially cleared forested hills through Sargeants Gap to the Isis River valley. This section of the corridor is within 2 km of the southern edge of the 2019/20 Pages Creek Road fire and has significant potential to be impacted by bushfire in the future. From the Isis River valley, the line route turns south-south-west toward the upper reaches of Lake Glenbawn. Bushfires have been uncommon along the Isis River valley, noting lands along the valley floor and lower slopes have historically been extensively cleared and grazed, with prime river flats also used for irrigated crop production. Bushfires could impact the Isis Valley section of the line route, noting the occurrence of the 2001/02 Merric fire on lightly timbered foothills in the valley. Future bushfires in the Isis River valley section would most likely be grassfires, potentially spreading into or from grassy woodlands on foothills extending into the valley.
Lake Glenbawn to Bayswater Power Station	The Lake Glenbawn to Bayswater Power Station section traverses mostly cleared agricultural land (traversing limited fragmented patches of dry sclerophyll forest and woodland) before reaching mining/power generation industrial lands in the vicinity of Lake Liddell. Along this section bushfires have been rare with no fires recorded as directly impacting the project area. Future bushfires along the Lake Glenbawn to Bayswater section would likely be grassfires, with forest fire potential in limited and fragmented areas in the hills between Muscle Creek and Rouchel Brook, some foothill areas south of Lake Glenbawn, and *Casuarina* regrowth areas in foreshore areas around Lake Liddell. In years of average to above average rainfall, a high proportion, fires starting near the project area are likely to be contained by NSW fire authorities. However, in below average rainfall years when forest fuels dry out and become combustible across a substantial proportion of the landscape, and/or bushfire igniting in adverse weather, or when the onset of adverse weather occurs before fires can be securely contained, fires can develop into large-scale fires which are problematic to contain in the rugged forested terrain, and can spread significantly during bouts of adverse fire weather. The large fire history of the section between the Isis River Valley and the south-western edge of the New England tableland demonstrates the potential for large fires in this area.

Impacts to energy hubs and Nemingha maintenance facility

Three of the 5 hubs (North Hub, Central Hub A and Central South Hub) are located in a bushfire prone area. Central Hub B and East Hub are not identified as bushfire prone, however mapping for Uralla Shire (where these hubs are located) has not been updated since 2009. The vegetation within and adjoining these sites appears to be grassland which would be mapped as Vegetation Category 3 bushfire prone land and therefore requires an assessment.

Although not specifically required under PBP, each switching station or substation asset at the energy hubs will be provided with a surrounding APZ to achieve a BAL of 29. This would prevent trees falling into the switching station / substation site and ensure that radiant heat from an approaching bushfire is at levels unlikely to cause damage to switching station / substation components.

The Nemingha maintenance facility is also located on bushfire prone land. An APZ achieving BAL 12.5 will be implemented for the site office and workshop, and an APZ achieving BAL 29 would be implemented for any other structures. Parking areas, roads, and other hardstand areas can form part of the APZ. Areas north, east, and west of the site have been developed and therefore do not require an APZ.

17.3.4.3 Transmission line impact on emergency egress and evacuation

The project would not adversely affect regional or landholder evacuation capability. NSW RFS bushfire preparedness policy is based on residents making early, informed decisions to leave or remain and defend their property, supported by access to an operational road network. The proposed transmission lines would cross highways and roads as overhead structures only and would not physically obstruct vehicle movements, emergency service access or evacuation traffic.

Consistent with NSW RFS guidance, evacuation decisions would continue to be based on fire behaviour, weather conditions, emergency warnings and incident-specific risk assessments rather than the presence of transmission infrastructure. Existing NSW RFS operational procedures provide for emergency management and firefighting activities in landscapes containing transmission infrastructure, and the project would not create a requirement for affected landholders or communities to adopt different evacuation behaviours than those otherwise recommended by NSW RFS.

17.3.5 Potential impacts - aerial firefighting

Water scooping

During the project design stage, consultation was undertaken with the NSW RFS in relation to potential impact on aerial firefighting operations and EnergyCo has undertaken substantial work during the project development stage to limit the potential impacts of the project on aerial firefighting (refer to the AIA, Technical Report 11 for further details).

Water scooping operations are conducted at Lake Glenbawn by various aircraft and helicopters, including the Fire Boss Air Tractor AT-802F, in both the north-south and east-west directions. The proposed transmission line has the potential to present a new obstacle that the Fire Boss aircraft would need to navigate during water scooping operations, particularly in the landing and takeoff climb-out phases.

A technical review of potential impacts to water scooping operations was undertaken using historical NSW RFS flight data from active firefighting operations, which showed multiple specialist air services contractors using multiple areas of Lake Glenbawn for water scooping under different conditions (refer to Annexure 2 of the AIA, Technical Report 11). This information was used to assess potential interactions between the proposed transmission lines and aerial firefighting activities.

North-south water scooping operations at Lake Glenbawn are substantially away from the proposed transmission line alignment. As such, the technical review concluded that the proposed transmission line would have no impact on existing Fire Boss aircraft north-south operations.

With respect to east-west operations, the technical review included an assessment of both the wider 'west-end' and narrower 'east-end' areas of Lake Glenbawn used for water scooping operations. The Fire Boss aircraft operator has identified that a minimum 30.5 metres (100 feet) vertical separation distance is required as a safety buffer between the aircraft and the top of an obstacle. The technical review identified that the project achieves a vertical separation distance of 106.9 metres when landing from the east and a vertical separation distance of 66.9 metres when taking off from the east. The technical review concluded that for both the west-end and east-end areas, this minimum vertical separation distance can be achieved between Fire Boss Air Tractor AT-802F aircraft and the tallest transmission tower within the segment of the transmission line directly underneath the flight path during landing and takeoff climb-out phases.

As such, the technical review concludes that the proposed transmission line alignment is not expected to restrict the water scooping operations of the aircraft of interest (Fire Boss Air Tractor AT-802F) at Lake Glenbawn.

Further detail on the work undertaken by EnergyCo to avoid potential impacts on aerial firefighting as a result of the project are provided in Technical Report 11.

Aerial firefighting near transmission lines

The presence of project infrastructure would be highly unlikely to have any material impact on aerial firefighting along the project area. Aerial firefighting is commonly undertaken in the vicinity of transmission lines, including in areas of rugged terrain where accessibility is limited.

NSW RFS has established protocols for fighting fires around transmission lines which form part of the guidelines used by firefighting brigades for local firefighting operations. For established fires spreading in adverse fire weather conditions, large waterbombing aircraft are typically prioritised to town/village and property defence where they can knock down and/or retard flame fronts as they approach vulnerable assets in a fire path. The project would provide ample separation between 500 kV and 330 kV operational easements and elevated bushfire risk-exposed human settlement locations identified in BFRMPs (Rocky River and West Uralla; Invergowrie and West Invergowrie).

Light fixed wing aircraft have significant limitations in forest environments and are best suited to application in open grassland/cropland areas. Fast moving grass fires pass quickly through transmission line easements in open grasslands, hence the presence of 500 kV and 330 kV transmission lines in the landscape rarely, if ever, prevents light fixed wing aircraft from pursuing aerial attacks on grassfires. In NSW, light fixed wing aircraft have been successfully used in rural landscapes containing transmission lines for more than 3 decades.

Small to medium helicopters are a potential resource for initial aerial attack in the forests along the project area, including in high commercial value pine plantations in Nundle State Forest (noting this has been uncommon historically in these forests). Light and medium helicopters are highly manoeuvrable and are able to manoeuvre and operate close to large transmission lines (noting that similar aircraft are used for transmission line inspections) and hence the presence of transmission lines does not significantly restrict their use in aerial firefighting. Transmission lines are marked on aeronautical maps, so pilots can readily ascertain where they are located.

In other parts of NSW, historically, the presence of transmission lines has had a negligible impact on aerial firefighting operations. To avoid impact on electricity supply assets, aerial retardant drops are undertaken to avoid directly impacting transmission lines but are able to be safely undertaken in adjacent forest or grassland areas as required (at least 25 metres away from lines/towers).

17.3.6 Cumulative impacts

The potential cumulative impacts of the project have been identified based on the scale and potential impacts of the project, in combination with the potential impacts of relevant identified future projects and broader developments supporting the New England REZ. A list of these relevant projects, including their descriptions and interfaces with the project, is provided in Section 24. A full cumulative assessment is included in Technical Report 12 with key findings summarised in Section 24.

The assessment identified the potential risk of any fire associated with a development affecting NSW RFS resources and response times if multiple fires from natural or human-made causes occur at the same time. Access arrangements contained in the Emergency Management Plan would mitigate the potential impacts of increased heavy construction vehicle movements, traffic management restrictions and road works during potential road treatments on emergency access/egress routes and firefighting efforts. In addition, the access and road and intersection treatments proposed for various projects will allow for better access for NSW RFS firefighting appliances and enhance fire suppression measures and egress routes.

17.3.7 Management and mitigation measures

The management and mitigation measures relevant to bushfire are outlined in Table 17.7.

Table 17.7. Management and mitigation measures – bushfire

Reference	Impact	Mitigation	Timing	Location
BF1	Increased risk of bushfire ignition from transmission line network infrastructure	To reduce the likelihood of transmission infrastructure causing an ignition, the project will comply with the following standards: • transmission line infrastructure will be designed to standards meeting or exceeding standards in Australian Standard AS/NZS 7000:2016 Overhead line design (AS/NSZ 7000) • wind loads assumed for design shall be calculated in accordance with Australian Standard AS/NZS 1170.2:2021 Structural design actions, Part 2: Wind actions and AS/NZS 7000 in conjunction with other relevant Australian codes and standards • design to standards meeting or exceeding design standards in Australian Standard AS 2067:2016 Substation and high voltage installations exceeding 1 kV AC. Note: an APZ will also be established and maintained around each substation (BF9).	Detailed design Construction	Operational easement and energy hubs
BF2	Increased risk of bushfire ignition from transmission line network infrastructure	The transmission line will have maintained vegetation clearance easements that comply with the specifications of AS/NZS 7000. This includes typical easement widths of 70 m for single 500 kV lines, 140 m for dual 500 kV lines, and 120 m for dual 330 kV lines. Reliability centred maintenance of transmission network assets and easement will be conducted in accordance with lifecycle Asset Management Plans prepared consistent with ISO 55001:2014 Asset Management – Management Systems – Requirements. Under such plans, assets are subject to high-frequency multi-mode inspection programs (ground-visual, aerial-visual (high-definition video/photography), Light detection and Ranging (LiDAR), and infra-red) and system performance monitoring.	Operation	Operational easement and energy hubs

Reference	Impact	Mitigation	Timing	Location
BF3	Increased risk of bushfire ignition from construction activities (for example hot works, grinding, cutting, vehicle movements)	Prior to commencement of the construction phase, develop and implement a Project Bush Fire Prevention Plan (alternatively, a section in the Construction Environmental Management Plan specifying bushfire prevention measures for all identified potential fire ignition sources) detailing the operational restrictions and procedures for preventing accidental fire ignition during construction, and detailing contingency arrangements for project work crews to extinguish any accidental fire ignitions at-source while they are able to be controlled with portable extinguishers and on-site equipment. In particular the project Bush Fire Prevention Plan will need to address: • establishment of a project 'hot works' management system for implementation during the project • smoking prohibition and designated smoking area protocol for project construction stage • fire-safe work procedure for earthmoving and drilling works • driving and parking vehicles off formed roads protocol to ensure prevention of accidental fire ignition by contact between vehicle exhausts/hot parts and grass or other vegetative fuels • pre-construction identification and preparation of evacuation routes from project construction sites for use in the event of a bushfire threat. Annual pre fire season audits of construction contractors will be conducted to assess the implementation of fire prevention, preparedness and response-readiness measures.	Detailed design Construction	All locations

Reference	Impact	Mitigation	Timing	Location
BF4	Bushfire safety risk to workforce during construction	Preparation of an Emergency Management Plan that includes bushfire emergency management measures conforming to the requirements of A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan (NSW RFS, 2014) setting out the project system for: • monitoring forecast fire danger ratings (FDR), fire alerts/warnings, and fire incidents and communicating these to the project workforce • restricting project worksite access or activities according to the forecast FDR • pre-planned triggers for project worksite evacuation in the event of reports of fire incidents or fire warnings • project responsibilities and arrangements for authorising and supervising worksite evacuations due to bushfire • pre-planned off-site refuge locations, evacuation routes and contingency routes in the event project worksite evacuation is required • fire or smoke reporting protocols to NSW RFS and FCNSW in the event of fire or smoke detection at project worksites • protocol for determining when worksites are safe to return to after evacuation • project training requirements for emergency response and evacuation management • ensuring access is maintained for emergency vehicles during roadworks.	Construction	All locations

Reference	Impact	Mitigation	Timing	Location
BF5	Bushfire safety risk to workforce accommodation camps and increased risk of bushfire ignition from accommodation camps	Workforce accommodation camps will have APZ achieving SFPP APZ compliance: Camps 1, 2, 4, and 5. Camp 3 site will be selected and designed to achieve SFPP APZ compliance. APZ maintenance should comply with standard APZ specifications as per Appendix 4 of PBP. An Emergency Management Plan that includes bushfire emergency management measures conforming to the requirements of A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan (NSW RFS, 2014) to be prepared for each project accommodation workers camp location. All temporary worker accommodation structures will incorporate ember protection measures as per the requirements of AS3959:2018 Sections 3 and 5. Property access roads from the public road network into construction support sites containing temporary worker accommodations will comply with the requirements of PBP Table 5.3b (Property Access). Construction ancillary sites with temporary worker accommodation will have a static water supply (tank) provided compliant with PBP Table 5.3d (20,000 litres).	Construction	Workforce accommodation camps
BF6	Bushfire safety risk to workers in site offices in laydown areas	An Emergency Management Plan that includes bushfire emergency management measures conforming to the requirements of A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan (NSW RFS, 2014) to be prepared for each project site office. All temporary project site office structures will incorporate ember protection measures as per the requirements of AS3959:2018 Sections 3 and 5. Property access tracks from the public road network into construction ancillary sites with offices will comply with the requirements of PBP Table 5.3b (Property Access).	Construction	Site offices

Reference	Impact	Mitigation	Timing	Location
		APZs achieving BAL 12.5 will be provided for site offices and amenities buildings located within laydown areas. APZ maintenance should comply with standard APZ specifications as per Appendix 4 of PBP.		
BF7	Increased risk of bushfire from laydown areas	APZs achieving BAL 29 will be provided for laydown areas. APZ maintenance should comply with standard APZ specifications as per Appendix 4 of PBP.	Construction	Laydown areas
BF8	Risk of bushfire ignition from improper storage and handling of dangerous or flammable chemicals, and explosives	APZs achieving BAL 12.5 will be provided for storage areas for hazardous or flammable chemicals. All hazardous chemicals shall be stored and handled in line with the NSW Code of Practice: Managing risks of hazardous chemicals in the workplace, Part 7.1 of the NSW Work Health and Safety Regulation 2025, and the relevant Australian Standards, including but not limited to: • AS 1940:2017 The storage and handling of flammable and combustible liquids • AS 3780:2023 The storage and handling of corrosive substances • AS 4332-2004 The storage and handling of gases in cylinders • AS 4452:2025 The storage and handling of toxic substances • AS/NZS 4681:2000 The storage and handling of Class 9 (miscellaneous) dangerous goods and articles • AS/NZS 3833:2024 The storage and handling of mixed classes of dangerous goods • AS 2067:2016 Substations and high voltage installations exceeding 1 kV a.c.	Construction Operation	Where hazardous or flammable chemicals are stored or used Where explosives are stored or used

Reference	Impact	Mitigation	Timing	Location
		All explosives and/or explosive precursors shall be stored and handled in accordance with the requirements of the NSW *Explosives Act 2003* and the NSW Explosives Regulation 2024. For use of explosive for blasting, this specifically includes: • obtaining a 'blasting explosive user licence' • lodgement of a 'notification of blasting activity' form needs with SafeWork NSW at least 7 days before blasting works commence • compliance with the following codes and standards: – AS 2187 series of standards - Explosives storage, transport and use – The Australian Code for the Transport of Explosives by Road and Rail – AS 4326-2008 The storage and handling of oxidising agents (if relevant). Refer to the Preliminary Risk Screening technical report for more details.		
BF9	Increased risk of bushfire ignition from energy hub, Nemingha maintenance facility, and Bayswater Power Station substation extension construction and operation	An Emergency Management Plan that includes bushfire emergency management measures conforming to the requirements of A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan (NSW RFS, 2014) to be prepared for the offices and workshops. APZs achieving BAL 29 will be provided for the energy hubs, Nemingha maintenance facility and the Bayswater substation extension. These will comply with standard APZ specifications as per Appendix 4 of PBP.	Operation	Energy hubs, Nemingha maintenance facility, Bayswater Power Station substation extension

Reference	Impact	Mitigation	Timing	Location
BF10	Increased bushfire risk from transmission line operation	Cyclic inspection and control of vegetation within transmission line easements in accordance with Network Operator standards. The standards determined by the Network Operator must meet the requirements of Electricity Supply (Safety and Network Management) Regulation 2014.	Operation	Operational easement

17.4 Electric and magnetic fields

Whenever electrical equipment is in service it produces an electric field and a magnetic field. The electric field is associated with the voltage of the equipment while the magnetic field is associated with the current (amperage). Both electric and magnetic fields are strongest closest to the source but reduce quickly with distance.

This section provides a summary of the assessment of electric and magnetic fields undertaken by Aurecon, provided in full in Technical Report 13.

17.4.1 Assessment approach

The EMF assessment was prepared with reference to the SEARs as detailed in Appendix A.

The section considers issues raised in engagement with community stakeholders relating to EMF (refer to Section 5) including physical health impacts from EMF generated by transmission lines, including long term exposure, impacts to livestock health and limited visibility of monitoring and compliance of EMF in operation.

The possibility of adverse health effects due to EMF associated with electrical equipment has been the subject of extensive research throughout the world for more than 40 years. To date, adverse health effects due to fields of the levels normally associated with electrical infrastructure have not been established, however, the possibility that such effects may exist has not been ruled out.

The most recent scientific reviews by authoritative bodies are reassuring for most potential health considerations. However, statistical associations between prolonged exposure to elevated magnetic fields and childhood leukaemia have persisted. Despite over 30 years of laboratory research, no mechanism for an effect has been established, which suggests the possibility that the observed statistical associations reflect some factor other than a causal relationship. This point is made in the 2001 report of the UK National Radiological Protection Board's Advisory Group:

> "*in the absence of clear evidence of a carcinogenic effect in adults, or of a plausible explanation from experiments on animals or isolated cells, the evidence is currently not strong enough to justify a firm conclusion that such fields cause leukaemia in children.*"

The key tasks for the EMF assessment included:

- calculating the electric and magnetic fields for the proposed transmission lines at one metre above ground level, extending up to 200 metres on each side of the lines and covering the suspension structure, conductor configurations and other relevant parameters associated with the transmission lines
- calculating the electric and magnetic fields for the proposed energy hubs and Bayswater Bayswater Power Station substation extension one metre above ground level at the substation or switching station boundary
- undertaking an assessment of the compliance of the anticipated field levels with the relevant national and international EMF guidelines (as described below)
- undertaking an assessment of compliance of the proposed lines with precautionary and prudent avoidance principles as defined in the relevant guidelines.

Using the reference design, the potential electric and magnetic fields in the vicinity of the proposed transmission lines and energy hubs were modelled. The potential electric and magnetic field strengths within the easement and energy hub transformer/switchyard areas were then assessed against relevant standards and guidelines, including consideration of public exposure with reference to the *International Commission for Non-Ionizing Radiation Protection (ICNIRP) Guidelines For Limiting Exposure to Electro and magnetic Fields* (ICNIRP, 2010). The ICNIRP guideline been adopted by the Australian Radiation Protection and Nuclear Safety Agency as the relevant consideration when assessing public exposure to EMF.

The criteria adopted for the project to assess against the ICNIRP guideline are shown in Table 17.8. A more conservative magnetic field limit for transmission lines has been adopted for the project compared to the limit stated in the ICNIRP guideline. The conservative approach was adopted to avoid potential interference with implantable medical devices as transmission easements are generally unfenced and they may be readily accessible to members of the public.

Table 17.8. Adopted field exposure limits for EMF assessment

Parameter	Transmission lines	Energy hubs
Electric field	9.1 kilovolt per metre (kV/m) directly below line 5 kV/m at easement boundary.	5 kV/m at perimeter security fence
Magnetic field	1,000 milliGauss (mG)	2,000 mG at perimeter security fence

Potential electric and magnetic fields were modelled for a double circuit configuration and 2 double circuits side by side.

Potential cumulative impacts arising from other infrastructure, such as crossing points with existing transmission lines, as well as future projects, were considered and assessed.

The detailed EMF assessment is provided in full in Technical Report 13.

17.4.2 Existing environment

EMF exist in the electrical equipment that we commonly use or encounter in our everyday lives. Examples of typical magnetic fields associated with household equipment and transmission infrastructure as presented in Technical Report 13, is provided in Table 17.9

Table 17.9. Typical magnetic field levels associated with equipment and infrastructure

Item	Typical measurement (mG)	Typical range of measurements (mG)
Electric stove	6	2–30
Refrigerator	2	2–5
Electric kettle	3	2–10

Item	Typical measurement (mG)	Typical range of measurements (mG)
Toaster	3	2–10
Electric blanket	20	5–30
Hair dryer	25	10–70
Pedestal fan	1	0.2–2
Substation fence	5	1–8
Distribution line – directly beneath	10	2–30
Distribution line – 10 m away	-	0.5–10
Transmission line – directly beneath	20	10–200
Transmission line – edge of easement	10	2–50

Existing sources of EMF within and close to the project area include transmission lines, lower voltage distribution lines and substation equipment. Existing sources of EMF within the project area include:

- Transgrid 330 kV line 83, 84, 85 and 86
- AGL 132 kV id: E859 (decommissioned)
- Ausgrid 132 kV id: E809
- Essential Energy 66 kV feeder 662 and 804
- Bayswater Power Station substation.

17.4.3 Potential impacts – construction

During construction, the transmission line would not be energised (that is, would not be operational) and would therefore not generate an electric or magnetic field. Existing electrical infrastructure such as existing transmission lines and substations have been designed to meet relevant EMF standards and therefore construction work in proximity to existing infrastructure would not create EMF risks.

17.4.4 Potential impacts – operation

17.4.4.1 Transmission lines

The EMF modelling indicates that both 500 kV and 330 kV proposed transmission lines, as single double circuit lines and as dual double circuit lines, achieve the relevant criteria under all assessed load scenarios for electric fields and magnetic fields.

In all locations, under all conditions, the calculated electric fields are well within the adopted project field limits directly beneath the line and at the easement edge.

Whether in isolation, or in combination with the existing 132 kV and 330 kV transmission lines, the contribution of the proposed 500 kV transmission lines at 500 kV and 330 kV operation to the magnetic field environment is predicted to be well within the adopted project field limits under all assessed conditions.

Additionally, where the project transmission lines would be in parallel with existing transmission lines, or require cross over points, the modelling indicates compliance with the identified criteria for both electric and magnetic fields.

Overall, it is unlikely that there would be any prolonged human exposure to EMF from the transmission lines given EnergyCo has adopted 'prudent avoidance' principles in selecting the transmission corridor, the project would comply with the ICNIRP guidelines and dwellings would not be permitted within the easement.

EMF can potentially interfere with active implanted medical devices such as pacemakers and insulin pumps, although these devices are generally designed to keep working safely in everyday environments where EMF are present. The magnetic fields near 500 kV and 330 kV transmission lines are typically well below the levels usually considered when designing these devices to avoid interference. Implanted medical devices are not expected to be affected by transmission lines in normal circumstances. Hearing aids or cochlear implants may sometimes pick up an audible buzzing directly under transmission lines or within an easement, but this will not damage the device or the ear.

As discussed in Technical Report 13, research into possible effects of EMF from transmission lines on livestock, plants and wildlife has been carried out over many years. Overall, the available findings indicate that magnetic fields from transmission lines are not expected to affect the health or reproductive capacity of farm animals, or present a danger to native fauna. For plants, the practical effects are also considered limited, with no significant effects expected for crops, pasture grasses or native flora, apart from possible reduced tree growth close to transmission lines and the normal restrictions on tree height within easements for safety reasons. Taken together, the evidence suggests there is limited basis for concern about broad impacts on animals, plants or natural ecosystems from transmission line EMF. Further information about EMF and livestock is provided in the Agricultural Impact Assessment, discussed in Section 13 and Technical Report 6.

17.4.4.2 Energy hubs and Bayswater Power Station substation extension

The energy hubs would be enclosed by a 2.4 metre high perimeter security fence. The perimeter security fence would be secured by locked gates with access restricted to authorised persons only. This would limit exposure to EMF for the general public. The assessment for the energy hubs calculated that the potential exposure for the public at the energy hub perimeter security fence was well within the adopted field criteria of 5 kV/m and 2,000 mG for electric and magnetic fields respectively, based on typical layouts within each energy hub, as shown in Section 6 of Technical Report 13.

The nearest potential dwellings are located approximately 73 metres from the North Hub project area, 235 metres from the Central Hub A project area, 194 metres from the Central Hub B project area, 1.76 kilometres from the East Hub project area and 156 metres from the Central South Hub project area. As the electric and magnetic fields decrease rapidly with distance from the energy hub high voltage equipment, the fields at the nearest dwellings are predicted to be well below the ICNIRP public exposure reference levels.

Similarly, at the Bayswater Power Station substation extension, the nearest dwelling is located approximately 3 kilometres from the existing Bayswater Power Station substation. As such, it is anticipated that the electric and magnetic field levels associated with the substation extension would be well within the applicable guideline limits.

17.4.4.3 Prudent avoidance principles

Prudent avoidance principles have been considered throughout the project development and design. In designing the proposed transmission lines, EnergyCo has:

- adopted adequate ground clearances throughout, thereby reducing EMF directly under transmission lines
- used “v” insulator strings, which enable the design to be relatively compact, thereby reducing electric fields
- arranged the phases of the double circuits to maximise magnetic field cancellation along new transmission line sections and where a new line would run parallel with existing transmission lines
- designed the transmission line to limit magnetic field levels within the easement to well below 1,000 mG, thereby avoiding interference with implantable medical devices used by members of the public.

As part of the route selection process, EnergyCo gave high importance to separating the alignments from residential dwellings and other occupied premises. Due to their locations being away from urban and semi-urban areas, it is unlikely that there would be any prolonged human exposure to EMF from the transmission lines.

Due to the uncertainty as to the existence of adverse health effects, it cannot be said whether the above measures would result in any health benefit, but they are all appropriate and consistent with the principles of prudent avoidance and are expected to minimise potential public exposure to EMF.

17.4.5 Cumulative impact assessment

The potential cumulative impacts of the project have been identified based on the scale and potential impacts of the project, in combination with the potential impacts of relevant identified future projects and broader developments supporting the New England REZ. A list of these relevant projects, including their descriptions and interfaces with the project, is provided in Section 24.

A cumulative assessment was conducted as part of the electric and magnetic field study impact assessment provided in Technical Report 13. Key findings are summarised in Section 24 and the assessment concluded that no material cumulative impacts are anticipated from interactions with either adjacent projects or from multiple major field sources within the project.

17.4.6 Management and mitigation measures

The management and mitigation measures relevant to EMF are outlined in Table 17.10.

Table 17.10. Management and mitigation measures – EMF

Reference	Impact	Mitigation	Timing	Relevant location(s)
EM1	Public exposure to EMF	The detailed design for the transmission lines and energy hubs will be developed to comply with the following criteria: • Magnetic fields: 2,000 milligauss being the ICNIRP guideline 'Reference Level' at the substation perimeter fence, and 1,000 milligauss being the adopted project field limits for transmission lines • Electric fields: 9.1 kV per metre, directly below line and 5 kV per metre at easement boundary, ensuring compliance with the ICNIRP guideline 'Basic Restriction'.	Detailed design	Transmission lines, energy hubs

17.5 Telecommunications

This section provides a summary of the potential impact of the proposed transmission line, towers and energy hubs on existing telecommunication services, assessed and incorporated in the EMF assessment undertaken by Aurecon (refer to Technical Report 13).

17.5.1 Assessment approach

The assessment of potential telecommunications interference was prepared with reference to the SEARs as detailed in Appendix A.

The assessment included a desktop 3-dimensional review of the Australian Communications and Media Authority database and the consideration of the presence and potential impact to telecommunications infrastructure, including:

- radio
- ultra-high frequency radio
- mobile and telecommunications
- microwave point to point communications.

17.5.2 Existing environment

The review of the Australian Communications and Media Authority database identified a total of 26 existing point-to-point microwave links intersecting or passing in close proximity to the transmission corridor. The identified links are licensed to a range of telecommunications, utility and government organisations, including NSW Telco Authority, Telstra, Optus, Vodafone, NBN Co, Transgrid, NSW RFS, NSW Police Force and AGL Macquarie.

17.5.3 Potential impacts

17.5.3.1 Radio

Radio interference was analysed at a reference frequency of 0.5 MHz, in accordance with international conventions. Under light rain conditions, the radio frequency interference limit is met at approximately 232 metres or 426 metres from the transmission line centreline, depending on the calculation method used. Where sensitive receivers are located within 426 metres of the transmission line, appropriate mitigation measures would be required. This would include consultation with affected users, and where required, may include the provision of signal boosting equipment or antenna enhancements.

17.5.3.2 Ultra high frequency radio

Ultra High Frequency (UHF) signals generally operate on a range from 300 MHz to 3 GHz. As radio noise caused by transmission lines decreases steeply above 3 MHz, no impact is expected in the UHF band. Farmers using Very High Frequency (VHF) alongside GPS for agricultural machinery may experience some degradation when in vicinity of the lines or if the lines happen to be in direct line of sight of their communication systems. These impacts may be mitigated with signal boosting equipment or antenna enhancements for affected users, where required.

17.5.3.3 Mobile and telecommunications

Mobile phones, National Broadband Network (NBN) and GPS operate on higher frequencies than transmission lines. Mobile phone coverage in Australia sits within the 300 MHz to 3 GHz and therefore the project would have limited interaction and interference with the mobile phone network. GPS operates to 1 GHz to 2 GHz and NBN operates at higher frequencies, 3 GHz to 30 GHz and is not expected to be impacted by the transmission line.

17.5.3.4 Microwave point to point public safety network

The Microwave Point to Point Public Safety Network (PSN) provides the platform for two-way communications for frontline emergency services and other network users during emergencies and day to day operations. Transmission line towers have the potential to obstruct existing point to point microwave links used for the PSN.

The placement of structures of steel lattice construction (such as the overhead transmission towers proposed for the project) in the line-of-sight of a point-to-point microwave link would not result in a total loss of signal. Instead, as the signal is able to pass through the structure, link performance would be degraded by a level that would vary dependent on a range of factors including the frequency of the signal, extent and point of interaction and type of tower.

Of the 26 identified point-to-point microwave links intersecting or passing in close proximity to the transmission corridor, 25 were determined by the assessment to have no material risk of impact from the proposed transmission infrastructure.

One NSW Telco Authority 7.5 GHz link between Turkey Mountain and Uralla was identified as having a high risk of impact due to limited horizontal and vertical clearance from a proposed transmission tower. Further assessment would be conducted during detailed design, in coordination with the NSW Telco Authority and it is expected that this impact can be mitigated by micro-siting of the tower and/or upgrading existing telecommunications equipment.

17.5.4 Mitigation and management

The management and mitigation measures relevant to telecommunications are outlined in Table 17.11.

Table 17.11. Management and mitigation measures - telecommunications

Reference	Impact	Mitigation	Timing	Relevant location(s)
EM2	Interference with radio and ultra high frequency radio services	At locations where the transmission lines may impact existing radio and ultra high frequency radio services, consultation will be undertaken with relevant landholders and radio users to identify appropriate mitigation arrangements. These may include signal boosting equipment or antenna enhancements (where feasible).	Detailed design	Transmission line corridor
EM3	Interference with microwave point to point communications	Consultation will be undertaken with the NSW Telco Authority regarding the 7.5 GHz link between Turkey Mountain and Uralla to identify appropriate mitigation arrangements, where required. These may include tower micro-siting and/or upgrading existing telecommunications equipment (where feasible).	Detailed design	Transmission line corridor

Surface water and flooding



Section 18

18 Surface water and flooding

This section summarises the assessment of potential impacts to surface water and flooding during construction and operation, and outlines the measures proposed to avoid, minimise and manage these impacts.

This section includes information from the Surface Water Assessment Report (SWA) undertaken by Engeny, provided in full in Technical Report 14; and the Flooding Assessment undertaken by Aurecon, provided in full in Technical Report 15.

18.1 Assessment approach

The SWA and Flooding Assessment have been prepared with regard to applicable legislation, including the *Water Management Act 2000* (WM Act), *Protection of the Environment Operations Act 1997*, the Water Management (General) Regulation 2025 and relevant policies and technical guidelines.

Both assessments have been prepared with reference to the SEARs as detailed in Appendix A.

The section considers issues raised in engagement with community stakeholders and relevant government agencies relating to surface water and flooding and local councils (refer to Section 5) including potential impacts to surface water quality associated with construction activities, changes to natural flow regimes resulting from construction related disturbance of waterways and landforms, and risks to local water supplies and availability arising from project water requirements during construction.

18.1.1 Assessment methodology

The study area for the SWA included the project area and its immediate surroundings, with consideration of the hydrological catchments intersected by the project where relevant to the assessment of surface water processes. The study area included surface water resources that may be directly or indirectly affected by the project, including watercourses, drainage lines, lakes and water supply resources within and adjacent to the project area.

The SWA was prepared using a combination of desktop review and technical inputs incorporating legislative and policy context, baseline hydrological conditions and reference design information. The assessment included review of publicly available information relating to climate, catchments and watercourses, water quality, water use and licensing, and existing surface water conditions. Potential interactions between the project and surface water resources were identified to inform the assessment of impacts and risks.

The assessment considered potential impacts to local hydrological and hydraulic regimes, watercourse stability, water quality (including erosion and sedimentation), drinking water resources (including potential impacts to the quality and availability of water supplies) and the availability of water resources to meet construction and operational requirements. Potential impacts to water quality and streamflow regimes were assessed against the relevant water quality objectives and river flow objectives. Surface water licensing, water sourcing requirements and relevant regulatory considerations were also assessed.

The Flooding Assessment was undertaken for the project area and the hydrological catchments intersected by the project. The flooding study area extended beyond the project area to include the catchments relevant to the assessment of flood risk and flood behaviour. The extent of each catchment considered was determined based on the degree of intersection with project infrastructure and the level of detail required to appropriately characterise flood risk and potential project impacts. The study area comprised of 8 hydrological catchments, being Bayswater Creek, Hunter River, Peel River, Barnard River, Macdonald River, Roumalla Creek, Salisbury Waters and Gwydir River catchments.

The assessment included a review of existing flood studies, catchment analysis and hydrological and hydraulic modelling undertaken at both regional and local scales. Regional-scale flood modelling was undertaken across the principal catchments intersected by the project to characterise existing flood behaviour and assess flood risk along the transmission corridor. In total, 8 regional flood models were developed to support assessment of project interactions with flood-prone land.

Higher-resolution local flood models were also developed for the energy hubs and workforce accommodation camps to assess existing flood risk and potential changes to flood behaviour resulting from project development. These assessments considered a range of design flood events, including the 10 per cent, 5 per cent, 2 per cent, 1 per cent, 0.5 per cent and 0.2 per cent annual exceedance probability (AEP) events and assessed flood depth, velocity and hazard under both existing and post-development conditions. Flood hazard was assessed using the Australian Rainfall and Runoff (ARR 2019) hazard classification framework, which categorises flood conditions from H1 (generally safe for people, vehicles and buildings) to H6 (extremely hazardous and unsafe for all people and vehicles), and incorporated both existing and post-development conditions. Climate change scenarios were also assessed to inform an understanding of future flood risk and resilience.

Key interactions between the project and surface water and flooding processes were identified to inform the assessment of impacts. Mitigation and management measures were then developed to address potential effects on hydrological and hydraulic regimes and water quality.

Further detail on the assessment methodology is provided in section 2 of the SWA (Technical Report 14) and section 5 of the Flooding Assessment (Technical Report 15).

18.2 Existing environment

18.2.1 Catchments and watercourses

The project area intersects catchments associated with the Gwydir, Namoi, Macleay, Manning and Hunter river systems. The Gwydir and Namoi rivers originate on the western slopes of the Great Dividing Range and form part of the Murray–Darling Basin, while the Macleay, Manning and Hunter rivers are coastal systems that drain east to the Pacific Ocean. These catchments also contribute to regionally important water resources, including Lake Glenbawn, Dungowan Dam, the Hunter River, Pages River, Macdonald River, Namoi River and Gwydir River systems.

Numerous watercourses occur within the project area, including a network of minor (first and second order) drainage lines and larger mapped waterways. The project area also intersects the upper reaches of Lake Glenbawn and contains numerous farm dams associated with existing agricultural land uses.The catchments and relevant major watercourses intersecting or occurring in proximity to the project are shown on Figure 18.1. The project would cross and interact with many of these watercourses, the majority of which are associated with natural drainage channels. A comprehensive list of watercourses and their associated Strahler stream order (stream hierarchy classification) is provided in section 3.3 of the SWA (Technical Report 14).

The project area is also subject to a number of Water Sharing Plans (WSPs) that regulate the extraction and management of surface water resources. The WSPs relevant to the project area are shown on Figure 18.1 and include:

- Regulated river water sources:
  - Water Sharing Plan for the Gwydir Regulated River Water Source 2016
  - Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated River Water Sources 2016
  - Water Sharing Plan for the Peel Regulated River Water Source 2022
  - Water Sharing Plan for the Hunter Regulated River Water Source 2016, which is associated with Lake Glenbawn and is intersected by the project area.
- Unregulated river water sources:
  - Water Sharing Plan for the Gwydir Unregulated River Water Sources 2012
  - Water Sharing Plan for the Macleay Unregulated and Alluvial Water Sources 2016
  - Water Sharing Plan for the Namoi and Peel Unregulated River Water Sources 2012
  - Water Sharing Plan for the Lower North Coast Unregulated and Alluvial Water Sources 2022
  - Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2022.

These WSPs provide the framework for the allocation, management and use of surface water resources across the catchments intersected by the project and are relevant to the assessment of construction water sourcing and cumulative water requirements.

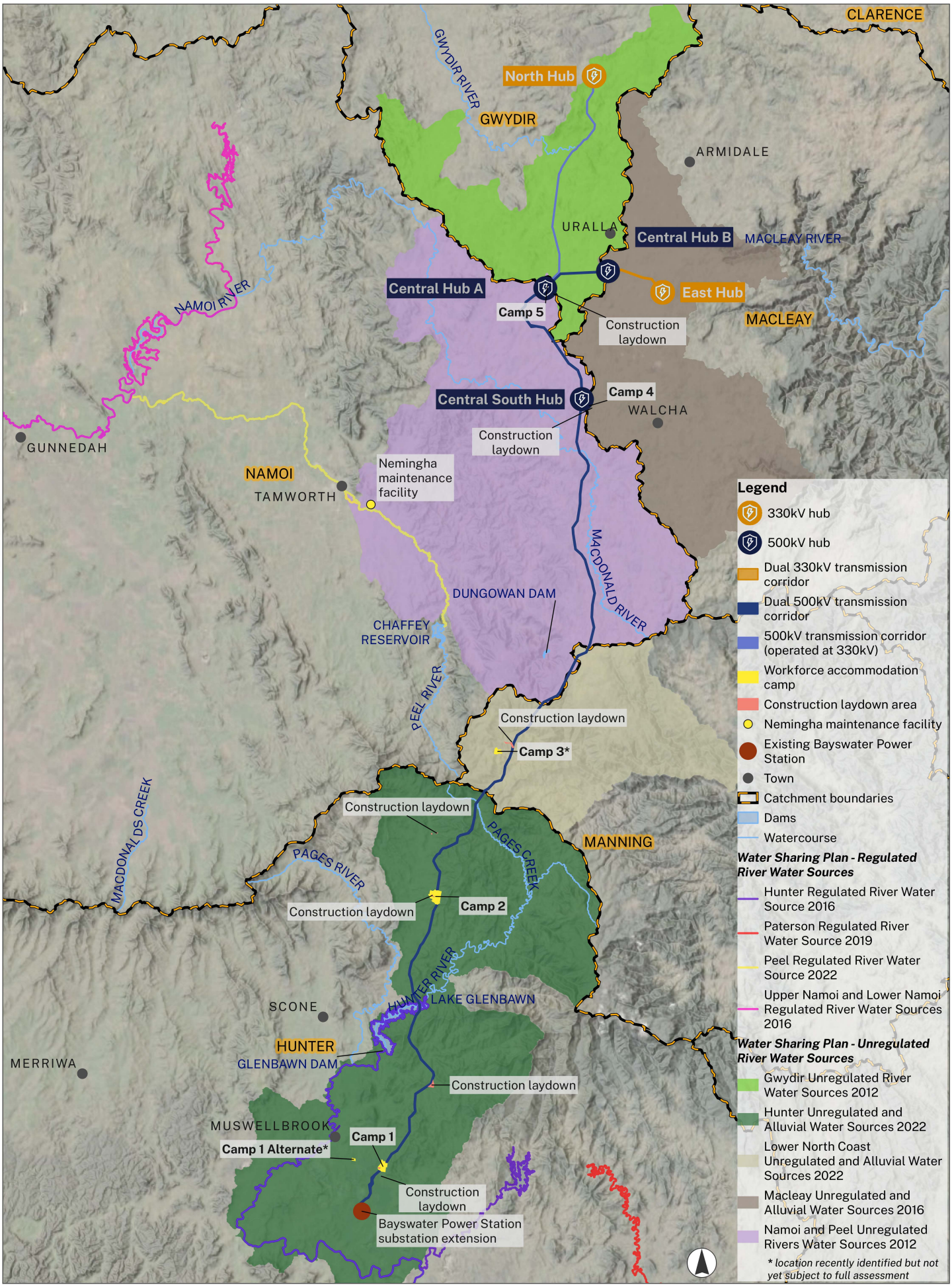


FIGURE 18.1 Catchments and water sharing plans

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

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

18.2.2 Geomorphology

The assessment of the geomorphic character of watercourses intersecting the project area has been informed by the NSW River Styles Database, which provides information on channel form, behaviour, condition and recovery potential for third order and higher streams. Recovery potential reflects the capacity of a watercourse to respond to disturbance and informs the level of management or intervention that may be required to maintain or improve condition.

Watercourses within the project area occur across a range of geomorphic settings, reflecting variability in catchment characteristics, land use and channel condition. River Styles mapping indicates that these watercourses comprise a mix of river valley forms, with geomorphic condition ranging from good to poor and corresponding variability in recovery potential. In general, higher order waterways within valley and floodplain settings exhibit moderate to good condition, while smaller tributaries and modified systems are more likely to exhibit poorer condition and lower recovery potential.

Watercourses located in proximity to the larger areas of the disturbance footprint associated with energy hubs, construction laydown areas and workforce accommodation camps occur across a range of geomorphic settings. These project components are generally located within lower order tributary catchments, with larger receiving watercourses intersecting, adjacent to, or downstream of the disturbance footprint. River Styles classifications of these waterways indicate they are predominantly in moderate to poor condition, with variable recovery potential.

Further detail on River Styles classifications and geomorphic attributes across the project area is provided in section 3.3 of the SWA (Technical Report 14).

18.2.3 Water quality

Surface water quality within the project area exhibits variability across a landscape characterised by land uses including grazing, cropping, energy generation and areas of native vegetation. The project traverses the Gwydir, Macleay, Namoi, Manning and Hunter River catchments, which are subject to differing water quality objectives and environmental values.

Baseline water quality has been characterised using publicly available monitoring data from the Peel River (Bowling Alley Point and downstream of Chaffey Dam), Cockburn River and Macdonald River, which provide a representative indication of water quality within and downstream of the project area. Water quality has been assessed against the water quality objectives for each relevant sub-catchment, with receiving environments assessed as ‘slightly to moderately disturbed systems’ in accordance with ANZG guidelines. The available data indicates that water quality across the project area is variable and does not consistently achieve guideline values. Nutrient concentrations commonly exceed guideline values, while turbidity generally complies with guideline values but exceeds them at times. These results are consistent with the predominance of agricultural land uses within the project area and the broader catchment setting.

Overall, surface water quality across the project area reflects a combination of land use influences and background catchment conditions. Further detail on baseline water quality and comparison with water quality objectives is provided in section 3.4 of the SWA (Technical Report 14).

18.2.4 Acid sulfate soils

Acid sulfate soils (ASS) and potential acid sulfate soils (PASS) are naturally occurring soils that contain iron sulfides. When exposed to air through excavation or drainage, these materials can oxidise and generate acidic conditions, resulting in the release of metals that may affect soils, surface water and groundwater.

A review of Australian National Soil Information System mapping identified areas of high probability but very low confidence for inland ASS occurrence associated with waterbodies surrounding Lake Liddell, Bayswater Power Station and Lake Glenbawn.

The broader project area is not representative of the conditions typically associated with inland ASS formation. Accordingly, the likelihood of ASS occurrence within the project area is considered low. Further detail is provided in section 3.5 of the SWA (Technical Report 14) and in the Contamination Assessment (Technical Report 19).

18.2.5 Flooding

Flood behaviour within the project area is influenced by both mainstream river flooding and localised runoff, with flooding from major watercourses (including the Hunter River, Macdonald River, Salisbury Waters and Gwydir River) representing the dominant mechanism. In steeper, upper catchments, flood extents are typically narrow and confined due to well-defined valleys and higher gradients. In contrast, broader flood extents occur at key river crossings, including the Hunter River, Macdonald River and Salisbury Waters floodplain areas, where overbank inundation is more extensive during larger flood events (for example 1 per centAEP).

The project area traverses hilly and undulating terrain, particularly within the upper reaches of the Macdonald River catchment and parts of the Salisbury Waters and Roumalla Creek catchments. In these areas, steep catchment gradients and well-defined valleys result in rapid runoff and concentrated channel flows. Localised flooding may also occur within smaller tributaries and low-lying areas, although these events are generally limited in extent compared with mainstream river flooding. Overall, flood behaviour is spatially variable across the project area. Most areas experience limited inundation due to topography, while higher flood exposure is generally associated with crossings of the Hunter River, Macdonald River and Salisbury Waters (and key tributaries of these major systems) and their associated floodplain environments.

18.3 Potential impacts – construction

18.3.1 Water quality

Construction activities have the potential to impact surface water quality due to ground disturbance, earthworks, vehicle movements, concrete works, material storage, watercourse crossings and wastewater management. Potential water quality risks associated with each project element are summarised in Table 18.1.

Table 18.1. Summary of potential construction water quality impacts

Project element	Key construction activities	Potential water quality risks
Transmission infrastructure, energy hubs, laydown areas and workforce accommodation camps	Site establishment, vegetation clearing, ground disturbance, earthworks, concrete works, vehicle movement, soil stockpiling, chemical and hazardous material storage and use, and water sourcing	• soil erosion and sedimentation of downstream watercourses and agricultural areas with increased turbidity and suspended sediments in runoff • spill of hydrocarbons or other pollutants used to support transportation and construction activities • release of stockpiled materials or concrete by-products including dust, slurry, alkaline water and dissolved metals • storage and handling of chemicals and hazardous materials • installation of pumping infrastructure causing erosion and mobilisation of sediments • disturbance of discrete areas identified as potential ASS.
Electrical infrastructure	Site establishment, vegetation clearing, ground disturbance, earthworks, concrete works, installation or upgrade of watercourse crossings and vehicle movement.	• soil erosion and sedimentation of downstream watercourses and agricultural areas • spill of hydrocarbons or other pollutants used to support transportation and construction activities • disturbance of discrete areas identified as potential ASS.
Access tracks and watercourse crossings	Vegetation clearing, ground disturbance, earthworks, installation or upgrade of watercourse crossings, and vehicle movement.	• soil erosion and sedimentation of downstream watercourses and agricultural areas • spill of hydrocarbons or other pollutants used to support transportation and construction activities • concentration of watercourse flows, with potential increased turbidity and suspended sediments, erosion of exposed soils and mobilisation of contaminants • disturbance of discrete areas identified as potential ASS.
Site facilities and amenities	Operation of site facilities, amenities and wastewater systems.	• discharge or spill of wastewater (treated or untreated), to downstream watercourses or agricultural areas.

Without appropriate management controls in place (noting that management controls are proposed), these activities may result in increased turbidity, sedimentation and contaminant loads in runoff, which can degrade water quality, impact aquatic habitats and affect downstream water users. Watercourse crossings and culvert installation may also result in localised changes to flow conditions, erosion and watercourse stability issues where not appropriately designed or managed.

Disturbance of ASS, if present, may also mobilise acidity and dissolved metals. As described in Section 18.2.4, areas of elevated ASS potential have been identified near some waterbodies such as Lake Liddell and Lake Glenbawn / Hunter River.

With the implementation of standard mitigation measures, including erosion and sediment controls, spill management, wastewater management systems and ASS management (where required), potential impacts to surface water quality are expected to be effectively managed.

Further detail on proposed mitigation measures is provided in Section 18.6.

NSW water quality objectives

Following the implementation of mitigation measures, potential impacts to water quality during construction are expected to be low.

A review of potential impacts to water quality with regard to the water quality objectives indicates that the construction-related risks described in Section 18.3.1 can be effectively managed through the implementation of the proposed mitigation measures. Specifically:

- project-related impacts on the water quality of the receiving environment during construction, if any, would be temporary and localised
- the ecological condition of receiving waterbodies is expected to be maintained and temporary disturbances to riparian corridors would be minimised and are expected to recover over time
- no material impacts to water quality including aspects such as visual amenity, secondary and primary contact recreation, drinking water supply, aquatic food production, livestock watering, irrigation, or homestead water supply are anticipated, as water quality leaving the project is expected to be comparable to that of the receiving environment
- no impacts to groundwater quality are anticipated that would affect drinking water at the point of supply.

Overall, water quality objectives in receiving environments are expected to be achieved and maintained.

18.3.2 Watercourses and riparian corridors

The design of the project has considered minimising impacts to watercourses and associated waterfront land (defined by the WM Act as the bed of any river, lake or estuary and the land within 40 metres of the river banks, lake shore or estuary mean high-water mark), including through the avoidance of direct disturbance where practicable, minimising clearing within riparian areas, and maximising the use of existing access tracks and crossings. The project design has also sought to minimise interactions with watercourses and waterfront land through careful siting of infrastructure and access tracks with the aim of utilising existing disturbed areas or existing access tracks where feasible.

Where interactions cannot be avoided, impacts to watercourses and riparian corridors would primarily occur during construction and be associated with vegetation clearing, earthworks, temporary instream works, and the installation or upgrade of watercourse crossings. These activities have the potential to result in localised disturbance to channel banks and riparian vegetation, increased turbidity and sediment mobilisation, and short-term changes to flow conditions.

The sensitivity of affected watercourses varies depending on their geomorphic condition and recovery potential. River Styles classifications indicate that watercourses intersected by the project range from good to poor condition and exhibit variable recovery potential. Watercourses with moderate to low recovery potential are generally more sensitive to disturbance and may require additional consideration during detailed design and construction planning. Disturbance of channel beds and banks has the potential to affect local geomorphic function, increase erosion risk and influence channel stability if not appropriately managed.

Most interactions with watercourses and riparian corridors are associated with access tracks and watercourse crossings, including the use and upgrade of existing crossings where practicable. Additional interactions may occur within energy hubs, construction laydown areas and workforce accommodation camps, including interactions with lower order drainage lines, mapped waterfront land and, in some locations, waterfront land associated with higher order watercourses. This includes waterfront land adjacent to sections of Spring Creek, Church Gully, Salisbury Waters, Bergen-op-Zoom Creek tributaries and Stony Creek.

All works within waterfront land would be undertaken in general accordance with the Guidelines for Controlled Activities on Waterfront Land and Managing Urban Stormwater: Soils and Construction (the 'Blue Book') (Landcom, 2004). These works would incorporate site-specific erosion and sediment controls, minimisation of disturbance, and progressive stabilisation and rehabilitation following construction. Construction would also be staged, where feasible, to avoid periods of high flow.

With the implementation of these measures, potential impacts to watercourses and riparian corridors are expected to be localised, temporary and of minor significance. Further detail on proposed mitigation measures is provided in Section 18.6.

18.3.3 Flow regimes

River flow objectives establish the key elements of flow regimes required to protect river health, water quality and downstream environmental values. Relevant objectives for the project area include the protection of water levels during dry periods, maintenance of natural low flows and flow variability, preservation of flow rises, including short-term increases in flow ('freshes') and high flow events, maintenance of wetland and floodplain inundation patterns, and minimising the impacts of instream structures.

Potential impacts to flow regimes are expected to be limited to temporary and localised changes during construction, primarily associated with instream works required for the construction of watercourse crossings. These activities would be managed to maintain flows where practicable and are not expected to result in measurable changes to low flows, flow variability or natural inundation regimes. The Flooding Assessment indicates that broader flood behaviour and inundation patterns would not be altered.

No permanent instream barriers (for example weirs or floodgates) are proposed, and all watercourse crossings would be designed and constructed to maintain flow conveyance and fish passage, consistent with relevant guidelines.

Overall, the project is not expected to materially affect flow regime processes and is not considered to conflict with the applicable river flow objectives.

18.3.4 Flooding

Construction activities may affect local flood behaviour through temporary disturbance of landforms, waterways and drainage features. Activities most likely to influence flooding include excavation, filling and temporary disturbance associated with access tracks, workforce accommodation camps, construction laydown areas, bulk earthworks, tower foundations, energy hubs and the Bayswater Power Station substation extension.

These activities may temporarily alter overland flow paths, reduce local flood storage and increase runoff from exposed or compacted surfaces. Temporary stockpiles, materials and access crossings may also obstruct flood flows where works occur within flood-prone areas. As a result, minor and localised changes to flood behaviour may occur in the immediate vicinity of works. Changes to flood extent, depth, velocity and hazard are, however, expected to be temporary, localised and generally confined to the project area.

Flood modelling and flood impact assessment undertaken for the project considered both the impact of flooding on construction activities and the impact of construction activities on local flood behaviour. The key findings are summarised in Table 18.2. Overall, impacts are generally minor and localised and can be managed through appropriate site layout, drainage design and flood management measures.

Table 18.2. Summary of construction flooding assessment

Project element	Impact of flooding on construction activities	Impact of construction activities on flooding
Workforce accommodation camps	Flood modelling indicates flood risk varies between camps. Camp 2 and Camp 5 are generally flood free, while Camp 1 and Camp 4 are affected by localised overland flow paths and drainage features. Flood-related impacts are expected to be manageable through site layout, drainage design and flood management measures.	Flood impact modelling indicates changes to flood behaviour would generally be minor and localised. Impacts are largely confined to the immediate vicinity of the camps and are not expected to result in material off-site impacts.
Construction laydown areas	Most laydowns are subject to low flood risk, although some sites contain shallow overland flow paths, local drainage lines or farm dams that may influence site layout and temporary access during flood events. Flood-related impacts would be manageable through site design and operational controls.	Impacts on flood behaviour are expected to be minor, temporary and localised, with no material off-site impacts anticipated. Site layout and detailed design would avoid or minimise encroachment into drainage features and flood-prone land where practicable.

Project element	Impact of flooding on construction activities	Impact of construction activities on flooding
Transmission line and access tracks	Flooding may temporarily restrict access to some tower sites, watercourse crossings and access tracks. These impacts would be localised and managed through construction planning, weather monitoring and scheduling of works.	Transmission tower foundations and associated construction activities including access tracks occupy relatively small, linear footprints. Any influence on flood levels, velocities or flow paths would be temporary and highly localised, with no material alteration to broader flood behaviour anticipated.
Energy hubs and Bayswater Power Station substation extension	Flood risk is generally low and associated primarily with localised overland flow paths. Floodwaters are generally predicted to remain around the perimeter of proposed bench areas and would not be expected to materially affect construction activities, provided appropriate site drainage and flood management measures are implemented.	Construction of hub benches and the Bayswater Power Station substation extension has the potential to locally redistribute shallow overland flow paths. Any changes to flood levels, velocities and hazard are expected to be minor, localised and manageable through detailed drainage and earthworks design, with no material off-site impacts anticipated.

Flooding may also affect construction activities by restricting access to work areas, inundating temporary works and excavations and disrupting plant and equipment operation, particularly during and following heavy rainfall events. Activities reliant on unsealed access, exposed excavations and stable ground conditions are most susceptible. Some localised constraints may occur where works intersect flood-prone areas, however, these risks would be managed through construction planning, monitoring of weather conditions, temporary drainage provisions and implementation of flood-related procedures within the CEMP.

Overall, potential impacts of construction activities on flooding are expected to be temporary, minor and localised. Modelling indicates that changes to flood levels, velocities and hazard would generally be confined to the immediate vicinity of works and would not result in material off-site impacts. With implementation of the mitigation measures described in Section 18.6, flooding risks to construction activities and construction-related impacts on flood behaviour are expected to be effectively managed.

18.3.5 Water requirements

Water requirements during construction would include both potable and non-potable water (refer to Section 3). Based on the current construction program, the total construction water requirement is estimated to be approximately 360 ML of potable water and 2,040 ML of non-potable water over the 6-year construction period. Potable water would be required to service workforce accommodation camps and concrete batch plants. Non-potable water would be required for activities such as civil works, dust suppression, equipment washdown and general site maintenance.

To assess potential impacts on water resources, the SWA (Technical Report 14) considered construction water requirements, available water supplies and the regulatory framework applying across the relevant WSP areas. The assessment identified potential water sources, compared predicted water requirements with available water allocations, and evaluated opportunities to capture, store and reuse water during construction.

Construction water requirements vary throughout the approximately 6-year construction period and peaks during Years 3 and 4, as shown on Figure 18.2. The transmission line component accounts for approximately 75 per centof the total non-potable water requirement, with the remainder distributed across energy hubs, workforce accommodation camps, laydown areas and supporting infrastructure.

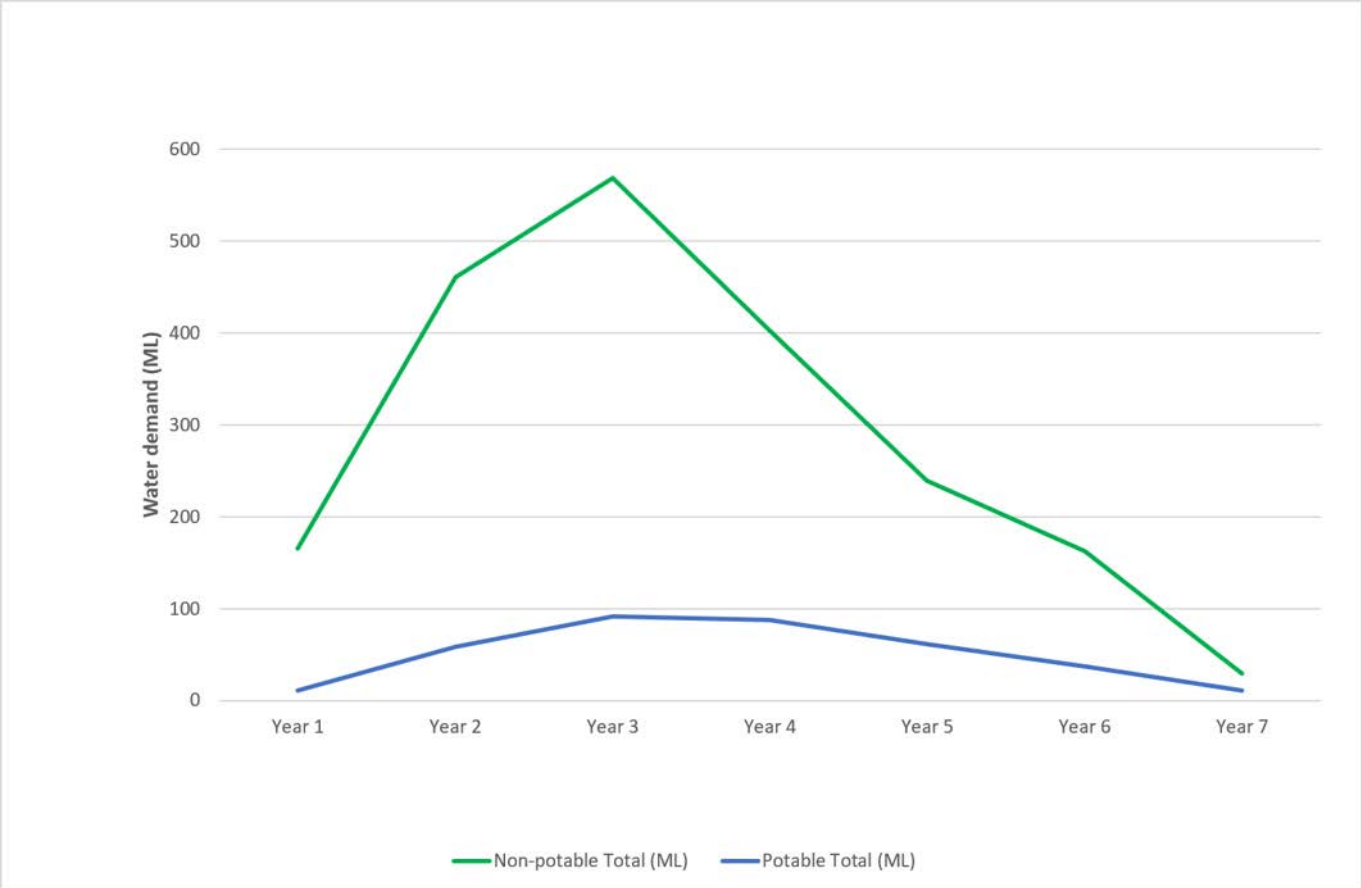


Figure 18.2. Estimated timeline of water requirements over the construction period

18.3.6 Project water supply

18.3.6.1 Water supply strategy

Non-potable water for the project would be preferentially sourced from a range of locations/sources, including:

- harvestable rights provisions from land owned by EnergyCo or by agreement with landholders
- collection of rainwater from roofs of buildings
- reuse of construction water and treated wastewater, subject to meeting applicable water quality criteria
- entering into agreements with willing Councils for the reuse of Council wastewater treatment plant and/or water treatment plant effluent
- extraction of water from surface water sources, including piping and storage of water on site
- extraction of water from groundwater sources, including from fractured rock aquifers (this may include aquifers where water quality may be unsuitable for potable supply or agricultural use but may be suitable for construction and industrial purposes) (refer to Section 19 and Technical Report 16 for further discussion on groundwater sources)
- entering into agreements with third-party water suppliers for the provision of treated effluent, mine water, industrial water and/or other non-potable water sources, subject to regulatory approvals and water quality criteria
- water imported to site via water truck (water supply companies).

Sources of non-potable water would be selected through an iterative process involving identification of:

- sources and suppliers based on their proximity to work areas
- willingness of suppliers
- infrastructure required to convey water to work areas
- supply reliability related to climate variability.

Potable water for the project would be sourced from commercial vendors including willing local Councils and other vendors located in proximity to each energy hub and workforce accommodation camp, and could include treated non-potable water. The demand for potable water by work area over the duration of the project would inform and support engagement with potential suppliers.

Water supplied from private dams and bores in agreement with associated landholders, would be within harvestable water rights and/or Water Access Licence (WAL) conditions held by the landholders. This would be managed between EnergyCo and associated landholders and/or applicable regulators if that source is needed during the construction phase.

Wherever practicable, the project would prioritise the use of harvestable rights water, collection of rainwater from roofs of buildings, and reuse of water. Where additional water is required, the project would seek to source water from available licensed entitlements that have sufficient capacity to meet demand without adversely affecting existing users. For workforce accommodation camps, the project may use local Council water supplies, subject to availability and agreement with the relevant service provider. By adopting a hierarchical approach that prioritises use of rainfall and runoff, reuse

of treated water, then available licensed water sources (including entitlements not currently being used), council supplies by agreement, and other surface water and groundwater take from sources with sufficient capacity, the project aims to meet its construction water requirements while minimising pressure on regional water resources and avoiding adverse impacts on existing entitlement holders.

EnergyCo has provided all Councils (other than Singleton and Liverpool Plains) with the estimated water needs per LGA. At meetings with the various Councils, during March and April 2026, the potential for each Council being open to supplying water was discussed. Enquiries were also made with WaterNSW and NSW DCCEEW regarding sourcing water from Lake Glenbawn, and AGL regarding sourcing water from Lake Liddell. A water broker has been engaged to assist with water sourcing and negotiations with existing licence holders that might be open to selling/temporarily transferring WALs.

EnergyCo proposes to develop a detailed water supply strategy as the project progresses and design details are refined, ensuring that project water demands can be met while minimising impacts on existing water users and protecting water available for the environment.

18.3.6.2 Potential surface water supply sources

The project area is situated across multiple regulated and unregulated river and groundwater WSPs across the Gwydir, Namoi, Macleay and Hunter catchments (refer to Figure 18.1). As required, construction water would be sourced across these catchments, reducing reliance on any individual water resource. Potential water sources include existing licensed surface water and groundwater sources, harvested runoff, commercial suppliers, local councils and imported water, with sourcing determined based on availability, supply reliability, proximity to work areas and regulatory requirements.

The SWA assessed the opportunity to capture and store rainfall runoff in accordance with applicable harvestable rights provisions under the WM Act, which allow landholders to capture and store in dams a proportion of the average annual rainfall runoff from their landholdings for use on those landholdings. Within the project area, the energy hubs, camps and laydown areas are considered to be the most likely to support rainfall-runoff harvesting. The assessment identified a conservative maximum harvestable rights capacity exceeding 200 ML across the proposed energy hubs, workforce accommodation camps and laydown areas (refer to Table 18.3). This may provide a substantial source of non-potable water and reduce reliance on other surface water sources. However, the volume available at any given time would depend on rainfall conditions, storage infrastructure and operational requirements.

Additionally, to identify whether sufficient water is available to support construction, peak yearly construction water requirements were compared against available allocations within each relevant water source to determine if there is sufficient capacity for construction related water take by EnergyCo without impacting on other water users or environmental flows.

Unregulated watercourses are watercourses where flows occur naturally and are not controlled by major water storage or release infrastructure, and as such, water availability depends on natural rainfall and runoff condition. In contrast, regulated rivers are watercourses where flows are controlled by infrastructure such as dams, weirs, and reservoirs, allowing water to be stored and released to meet environmental, town water supply, irrigation, and other water use needs.

To assess the potential availability of water within the unregulated water sources intersecting the project area, a summary of WAL allocations under the relevant WSPs was compiled for each water source and is summarised in Table 18.3. The volumes presented are based on the available water allocations for the 2026-27 water year, as recorded in the NSW Water Register (https://waterregister.waternsw.com.au).

As shown in Table 18.3, peak year demand for non-potable water represents approximately 1 per cent of available allocations within each WSP area, except for the Macleay where peak yearly demand for non-potable water is around 9 per cent. At some locations harvestable rights represent a high proportion of peak yearly demand and the use of harvestable rights water combined with other water supply options as discussed above, would reduce reliance on other water sources.

Further discussion on the potential use of groundwater as a source of non-potable water during construction is provided in Section 19 and Technical Report 16.

Table 18.3. Non-potable water requirements, harvestable rights and allocations by WSP

Water Sharing Plan (for intersecting water sources only)	Work area(s)	Estimated peak yearly requirement (ML)	Estimated harvestable right (ML)1	WSP Unregulated (ML)2
Gwydir Unregulated River Water Sources	North Hub	17.4 (year 5)	16.6	2,420
Macleay Unregulated and Alluvial Water Sources	Central Hub B, East Hub, Central South Hub, Camp 4 and surrounding transmission works	152.8 (year 3)	55.4	1,796
Namoi and Peel Unregulated Rivers Water Sources	Central Hub A, Camp 5, surrounding transmission works and Tamworth maintenance facility	178.5 (year 4)	25.2	16,066
Lower North Coast Unregulated and Alluvial Water Sources	Barry Road Laydown	-	17.0	1,216
Hunter Unregulated and Alluvial Water Sources	Albano Road Laydown, Camp 2, Timor Crawney Road Laydown, Camp 1, surrounding transmission works and Bayswater Power Station substation extension	328.2 (year 3)	96.0	36,124

Notes:

1. Conservative estimated based on disturbance footprints, not landholdings

2. 1 unit share = 1 ML

18.3.6.3 Exposure to climate variability

The SWA also considered exposure to climate variability and drought conditions. The project is located within predominantly unregulated water sources, where water availability is dependent on prevailing rainfall and runoff conditions. The SWA notes that non-potable water requirements may increase during dry conditions due to increased dust suppression requirements, while water availability may be reduced during prolonged drought periods.

As no accurate water utilisation data is available for unregulated water sources, there are no historical records available to assess longer-term trends in water availability within the unregulated sources. The SWA therefore undertook a review of historical allocation and utilisation data for nearby regulated river systems to provide a broad indication of prevailing hydrological conditions and potential constraints on water availability in unregulated sources. The results of the review provide an indication of climatic and hydrological conditions that may influence water availability across the project area.

Results of the review indicate that the Namoi regulated water source exhibits the highest and most consistent utilisation rates, with a median utilisation of approximately 75 per cent and utilisation commonly exceeding 70 per cent, indicating that water users regularly access most of their available allocations. This suggests strong dependence on water resources and limited spare capacity. In contrast, the Gwydir, Peel and Hunter systems show lower median utilisation rates, indicating that a substantial proportion of allocated water is not used in many years. However, these 3 systems all also display considerable variability, with utilisation having historically reached maximums of 95 per cent for the Gwydir, 65 per cent for the Peel and 70 per cent for the Hunter, demonstrating that water demand can increase substantially under certain conditions.

As noted previously, water sourcing arrangements for the project would be confirmed during detailed design. To minimise pressure on regional water resources, the proposed water sourcing strategy prioritises harvestable rights water, followed by available licensed water sources and, where appropriate, potable supplies from local councils or other suppliers. The potential for increased water demand during prolonged dry periods, particularly for dust suppression activities, would be considered during detailed design and construction planning.

Based on available allocations, historical utilisation patterns, the proposed sourcing hierarchy, proposed management measures and the potential use of harvested runoff, the SWA concluded that construction water requirements are unlikely to materially affect existing water users, water entitlements or water sharing outcomes noting that uncertainties exist regarding future climatic conditions, water allocations and water use patterns.

Under Schedule 4 of the Water Management (General) Regulation 2025, certain exemptions from water access licences apply to public authorities (such as EnergyCo), including taking water that occurs in connection with the construction of essential infrastructure. Notwithstanding these exemptions, the project's water sourcing strategy seeks to minimise reliance on licensed water resources through the use of harvested runoff, available licensed entitlements and alternative supply sources where practicable.

Overall, construction water requirements are expected to represent a small proportion of available water resources within the relevant WSP areas. The distribution of construction water requirements across multiple catchments, availability of alternative supply options, and opportunity to capture and reuse rainfall runoff indicate that impacts on regional and local water supplies are expected to be minor. Further information is provided in section 4.2 and section 4.3 of the SWA (Technical Report 14).

18.4 Potential impacts – operation

During operation, potential impacts to surface water are primarily associated with soil erosion and sediment mobilisation, accidental spills of hydrocarbons or other pollutants and wastewater management. Ongoing water demands during operation would be minimal, with minimal wastewater expected to be generated. Flood-related impacts are primarily associated with the interaction of operational infrastructure with flood-prone areas.

Operational activities, as well as any areas of inadequate site stabilisation following construction, may result in sediment mobilisation to surrounding drainage lines and downstream watercourses. Erosion from access tracks and other disturbed areas also has the potential to increase turbidity and sedimentation in receiving environments. As described in Section 18.3.1, these changes can degrade water quality and impact aquatic habitats and downstream water users and measures are proposed to address these risks.

There is also a risk of surface water contamination from incidental spills or leaks of hydrocarbons and other chemicals, as well as from the discharge or spill of wastewater (treated or untreated). These risks would be managed through standard environmental management measures that are proposed and that would be documented in the OEMP.

Operational impacts on watercourses and riparian corridors are expected to be minimal, as disturbance would be largely confined to infrastructure footprints and access tracks retained post construction (refer to Section 18.3.2). Any new permanent watercourse crossings would be designed to maintain streamflow.

The Flooding Assessment undertaken for the project indicates that operational flood risk is generally low and manageable. The proposed energy hubs are generally located outside areas affected by regional flooding and are primarily subject to localised shallow overland flow paths. Flood modelling indicates that any changes to flood levels and velocities associated with operation of the hubs would be minor, localised and dissipate rapidly, with no material off-site impacts anticipated. Local drainage infrastructure incorporated into the bench design would assist in maintaining flood protection and managing local overland flow pathways.

Consistent with the energy hubs, the Bayswater Power Station substation extension would be designed to achieve flood immunity to the 1 per cent AEP flood level (that is, it would remain functional during a flood event that has a 100-year recurrence interval, historically referred to as a 1 in 100-year flood) with appropriate freeboard and to maintain existing overland flow paths around the site. Floodwaters are predicted to remain around the perimeter of the proposed bench during the 1 per cent AEP event, with any redistribution of flows expected to be minor and highly localised.

A future climate change assessment was undertaken for the energy hubs and Bayswater Power Station substation extension under a 2100 climate change scenario. The assessment found that future climate change may result in minor increases in flood levels and localised changes to overland flow paths around bench footprints. Predicted changes in flood behaviour were generally small and remained confined to the immediate vicinity of the infrastructure. For the Bayswater Power Station substation extension, future climate change is expected to result in very minor and localised changes to flood behaviour around the perimeter of the proposed bench, with small increases in flood levels due to redistribution of shallow overland flow. The majority of the expanded substation bench is likely to remain above the design flood level, although with reduced freeboard under the future climate change scenario, with no material increase in peak flood levels or change to regional flood behaviour anticipated. The assessment concluded that these changes would be localised, relatively minor in magnitude and manageable through appropriate local drainage design and would not materially alter the broader flood risk profile of the project.

The Nemingha Maintenance Facility is located on the Cockburn River floodplain and is influenced by flooding from both the Cockburn River and Peel River. Flood modelling indicates that part of the site would be inundated under existing 1 per cent AEP conditions, with floodwaters encroaching into the south-western portion of the site. To manage this risk, the facility would be elevated to achieve immunity to at least the 1 per cent AEP event with appropriate freeboard. The flood impact assessment found that the facility would have negligible impacts on regional flood behaviour, with any redistribution of floodwaters confined to the immediate vicinity of the site and no significant adverse impacts to upstream or downstream properties outside the project area.

Where transmission structures are located within flood-prone areas, only the tower footings would interact with flood flows. A conservative hydraulic case study undertaken as part of the Flooding Assessment demonstrated that any changes to flood levels and velocities would be confined to the immediate vicinity of the structure and would not materially influence broader flood behaviour. Any operational impacts associated with access tracks would similarly be localised and managed through appropriate drainage and scour protection measures.

Flooding of energy hub access roads and access tracks may temporarily restrict access during significant flood events. The flooding assessment identified that the most notable constraints occur at the North Hub and Central South Hub, where some crossings are subject to relatively deep flooding and high hazard classifications (up to H5 and H6) during 1 per cent and 10 per cent AEP flood events. It is noted that during such events the broader road network would also be affected by flooding.

For the remaining hubs, flooding impacts are generally associated with a limited number of discrete creek and floodplain crossings rather than extended lengths of inundated roadway. As a result, access interruptions are expected to be temporary and event-driven, with access generally available under normal conditions and manageable through scheduling, monitoring of weather forecasts and flood warnings, and contingency planning.

Access track assessments indicate that the majority of crossings are characterised by relatively small, inundated areas and hazard classifications of H1 to H2. A small number of crossings are associated with higher hazard classifications and increased scour potential and would be subject to targeted design, inspection and maintenance requirements. Access tracks are not expected to be used during heavy rainfall or flood events, further reducing operational flood risk.

Flood emergency response considerations were also assessed for the energy hubs and operational facilities. The assessment concluded that several sites may experience temporary isolation during extreme flood events due to inundation of surrounding roads and creek crossings, despite the hubs themselves generally remaining flood free. Where reliable vehicular evacuation cannot be guaranteed during extreme flood events, emergency management would be based on a shelter-in-place strategy supported by conservative operational controls, including avoidance of site occupation during forecast severe weather and flood conditions. The assessment concluded that residual flood risk to life at the assessed hubs and operational facilities would be low and manageable.

Overall, with the implementation of appropriate management measures, potential impacts to surface water and flooding during operation are expected to be localised, confined to the project area and minor. Further detail on mitigation measures is provided in Section 18.6.

18.5 Cumulative impacts

The potential cumulative impacts of the project have been identified based on the scale and nature of the project, in combination with the potential impacts of other relevant existing and future projects. A list of the projects considered in the cumulative assessment for surface water and flooding is provided in Section 24.

The cumulative assessment is detailed in section 6 of the SWA (refer to Technical Report 14) and section 10 of the Flooding Assessment (refer to Technical Report 15), with the key findings summarised in Section 24. The assessments concluded that during both construction and operation, potential cumulative impacts to surface water and flooding are expected to be limited and localised. Water demand during construction has the potential to contribute to cumulative impacts where multiple projects draw on shared water sources over similar timeframes, however, nearby projects are proposing to source water from a range of supply options, all of which would be utilised in accordance with water access and extraction rules managed under the WM Act and relevant WSPs.

18.6 Mitigation and management

The proposed management measures for surface water and flooding prioritise avoidance of impacts as the primary approach, followed by impact minimisation and where required, mitigation. While not all interactions with surface water and flooding processes can be avoided, the implementation of appropriate management measures would reduce potential impacts to acceptable levels and maintain the integrity of receiving environments.

Where impacts occur, measures such as erosion and sediment controls, water quality management, and design measures to maintain flow conveyance would be implemented to manage risks to water quality, watercourses and flow regimes. These measures also support the protection of downstream environments and existing water uses.

An overview of the proposed mitigation and management measures for surface water and flooding is provided in Table 18.4.

Table 18.4. Surface water and flooding - mitigation and management measures

Reference	Impact	Mitigation measure	Timing	Relevant locations
SW1	Impacts to soil and water resources from construction	A Soil and Water Management Plan (SWMP) and Erosion and Sediment Control Plan (ESCP) will be developed and implemented in accordance with relevant guidelines.	Pre-construction Construction	All locations
SW2	Impacts to watercourses and waterfront land from additional watercourse crossings	Minimise impacts from watercourse crossings by limiting crossings to existing access tracks where practicable, locating and orienting crossings to reduce disturbance, and designing crossings to minimise flood risk and impacts on upstream and downstream watercourse conditions. Design watercourse crossings to consider existing bed and bank stability, hydraulic gradients, and required scour protection, and: • consider geomorphic design risk rankings, where watercourses are rated as high geomorphic design risk, as requiring enhanced designs for geomorphic protection • consider geomorphic protection rankings, where watercourses are listed as high or very high, as requiring additional consideration of watercourse protection during detailed design and construction • maintain streamflow in watercourses during construction works and where permanent watercourse crossings are proposed. Design, construct and maintain crossings to be generally in accordance with DPI Fisheries Policy and Guidelines for Fish Habitat Conservation and Management (DPI, 2013), and Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings (Fairfull & Witheridge, 2003), including riparian buffer zones being established adjacent to areas of Key Fish Habitat.	Detailed design	Within waterfront land
SW3	Impacts to watercourses and waterfront land from vegetation clearing	Optimise, where possible, the number and location of transmission towers to minimise vegetation clearing within waterfront lands.	Detailed design Construction	Within waterfront land

Reference	Impact	Mitigation measure	Timing	Relevant locations
SW4	Impacts to natural drainage and flow regimes	Minimise impacts to natural drainage and flow regimes by locating infrastructure and stockpiles away from drainage lines, riparian vegetation and overland flow paths, grading earthworks to maintain existing catchments and flow paths where practicable, and diverting upstream flows around construction areas as required.	Detailed design Construction	All locations
SW5	Acidification of soil and groundwater due to the exposure and excavation of ASS	Measures to manage potential in-land acid sulfate soils if encountered, in accordance with the NSW Acid Sulfate Soil Guidelines. If encountered, a project specific Acid Sulfate Soil Management Plan (ASSMP) will be required, specifically pertaining to ground disturbance activities occurring in the vicinity of Lake Glenbawn.	Construction	Areas within the project area mapped as high risk of ASS
SW6	Impacts to water availability due to project water use	Account for all water take that is needed to support water supply arrangements during construction and operation. Extract/take water from surface waters with consideration of the rules within the relevant WSP (for example cease to pump rules).	Construction Operations	All locations
SW7	Impacts to water quality from wastewater discharge	Design and implement wastewater collection and treatment systems, where required, that are appropriately sized for the project infrastructure. Where possible collect and treat wastewater from site offices for re-use on site to fulfil non-potable construction and operational water demands. The specifics of on-site wastewater management systems, including design and capacity, would be determined in the detailed design phase, and will comply with ANZG Volume 3: Primary industries — Rationale and background information, Chapter 4: Irrigation water quality (ANZG, 2018) and the requirements of the Public Health Act 2010.	Detailed design Construction Operations	All locations
SW8	Impacts to water availability due to project water use	EnergyCo will develop a detailed Water Supply Strategy as part of detailed design, ensuring that project water demands can be met while minimising impacts on existing water users and protecting water available for the environment. The strategy will include a hierarchical approach that prioritises minimising	Detailed design	All locations

Reference	Impact	Mitigation measure	Timing	Relevant locations
		pressure on regional water resources and avoiding adverse impacts on existing entitlement holders. The strategy will be prepared in consultation with Councils and other relevant stakeholders.		
FL1	Impact of flooding on construction	Site layout, stockpiling, and material storage located to avoid overland flow paths up to the 5% AEP event, where practicable, to minimise flood risk and reduce the potential for flood damage. Temporary drainage controls (for example diversion drains, bunding, culverts, sump pumps) would be installed where required to safely convey runoff through construction areas. Emergency access and egress routes for construction personnel would be maintained at all times and reviewed following heavy rainfall events.	Pre-construction Construction	All locations
FL2	Impact of flooding on operation	Permanent infrastructure would be designed having regard to applicable flood immunity criteria for critical infrastructure. Where infrastructure is located within flood risk areas, flood-resilient design measures (for example elevation of finished floor levels, waterproofing, protective bunding, submersible equipment where appropriate) would be incorporated. Hub benches to be set at the 1% AEP plus 0.5 m freeboard where impacted by flooding. Where impacted by local drainage, a minimum of 300 mm freeboard should be adopted if the flood risk is considered low. Consideration of hydraulic loads, debris loads and impact of scour on structural stability of towers.	Detailed design	Critical infrastructure
FL3	Impact of construction and operation on flooding	During construction, temporary works would be configured to avoid unnecessary obstruction of overland flow paths and drainage lines. The project would be designed to limit impacts on flooding to pre-development conditions outside of the project in the construction phase for events up to the 5%	Detailed design Construction	All locations

Reference	Impact	Mitigation measure	Timing	Relevant locations
		AEP and in the operational phase up to the 1% AEP event. Any unavoidable flood impacts would be mitigated through localised drainage upgrades, onsite detention, scour protection, flow path realignment or landform grading, as identified during detailed design.		
FL4	General flood impacts	Detailed flood impact assessment is required at detailed design to confirm flood risk to critical project assets or where there is the potential to impact adjacent properties or public safety.	Detailed design	Critical infrastructure
FL5	Flood impacts to operational access	Flood risk to access routes should be reviewed during detailed design having regard to the proposed design, operational requirements and desired level of service. Where unacceptable risks are identified, appropriate design, maintenance or operational measures should be considered.	Detailed design Operation	Access tracks and public road upgrades
FL6	Flood impacts on emergency access and evacuation	Emergency access and flood response requirements should be reviewed during detailed design and operational planning. Where flood risk is identified as a constraint to emergency access, appropriate emergency management measures should be developed in consultation with relevant stakeholders that is, SES and Council.	Detailed design Operation	Maintenance facility, energy hubs, workforce accommodation camps and construction ancillary sites
FL7	Isolation of flood-prone facilities	The potential for flood-related isolation should be assessed during detailed design and operational planning. Where isolation risks are identified, appropriate access, shelter-in-place or operational management measures should be considered.	Detailed design Operation	Operational facilities
FL8	Flood impacts to camps, laydowns and ancillary facilities	Flood risk should be considered during site layout at detailed design stage. Where camps, laydowns or ancillary facilities are proposed within flood-prone areas, the need for setbacks, mitigation measures or operational controls should be assessed.	Detailed design	Camps, laydowns and ancillary facilities

Reference	Impact	Mitigation measure	Timing	Relevant locations
FL9	Elevated flood hazard, scour and erosion risks at crossings	Waterway crossings identified as having elevated flood hazard, scour or erosion risk should be reviewed during detailed design to determine whether additional drainage, scour protection, maintenance provisions or operational controls are required having regard to the proposed design and intended level of service.	Detailed design	High-risk access track and public road crossings
FL10	Flood impacts on broader road network access	Where operational access is dependent on public roads located within flood-prone areas, the suitability of the access route should be reviewed during detailed design. Any identified flood-related access constraints should be considered in operational planning and emergency management procedures.	Detailed design Operation	Public road connections to hubs and project infrastructure

Groundwater



Section 19

19 Groundwater

This section summarises the assessment of potential impacts to groundwater during construction and operation, and outlines the measures proposed to avoid, minimise and manage these impacts.

The Groundwater Impact Assessment (GWIA) prepared by Aurecon is provided in full in Technical Report 16.

19.1 Assessment approach

The assessment methodology has been informed by relevant legislation, water sharing plans, policies and technical guidelines. Further detail is provided in Section 2 of the GWIA (Technical Report 16).

The GWIA has been prepared with reference to the SEARs as detailed in Appendix A.

The assessment considers issues raised in engagement with community stakeholders and relevant regulatory authorities (refer to Section 5) including matters relating to project water requirements and potential impacts on existing water resources and water users. This includes consideration of potential impacts to groundwater resources, groundwater users and groundwater dependent ecosystems (GDEs).

The GWIA was prepared using a combination of desktop review and site investigation data, incorporating legislative and policy context, baseline hydrogeological conditions and reference design information. The assessment was undertaken at a regional scale using a defined groundwater study area extending 1.5 kilometres beyond the project area to assess the potential area of groundwater influence. The extent of the groundwater study area is described in Section 1.3 of the GWIA and is shown in Appendix A of the GWIA.

The desktop review relied on publicly available databases to characterise the existing groundwater environment within the groundwater study area, supported by site investigations undertaken by Douglas Partners.

A qualitative assessment of potential groundwater impacts was undertaken based on available baseline data. The assessment considered construction and operational activities, including the presence of infrastructure such as transmission towers, hubs and access roads.

A qualitative risk assessment was undertaken to identify potential impacts to groundwater aquifers, including a review of construction and operational impacts to groundwater users and sensitive environments such as GDEs, both in terms of groundwater flow and groundwater quality. A review of water licensing requirements was also undertaken for the construction groundwater take.

Further detail on the assessment methodology is provided in Section 3 of the GWIA (Technical Report 16).

19.2 Existing environment

19.2.1 Hydrogeology

Regional geological and hydrogeological mapping sourced from Geoscience Australia indicates that the project area is predominantly located within the North-east Australian fractured rock province, with a portion of the southern extent located within the Sydney Basin.

Groundwater occurs predominantly within fractured rock aquifers across most of the project area, with sedimentary aquifers present in the Sydney Basin. The Hawkesbury Sandstone is the main aquifer unit within the Sydney Basin and contains both fractured and porous groundwater systems.

Groundwater conditions vary across the project area. In fractured rock areas, groundwater is unevenly distributed and can vary over relatively short distances, resulting in differences in groundwater availability and quality between locations. Groundwater within the Sydney Basin shows similar variability, although it may be more continuous within sedimentary rock layers in some locations.

Baseline groundwater levels across the regional groundwater study area are:

- Fractured/porous rock groundwater sources: approximately 9 metres below ground level (mbgl), as per regional studies and between 3–8 mbgl as per site-specific investigations
- Sydney Basin groundwater source: approximately 12 mbgl as per regional studies and approximately 8 mbgl as per regional groundwater monitoring sites
- Alluvial groundwater sources: shallower groundwater levels can be expected to range between approximately 6–7 mbgl as per regional groundwater monitoring sites.

The project area extends across 4 water sharing plans (WSPs) with various groundwater sources within each WSP. The proportional extent of each WSP within the groundwater study area is summarised below:

- NSW Murray Darling Basin Fractured Rock Groundwater Sources 2020 (43.4 per cent of the groundwater study area)
- North Coast Fractured and Porous Rock Groundwater Sources 2016 (53.5 per cent of the groundwater study area)
- Namoi Alluvial Groundwater Sources 2020 (0.4 per cent of the groundwater study area)
- Hunter Unregulated and Alluvial Water Sources 2022 (2.7 per cent of the groundwater study area).

The WSPs include information relating to registered bores, WALs, groundwater allocations and extraction limits for each groundwater source. This information is summarised in Section 4.6.2 of the GWIA (refer to Technical Report 16). Groundwater resources are in use across the project area, however, available share volumes remain within several groundwater sources. These resources may provide opportunities for construction water supply.

Based on limited salinity data from registered groundwater bores and water quality data collected in site-specific contamination investigations, the groundwater within the project area is considered to be of fresh to brackish quality, suitable for a range of beneficial uses. Baseline water quality across the groundwater study area is generally:

- not suitable for consumptive use (as it exceeds the adopted drinking water guidelines)
- of generally moderate ecological value (as it exceeds the adopted freshwater toxicant ecological and aesthetic guidelines, protective of 90 per cent of species)
- of low irrigation potential (as it exceeds the adopted long term irrigation guidelines).

19.2.2 Sensitive groundwater receivers

Sensitive groundwater receivers utilise or depend on groundwater resources. These include registered groundwater bores and GDEs.

Registered groundwater bores

Groundwater is a resource used across the project area for a range of uses, including stock and domestic supply, irrigation, industry and monitoring. A total of 608 registered bores have been identified within the groundwater study area, which includes an additional 1.5 kilometres buffer from the project area. Additional bores may also occur under basic landholder rights that are not formally registered.

Registered bores are generally spatially dispersed, with groundwater use localised and influenced by the underlying geology and aquifer conditions.

Given the predominance of fractured rock aquifers, groundwater conditions can vary over relatively short distances. As a result, bores, particularly those screened within lower yielding aquifers, may be more sensitive to changes in groundwater levels or quality than those within higher yielding systems.

Further detail on existing groundwater bores, licences and usage is provided in the GWIA (Technical Report 16).

Groundwater dependent ecosystems

GDEs within the project area exhibit a range of groundwater dependency. Terrestrial GDEs are considered to have variable dependence, ranging from low to high. Aquatic GDEs are generally considered to have moderate to high dependence, including the Macdonald River, which is identified as a gaining system with known groundwater interaction.

No subterranean (stygofauna) GDEs or spring systems have been identified within the project area based on available datasets, including the Bureau of Meteorology GDE Atlas. However, the groundwater study area intersects 2 limestone karst systems, the Timor Limestone Member (Timor caves) and the Manning Limestone Beds (Barry caves), which have recognised ecological and heritage value with an approximate extent of Barry caves provided to EnergyCo by the speleological society. As described in Section 2.6, Section 7 and Appendix B the project development has prioritised avoidance of these karst systems.

Watercourses and waterbodies with groundwater influence within or in proximity to the groundwater study area are also likely to function as inflow dependent ecosystems, supported in part by groundwater contributions such as baseflow. High ecological value aquatic ecosystems have been identified within these systems, predominantly associated with watercourses and streams.

Key waterbodies within the groundwater study area exhibit differing levels of groundwater interaction. Lake Liddell is an engineered waterbody and is likely to have limited hydraulic connection with surrounding groundwater. In contrast, Lake Glenbawn is a high value water supply reservoir where groundwater is likely to contribute to baseflow from surrounding catchments.

Further detail on GDEs is provided in Section 7 and Technical Report 1.

19.3 Potential impacts – construction

Construction activities have the potential to impact groundwater through changes to groundwater flow, levels and quality, as well as impacts to groundwater users and sensitive environments. These impacts are primarily associated with excavation, dewatering, groundwater extraction and surface disturbance activities.

The potential construction impacts to groundwater are summarised in the following sections. Mitigation and management measures to avoid or minimise these potential impacts are summarised in Table 19.1. With the implementation of these measures, the potential construction impacts to groundwater are expected to be localised and present a low residual risk.

19.3.1 Groundwater level and flow

Construction activities have the potential to alter groundwater flow paths, recharge and groundwater levels at a local scale. These impacts may occur where piling, footing and foundation excavations, hub earthworks, service relocation works or dewatering activities intercept perched or shallow groundwater. Soil compaction and the creation of hardstand or access surfaces may also reduce infiltration and recharge, resulting in localised changes to groundwater conditions.

Impacts are expected to be localised and generally temporary. Some impacts may persist where permanent infrastructure or drained excavations alter groundwater flow paths or recharge. Sensitive receptors may include nearby groundwater users and GDEs, particularly where aquifer productivity is low or groundwater conditions are already variable (refer to Section 19.3.5 for additional detail).

19.3.2 Groundwater quality

Construction activities have the potential to impact groundwater quality. These impacts may arise from accidental leaks and spills of fuels, oils and chemicals, discharge of dewatered groundwater, and the exposure of potential acid sulfate soils. Mobilisation of sediments or contaminants from disturbed or compacted surfaces may also occur.

Some areas, including limestone karst systems, may be more sensitive to groundwater quality impacts due to increased run-off pathways and groundwater connectivity. Potential groundwater quality impacts in these areas are expected to be highly localised. The project proposes to utilise existing roads, including Sargeants Gap Road in the vicinity of the Timor caves karst system, where localised road treatment works may be required to facilitate construction vehicle movements. In the absence of appropriate controls, there is a potential for contaminants associated with road use and localised road works to affect sensitive downstream environments, however, these risks can be managed with standard construction controls (refer to Section 19.6 for additional detail).

19.3.3 NSW Aquifer Interference Policy

The NSW Aquifer Interference Policy (AIP) explains the process of administering water policy under the WM Act, for activities that interfere with the aquifer. The AIP outlines the assessment process applied by DCCEEW (NSW) Water to assess aquifer interference projects, including:

- if the predicted impacts are less than the level 1 minimal impact considerations (as defined in the AIP), these impacts may be considered acceptable
- if predicted impacts exceed the level 1 thresholds, the project would potentially be accepted as suitable with appropriate monitoring and controls.

The AIP minimal impact considerations relating to groundwater levels, groundwater quality, groundwater users and GDEs were considered as part of the groundwater assessment.

The groundwater assessment (provided in Technical Report 16) concluded that construction and operation impacts to groundwater were rated as low risk, except for the risk of groundwater acidification occurring in the vicinity of Lake Glenbawn because of construction works in areas of potential acid sulfate soils, which was noted as medium risk. These risks can be managed with standard construction controls for working in such environments. With the implementation of the proposed monitoring, management and mitigation measures, the project is unlikely to cause material impacts to groundwater systems and is expected to satisfy the level 1 minimal impact thresholds with appropriate implementation of the proposed mitigation measures.

19.3.4 Sensitive environments

Construction activities have the potential to impact sensitive groundwater environments within the groundwater study area, including waterbodies, waterways and karst systems. Impacts may arise from localised changes to groundwater flow, levels and quality associated with excavation, dewatering and surface disturbance.

At Lake Liddell, the groundwater environment is already significantly modified as a result of existing industrial and mining activities in the area, and construction activities associated with the project are expected to result in minimal additional impact.

At Lake Glenbawn, construction of transmission line infrastructure, including piling, excavation and associated works, may result in localised and short-term changes to groundwater flow and quality. In particular, disturbance of potential acid sulfate soils at discrete locations adjacent to the shoreline of Lake Glenbawn may affect groundwater quality where groundwater contributes to baseflow to the lake. Potential impacts would be managed through the implementation of an Acid

Sulfate Soils Management Plan (ASSMP), including verification of acid sulfate soil occurrence, minimisation of disturbance, treatment of excavated material, and implementation of erosion and sediment controls to prevent the mobilisation of acidic drainage and sediments to surrounding groundwater and surface water environments. With these measures in place, residual impacts are expected to be localised and low.

Similarly, across the project area, construction near waterways and crossings may affect groundwater quality and, due to groundwater–surface water connectivity, could influence downstream GDEs. These impacts may arise from the mobilisation of sediments or contaminants and potential infiltration to groundwater. Activities along the transmission line corridor are expected to result in localised and low impacts due to the limited scale and duration of works. In contrast, energy hub areas present a relatively higher risk due to the extent and duration of disturbance.

The karst systems associated with the Timor and Barry caves represent the most sensitive groundwater environments within the groundwater study area. These karst systems are highly vulnerable to changes in groundwater quality and flow due to rapid infiltration pathways and strong connectivity to surface processes. Project interaction with these environments is limited. In the vicinity of the Timor caves karst system, potential risks are associated with increased construction traffic on an existing road and localised road treatment works including on Sargeants Gap Road, required to facilitate the safe passage of construction vehicles.

While the full extent of the Barry caves system has not been confirmed, no direct interaction with known cave extents is anticipated. However, portions of the transmission alignment and access tracks north-west of the known Barry caves extent intersect the Manning Group Limestone Beds, which are understood to host the Barry caves system. To mitigate potential impacts to any unmapped karst features in these areas, geotechnical surveys would be undertaken, including where Manning Group Limestone Beds are suspected to identify any karst systems or geotechnical constraints.

In the absence of appropriate controls, there is a risk that contaminants associated with increased traffic and localised road works could infiltrate karst catchments and affect sensitive downstream environments. Unless there are severe irregularities (that is, potholes, bumps etc), vibration levels from heavy vehicle movements on Sargeants Gap Road (or other access tracks should further systems be identified) are unlikely to cause vibration related damage (that is, damage not relating to increased static or dynamic loads) to the cave system. Where localised road treatment works are required in the vicinity of identified karst features, alternative compaction methodologies (such as static or kneading compaction) would be considered to minimise vibration risks.

While mitigation and management measures are proposed in this area (as discussed and assessed in Section 14 and Section 16) it is acknowledged that in the absence of appropriate controls, potential impacts could alter groundwater flow pathways, including blockages or localised flooding, and potentially affect sensitive ecological communities. However, the likelihood of such impacts is considered low due to the absence of project infrastructure within known cave extents, the limited and localised nature of works in the vicinity of karst environments and the implementation of project-specific mitigation measures, including enhanced erosion and sediment controls, spill prevention measures and the use of alternative compaction methodologies (such as static or kneading compaction) in areas of identified karst sensitivity. Accordingly, residual impacts on groundwater flow processes and groundwater dependent ecological values are expected to be low.

19.3.5 Construction dewatering

Incidental and localised dewatering may be required during construction where excavations for transmission line foundations or energy hub earthworks intersect perched or shallow groundwater. The extent of dewatering is uncertain at this stage but is expected to be limited and of low impact magnitude, except at Central Hub A as discussed below.

Assessment of earthworks required at energy hubs indicates that dewatering may be required in areas of deeper excavation. Based on conservative assumptions, any associated drawdown is expected to be localised. No registered groundwater bores have been identified within the predicted area of influence at assessed energy hub locations.

A terrestrial GDE in proximity to Central Hub A (Blakely's Red Gum - yellow box grassy woodland) may be susceptible to localised drawdown, with a localised minor to moderate impact predicted associated with the excavation for one transformer yard. The GWIA found that the residual risk to GDEs as a result of energy hub construction with the implementation of the proposed mitigation and management measures would be low.

Dewatering may result in temporary reductions in groundwater levels and localised changes in flow. These impacts are expected to be short term and spatially constrained.

19.3.6 Groundwater supply

As described in Section 3 and Section 18, groundwater may be used as a source of non-potable water during construction. Non-potable water would be required for activities such as civil works, dust suppression, equipment washdown and general site maintenance.

Groundwater availability has been assessed within the project area through review of registered bores, associated water access licences and existing approvals for extraction. Availability varies across the project area, for example the Hunter Unregulated and Alluvial Water Sources 2022 WSP is considered to be a highly productive alluvial aquifer and is likely already under stress from current take, while the North Coast Fractured and Porous Rock Groundwater Source 2016 is considered a moderately to less productive aquifer.

It is noted that prolonged droughts have the potential to significantly reduce recharge and hence affect groundwater levels in the shallow water table in alluvium/colluvium and regolith, with a lag in deeper fractured rock aquifers. As such, multiple groundwater take sites may be considered for non-potable supply to provide contingency in groundwater availability and drawdown capacity. Given the variability in groundwater availability across the project area and the influence of seasonal and drought conditions, a range of potential groundwater supply sources may be considered during construction to provide flexibility and contingency for non-potable water demands.

Groundwater take would be undertaken in consideration of relevant WSP allocation capacity to minimise impacts. Prior to extraction of groundwater for construction use, pumping tests and baseline monitoring would be undertaken as a management control to determine sustainable pumping rates and whether induced drawdown is likely to impact surrounding bore users and sensitive environments. For longer-term groundwater supply sites for construction water, baseline monitoring is recommended for a minimum period of 12 months prior to take commencing and would include water level monitoring via the deployment of a datalogger and water quality at quarterly or biannual sampling events.

If utilised during construction as a source of non-potable water, groundwater extraction may result in localised drawdown, with potential impacts on nearby groundwater users and GDEs if not appropriately managed. Groundwater take would be managed to avoid adverse impacts to groundwater users and GDEs through the proposed Groundwater Management Plan (GWMP), which will incorporate groundwater monitoring, tracking of extraction volumes and management of potential impacts on groundwater users and GDEs.

19.4 Potential impacts – operation

During operation, potential impacts to groundwater are associated with the project's permanent infrastructure including transmission line towers, energy hubs and substations, and access tracks. These impacts are generally related to localised changes to groundwater flow, recharge, levels and quality.

Transmission line foundations, including piles and footings, may result in minor and localised changes to groundwater flow paths. Long-term interaction between construction materials and surrounding ground conditions may also affect groundwater quality. Routine maintenance activities are considered to present a low risk of contamination from accidental spills of fuels and chemicals.

At energy hubs, hardstand and compacted surfaces may reduce infiltration and recharge, resulting in localised changes to groundwater levels. Permanently drained excavations may alter groundwater flow paths and reduce baseflow to receiving environments. Stormwater run-off from these areas may also carry pollutants that could infiltrate to groundwater if not appropriately managed. Similarly, access tracks may reduce recharge due to surface compaction and increased run-off during maintenance.

Mitigation measures to avoid or minimise these potential impacts are summarised in Table 19.1. With the implementation of these measures, operational impacts to groundwater are expected to be localised and present a low residual risk.

19.5 Cumulative impacts

The potential cumulative impacts of the project have been identified based on the scale and nature of the project, in combination with the potential impacts of other relevant existing and future projects. A list of the projects considered in the cumulative assessment for groundwater is provided in Section 24.

The cumulative assessment is detailed in Section 8 of the GWIA (Technical Report 16) and key findings are summarised in Section 24. Cumulative impacts were considered to be limited to issues relating to groundwater dewatering, groundwater take and groundwater quality during construction stages. With appropriate mitigation measures in place, the assessment concluded that cumulative groundwater impacts from the project and other developments are expected to be low to negligible.

19.6 Management and mitigation measures

Mitigation and management measures have been identified to avoid or minimise potential impacts to groundwater and sensitive environments during construction and operation of the project. These measures include controls to manage potential impacts to groundwater levels, flow and quality, as well as measures to protect groundwater users and sensitive receptors.

A summary of the proposed mitigation and management measures is provided in Table 19.1.

Table 19.1. Proposed mitigation and management measures – groundwater

Reference	Impact	Mitigation measure	Timing	Relevant location (s)
GW1	Contamination of groundwater due to downward leaching of spilled fuels and chemicals Encountering contaminated groundwater during construction	A Soil and Water Management Plan (SWMP) will be developed for the construction phase of the project, which will include: • erosion and sedimentation controls in areas of ground disturbance and upstream of waterways/waterbodies to manage run-off – use of sediment fences, berms, diversion drains and/or sediment traps, where required – prevent sediment laden run-off to discharge into waterways/waterbodies and other environmental sensitive areas such as karsts (along Sargeants Gap Road) and alluvial water sources (road upgrades along Kingdon Ponds, Isis River, Peel River, Macdonald River) • equipment and plant are to be routinely inspected for leaks and hazardous substances (such as fuels, oils and chemicals) are to be appropriately storedand bunded • measures are to be put in place to promptly and effectively contain and manage accidental spills/leaks and maintain spill kits • concrete washout is to occur at designed washout areas and to be avoided on bare ground • generated waste is to be appropriated stored/contained (such as drilling spoil, grout, washout etc.) for disposal • minimise in-stream works at waterways/waterbody crossings where possible • minimise vegetation clearing and soil stripping where possible.	Construction	Ground disturbance areas and ancillary sites within project area

Reference	Impact	Mitigation measure	Timing	Relevant location (s)
		An Unexpected Contamination Finds Plan (UCFP) will be developed and appended to the SWMP, which will include measures to manage discovered/encountered contaminated groundwater during construction, which may be noted as visual/olfactory indicators (odour/colour). Measures shall include: • making the area safe by stopping works which could mobilise contaminants • testing of groundwater and establishment of contamination levels • delineation of groundwater contamination via the installation of monitoring wells and/or use of sounding techniques such as direct sensing probing tools (for petroleum hydrocarbons) • avoid ground disturbance activities which have the potential to intersect the watertable in potential contaminated groundwater areas. Depending on the type and extent of contamination, may be remediated passively (that is, natural attenuation) or actively (that is, air sparging) depending on location, sensitivity of users and ecosystems.		
GW2 SC5	Acidification of groundwater due to the exposure and excavation of ASS	Measures to manage potential in-land acid sulfate soils if encountered, in accordance with the NSW Acid Sulfate Soil Guidelines. If encountered, a project specific acid sulfate soil management plan (ASSMP) will be required, specifically pertaining to ground disturbance activities occurring in the vicinity of Lake Glenbawn.	Construction	Lake Glenbawn

Reference	Impact	Mitigation measure	Timing	Relevant location (s)
GW3	Aquifer interference as a result of groundwater dewatering	A Dewatering Management Plan (DMP) will be required as an appendix of the SWMP, specifically for ground disturbance works at hubs, where significant cuts are expected which will likely intersect groundwater. The DMP will consider the following measures: • estimate and present expected dewatering volumes, water production schedule and methods • present feasible dewatering mitigation measures to be implemented during construction for temporary and/or permanently drained cuts • testing of groundwater quality to inform disposal strategy • present groundwater disposal options, which may involve pump and treat, surface discharge, stream discharge, re-injection and/or off-site trucking depending on water quality objectives.	Construction	Hubs and incidental dewatering required where shallow groundwater is encountered in the project area
GW4	Lowering of water table as a result of construction activities at Energy Hubs and take sites	A Groundwater Management Plan (GWMP) will be required as an appendix to the SWMP, specifically to monitor impacts of works extracting groundwater for construction purposes at specific locations. The GWMP will consider the following measures: • Monitoring (minimum of 12 months) of groundwater levels and quality at and downstream of Central Hub A transformer yard cut to monitor potential impacts of temporary dewatering and permanently drained cuts on baseflow to local streams and riparian terrestrial groundwater dependent ecosystems (GDEs). Should impacts be noted, provisions should be made to implement managed aquifer recharge in this area (such as a soakaway) to restore baseflow regime supplying local GDEs both during and following the construction phase.	Construction	Groundwater take sites, Central Hub A

Reference	Impact	Mitigation measure	Timing	Relevant location (s)
		• Undertaking of pumping tests and baseline level and quality monitoring (minimum 12 months) at groundwater take sites to determine sustainable pumping yields and potential distance drawdown impacts to surrounding bore users and GDEs. • Continued groundwater level monitoring post the minimum 12 months baseline monitoring period in the event that groundwater extraction and/or dewatering works commence a significant time after initial baselining, to confirm a concurrent baseline. • Monitoring of groundwater levels at take sites during active pumping and at surrounding bores (registered or Basic Landholder Rights) and GDEs within the radius of influence of take sites. If impacts because of significant aquifer interference are found, provisions should be made to manage loss of available drawdown, such as reducing and/or ceasing pumping and/or make good measures such as bore depth extension and/or re-installation and potential managed aquifer recharge at impacted GDEs. • Tracking of groundwater take volumes to remain within WSP aquifer limits.		
GW5	Use of vibration equipment along Sargeants Gap Road access tracks north-west of Barry caves leading to structural damage to karst systems	Should the use of vibratory compaction equipment be required either along Sargeants Gap Road for localised widening works and north-west of the Barry caves northern extent, where access tracks and a minor segment of the transmission alignment intersect mapped and recognised limestone beds, the location of the works and proximity to caves features (including cave entrance and mapped extents) will be confirmed to understand separation distance from construction activities. Geotechnical and/or geophysical investigations will be required to confirm appropriate vibration thresholds and the tolerance of the karst system to vibration in the vicinity of the works to prevent potential structural damage.	Construction	Sargeants Gap Road Limestone beds within the Manning Group north-west of the Barry caves known extent

Reference	Impact	Mitigation measure	Timing	Relevant location (s)
GW6	Contaminated run-off from impervious and/or compacted/sealed surfaces at substations and/or access roads infiltrating in groundwater at discharge / collection points. Leakage of sewerage and/or septic infrastructure at substations in groundwater	Appropriate drainage design to manage stormwater run-off quality and discharge to natural ground infiltrating in groundwater. Development of a project-wide OEMP, specific measures include: • appropriate storage and/or bunding of equipment and hazardous substances • operational procedures for emergency response to spills/leaks from equipment and/or maintenance activities • appropriate management and maintenance of stormwater run-off infrastructure, such as oil-water separators, bioswales, soakaways, sediment ponds, retention/detention ponds • appropriate management and maintenance of sewerage and/or septic systems.	Operation	Energy hubs, operation facilities and stormwater discharge points

Air quality



Section 20

20 Air quality

This section provides a summary of the detailed assessment undertaken of the potential air quality impacts of the project during both construction and operation. This section also identifies mitigation and management measures to be implemented to minimise potential impacts.

The Air Quality Impact Assessment (AQIA) for the project was undertaken by Airen Consulting and is provided in full in Technical Report 17.

20.1 Assessment approach

The AQIA has been undertaken with reference to relevant guidelines including *Guidance on the assessment of dust from demolition and construction* (Institute of Air Quality Management (IAQM) 2024) (IAQM guidance).

The assessment was also prepared with reference to the SEARs as detailed in Appendix A.

This section considers issues raised in engagement with community stakeholders and relevant regulatory authorities relating to air quality (refer to Section 5) including potential air quality impacts to human and livestock health, air quality impacts during construction and potential changes to the existing rural amenity. Further information on impacts to livestock health is provided in the Agricultural Impact Assessment, discussed in Section 13 and Technical Report 6.

The key steps in the air quality assessment for the project included:

- review of key project activities that may impact air quality to determine relevant legislation, guidelines and standards to be applied
- desktop review of the existing air quality environment, including analysis of ambient air quality data from monitoring stations in proximity to the project area
- application of the IAQM guidance including:
  - Step 1 Screening[20] – review to confirm the presence of human and ecological receivers within the vicinity of the project which have the potential to be impacted by the project.

[20]. The IAQM advises a study area of 350 metres from the boundary of the site or within 500 metres of site egress points for human receivers, and 50 metres from the boundary of the site or within 500 metres of site egress points for ecological receivers. No further assessment is required if there are no receivers within a certain distance of the works. For the purposes of this assessment, the site is assumed to be works occurring anywhere within the project area. It should be noted that many of the project sites would have been screened out by the 350 metre distance, however all key project sites have been considered regardless of this criterion to make sure that potential impacts have been fully evaluated.

  - Step 2 Assess risks – undertaken for the key dust generating activities taking into account the scale and nature of the works and the sensitivity of the area (based on sensitivity to ecological effect, number of nearby receivers and distance to receivers).
  - Step 3 Determine mitigation – identification of site specific project controls for the key dust generating activities.
  - Step 4 Determine significance – examination of residual impacts following mitigation.
- qualitative assessment of emissions from diesel equipment exhausts (oxides of nitrogen (NO_x), particulate matter with equivalent aerodynamic diameter of 10 microns or less (PM_{10}) and particulate matter with equivalent aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$)
- qualitative assessment of potential odour impacts
- identification of mitigation measures to manage the potential air quality impacts.

Further details on the air quality impact assessment methodology are described in Section 4 of the AQIA (refer to Technical Report 17).

20.2 Existing environment

20.2.1 Existing air quality

The existing ambient air quality within and surrounding the project area is influenced by a range of factors with key factors including:

- agricultural activities
- extractive industries
- wind generated dust from exposed land
- vehicle movements on sealed and unsealed roads
- seasonal emissions from household wood heaters
- bushfires and controlled burning activities.

The DPHI monitors air quality conditions at various locations across NSW including the Upper Hunter and New England regions. Data from the Armidale, Tamworth and Muswellbrook monitoring stations were reviewed to characterise the existing air quality of the project area. These monitoring locations provide a conservative consideration of background air quality conditions. Five years of data from 2021 to 2025 were reviewed and compared to relevant air quality criteria set by the EPA. A review of the existing air quality monitoring data found that:

- annual average PM_{10} concentrations have not exceeded the EPA criterion (25 µg/m^3) between 2021 and 2025. The average daily PM_{10} concentrations in the project area have occasionally exceeded the EPA criterion (50 µg/m^3) (up to 1 or 2 days per year) within each of the 3 regional locations likely due to regional dust, hazard reduction burning, bushfires, woodsmoke and local dust sources

- annual average $PM_{2.5}$ concentrations have not exceeded the EPA criterion (8 µg/m^3) between 2021 and 2025, except at Muswellbrook in 2023. The average daily $PM_{2.5}$ concentrations in the project area have occasionally exceeded the EPA criterion (25 µg/m^3) at Armidale, and more significantly at Muswellbrook (up to 11 days in 2022) likely caused by hazard-reduction burning, bushfires, and woodsmoke. A strong seasonal trend is evident in the data from all 3 locations with higher $PM_{2.5}$ concentrations in winter and lower concentrations in summer, indicative of smoke from domestic wood-fired heaters
- the NO_2 concentrations for the 2021 to 2025 period show that the maximum 1-hour average and annual average NO_2 concentrations have not exceeded the respective EPA criteria for Tamworth and Muswellbrook. Similar outcomes would be expected for the Armidale region, however, monitoring data is not available.

20.3 Potential impacts – construction

20.3.1 Dust

The key air quality issue for the project would be the generation of dust during construction. Dust emissions from construction works have the potential to cause impacts if not managed adequately. Dust risks during construction would largely result from vegetation clearing, earthworks and ground disturbance works, crushing and grinding, concrete batching, vehicle movements on sealed and unsealed roads, and wind erosion from exposed areas. These activities may be required for construction of all key project components including the energy hubs, transmission lines and towers, the Nemingha maintenance facility and ancillary facilities such as workforce accommodation camps, all of which would be located at various points along the project alignment.

Dust generated by aerial activities, including helicopter landing and take-off, at laydown areas is expected to be minimal and short term.

In line with IAQM assessment approach, dust risks during construction were considered for demolition, earthworks, construction and trackout (transport of dust by vehicles) activities. The unmitigated dust risk (that is, without the proposed management controls in place) was assessed for different construction activities and was found to range between a negligible and medium level of unmitigated risk. The medium level of unmitigated dust risks related to the construction of the transmission lines and towers, workforce accommodation camps (Camp 1 and Camp 2) and the Nemingha maintenance facility. The medium risk ranking for the transmission lines and towers was primarily driven by activities occurring in some areas that are in proximity to sensitive receivers and along access tracks, while the medium risk ranking for the workforce accommodation camps (Camp 1 and Camp 2) and the Nemingha maintenance facility was primarily driven by the proximity of sensitive receivers. The remaining construction activities were found to have low to negligible unmitigated dust risk.

To minimise potential dust impacts during construction, a range of mitigation and management measures are proposed as part of the project and are described in Section 20.6. With these proposed controls in place, the AQIA found that the level of risk associated with dust impacts would be reduced and would be effectively managed such that the residual impacts from construction would not be significant.

20.3.2 Exhaust emissions

Construction vehicle movements would be required along the length of the project area on a daily basis. Movements would comprise vehicles travelling on the local, State and national road network delivering materials to and from the project construction areas, ancillary sites and workforce accommodation camps as well as construction workers travelling in mini-buses and light vehicles between the workforce accommodation camps and construction areas.

Many construction workers would be transported between construction areas and the workforce accommodation camps via shuttle buses to minimise traffic impacts and also reduce combustion emissions.

A broad range of construction equipment that has diesel or petrol engines would be required for the project. Emissions from machinery operating along the transmission line corridor would be intermittent and transient, as not all equipment would operate simultaneously within these construction areas.

Fuel combustion from vehicles and machinery produces CO, NO_x, SO_2, and VOCs, with impact levels depending on engine output, fuel quality, condition, and usage intensity. The IAQM notes that exhaust emissions from on-site plant and machinery traffic are unlikely to make a significant impact on local air quality. Emissions would be appropriately managed through the implementation of mitigation measures as provided in Section 20.6.

Chemicals and fuels used during construction like petroleum, diesel, liquified natural gas, herbicides, pesticides, and oils will be securely stored in designated areas. Any fugitive emissions from leaks or irregular releases would be minor and disperse quickly, making air quality impacts negligible with the implementation of proper handling and storage practices.

20.3.3 Odour

Wastewater treatment plants would be located at workforce accommodation camps. The proposed wastewater treatment plants are anticipated to consist of generally contained systems that would include biological and chemical treatment, filtration, and disinfection. The treatment systems would mainly comprise of enclosed tanks however odour may be generated from wastewater screening to remove inorganics, from screened material stored in waste bins and from greywater reuse.

The most potentially affected receivers are on-site workers living within the workforce accommodation camps. In general, there is low potential for odour generation at these types of wastewater facilities, given the relatively small scale of the treatment plants with no large open odour sources.

If odour emissions do occur, they would likely be infrequent, of short duration and of low intensity. Off-site receivers are not expected to be adversely impacted by odour emissions given the distances to the wastewater treatment plants. Potential odour emissions from the wastewater treatment plants at each of the workforce accommodation camps are not predicted to be significant and no adverse odour impacts on the community are anticipated.

20.4 Potential impacts – operation

The energy hubs and transmission lines would be inspected by operational employees and contractors on a regular basis. Other operational activities relate to maintenance activities or activities in the event of an emergency. These activities are generally of low intensity when compared to construction and would generally have limited potential for adverse air quality impacts.

Windblown dust may be generated from unsealed access tracks and easements along the transmission lines and any unsealed project roads, including at the energy hubs. During routine inspection, maintenance or emergency works, light vehicles or helicopters would be used to transport personnel to the various sites. These activities would not generate significant dust or gaseous emissions and are not expected to cause adverse air quality impacts.

20.5 Cumulative impacts

The potential cumulative air quality impacts of the project have been identified based on the scale and potential impacts of the project, in combination with the potential impacts of relevant identified future projects and broader developments supporting the New England REZ. A list of these relevant projects, including their descriptions and interfaces with the project, is provided in Section 24.

A cumulative assessment was also conducted within the air quality impact assessment provided in Technical Report 17. The assessment identified that the greatest potential for cumulative air quality impacts would occur during overlapping construction periods with other major infrastructure, transmission and renewable energy projects in the region, including the Hunter Transmission Project, Bayswater Power Station Upgrade and nearby renewable energy developments. Potential cumulative impacts are primarily associated with construction dust generation. With the implementation of the mitigation and management measures described in Section 20.6, cumulative air quality impacts are expected to be managed to acceptable levels and are not considered likely to be significant.

Further discussion regarding potential cumulative air quality impacts is provided in Technical Report 17 and Section 24.

20.6 Mitigation and management

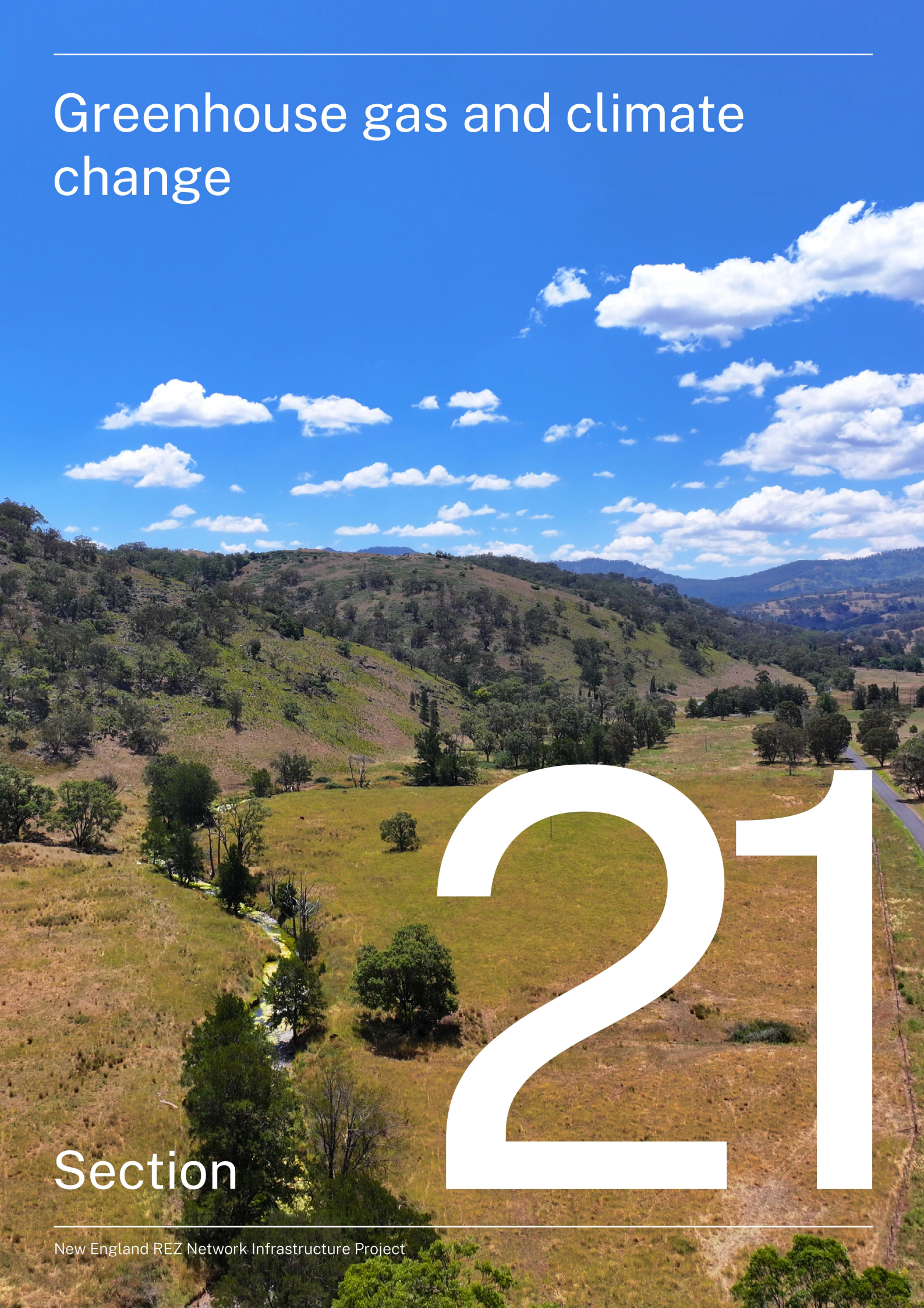
Mitigation and management measures that will be implemented as part of the project to minimise potential air quality impacts are listed in Table 20.1.

Table 20.1. Proposed mitigation and management measures – air quality

Reference	Impact	Mitigation measure	Timing	Relevant location(s)
AQ1	Adverse air quality during construction	Management measures to prevent or minimise dust generation and impacts to the local community and environment will include (but not be limited to): • use of water sprays or dust suppression surfactants as required for dust suppression where required and appropriate • modifying activities based on observed dust levels and weather forecasts • minimising the amount of material stockpiled • positioning stockpiles away from surrounding receivers • project construction vehicle movements are to adhere to designated entry/exit routes and parking areas • implementing measures to minimise the tracking of material onto sealed roads for example wheel wash • covering loads • stabilising disturbed areas as soon as practicable, including new access routes • minimising the extent of disturbance as far as practicable • regularly conducting visual inspections of dust emissions and applying additional controls as required • minimising concurrent construction activities near sensitive receivers that have a greater potential of the risk of dust impact, where possible.	Construction	All locations
AQ2	Adverse air quality due to vehicle and plant emissions	Where feasible, construction vehicles and machinery will be fitted with appropriate emission control equipment and maintained in a proper and efficient manner. Equipment selected and operated to meet the Protection of the Environment Operations (POEO) Clean Air Regulation emission obligations.	Construction	All locations

Reference	Impact	Mitigation measure	Timing	Relevant location(s)
AQ3	Adverse air quality due to concrete batch plants	Measures will be implemented at concrete batch plants to minimise emissions to air as far as possible. The measures will be regularly inspected with additional controls implemented as required. Measures to minimise emissions to air from concrete batch plants may include: • storing all aggregate and sand appropriately in storage bins or bays to minimise dust generation, making sure material does not exceed the height of the bay • fitting dust filters to cement silos and hoppers • all inspection points and hatches will be fully sealed • all dry raw materials to be transferred into the bowl of an agitator via front end loaders by maintaining adequate moisture levels and/or an enclosed conveyor • cement silos will be fitted with an emergency pressure alert and automatic cut off protection to prevent overfill • transfer of cement from storage to batching will occur via sealed steel augers.	Construction	Concrete batch plants
AQ4	Adverse air quality due to crushing and screening	The following measures will be implemented to minimise dust emissions associated with the proposed crushing and screening activities: • making sure covers are fitted to the screening operations • controlling dust emissions from screening operations using water sprinklers, where required and appropriate • inspecting the water sprinklers on a regular basis to maximise efficiency • installing wind breaks in appropriate locations adjacent to the dust generating equipment and processes, where practicable • dampening rocks during dry weather conditions, prior to screening.	Construction	All locations of crushing and screening equipment.

Greenhouse gas and climate change



Section 21

21 Greenhouse gas and climate change

This section provides a summary of the assessment of the potential greenhouse gas (GHG) impacts of the project during both construction and operation. This section also identifies mitigation and management measures to be implemented to minimise potential impacts.

Whilst the construction and operation of the project would generate some GHG emissions, the project itself is a key part of the NSW Electricity Infrastructure Roadmap and would support a fundamental change in the way that electricity is generated, stored and distributed in NSW, assisting NSW to move towards its net zero target and contributing to meaningful climate change action.

The detailed GHG Assessment was prepared by Airen Consulting and is provided in full in Technical Report 18.

21.1 Assessment approach

GHG is a collective term for a range of gases that are known to trap radiation in the upper atmosphere. GHG emissions have been presented as carbon dioxide equivalents (CO_2-e) and includes consideration of carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons and sulphur hexafluoride (SF_6).

The GHG assessment was informed by the NSW Guide for Large Emitters (EPA, 2025) (the Large Emitters Guide).

The assessment was also prepared with reference to the SEARs as detailed in Appendix A.

The assessment involved:

- defining the assessment boundary and GHG emission scenarios
- selection and identification of GHG mitigation measures
- estimation of Scope 1, 2 and 3 GHG emissions in accordance with the *Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard* (WRI, 2004) (the GHG Protocol)
- comparison of project emissions with State, National and Global emissions.

Under the GHG Protocol, the direct and indirect GHG emission sources of a project are classified as follows:

- Scope 1 – direct emissions from sources that are owned or operated by the organisation (examples include combustion of diesel in company owned vehicles or on-site generators).
- Scope 2 – indirect emissions associated with the import of energy from another source (examples include importation of electricity or heat).
- Scope 3 – other indirect emissions which are a direct result of the operations of the organisation but from sources not owned or operated by them (examples include supply of goods and product usage).

Emissions were quantified for both construction and operational phases of the project. The key emissions sources for the project are:

- vegetation clearing – loss of carbon sink
- petrol (stationary and transport) – fuel combustion from on site plant and equipment and transport
- diesel (stationary and transport) – fuel combustion from on site plant and equipment and transport
- industrial processes - sulfur hexafluoride in high voltage switch gear
- electricity – emissions from purchased electricity
- materials – steel and concrete for construction (including transport).

Climate change adaptation has been addressed in the project design by ensuring the project can continue to operate safely and reliably under future climate conditions (for example higher temperatures, bushfires, floods). Climate change adaptations have been addressed throughout the EIS including in the following key assessments:

- bushfire related impacts and management measures (refer to Section 17.3 and Technical Report 12)
- flooding impacts and management measures (refer to Section 18 and Technical Report 15)
- surface water impacts and management measures (refer to Section 18 and Technical Report 14).

Information on the strategic context of the project and its role in NSW's energy transition to reduce GHG emissions and consistency with NSW and Australian climate change policies is discussed in Section 2.

21.2 Potential impacts – construction

During the construction period, the annual GHG emissions are estimated to vary depending on the activities undertaken in any one year from approximately 122,600 tonnes (t) of CO_2-e to 357,000 t CO_2-e. Larger annual emissions would occur in the first few years of construction due to clearing of vegetation leading to a loss of carbon sink. During this period the second largest contribution to GHG emissions would be diesel emissions from on-site plant and equipment. In the second half of

the construction period when the majority of vegetation clearing has already occurred, the largest source of emissions would be diesel from on-site plant and equipment. A breakdown of the Scope 1, 2 and 3 emissions per year for the construction phase is provided in the GHG Assessment (refer to Technical Report 18).

The project's annual average construction phase GHG emissions were compared against State and National GHG emissions for the year 2024 to determine their approximate contribution and review the potential for impact on Australia's ability to meet GHG reduction targets and policies. The project's annual average construction phase Scope 1 emissions would equate to 0.21 per cent and 0.05 per cent of NSW's and Australia's 2024 annual emissions respectively. The project is considered unlikely to impact Australia's ability to meet GHG reduction targets and related policy matters and given that the project is a key component of NSW's strategy of moving away from GHG intensive power generation, it would contribute to achieving medium and long-term reductions in GHG emissions in NSW.

The construction of the project is unlikely to impact climate change adaptation requirements due to its GHG emissions. Given the relatively small contribution to overall annual emissions, it is considered that the project GHG emissions would not materially affect climate drivers or the implementation of adaptation and resilience measures across NSW or Australia. As noted above, the delivery of the project would make a positive contribution to reducing climate change impacts resulting from power supply in NSW.

21.3 Potential impacts – operation

The project operational emissions are estimated to be in the order of 3,161 t CO_2-e per year. The largest contribution in operation is Scope 1 emissions (3,112 t CO_2-e) related to the use of sulphurhexafluoride (SF_6) which is used in gas insulated switchgear and circuit breakers at the energy hubs. Emissions arise from potential gas leakage.

As the operation phase emissions would not exceed 25,000 t CO_2-e in any financial year, the project is not considered to be a large emitter as per the Large Emitters Guide, and certain aspects of the guide are not applicable to the project, such as selection and assessment of mitigation measures, benchmarking and goal setting. However, EnergyCo is committed to emission minimisation measures for employees and contractors as identified in Table 21.1.

Similar to construction emissions, the project's estimated operational emissions were compared against State and National GHG emissions for the year 2024 to determine their relative contribution. The comparison shows that the annual average Scope 1 emissions from the project during operation would equate to in the order of 0.0029 per cent of NSW's emissions and 0.0007 per cent of Australia's emissions. As such, the project is unlikely to impact climate change adaptation due to GHG emissions, given the relatively small contribution to overall emissions. Furthermore, as noted above, the operation of the project would facilitate the reduction of GHG emissions through the provision of electricity transmission infrastructure to enable the delivery of 6 GW of renewable energy to the NEM. For comparison, the generation of the same amount of electricity by coal-fired power stations would produce in the order of 17 million t CO_2-e per year. This estimate assumes 6 GW of coal-fired generation operating continuously throughout the year and applies emission

factors from the National Greenhouse Accounts Factors (DCCEEW, 2025a). Based on NSW's reported 2024 GHG emissions, the estimated avoided emissions are equivalent to approximately 16 per cent of NSW's annual emissions. The operation of the project would therefore contribute to the reduction of GHG emissions by enabling the delivery of renewable energy to the NEM. This would contribute to the efforts of the Australian and NSW Governments in meeting emissions reduction targets.

21.4 Mitigation and management

The project would generally contribute to positive GHG outcomes through reductions in GHG emissions in comparison to other sources of electricity generation used in NSW, including traditional coal-fired power stations. While some emissions are expected in the construction phase, the operational emissions would be relatively low.

The project would support the State's objective to decarbonise by facilitating the connection of the New England REZ to the NEM. With a proposed transfer capacity of 6 GW, the project would make a material contribution to the NEM and support the State's transition away from fossil fuel reliance, and therefore reduced GHG emissions from the electricity sector. GHG emissions are linked to anthropogenic climate change, and reducing emissions would ensure that future impacts from climate change that may impact on future generations are minimised, as the project directly supports the decarbonisation of the NEM.

EnergyCo is committed to the ongoing management and reduction of GHG emissions generated by the project. Table 21.1 identifies the GHG management measures to be implemented to reduce GHG emissions.

Table 21.1. Proposed mitigation and management measures – GHG

Reference	Impact	Mitigation measure	Timing	Relevant location (s)
GH1	GHG emissions	Consideration will be given to the fuel efficiency of vehicles and equipment.	Construction	All locations
GH2	GHG emissions	The purchase of electrical vehicles and equipment will be investigated to reduce or eliminate on-site fuel use.	Pre-construction Construction Operation	All locations
GH3	GHG emissions	Maintenance of vehicles and equipment will be conducted according to manufacturers' specifications to optimise fuel consumption.	Construction Operation	All locations

Reference	Impact	Mitigation measure	Timing	Relevant location (s)
GH4	GHG emissions	Pre-start inspections will be conducted at each shift on mobile plant and vehicles.	Construction Operation	All locations
GH5	GHG emissions	Travel distances will be minimised as far as practicable to reduce diesel consumption.	Construction	All locations
GH6	GHG emissions	Roads used for construction will be routinely maintained to reduce truck tyre rolling resistance, where practicable.	Construction	All locations
GH7	GHG emissions	Idling of diesel vehicles and equipment will be minimised wherever feasible.	Construction Operation	All locations
GH8	GHG emissions	Low carbon concrete and steel in transmission line towers and other project infrastructure will be used where feasible.	Construction	All locations
GH9	GHG emissions	Materials from local sources will be sourced where feasible.	Pre-construction Construction	All locations
GH10	GHG emissions	Consideration will be given to using on-site renewable energy sources where possible to supplement electricity purchased from the grid at construction support sites and workforce accommodation camps.	Pre-construction Construction	All locations
GH11	GHG emissions	Refrigerants with a low (or zero) global warming potential will be used at temporary worker accommodation where possible.	Pre-construction Construction	All locations
GH12	GHG emissions	Education and signage will be implemented to encourage energy efficiency at construction support sites and temporary worker accommodation.	Construction	All locations

Reference	Impact	Mitigation measure	Timing	Relevant location (s)
GH13	GHG emissions	Motion detectors will be used for lighting at construction support sites and temporary worker accommodation.	Construction	All locations
GH14	GHG emissions	Electricity and fuel usage will be tracked on a regular basis to identify trends and opportunities for efficiency gains.	Construction Operation	All locations

Contamination



Section 22

22 Contamination

This section provides a summary of the assessment undertaken to identify the existence of any areas of potentially contaminated land that may be of relevance to the project, and of the risks and impacts of the project in relation to contamination. It also identifies the mitigation and management measures to be implemented to minimise and manage any potential impacts associated with areas of contaminated land.

This section is based on a contamination assessment completed by Aurecon, which is provided in full in Technical Report 19.

22.1 Assessment approach

The contamination assessment was undertaken based on the contamination study area which is defined and shown in Technical Report 19 and generally consists of the project area plus a buffer of approximately one kilometre around the energy hubs, and approximately 250 metres at all other locations. For some particular database searches, such as the NSW per- and polyfluoroalkyl substances (PFAS) investigation sites database, and the Department of Defence Unexploded Ordnance (UXO) database, searches were undertaken within 10 kilometres of the project area.

The assessment was undertaken using the following assessment approach:

- desktop assessment, consisting of:
  - assessment of publicly available aerial imagery from 1940's to the 2020's where available
  - geography, soil, topography and groundwater data
  - Acid Sulfate Soil (ASS) risk maps and classes, and the potential for Acid Sulfate Rock (ASR)
  - dryland salinity risk mapping
  - Naturally Occurring Asbestos (NOA) risk mapping within 10 kilometres
  - UXO risk mapping within 10 kilometres
  - former livestock dip mapping
  - public records and reports of contaminated land
  - PFAS investigation sites database within 10 kilometres
  - soil capability, quality and limitations
  - landfills, quarries and waste facilities.
- site inspections of selected areas between 11 June 2024 and 18 March 2025.

- intrusive site investigations including:
  - collection and analysis of soil and groundwater for analysis
  - geotechnical investigations.

Intrusive investigations were undertaken via 84 boreholes, 38 test pits and 7 groundwater wells within and immediately adjacent the project area.

The desktop assessments and fieldwork identified some potential or actual sources of contamination within or surrounding the project area, referred to as Areas of Environmental Concern (AECs). These AECs may contain Contaminants of Potential Concern (COPCs).

A qualitative risk assessment was undertaken to determine the contamination impact risk associated with these AECs and COPCs. The risk was assessed by estimating the likelihood of linkages between contamination and sensitive receivers occurring, and the consequence of exposure. This then informs what the construction and operational impacts of the project would be and the required mitigation and management measures.

Risk ratings were defined as follows:

- very high – there is a high probability that severe harm could arise to a designated receiver from an identified source without appropriate remedial action
- high – a designated receiver is likely to experience major harm from an identified source without remedial action
- moderate – it is possible that harm could arise to a specific receiver, but it is unlikely that such harm would be major
- low – it is possible that harm could arise to a designated receiver from an identified source, though this is likely to be mild
- negligible – the presence of the identified contaminant source does not give rise to the potential to cause major harm.

The risk rating in Table 22.1 assumes that no controls or mitigation has been established. For a detailed description of the likelihood and consequence parameters please refer to chapter 3 of the contamination assessment (Technical Report 19).

Table 22.1. Risk ratings matrix

Consequence	Likelihood: Rare COPCs may be present at a site in exceptional circumstances	Likelihood: Unlikely COPCs have a 10–40% probability of being present at a site	Likelihood: Possible COPCs have a 40–60% probability of being present at a site	Likelihood: Likely COPCs have a 60–90% probability of being present at a site	Likelihood: Almost certain COPCs have a greater than 90% probability of being present at a site
Severe **May require significant remediation**	Low	Low to moderate	Moderate to high	Very high	Very high
Moderate **May require localised remediation**	Negligible to low	Low	Moderate	Moderate to high	High
Mild **May require small scale localised remediation**	Negligible	Low	Low	Low to moderate	Moderate
Negligible **Unlikely to require remediation**	Negligible	Negligible	Negligible to low	Low	Low

22.2 Existing environment

This section describes the existing environment of the project area with respect to contaminated land risks. Descriptions of topography and landform have been previously provided in Section 2, while land use and zoning are discussed in Section 12, and soils and land capability is discussed in Section 13. Details of the hydrology and hydrogeology of the project area are detailed in Section 18 and Section 19. Further details on the existing environment are also provided in Technical Report 19.

22.2.1 Land use related sources of contamination

As discussed in Section 12, the primary land use within the project area is grazing on a mix of native and modified pastures which has limited sources of potential contamination. There are, however, discrete sections of the project area that contain naturally occurring and human made contamination risk.

Extensive review of publicly available databases was undertaken as part of the contamination assessment (refer to Technical Report 19) and significant sources of potential contamination within the project area include:

- Liddell and Bayswater 330 kV substations – potential for onsite spills and/or leaks from maintenance activities and potential use of uncontrolled fill material during construction.
- Liddell and Bayswater power stations – potential use of uncontrolled fill material during construction and petroleum product storage.
- ash dams (associated with the power stations) – encapsulation of combusted coal ash.
- water supply dams (associated with the power stations) – potential use of imported uncontrolled fill for construction.
- Caltex service station and fuel depot – potential for leaks and/or spills from petroleum underground storage tanks to impact groundwater and/or surrounding soils.
- Brooklyn Quarry – potential for contamination from quarrying activities such as storage and leaks and/or spills of petroleum fuel or chemicals associated with machinery maintenance, and potential mobilisation of naturally occurring metals.
- cattle and livestock dips – historical use of arsenic and pesticides.
- active coal or mineral mining leases – potentially contaminating activities associated with mining operations including storage and leaks and/or spills of petroleum fuel or machinery maintenance chemicals, use of firefighting foams, hazardous building materials, and dumping of wastes.
- aviation facilities – potentially contaminating activities associated with fuelling and/or maintenance of aircraft, herbicide and pesticide use for clearing of vegetation and use of hazardous building materials in airfield structures (if present).
- areas of disturbed land, fill, stockpiling and dumping – potential contamination from historical or existing stockpiles related to uncontrolled filling and dumping of wastes.
- areas of potential herbicide and pesticide use on cleared agricultural land.
- existing transmission line infrastructure – potential flaking of lead paint from structures.
- farm dams (open and/or infilled) – potential for contaminant sediment accumulation and potential use of uncontrolled fill material during construction or dumping of wastes.

22.2.2 Acid sulfate soils

Acid sulfate soils (ASS) and potential acid sulfate soils (PASS) are naturally occurring soils that contain iron sulfides which oxidise on exposure to air and create sulfuric acid resulting in the mobilisation of aluminium, iron and manganese from the soils. Acid sulfate soils typically occur in coastal environments at elevations less than 10 m AHD. Inland acid sulfate soils can be formed in extended periods of drought in inland riverine systems but require very specific climatic factors and sources of sulfate, with their presence limited to the lower levels of the river channel and bottom sediments.

Disturbing ASS has the potential to acidify and chemically alter groundwater which may lead to negative downstream impacts on groundwater users and receivers. Similarly, acid sulfate rocks (ASR) are unweathered rocks that contain metal sulfide minerals, which can generate acid when exposed to both oxygen and water.

Desktop mapping reviewed as part of the contamination assessment indicates that high probability/very low confidence inland ASS risk areas coincide with waterbodies in the southern extent of the project area, which include Lake Liddell, Liddell ash disposal dam, Liddell water supply dam, Bayswater ash dam and Lake Glenbawn/Hunter River. Areas of low and extremely low probability are present throughout the remainder of the project area, as would be expected for a region that is typically elevated (noting that ASS is predominantly found in low lying, coastal and alluvial landscapes).

22.2.3 Naturally occurring asbestos

Naturally occurring asbestos (NOA) refers to the mineral that occurs as a natural component of soils or rock formations, as opposed to asbestos that is present in commercial products, mining or processing operations. NOA can be released from soil or rocks by routine human activities, including construction, or through natural processes such as weathering.

A review of NOA mapping has identified that while most of the project area does not lie in areas mapped as having a risk of NOA, there are low, medium and high-risk areas in a geological band from Hanging Rock to Glenrock, which intersects approximately 3 kilometres of the alignment, including transmission towers and access roads.

22.3 Potential impacts

Construction and operation of the project have the potential to disturb existing contamination in the project area and potentially expose people and the environment to impacts if works in these areas are not appropriately managed.

The identified AECs and their COPCs relevant to the project area, and the unmitigated risk rating is provided in Table 22.2, and shown spatially in Figure 22.1. As described in Section 22.1 the contamination assessment in Technical Report 19 has assessed a broader contamination study area and identified AECs within this broader area. For the purposes of the EIS a summary of the potential impacts has been provided in this section focused on the AECs that are located within the project area and its immediate vicinity as relevant to the project.

As summarised in Table 22.2 in the absence of mitigation the contamination assessment identified a number of moderate, high and very high contamination risks (unmitigated risks).

Table 22.2. Areas of environmental concern relevant to the project area

AEC Name	Contaminants of Potential Concern (COPC)	Approximate location	Source-pathway-receptor (SPR) linkage	Unmitigated risk rating
Naturally occurring asbestos risk areas	Asbestos	Barry and Hanging Rock access roads, and a section of the alignment north of Barry	**Potentially complete** Limited to inhalation risk during ground disturbance works and migration of airborne COPCs off-site	Moderate to high
Acid sulfate soils high risk areas	Acidity Sulfur	Intersects with project area near Lake Glenbawn, Liddell ash dam and Liddell water supply dam	**Potentially complete** Limited to ecological risks associated with improper spoil management, and/or potential lowering of groundwater levels from dewatering (if required)	Moderate to high
Liddell 330 kV substation	Heavy metals, TRH, BTEXN, PAH, PCBs, Solvents, Asbestos	Adjacent to the east of the project area	**Potentially complete** Limited to migration of legacy groundwater COPCs to the contamination study area. Ground disturbance works not expected in directly impacted soils	Low to moderate
Bayswater 330 kV substation	Heavy metals, TRH, BTEXN, PAH, PCBs, Solvents, Asbestos	Within project area relevant to Bayswater substation extension	**Potentially complete** Limited to migration of legacy groundwater COPCs to the contamination study area, and ground disturbance works in potentially impacted soils	Low to moderate
Operational Bayswater Power Station	Heavy metals, TRH, BTEXN, PAH, PCBs, Solvents, Asbestos	Within project area relevant to Bayswater substation extension	**Potentially complete** Limited to migration of legacy groundwater COPCs to the contamination study area. Ground disturbance works not expected directly in impacted soils	Low to moderate
Ash dams • **Liddell ash disposal dam** • **Ash skimmer dam**	Heavy metals EC and pH	Both ash dams intersect the project area	**Potentially complete** Limited to migration of legacy groundwater COPCs to the contamination study area, and ground disturbance works in potentially impacted soils	Very high

AEC Name	Contaminants of Potential Concern (COPC)	Approximate location	Source-pathway-receptor (SPR) linkage	Unmitigated risk rating
Water supply dams • **Liddell water supply dam** • **Bayswater brine decant dam**	Heavy metals, TRH, BTEXN, PAH, PCBs, Solvents, Asbestos Salinity	Intersects the project area	**Potentially complete** Limited to migration of legacy groundwater COPCs to the contamination study area, and ground disturbance works in potentially impacted soils	Low
EPA notified activity **Caltex service station (Nemingha)**	Heavy metals, TRH, BTEXN, PAH, VOC	Approximately 100 m east of the project area (relevant to Nemingha maintenance facility)	**Potentially complete** Limited to direct contact with soils during ground disturbance works and associated migration of COPCs to water bodies from improperly managed spoil	Low
Cattle and livestock dips	Heavy metals, OCP	No cattle dips were identified from spatial data within the project area Site observations and anecdotal evidence suggest livestock dip stations may be present	**Potentially complete** Limited to direct contact with soils and/or groundwater during ground disturbance works during construction, and health risks from vapour intrusion to the maintenance facility	Low
Active coal or mineral mining leases	Heavy metals, TRH, BTEXN, PAH, PFAS, Solvents, Asbestos	Small interactions with CL229 associated with an access track near Bayswater substation extension	**Incomplete** Distance to the AEC is expected to mitigate risk of COPC migration to the contamination study area	Moderate
Airstrip	Heavy metals, TRH, BTEXN, PAH, PCBs, OCP / OPP, PFAS Asbestos	Multiple locations uncertified aerodromes intersecting the project area	**Potentially complete** Limited to direct contact with soils during ground disturbance works and associated migration of COPCs to water bodies from improperly managed spoil	Low

AEC Name	Contaminants of Potential Concern (COPC)	Approximate location	Source-pathway-receptor (SPR) linkage	Unmitigated risk rating
Disturbed terrain	Heavy metals, TRH, BTEXN, PAH, PCBs, OCP / OPP Asbestos	Multiple locations intersecting the project area	**Potentially complete** Limited to direct contact with soils during ground disturbance works, airborne migration of COPCs off-site, and migration of COPCs to water bodies from improperly managed spoil	Moderate
Areas of potential herbicide or pesticide use	OCP / OPP	Cleared agricultural land throughout the project area	**Potentially complete** Limited to direct contact with soils during ground disturbance works and open spaces, accumulation of COPCs in terrestrial fauna and migration of COPCs to water bodies from improperly managed spoil	Low
Existing transmission line infrastructure	Heavy metals	Multiple locations intersecting the project area	**Potentially complete** Limited to direct contact with soils during ground disturbance works, airborne migration of COPCs off-site, and migration of COPCs to water bodies from improperly managed spoil	Low
Farm dams	Heavy metals, OCP / OPP Nutrients and pathogens Hazardous building material including asbestos	Multiple locations intersecting the project area contain current and former farm dams and manmade water bodies	**Potentially complete** Limited to direct contact with soils during ground disturbance works and in open spaces, accumulation of COPCs in terrestrial fauna and migration of COPCs to water bodies from improperly managed spoil	Low

Note 1: Benzene, toluene, ethylbenzene, xylene and naphthalene (BTEXN), Organochlorine pesticide (OCP), Organophosphate pesticides (OPP), Polycyclic aromatic hydrocarbons (PAH), Polychlorinated biphenyl (PCB), Total recoverable hydrocarbons (TRH), Volatile organic compounds (VOC)

Most AEC locations within the project area are considered to present a low contamination risk. The highest potential for contamination to be encountered is associated with the Liddell Ash Dam and Ash Skimmer Dam, where existing and historical land uses indicate a greater likelihood of contaminants of potential concern being present, and the areas of land that contain NOA or ASS.

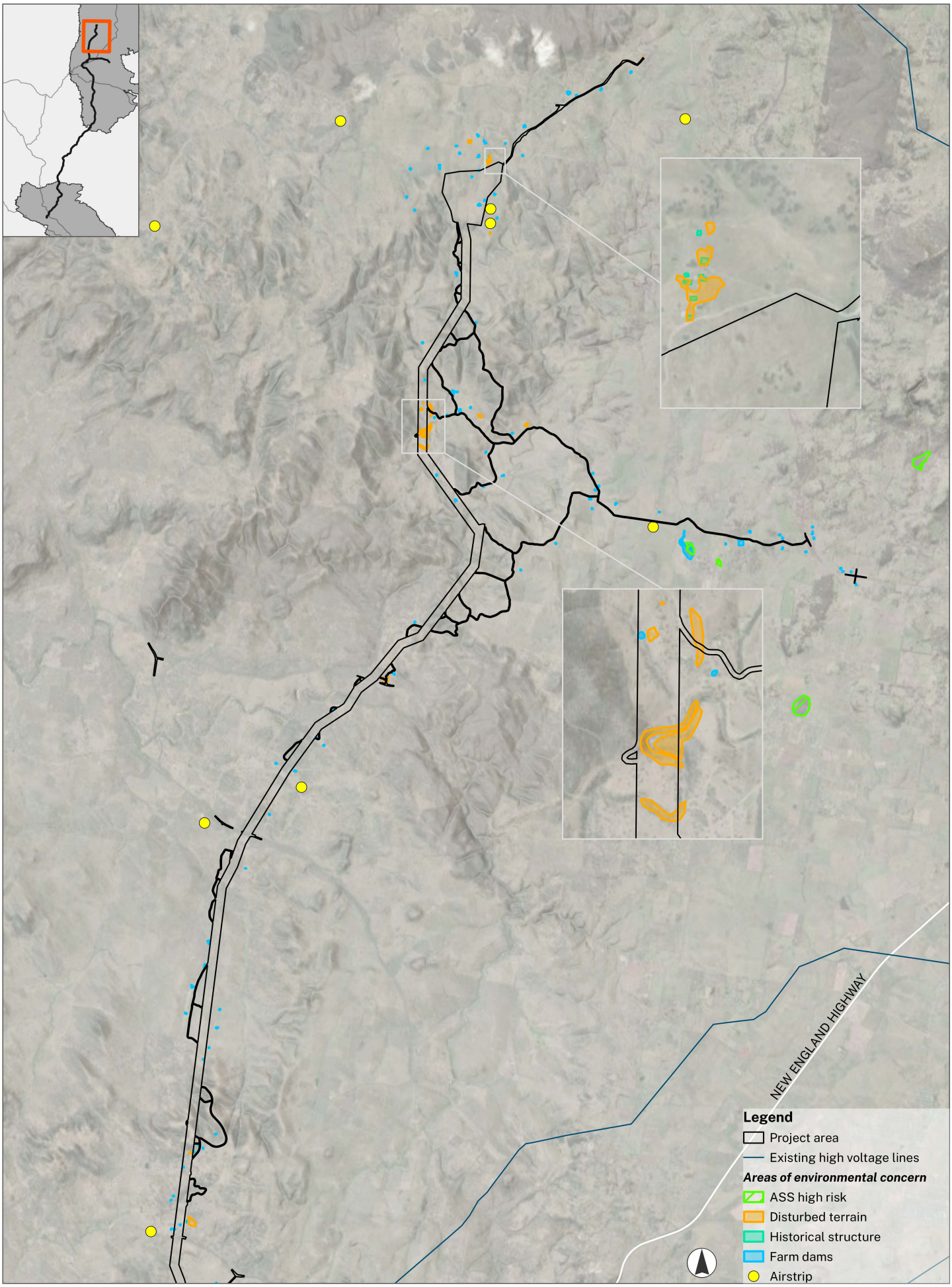


FIGURE 22.1a Areas of environmental concern (Map 1 of 6)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

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GDA2020 MGA Zone 56

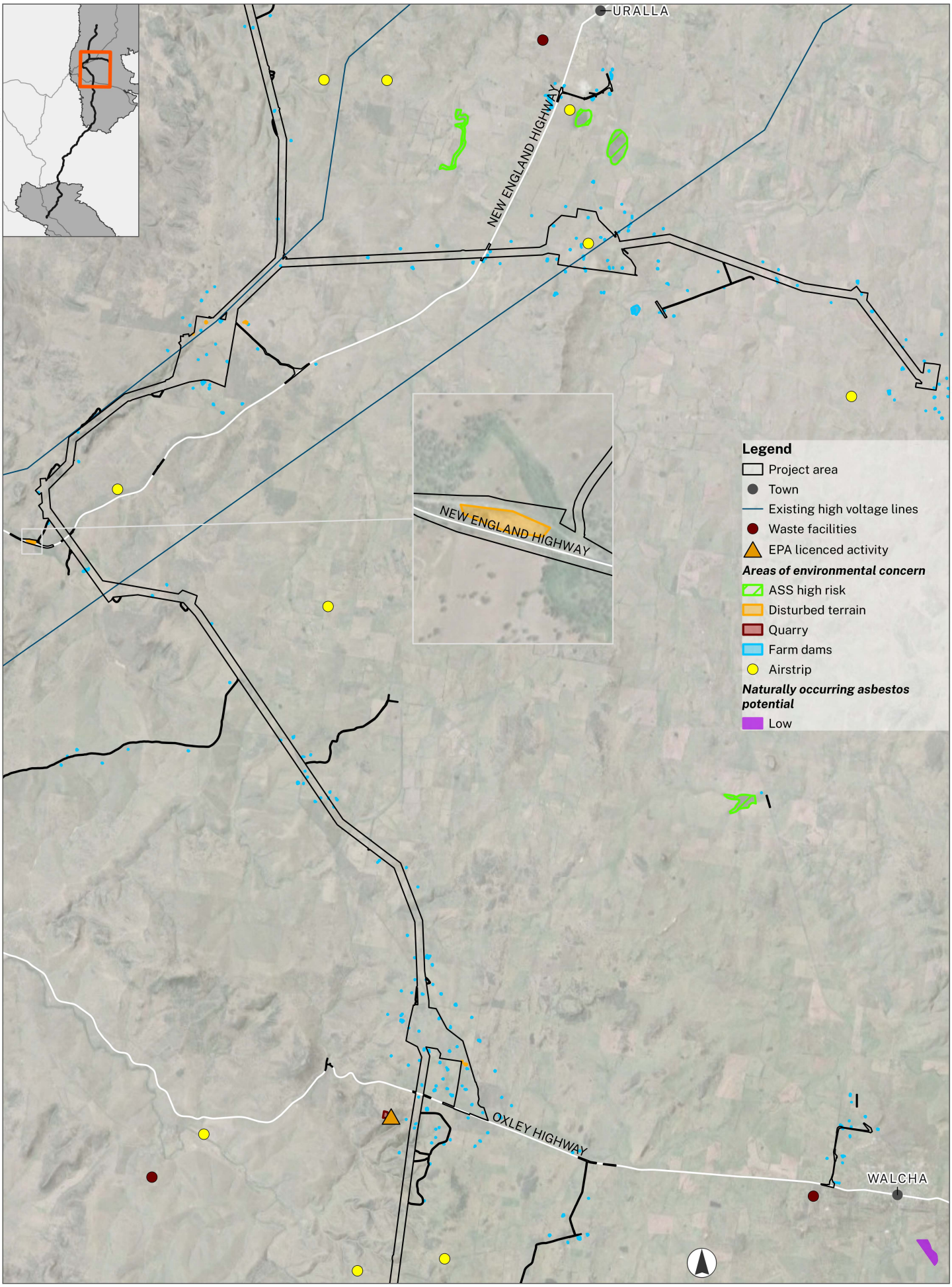


FIGURE 22.1b Areas of environmental concern (Map 2 of 6)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

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GDA2020 MGA Zone 56

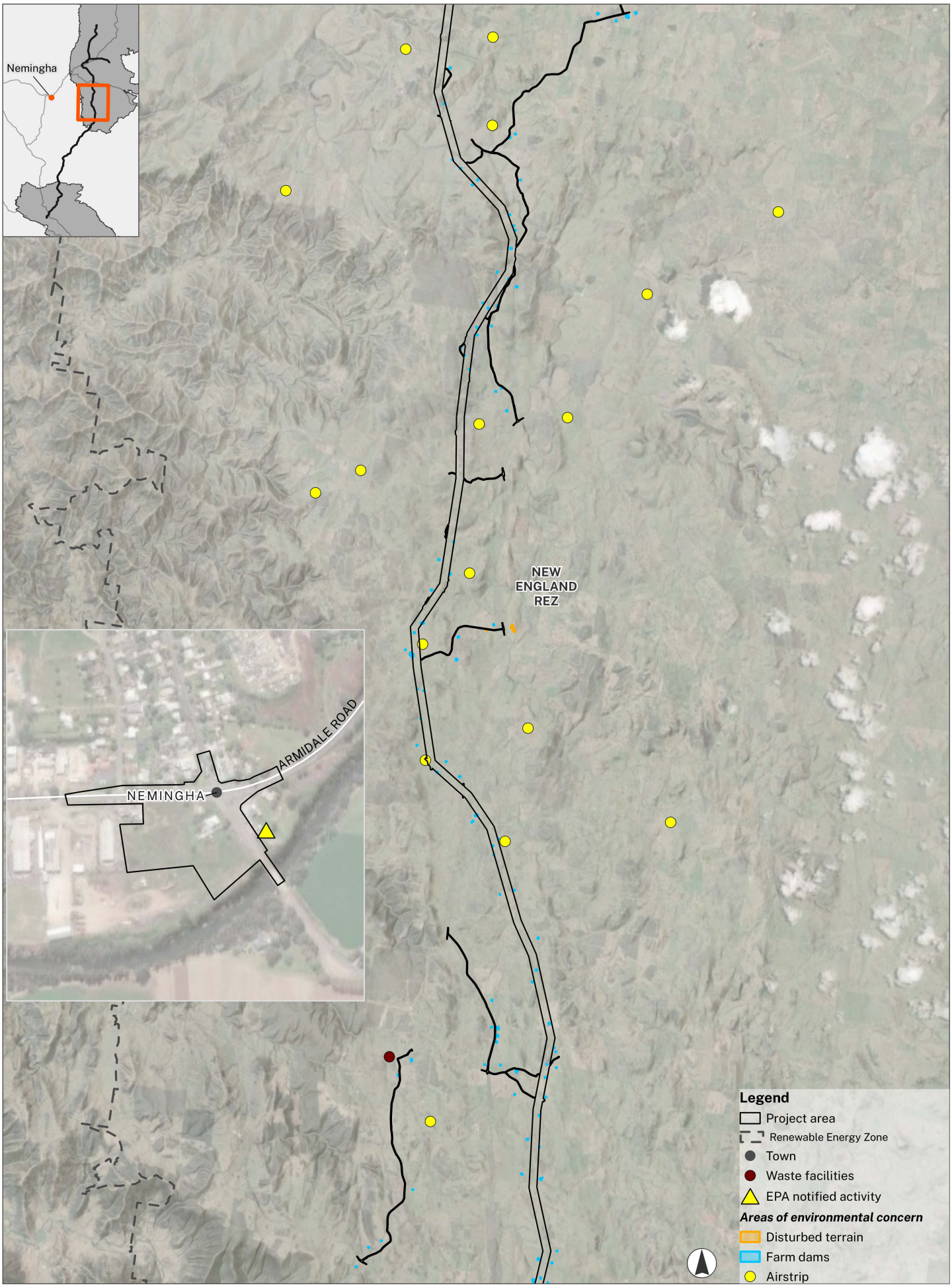


FIGURE 22.1c Areas of environmental concern (Map 3 of 6)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:160,000 at A4
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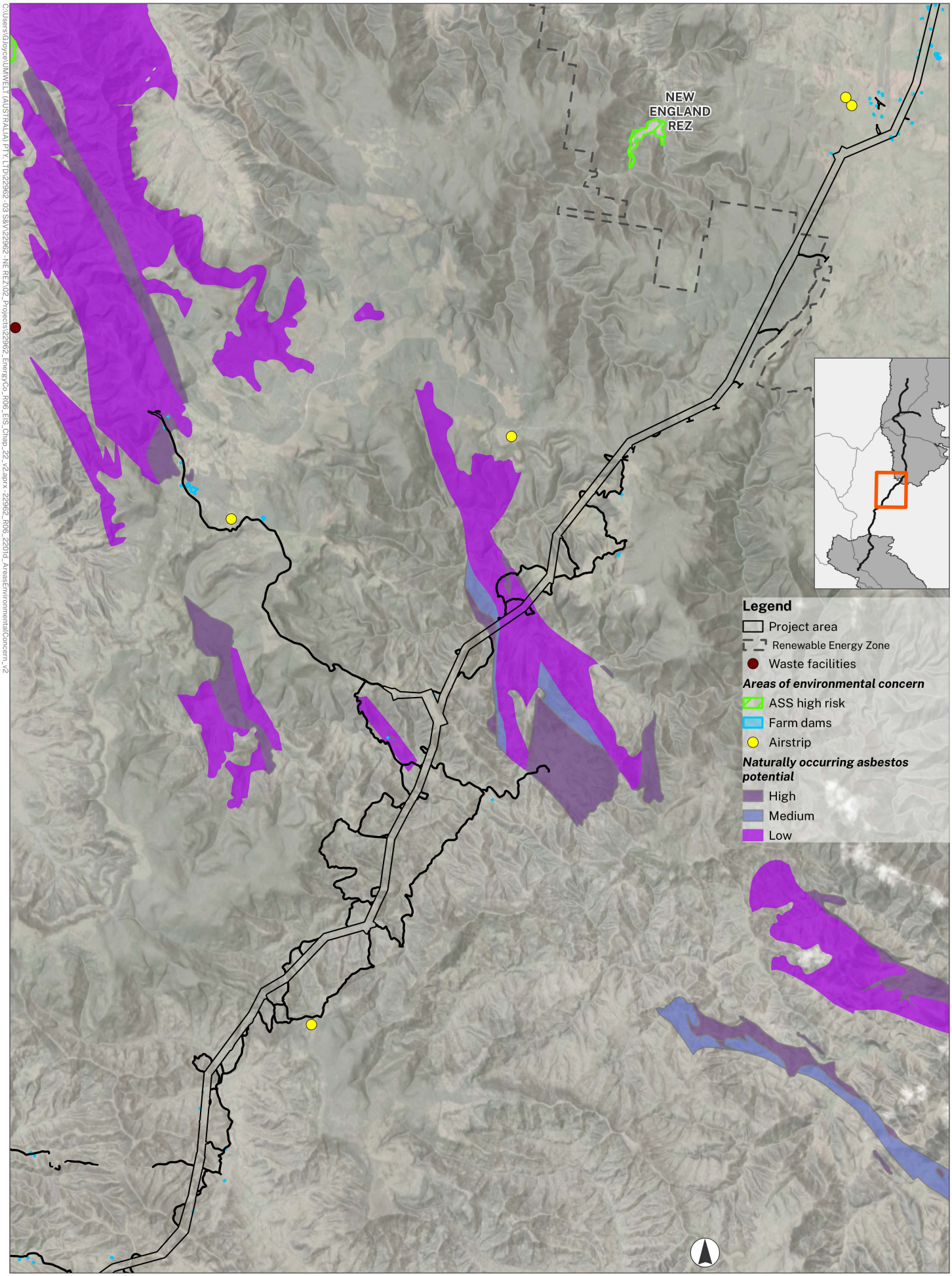


FIGURE 22.1d Areas of environmental concern (Map 4 of 6)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

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Kilometres

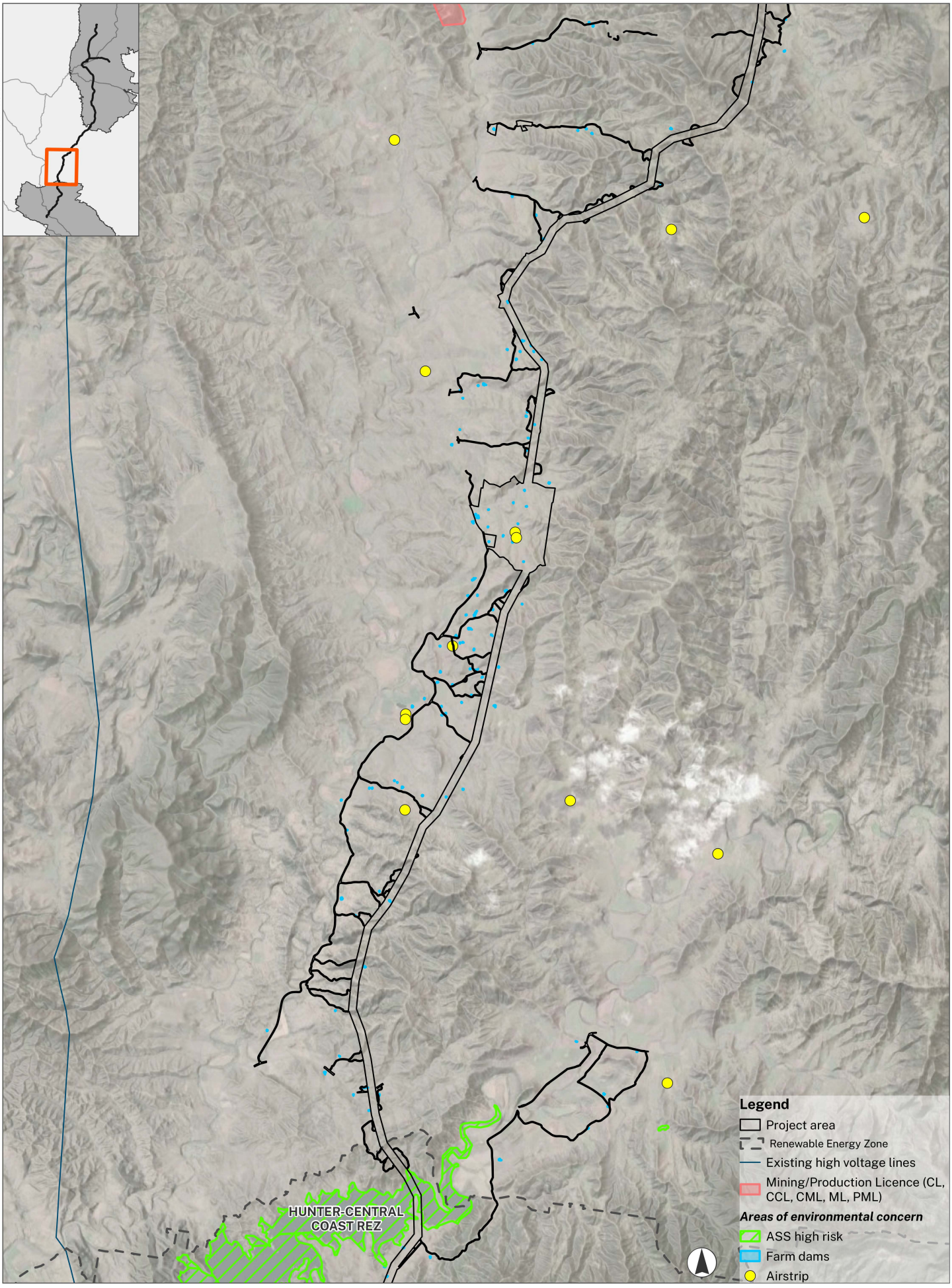


FIGURE 22.1e Areas of environmental concern (Map 5 of 6)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

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GDA2020 MGA Zone 56

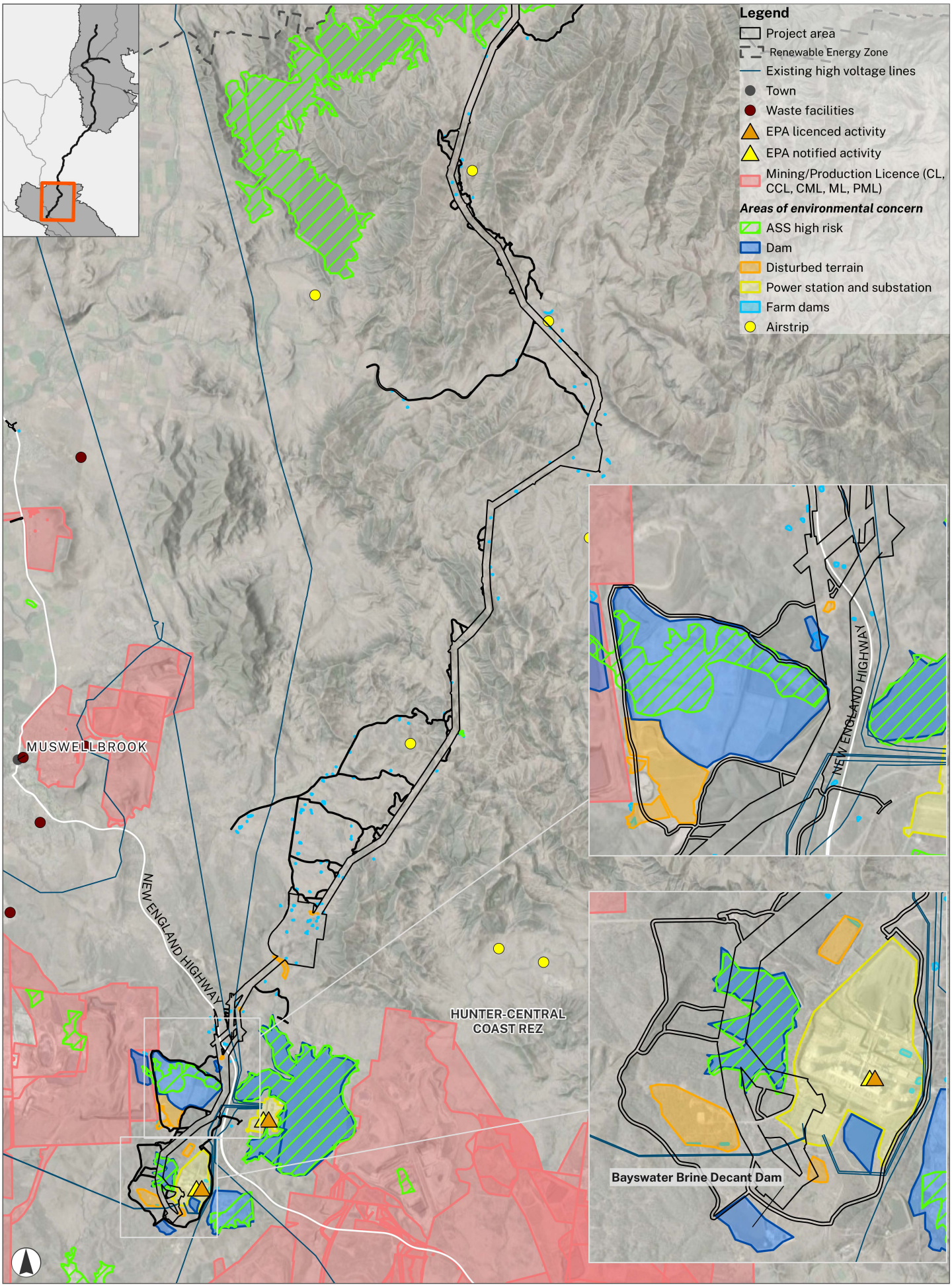


FIGURE 22.1f Areas of environmental concern (Map 6 of 6)

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

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GDA2020 MGA Zone 56

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Kilometres

22.3.1 Construction impacts

Disturbance of contaminated soil during construction has the potential to expose workers, nearby sensitive receivers and the wider environment to harmful contaminants in the absence of appropriate controls. There is also a low risk of groundwater contamination during construction due to the limited and localised nature of potential groundwater interaction.

Construction activities also have the potential to introduce contamination to the environment through accidental spills and leaks of hazardous materials and dangerous goods, inappropriate management of contaminated soils and stockpiled materials.

As discussed in Section 22.2.3, the desktop assessment identified a potential area of NOA risk from Hanging Rock to Glenrock which intersects with the project area. During construction there is a risk of disturbing soil and rock containing NOA at these locations.

The Contamination Assessment (Technical Report 19) concluded that the project area is considered suitable for the proposed development with regard to contamination risk, with implementation of appropriate environmental management measures during construction and with additional targeted investigations proposed to further test and define AECs. The identified AECs in Table 22.2 are considered manageable within the proposed development context. Although there is limited soil and groundwater data across parts of the project area, available information indicates no widespread contamination that would prevent development. Residual risks to human health and the environment can be managed through a CEMP and associated sub-plans, along with further targeted investigations, particularly at the Nemingha Maintenance Facility and in areas of moderate or higher contamination risk where ground disturbance is proposed.

22.3.2 Operational impacts

During operation, the risk of encountering existing contamination would be minimal, with the majority of impacts occurring during construction of the project. Interaction with existing AEC's would be appropriately managed during operation such that any residual risk to operational workers and the public would be negligible.

During operation of the project, potential contamination risk to the environment may occur by chemical leaks, spills and runoff into the soil, surface water or groundwater. Herbicide application around project infrastructure and assets may also occur. These risks would be minimised through spill containment facilities, incident response procedures, and managed through established operator environmental management plans.

22.4 Cumulative impacts

The potential cumulative impacts of the project have been identified based on the scale and potential impacts of the project, in combination with the potential impacts of relevant identified future projects and broader developments supporting the New England REZ. A list of these relevant projects, including their descriptions and interfaces with the project, is provided in Section 24.

Cumulative impacts can arise from the interaction of the construction and operational activities of multiple projects on AECs which may contribute to disturbance of asbestos fibres and impacts to surface water. The assessment concluded that potential impacts may occur where there is overlap between projects on the Bayswater and Liddell Power Station lands, however, these would be mitigated through project specific management measures during construction under each project approval.

The cumulative assessment is provided in Technical Report 19, with the key findings summarised in Section 24.

22.5 Management and mitigation

The management and mitigation measures relevant to contaminated land are outlined in Table 22.3, with further detail provided in chapter 11 of the contamination assessment (refer to Technical Report 19).

During the construction phase, potential soil and groundwater impacts in the project area may be encountered that require management as a result of construction activities.

It is expected that construction activities that do not intersect AECs, or intersect with AECs identified as low impact only, will be managed through the implementation of a CEMP which will outline the environmental management framework for the construction phase of the project and detail how the management and mitigation measures from this EIS (summarised in Section 25) would be implemented. Construction activities intercepting AECs identified as moderate impact or higher will be subject to additional management and risk mitigation measures detailed in Table 22.3.

During operation of the project, environmental management would be undertaken in accordance with an OEMP (summarised in Section 25). This includes the management of waste, erosion, spills, leaks and other associated operational aspects.

Table 22.3. Management and mitigation measures relating to contamination

Reference number	Impact	Mitigation measure	Timing	Relevant location
SC1	Soil contamination (AECs)	Potential human health and ecological risks from construction activities in areas external to AECs will be managed via implementation of a Soil and Water Management Plan (SWMP) and standard controls summarised in Section 25. Construction activities within the project area that intersect AECs identified as having a moderate or greater impact will be minimised during finalisation of the design and construction methodology and avoided or minimised where practicable during construction. Where disturbance works are unable to be avoided, AECs require further assessment prior to construction via a targeted detailed site investigation. All investigations and remediation/validation (if required) will be undertaken in accordance with the assessment of site contamination under the 2013 National Environmental Protection Measures (NEPM) and Guidelines for Consultants Reporting on Contaminated Land (EPA, 2020b), and other relevant guidelines made or endorsed by the EPA.	Detailed design Construction	Areas within the project area subject to maintenance activities or disturbance that potentially intersect with AECs identified as moderate or greater impact.
SC2	Surface water (AECs)	Potential risk to surface water quality from construction activities will be managed via the implementation of a Soil and Water Management Plan (SWMP) and standard controls summarised in Section 25. Construction activities within the project area that intersect surface water bodies will be minimised during detailed design and development of the construction methodology. Impacts will be minimised where practicable during construction.	Detailed design Construction	Areas within the project area where construction or operational activities intersect watercourses, farm dams or other surface water bodies.

Reference number	Impact	Mitigation measure	Timing	Relevant location
		Where disturbance works impacting a surface water body cannot be avoided, water will be assessed against relevant discharge or disposal criteria prior to dewatering, disturbance or extraction activities, with any required approvals obtained. All investigation and management measures will be undertaken in accordance with the NEPM, Australia and New Zealand Guidelines (ANZG) for freshwater quality (ANZECC, 2018) and other relevant guidelines made or endorsed by the EPA.		
SC3	Groundwater contamination (AECs)	A Groundwater Management Plan (GWMP) will be required as an appendix to the SWMP, specifically to monitor impacts of works extracting groundwater for construction purposes at specific locations. Where disposal or discharge of extracted groundwater is required further sampling and analysis of groundwater is required for comparison against the relevant criteria for the disposal pathway. This will include ANZG freshwater quality guidelines (ANZECC, 2018) for discharge to surface water, trade waste or sewer acceptance criteria in accordance with operator requirements, and / or requirements of the receiving treatment facility in line with licence conditions. The project may need to gain approval under the POEO Act 1997 prior to discharge or disposal. Where extraction of groundwater is proposed in areas not likely to have been impacted by AECs, management of groundwater will be managed via implementation of standard controls discussed in Section 25 of the EIS. Where groundwater extraction is required within 500 m from AECs potentially impacted by historical land use activities, then the risk monitoring and control measures for reinjection, disposal or discharge of extracted groundwater as described in chapter 11 of the contamination assessment (Technical Report 19) will apply.	Detailed design Construction	Areas within the project area where groundwater extraction activities are required within 500 m of AECs that may have impacted groundwater quality due to their historical land use activities.

Reference number	Impact	Mitigation measure	Timing	Relevant location
SC4	Salinity	Disturbance works within the project area intersecting areas mapped as moderate or higher risk of saline soils would require a visual inspection for the presence of saline soils. Areas of known or suspected salinity would be subject to further testing as required. If salinity is confirmed, excavated soils will be managed in accordance with Book 4 Dryland Salinity: Productive use of Saline Land and Water (DECC, 2008a) and the Salinity Training Manual (DPI, 2014). This will be captured within the SWMP to manage salinity impacts. Erosion controls will be implemented in accordance with The Blue Book (Landcom, 2004) in the ESCP. Prior to construction, materials will be selected to withstand acidic or high saline soil and groundwater environment (where applicable). During construction, existing areas of waterlogging and poor drainage will be avoided, where practicable, regarding access tracks and permanent structures.	Detailed design Construction	Areas within the project area mapped as moderate or higher risk saline soils.
SC5	Acidification of soil and groundwater due to the exposure and excavation of ASS	Measures to manage potential in-land acid sulfate soils if encountered, in accordance with the NSW Acid Sulfate Soil Guidelines. If encountered, a project specific Acid Sulfate Soil Management Plan (ASSMP) will be required, specifically pertaining to ground disturbance activities occurring in the vicinity of Lake Glenbawn.	Construction	Areas within the project area mapped as high risk of ASS.

Reference number	Impact	Mitigation measure	Timing	Relevant location
SC6	Naturally occurring asbestos	Construction activities within the project area that intersect NOA will be minimised during finalisation of the design and construction methodology and avoided or minimised where practicable during construction. Where disturbance works are unable to avoid relevant areas comprising NOA further assessment is required prior to construction via a targeted sampling program. All investigations will be undertaken in accordance with the assessment of site contamination NEPM and other relevant guidelines made or endorsed by the EPA. Investigation should be undertaken by suitably qualified personnel with asbestos / NOA experience. Once the extent of NOA is better understood and designs are refined, the SWMP will be updated to include management of NOA in accordance with the NSW Government Code of Practice How to manage and control asbestos in the workplace (Safe Work NSW, 2022). The SWMP will include the measures outlined to manage NOA as detailed in chapter 11 of the contamination assessment (Technical Report 19).	Detailed design Construction	Areas within the project area mapped as low, medium and high risk of NOA.
SC7	Soil and surface water contamination - chemical spills and runoffs	All chemicals, fuels or other hazardous substances will be stored in accordance with the supplier's instructions and relevant legislation, Australian Standards and applicable guidelines. A spill response plan will be developed and implemented. Environmental spill kits containing spill response materials suitable for the work being undertaken will be available with extras available to be carried in vehicles. All staff will be trained in emergency spill procedures. Herbicide application will comply with label requirements and applicable buffer distances from surface water.	Construction Operation	All locations.

Reference number	Impact	Mitigation measure	Timing	Relevant location
SC8	Improper management of spoil or imported soil	The contractor will undertake compliance monitoring and recording of waste volumes, waste types, and waste stockpiles where excavations and stripping of surface soil contamination occur for the project. The contractor will keep all records during construction for waste disposal and for the importation of materials such as engineering fill and excavated natural materials (ENM) or virgin excavated natural materials (VENM) soils. Engineering fill materials for use within the project area will be validated to ensure they meet the classification of VENM or ENM prior to being transported to the project. Any spoil proposed to be offsite disposed will need to be assessed in accordance with the Waste Classification Guidelines (EPA, 2014), relevant Resource Recovery Order / Resource Recovery Exemptions or classified as VENM as defined in the POEO Act.	Construction	All locations.
SC9	Unexpected contamination	The discovery of any unexpected contamination during construction will be managed in accordance with an Unexpected Contaminated Finds Plan (UCFP) which will be prepared prior to construction and included in the SWMP.	Construction	Ground disturbance areas and ancillary sites within project area.

Waste



Section 23

23 Waste management

This section examines the potential impacts associated with waste generation during the construction and operation of the project and identifies mitigation and management measures to avoid and reduce waste, promote reuse and recycling, and ensure the safe management and disposal of waste associated with the project.

23.1 Assessment approach

The waste assessment was prepared with reference to the following plans, policies, and guidelines:

- NSW EPA Waste Classification Guidelines (2014).
- NSW EPA Circular Economy Policy Statement: Too Good to Waste (2019).
- NSW DPIE Waste and Sustainable Materials Strategy 2041 Stage 1: 2021–2027 (2021c).

The assessment was also prepared with reference to the SEARs detailed in Appendix A.

This section also considers the issues raised in stakeholder engagement relating to waste (refer to Section 5), including the effective management of waste generated by the project and by broader renewable energy development within the New England REZ, including consultation with local government, generators and other stakeholders. The study area for this assessment is defined as the 8 LGAs within which the project is located, being Armidale Regional, Uralla Shire, Tamworth Regional, Walcha Shire, Liverpool Plains Shire, Upper Hunter Shire, Muswellbrook Shire and Singleton.

A desktop assessment examined potential waste impacts from the project's construction and operation by:

- identifying waste-generating activities
- identifying waste types, quantities, and preliminary classifications
- outlining management options for each waste stream
- recommending measures based on the waste hierarchy and circular economy principles.

23.2 Existing environment

There are a number of existing licensed waste management facilities within the vicinity of the project operated by local councils and private operators that accept a wide range of wastes. Existing waste facilities within approximately 80 kilometres of the project and the waste types able to be received by these facilities are listed in Table 23.1.

EnergyCo has consulted with councils to determine the potential waste streams and waste capacity that council operated facilities may be able to accept, subject to appropriate agreements. This consultation will continue during detailed design as further refinements are made to projected waste volumes and types generated by the project.

Table 23.1. Waste management facilities within proximity to the project

Facility name	LGA	Wastes accepted	Approximate distance from the project area
Guyra Recycling and Waste Transfer Station	Armidale Regional	General household waste, some problem wastes and garden waste	13 km
Armidale Waste Management Facility	Armidale Regional	Garden waste – waste processing (non-thermal treatment) Landfilling of general solid waste (putrescible and non-putrescible), asbestos waste and tyres Concrete, bricks and roof tiles – waste processing (non-thermal treatment) Contaminated soil from Armidale Gas works	23 km
Ebor Waste Transfer Station	Armidale Regional	General household waste, some problem wastes and garden waste	65 km
Wollomombi Waste Transfer Station	Armidale Regional	General household waste, some problem wastes and garden waste	43 km
Hillgrove Waste Transfer Station	Armidale Regional	General household waste, some problem wastes and garden waste	35 km
Lower Creek Waste Transfer Station	Armidale Regional	General household waste, some problem wastes and garden waste	61 km
Bundarra Waste Management Facility	Uralla Shire	General household waste, green waste, metals, glass, cardboard, waste oil, and batteries	40 km
Kingstown Waste Management Facility	Uralla Shire	Recyclables and general household waste (consolidated for transport to Uralla Waste Management Facility)	19 km
Uralla Waste Management Facility	Uralla Shire	General solid waste (putrescible and non-putrescible), asbestos and waste tyres	5 km

Facility name	LGA	Wastes accepted	Approximate distance from the project area
Kentucky Recycling Station	Uralla Shire	Household paper, cardboard, glass, hard plastics, and metals	6 km
Barraba Landfill	Tamworth Regional	Common waste types	80 km
Manilla Landfill	Tamworth Regional	Common waste types	55 km
Watsons Creek Transfer Station	Tamworth Regional	Common waste types	25 km
Bendemeer Transfer Station	Tamworth Regional	Common waste types	19 km
Somerton Landfill	Tamworth Regional	Common waste types	65 km
Kootingal Transfer Station	Tamworth Regional	Landfilling of general solid waste (putrescible and non-putrescible), asbestos waste and waste tyres	35 km
Tamworth Landfill	Tamworth Regional	Landfilling of general solid waste (putrescible and non-putrescible), asbestos waste Certain liquid waste – waste processing (non-thermal treatment) Composting of domestic garden waste and some pre-approved commercial quantities General or specific exempted waste (waste that meets conditions of a resource recovery exemption)	46 km
Duri Landfill	Tamworth Regional	Common waste types	59 km
Dungowan Transfer Station	Tamworth Regional	Common waste types	30 km
Niangala Transfer Station	Tamworth Regional	Common waste types	4 km

Facility name	LGA	Wastes accepted	Approximate distance from the project area
Nundle Transfer Station	Tamworth Regional	Common waste types	18 km
Woolbrook Waste Transfer Facility	Walcha Shire	Domestic, domestic recyclables	8 km
Walcha Community Recycling Centre	Walcha Shire	Landfilling of general solid waste (putrescible and non-putrescible), asbestos and waste tyres	11 km
Nowendoc Waste Facility	Walcha Shire	Domestic, domestic recyclables, scrap metal	29 km
Quirindi Waste Management Facility	Liverpool Plains Shire	Garbage, bulky goods, green waste, building and construction materials, tyres, batteries, used oil, scrap metal, empty gas cylinders, white goods, asbestos (with prior notice) and sorted recyclables	48 km
Werris Creek Waste Management Facility	Liverpool Plains Shire	Garbage, bulky goods, green waste, building and construction materials, tyres, batteries, used oil, scrap metal, empty gas cylinders, white goods and sorted recyclables	58 km
Willow Tree Waste Management Facility	Liverpool Plains Shire	Garbage, bulky goods, green waste, building and construction materials, tyres, batteries, used oil, scrap metal, empty gas cylinders, white goods and sorted recyclables	32 km
Murrurundi Waste Management Facility	Upper Hunter Shire	Landfilling of general solid waste (putrescible and non-putrescible), and waste tyres	24 km
Scone Landfill	Upper Hunter Shire	Waste storage of restricted solid waste, liquid waste, hazardous wastes Landfilling of general solid waste (putrescible and non-putrescible) and asbestos waste	16 km

Facility name	LGA	Wastes accepted	Approximate distance from the project area
Aberdeen Waste Management Facility	Upper Hunter Shire	Landfilling of general solid waste (putrescible and non-putrescible), asbestos waste and tyres	13 km
Merriwa Waste Management Facility	Upper Hunter Shire	Landfilling of general solid waste (putrescible and non-putrescible), asbestos waste and waste tyres, recovery of general waste	58 km
Muswellbrook Waste and Recycling Facility	Muswellbrook Shire	Common waste types	10 km
Singleton Waste Management Facility	Singleton	Landfilling of general solid waste (putrescible and non-putrescible), asbestos waste	30 km

23.3 Construction waste

23.3.1 Waste generation during construction

Construction waste generating activities and indicative quantities are outlined in Table 23.2. The estimates of construction waste streams and quantities have been calculated from the reference design and based on the construction methodology described in Section 3. Final waste quantities and classifications would be confirmed during the detailed design phase.

To achieve effective waste and resource management, the project would adopt strategies aligned with the waste management hierarchy, prioritising avoidance, reduction and reuse/recycling before disposal. Waste management approaches are discussed in Section 23.5.

Table 23.2. Construction waste generation types and quantity estimates

Activity	Waste type	Indicative total quantity	Likely classification
Clearing and grubbing	Vegetation waste, including timber, shrubs, grasses, leaves and weeds. May comprise mulched material or solid timber	270,000 cubic metres	General solid waste (putrescible)

Activity	Waste type	Indicative total quantity	Likely classification
General earthworks and excavation activities	Spoil from excavations that is unsuitable for use on the project NOA	10,000 cubic metres	General and restricted solid wastes (non-putrescible) subject to classification Special wastes
Concrete batching	Concrete waste generated at concrete pours (excess, overpour, washdown) and at batch plants	4,200 cubic metres	General solid waste (non-putrescible)
Wastewater generated from amenities at construction ancillary sites (including workforce accommodation camps)	Liquid waste / slurry from field and compound amenities and ablution	120 megalitres	Liquid waste
General waste from workforce accommodation camps and personnel	General domestic waste from workforce accommodation camps and personnel Organic waste Recyclables	1,500 tonnes general domestic 775 tonnes organic 650 tonnes recyclables	General solid waste (putrescible and non-putrescible)
General construction waste	Offcuts, excess material, packaging Oils Grease	20,000 tonnes offcuts, excess material and packaging 170 kilolitres oils 50 tonnes grease	General solid waste (non-putrescible) Liquid waste (oils)
Conductor drums	Treated timber	4,400 drums	General solid waste (non-putrescible)
Miscellaneous chemicals	Aerosols - paints, sprays, galvanising sprays Fuel and oils for plant Adhesives and glues Cleaners Herbicides / Pesticides	Minimal quantity	General solid waste (non-putrescible) Hazardous waste Liquid waste (oils and flammable liquids)

23.3.2 Waste management during construction

Construction waste would be managed in accordance with circular economy principles and the waste hierarchy: avoid and reduce, reuse, recycle and recover with disposal considered only as a last option (refer to Figure 23.1). Wastes would be managed in accordance with the waste provisions contained within the POEO Act and other relevant plans, policies, and guidelines.

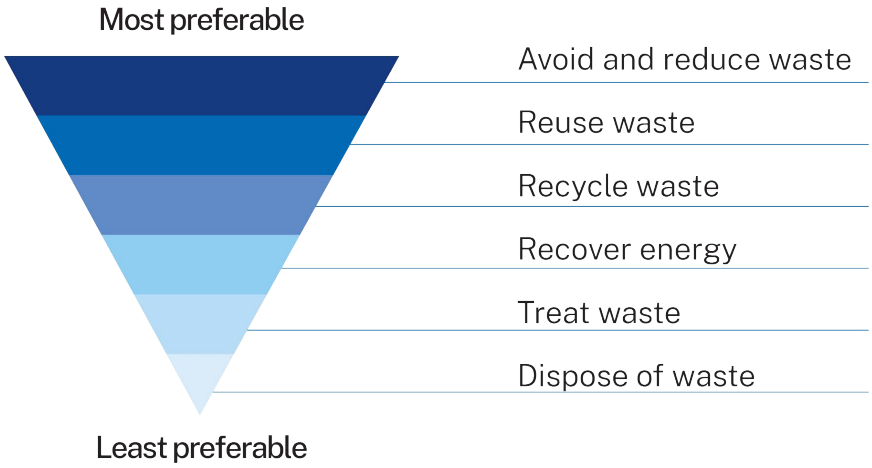


Figure 23.1. Waste hierarchy (source: NSW Government, 2019)

Waste unable to be reused or recycled would be disposed in accordance with NSW EPA Waste Classification Guidelines (2014), which outline requirements for waste classification, management, transport and disposal.

Improperly managed construction waste can contaminate soil and water, produce leachate, odours, and dust, and pose environmental and health risks. These risks can be minimised and managed through using well established waste management techniques and through appropriate handling, transport and disposal. Table 23.3 details measures for managing construction waste as part of the project, with further mitigation detailed in Section 23.5. Recycling and disposal facilities for each waste type would be selected based on capacity, licensing, confirmed classifications and in consultation with the waste management facility operator.

Table 23.3. Construction waste management

Waste type	Proposed management
Vegetation waste, including timber, shrubs, grasses, leaves and weeds	Any usable timber is a valuable resource and would be reused where practicable. Examples of reuse include structural timber, furniture, structural poles for fauna and fence posts. Timber that is not suitable for structural uses could be reused as firewood, and any remaining timber could be mulched and reused on-site according to NSW EPA requirements or removed for off-site use under The Mulch Order 2016 and NSW *Biosecurity Act 2015*. Weed-contaminated waste would be disposed of at a licensed facility in line with the NSW *Biosecurity Act 2015*. In the Nundle, Terrible Billy and Hanging Rock State Forest areas, the reuse of any usable timber for forestry purposes would be discussed with the FCNSW.

Waste type	Proposed management
Spoil from excavations that is unsuitable for reuse	Much of the spoil likely to be generated would (subject to classification) be excavated natural material (ENM) or virgin excavated natural material (VENM) and be suitable for reuse. The spoil that is suspected of being contaminated or containing NOA would be subject to testing to determine waste classification. Contaminated spoil would be contained, sampled, and analysed and managed either: • in situ with relevant controls to ensure no unacceptable risk to human health or ecological values, or • disposed of at an appropriately licensed waste management facility in accordance with the NSW EPA Waste Classification Guidelines (2014).
Concrete, asphalt, road base, gravel	Where practicable, construction waste would be reused in accordance with the relevant NSW EPA Resource Recovery Order. Non-reusable materials would be stored on-site and processed at a recycling facility. All waste would be classified and disposed in accordance with the NSW EPA Waste Classification Guidelines (2014).
Vehicle/plant maintenance materials	Vehicle and plant maintenance waste would be collected in labelled bins and stored in designated areas prior to collection by authorised waste contractors for recycling or off-site disposal. Tyres would be collected by licensed waste contractors for off-site recycling at licensed facilities. Liquid wastes would be stored in suitable containers in bunded areas prior to off-site transportation. Bunded areas would have a capacity of at least 130% of the largest volume stored. All waste would be disposed of in accordance with the NSW EPA Waste Classification Guidelines (2014).
Steel and other materials, timber used in forming of foundations or piles, conductor, earthing and tower waste materials, pipe and conduit and electrical cabling	Where practicable, construction waste materials would be reused in accordance with the relevant NSW EPA Resource Recovery Order. Materials that could not be reused on-site would be segregated and sorted prior to processing at an appropriate materials recycling facility. Electrical waste would be securely stored for collection by an authorised contractor for subsequent processing and off-site recycling. All wastes would be classified and disposed of in accordance with the NSW EPA Waste Classification Guidelines (2014).
Hazardous waste, contaminated waste and / or special waste	Hazardous waste or special waste, such as asbestos, would be stored in clearly labelled bins within designated storage areas and collected by an authorised contractor for off-site disposal in accordance with the NSW EPA Waste Classification Guidelines (2014).

Waste type	Proposed management
Transportation and packaging waste, including plastic, paper, cardboard, pallets, treated timber cable drums	Where practicable, construction waste would be reused according to the relevant NSW EPA Resource Recovery Order. If reuse on-site is not practicable, waste would be sorted and processed at a recycling facility. All waste would be classified and disposed of in accordance with the NSW EPA Waste Classification Guidelines (2014).
General domestic waste, including food waste, paper, cardboard, plastic and glass	General domestic waste from construction ancillary sites, including workforce accommodation camps, would be source separated into recycling and residual landfill waste collection bins. Authorised contractors would regularly collect and transport these wastes for off-site recycling or disposal.
Wastewater, including concrete washouts and sewage	Wastewater treatment plants are proposed at workforce accommodation camps. Treated water may be used for dust suppression, subject to meeting water quality criteria. Remaining wastewater would be temporarily stored in tanks at relevant construction ancillary sites (including at workforce accommodation camps) and regularly transported by authorised contractors to approved facilities for treatment and disposal.

23.4 Operational waste

23.4.1 Waste generation during operation

The project would generate waste during operation, however, this would be materially reduced waste volumes when compared to the construction phase. Key activities that have the potential to generate waste during operation are provided in Table 23.4.

Table 23.4. Operational waste generation types and quantity estimates

Activity	Waste type	Indicative total quantity	Likely classification
Clearing and grubbing – vegetation maintenance	Green waste, including timber, shrubs, grasses, leaves and weeds	Minimal and limited to vegetation clearance maintenance only. Vegetation mulched or reused.	General solid waste (putrescible)
Waste oil from energy hub transformers	Liquid waste	Minimal quantity	Hazardous waste – containers holding oils if residues have not been removed by cleaning Liquid waste (oil)

Activity	Waste type	Indicative total quantity	Likely classification
Wastewater generated from amenities – Nemingha maintenance facility and energy hubs	Liquid waste / slurry from amenities and ablution	Less than 500 kilolitres per year Nemingha maintenance facility would be connected to existing sewer network	Liquid waste
General waste from Nemingha maintenance facility, energy hubs and transmission line maintenance	• General domestic waste from personnel • Packaging • Insulators and conduits • Pallets • Empty oil drums and other containers • Organic waste • Recyclables	15 tonnes per year	General solid waste (putrescible and non-putrescible)
Conductor drums	Timber	Less than 10 drums per year	General solid waste (non-putrescible)
Miscellaneous chemicals	• Aerosols - paints, sprays, galvanising sprays • Fuel and oils for plant • Hydraulic fluid and oil filters • Cables and batteries • Adhesives and glues • Cleaners • Herbicides / Pesticides	Minimal quantity	General solid waste (non-putrescible) Hazardous waste Liquid waste (oils and flammable liquids)

23.4.2 Waste management during operation

Operational waste would be managed in a similar way to the management of construction waste. Table 23.5 outlines the proposed strategy for managing operational waste, including protocols to ensure effective segregation and to minimise cross-contamination risks. Recycling and disposal facilities for each waste stream would be selected based on their capacity and availability, the types of waste they are authorised to accept, and confirmed waste classifications.

Table 23.5. Operational waste management

Activity/Waste type	Proposed management
Maintenance of towers, conductors, vehicles and equipment (for example transformers in energy hubs)	Waste would be collected by an authorised waste management contractor for off-site recycling or disposal at a licensed facility in accordance with the NSW EPA Waste Classification Guidelines (2014)
Maintenance materials including lubricants, waste oils, fuels, coolant, radiator fluid, hydraulic fluid, drained oil filters, electrical waste, including batteries, cables, insulators and conduits	Waste would be collected by an authorised waste management contractor for off-site recycling or disposal at a licensed waste management facility in accordance with the NSW EPA Waste Classification Guidelines (2014)
General waste including packaging waste, plastic, paper, cardboard, pallets, fumigated timber cable drums, empty oil and other containers/drums	Waste would be collected by an authorised waste management contractor for off-site recycling or disposal at a licensed facility in accordance with the NSW EPA Waste Classification Guidelines (2014)
Green waste from vegetation maintenance	Green waste that is free of weeds would be chipped, mulched and reused on-site in accordance with the relevant NSW EPA Resource Recovery Order. If green waste is unsuitable for on-site mulching, the material would be removed for off-site beneficial reuse in accordance with The Mulch Order 2016 (EPA, 2016) and the NSW *Biosecurity Act 2015* Weed-contaminated waste would be disposed of and taken to a licensed waste management facility in accordance with the *Biosecurity Act 2015*
General waste from worker activities	Waste would be collected by an authorised waste management contractor for off-site recycling or disposal at a licensed facility in accordance with the NSW EPA Waste Classification Guidelines (2014)
Wastewater	Wastewater would be managed through an appropriate disposal system, such as a septic tank, with treated water directed to a suitable landscaped area. If any wastewater needs to be removed from the site, it would be transported to a licensed facility for disposal, following the NSW EPA Waste Classification Guidelines (2014) The Nemingha maintenance facility would be connected to the existing sewer network.

23.5 Mitigation and management

Waste generated during construction would be managed in accordance with circular economy practices and the waste hierarchy, prioritising avoidance, reduction, reuse and recycling and recovery prior to off-site disposal. The management of waste would comply with the requirements of the POEO Act, its regulations, and other relevant legislation, policies, and guidelines. The mitigation strategies described in this section would form part of a Waste Management Plan for the project.

Mitigation and management measures proposed to manage waste during construction and operation of the project are listed in Table 23.6.

Table 23.6. Waste management and mitigation measures

Reference	Impact	Mitigation	Timing	Relevant location
WM1	Waste management	A Waste Management Plan (WMP) will be prepared and will include appropriate measures to manage waste generation, reuse, recycling and disposal during construction of the project.	Detailed design	All locations
WM2	Waste facilities	The recycling and disposal facilities to be used by the project during construction and operation will be determined based on availability/capacity, waste licensed to be accepted and confirmed waste classifications. Consultation will be carried out with waste management facility operators to identify landfill capacities and confirm suitable licensed waste management recycling and disposal locations for the project.	Detailed design Construction Operation	All locations
WM3	Waste management	In the Nundle, Terrible Billy and Hanging Rock State Forest areas, the reuse of any usable timber for forestry purposes will be discussed with the FCNSW.	Detailed design Construction	Nundle, Terrible and Hanging Rock State Forests within project area
WM4	General waste management	The following general waste management actions will be implemented throughout the construction and operation of the project: • the waste hierarchy principles of avoid, reduce, reuse, or recycle will be applied with disposal as the last resort • waste will be assessed, classified, managed and disposed of in accordance with the NSW EPA Waste Classification Guidelines (2014) and the relevant requirements of the Protection of the Environment Operations (Waste) Regulation 2014 • appropriate waste bins/receptacles/waste storage areas will be maintained at construction ancillary sites	Construction Operation	All locations

Reference	Impact	Mitigation	Timing	Relevant location
		• waste streams will be segregated to avoid cross contamination of materials and to maximise reuse and recycling opportunities • waste and surplus spoil will be removed and transported to an appropriately licensed waste management facility or other facilities lawfully able to accept materials • wastewater from construction work will be collected and transported to a licensed premises that can lawfully accept the waste.		
WM5	General waste management	The waste management measures per Table 23.3 and Table 23.5 will be implemented.	Construction and operation	All locations

Cumulative impacts



Section 24

24 Cumulative impacts

This section examines the potential cumulative impacts associated with the project and other relevant future projects (project-level CIA). Cumulative impacts were considered for each relevant environmental, social and economic aspect for the project, with assessments undertaken as part of the technical studies completed for the EIS. This section summarises the outcomes of these cumulative impact assessments.

EnergyCo is also working with other government and non-government stakeholders to address broader regional opportunities and challenges associated with the energy transition. This broader Roadmap coordination and benefits for the New England REZ, including the regional major infrastructure studies are discussed in Section 2. The regional major infrastructure studies, whilst being a separate broader study process, address some of the key strategic topics also considered in this project-level CIA (for example waste, water and workforce accommodation).

24.1 Assessment approach

The CIA was prepared with reference to the *Cumulative Impact Assessment Guidelines for State Significant Projects* (DPHI, 2026c) (CIA guideline).

The assessment was also prepared with reference to the SEARs as detailed in Appendix A.

This section considers issues raised in engagement with community and other stakeholders relating to cumulative impacts (refer to Section 5) including the cumulative impacts of multiple projects on roads, housing, services, the environment, communities, visual amenity and rural character change.

The project-level CIA involved:

- screening and identifying future relevant projects to be considered in the assessment, using the guidance provided in the CIA guideline
- assessing cumulative impacts associated with the interaction between the project and relevant future projects including issue-specific and combined CIA where relevant
- identification of mitigation and management measures to address cumulative impacts.

The project-level CIA study area was defined based on the scale and potential impacts of the project, combined with potential impacts of identified relevant future projects (as defined in the CIA guideline and discussed in Section 24.2.1). Future relevant projects within the local government areas traversed by the project (being Armidale Regional, Uralla Shire, Tamworth Regional, Walcha Shire, Liverpool Plains Shire, Upper Hunter Shire, Muswellbrook Shire and Singleton) were reviewed, and relevant future projects identified. Projects outside the traversed LGAs were also considered where they had a credible interaction with the project, such as transport routes, workforce and accommodation markets.

Each technical specialist then reviewed the relevant future projects along with the project-specific impact findings to identify cumulative impact issues related to that particular technical study that required assessment.

Quantitative analysis was undertaken where feasible, based on accessible technical documentation for the relevant future projects. This included anticipated construction timelines and available technical documentation, as detailed in Section 24.2.1 (noting these are conceptual and may change as each relevant future project progresses through the planning approval process, post approval requirements and project financing, all of which may influence final construction timelines and technical assumptions). Where quantitative information was limited, qualitative assessment was undertaken.

EnergyCo has outlined environmental management strategies, management plans, and proposed mitigation measures in Section 25 and Appendix F. These strategies employ an adaptive management framework which would consider the final timing of construction of each relevant future project and the management of cumulative impacts. Engagement with developers would be undertaken to coordinate project delivery and manage potential cumulative impacts.

It is noted that the project-level CIA undertaken as part of the EIS has been undertaken in accordance with relevant guidelines and has a different assessment framework to the broader considerations for the New England REZ Regional Major Infrastructure Studies discussed in Section 2. For this reason, the study assumptions and parameters (for example, water demand assumptions.) between the project-level CIA and regional studies differ. The Regional Major Infrastructure Studies were prepared for a different purpose, considered different future projects and included a number of conservative assumptions and timeframes to allow the NSW Government to plan for higher impacts and identify necessary strategies. The project-level CIA and the New England REZ Regional Major Infrastructure Studies are therefore not directly comparable.

24.2 Project-level CIA

24.2.1 Identification of relevant future projects

The project-level CIA considered relevant future projects as defined in the CIA guideline and as described in Table 24.1.

Several criteria were used to identify relevant future projects with the potential to interact with the project, resulting in potential cumulative impacts. These criteria, summarised in Table 24.2, primarily relate to locality, construction and operational timeframes and required resources.

Table 24.1. Relevant future projects definition under CIA guideline

Definition	Example
Changes to existing projects	• The approval for the project is due to run out and the operations are likely to cease • The proponent of the project has announced the operation will close • The intensity of the project's operations may change over time (for example the project is currently operating below its approved capacity, the project is currently under construction and will only start operating in 2 years) • The proponent has announced it will seek approval for a major expansion of the project.
Approved projects	• The project has been approved under the EP&A Act but has not started yet.
Projects under assessment	• The application for the project has been exhibited and is currently under assessment.

Table 24.2. Screening criteria

Criteria	Description
Locality	• Major projects generally within the Armidale Regional, Uralla Shire, Tamworth Regional, Walcha, Liverpool Plains, Upper Hunter Shire, Muswellbrook and Singleton LGAs.
Timing	• The timing of the project construction is estimated to overlap with relevant future projects in construction or when operational • The timing of the commencement of the project operation is estimated to overlap with the planned construction of a relevant future project.
Resources	• Competing needs for resources, for example construction workforce, by both the project and relevant future projects • Competing needs for assets and resources, for example public roads, community infrastructure (accommodation, social services) by both the project and relevant future projects.

The following types of development were considered for inclusion as 'relevant future projects' as per the CIA guideline: other state significant development (SSD) and CSSI/SSI projects; projects classified as designated development; projects assessed under Division 5.1 of the EP&A Act that are likely to significantly affect the environment; projects declared controlled actions under the EPBC Act; and any major greenfield and urban renewal developments scheduled for the area.

Potentially relevant future projects were identified based on the screening criteria, utilising government and publicly accessible data sources, including:

- DPHI Major Projects website (as at August 2026)
- development application information sought by EnergyCo from the relevant councils relating to designated developments.

Relevant future projects considered in the assessment are summarised in Table 24.3 and shown on Figure 24.1. During mid-September 2026, EIS's for 2 additional state significant projects commenced exhibition (Bowmans Creek Wind Farm Stage 2 (SSD-73123714) and Upper Hunter Battery Energy Storage System (SSD-61707209)). The exhibition periods for both of these projects commenced after the completion of the CIA assessments for the project. The consideration of these projects in the project -level CIA will be undertaken as part of the Submissions Report / Amendment Report.

The majority of cumulative impacts are expected to occur during the project's construction phase, such as disruptions from traffic, noise, social infrastructure pressures and biodiversity impacts associated with vegetation clearing. Once operational, the project is anticipated to have few cumulative effects, largely limited to potential visual impacts.

Figure 24.2 outlines how the estimated delivery timeframes of relevant future projects align with the construction program for the project.

It is noted that the timing of approvals and subsequent construction programs for relevant future projects is inherently uncertain and subject to the relevant planning and approval processes for each project. As such, the extent and duration of overlap between projects may vary from that assumed in this assessment. For the purposes of this CIA the general approach applied assumes future relevant projects at EIS exhibition would indicatively be approved within around 6 months and where projects are approved but construction has not yet commenced, they would commence construction within around 6 months (unless clearly stated otherwise).

Additional conservatism was applied to the TTIA and subsequently to the SIA where it was conservatively assumed that construction commencement for the project would be mid-2029, with 2 peak periods. The first peak period assessed corresponded to the anticipated overlap of construction activities in early 2030, representing a potential peak condition for concurrent external project traffic. The second period aligned with the peak construction phase of the project, anticipated to occur in late 2030. These periods were identified to represent reasonable worst-case conditions for cumulative traffic, safety and operational impacts. In summary, the traffic assessment assessed a scenario that is more conservative than the traffic volumes generated by simply combining each relevant project.

It should be noted that for renewable energy developments in the New England REZ that are awarded access rights to connect to the project, or that propose to connect to Transgrid's network, the timeframes for commencement of construction would also be determined by AEMO's commissioning process. This process has the effect of staging the delivery of such projects to maintain system reliability and security of the NEM. In this regard, the CIA approach for these projects is conservative as it is based on the timeframes documented in respective EIS documents as opposed to the commissioning program that will ultimately be determined by AEMO.

Each environmental aspect has considered potential cumulative impacts as a result of the project and future relevant projects as relevant to the particular assessment. The outcomes of the assessments are detailed in each technical report, discussed briefly in the corresponding EIS technical summary sections (EIS Section 7 to Section 23) and are summarised in Section 24.2.2.

Table 24.3. Overview of relevant future projects

Relevant project	SSD / SSI reference	Proponent	Scope	Location (relevant to project)	Status	Estimated construction interface with the project
Hunter Transmission Project	SSI-70610456	EnergyCo	110 km 500 kV transmission line between Bayswater Power Station and Olney State Forest.	Muswellbrook, Singleton LGAs	Approved	The project connects to HTP's proposed Bayswater South switching station at the Bayswater Power Station. Concurrent construction periods for both projects, utilising some of the same major transport routes within the Muswellbrook LGA. HTP is estimated to commence construction in late 2027 for a period of around 2 years.
Liddell Future Landuse and Enabling Works	SSD-24937520	AGL Macquarie Pty Limited	Demolition of the Liddell Power Station and rehabilitation	Muswellbrook LGA	Construction	The Liddell Future Landuse and Enabling Works is associated with energy transition and occurs at the same time as construction of the project within Muswellbrook LGA. The project may require similar resources and infrastructure supporting the construction.
Liddell Battery and Bayswater Ancillary Works	SSD-8889679	AGL Macquarie Limited	Liddell / Bayswater decoupling works; construction and operation of a battery energy storage system; and Bayswater ancillary works	Muswellbrook and Singleton LGAs	Approved	The stage 1 decoupling works were completed in December 2023. The battery energy storage system commenced operation in July 2026. Bayswater ancillary works commenced pre-construction in December 2024 and may occur at the same time as the construction of the project, however these works are all relatively minor works and appropriately considered as part of the ongoing Bayswater Power Station operations and not materially change the existing operations. The project was therefore not assessed in the project-level CIA.

Relevant project	SSD / SSI reference	Proponent	Scope	Location (relevant to project)	Status	Estimated construction interface with the project
Bayswater Power Station upgrade	SSD-9697	AGL Energy Limited	Ash storage and handling, coal handling upgrades, new ash pipeline, construction and operation of a salt cake landfill, establishment of borrow pits and replacement of pipelines	Muswellbrook and Singleton LGAs	Approved	The ancillary upgrades proposed as part of the Bayswater Power Station upgrade may occur at the same time as the construction of the project.
Mount Pleasant Optimisation Project	SSD-10418	MACH Mount Pleasant Operations Pty Ltd	Extraction of additional coal reserves within same development footprint.	Muswellbrook LGA	Approved	The Mount Pleasant Optimisation Project is currently under construction and has a long construction timeframe. This would occur at the same time as the project construction. The Mount Pleasant Optimisation Project involves the progressive expansion of the mining lease for extraction through to 2047, so while the construction timeframes overlap this would be within what is expected of large coal mining operations.
Muswellbrook Bypass	Transport for NSW Review of Environmental Factors	Transport for NSW	9 km highway bypass	Muswellbrook LGA	Approved	The main construction works associated with the Muswellbrook Bypass are currently estimated to commence in 2027 and is expected to take around three and a half years to complete. Construction is therefore estimated to overlap with the project construction period from 2028 to around 2030.

Relevant project	SSD / SSI reference	Proponent	Scope	Location (relevant to project)	Status	Estimated construction interface with the project
						This project does not meet the CIA guideline definition of 'relevant future project', however it has been conservatively included as it is a significant infrastructure project in the Muswellbrook locality.
Queensland Hunter Gas Pipeline	MP06_0286	Hunter Gas Pipeline Pty Ltd	825 km natural gas transmission pipeline from Moree Plains to Newcastle	Liverpool Plains, Upper Hunter, Muswellbrook, Singleton, LGAs	Approved	The Queensland Hunter Gas Pipeline construction program is not publicly available. The construction footprint overlaps with the project area near Muswellbrook. For the purposes of a conservative CIA, it has been considered in the assessment, with an estimated construction period overlap in 2028 and 2029.
Bowmans Creek Wind Farm	SSD-10315	Epuron Projects Pty Ltd	54 wind turbines and ancillary infrastructure	Singleton LGA	Approved Prepare modification report	Bowmans Creek Wind Farm is currently being modified for the inclusion of a BESS. Construction is estimated to commence in 2027 and may overlap with the first 6–12 months of the project's construction. Portions of the project area are located within a host landholder for the Bowmans Creek Wind Farm.
Muswellbrook Solar Farm	SSD-46543209	ESCO Solar Farm 9 Pty Ltd	135 MW solar farm with 135MW / 2 hour BESS	Muswellbrook LGA	Approved	The Muswellbrook Solar Farm is associated with energy transition and would occur at the same time as construction of the project within Muswellbrook LGA. The project would require similar resources and infrastructure supporting the construction. The Muswellbrook Solar Farm is estimated to start construction in 2026, and may overlap with the first year of the project's construction.

Relevant project	SSD / SSI reference	Proponent	Scope	Location (relevant to project)	Status	Estimated construction interface with the project
Maxwell Solar Farm	SSD-9820	Maxwell Solar Pty Ltd	25 MW solar farm	Muswellbrook LGA	Construction	The Maxwell Solar Farm early works construction only has commenced. It has been estimated to complete construction mid-2028 and may overlap with the first 6 months of the project's construction.
Muswellbrook Battery Energy Storage	SSD-29704663	Firm Power	150 MW / 2 hour BESS	Muswellbrook LGA	Approved	The Muswellbrook Battery Energy Storage project is estimated to commence construction mid-2027 and may overlap with the first 6 months of the project's construction.
Denman Battery Energy Storage System	SSD-76189216	Denman BESS Holdings Pty Ltd	2,400 MW / 2 hour BESS	Muswellbrook LGA	Response to Submissions	The Denman Battery Energy Storage System is expected to commence construction mid-2027 and may overlap the first 18 months of the project's construction.
Hills of Gold Wind Farm	SSD-9679	Wind Energy Partners Pty Ltd	70 wind turbines, 100 MW / 4 hour BESS	Tamworth, Upper Hunter, Liverpool Plains LGAs	Approved	The Hills of Gold Wind Farm construction schedule is unknown. It has been assumed for the purposes of the CIA to commence construction in 2027 and may overlap with the first 12 months of the project's construction.
Middlebrook Solar Farm, including Mod 1	SSD-10455	Middlebrook Solar Farm Pty Ltd	320 MW solar farm, 320 MW / 2 hour BESS	Tamworth LGA	Prepare modification report	Middlebrook Solar Farm is estimated to commence construction late 2027 and may overlap with the first 2 years of the project's construction.

Relevant project	SSD / SSI reference	Proponent	Scope	Location (relevant to project)	Status	Estimated construction interface with the project
Tamworth Battery Energy Storage System	SSD-23830229	Valent Energy Developments Pty Ltd	200 MW / 2 hour BESS	Tamworth LGA	Response to Submissions	Tamworth Battery Energy Storage System is estimated to commence construction mid-2027 and may overlap with the first 18 months of the project's construction.
Kingswood Battery Energy Storage System	SSD-63207219	Iberdrola Australia Development Pty Ltd	270 MW / 4 hour BESS	Tamworth LGA	Approved	The Kingswood Battery Energy Storage System is estimated to commence construction in 2027 and may overlap with the first 6 months of the project's construction.
Upper Hunter South Solar Farm	SSD-65996959	Upper Hunter SF Pty Ltd	90 MW solar farm, 30 MW / 2 hour BESS	Muswellbrook LGA	Response to Submissions	The Upper Hunter South Solar is estimated to commence construction mid-2027 and may overlap with the first 12 months of the project's' construction.
Upper Hunter Energy Park (formerly Kyoto Wind Farm)	MP06_0055	Maven Renewable Energy Pty Ltd	18 wind turbines	Upper Hunter LGA	Approved	The construction of the Kyoto Wind Farm is estimated to commence mid-2027 and may overlap with the first 12 months of the project's construction.
Tangaratta Feedmill	SSD-58801472	Tangaratta Stockfeeds Pty Limited	Poultry feed mill with capacity to produce up to 17,500 tonnes per week	Tamworth LGA	Assessment	The construction of Tangaratta Feedmill is estimated to commence mid-2027 and may overlap with the first 18 months of the project's construction. During operation the Tangaratta Feedmill is expected to generate an additional 216 truck movements per day from 2029 to 2036 overlapping with the project's construction. Traffic impacts are expected to be limited to Wallamore Road and Bowlers Lane, Tamworth, and Oxley Highway.

Relevant project	SSD / SSI reference	Proponent	Scope	Location (relevant to project)	Status	Estimated construction interface with the project
Maison Dieu Solar Farm	SSD-48160216	Terrain Solar Pty Ltd	60 MW solar farm, 40 MW / 2 hour BESS	Singleton LGA	Assessment	Construction of the Maison Dieu Solar Farm is estimated to commence mid-2027 and may overlap with the first 12 months of the project's construction.
Bendemeer Solar Farm	SSD-36651552	Athena Energy Australia (Holdings) Pty Ltd	255 MW solar farm, 150 MW / 2 hour BESS	Tamworth LGA	Assessment	Bendemeer Solar Farm is estimated to commence mid-2027 and may overlap with the first 12 months of the project's construction.
Thunderbolt Wind Farm Stage 1	SSD-10807896	Neoen Pty Limited	32 wind turbines	Tamworth LGA	Approved	Thunderbolt Wind Farm Stage 1 is estimated to start construction in 2027 and may overlap with the first 12 months of the project's construction.
Oven Mountain Pumped Hydro	SSI-12422997	OMPS Pty Ltd	900 MW pumped hydro	Armidale LGA	Assessment	Oven Mountain Pumped Hydro is estimated to commence construction mid-2027 and may overlap with the first 4 and a half years of the project's construction, with project interaction relating to likely construction transport routes and included for a conservative assessment.
Oxley Solar Farm	SSD-10346	Oxley Solar Development Pty Ltd	225 MW solar farm, 50 MW / 1 hour BESS	Armidale LGA	Approved (Dec 2023)	Oxley Solar Farm was approved in 2023 however construction has not commenced. It has been estimated that construction may commence in 2027 which may overlap with the first 6 months of the project's construction.

Relevant project	SSD / SSI reference	Proponent	Scope	Location (relevant to project)	Status	Estimated construction interface with the project
Tilbuster Solar Farm / Tilbuster 2	SSD-9619 SSD-69799460	Enerparc Australia Pty Ltd	140 MW solar farm, 15 MW / 2 hour BESS	Armidale LGA	Approved. Modification under assessment of separate DA	Tilbuster Solar Farm / Tilbuster 2 is estimated to start construction mid-2027 and may overlap with the first 6 months of the project's construction.
UNE New Wright Block	SSD-9613	University of New England (UNE)	3 residential blocks and 188 parking spaces providing accommodation for 342 students	Armidale LGA	Approved (2020)	No publicly available information is available regarding the construction timeframe of the UNE New Wright Block. It has been assumed for the purposes of the CIA to commence construction in 2027 and may overlap with the first 6 months of the project's construction.
Armidale BESS	SSD-23515853	GMR Energy Pty Ltd	150 MW / 2 hour BESS	Armidale LGA	Approved (12 December 2025)	Armidale BESS is expected to commence construction in 2027 and may overlap with the first 12 months of the project's construction.
Baiada Integrated Poultry Processing Facility	SSD-9394	Baiada Poultry Pty Limited	Poultry processing for up to 3 million birds per week	Tamworth LGA	Mod 5 Approved (4 May 2026)	The main construction works for Baiada Integrated Poultry Processing Facility has commenced. For the purpose of the CIA is has been conservatively assumed there may be minor overlap with the project in early 2028.
Gara BESS	SSD-71680710	ACEnergy Pty Ltd	400 MW / 4 hour BESS	Armidale LGA	Assessment	Construction of the Gara BESS is expected to commence in mid-2027 and may overlap with the first 12 months of the project's construction.

Relevant project	SSD / SSI reference	Proponent	Scope	Location (relevant to project)	Status	Estimated construction interface with the project
Winterbourne Wind Farm	SSD-10471	Winterbourne Wind Pty Ltd	118 wind turbines	Walcha LGA	Assessment	Construction of Winterbourne Wind Farm is expected to commence in mid-2027 and may overlap with the first 4 years of the project's construction.
New England Solar Farm Stage 2	SSD-9255	ACEN Australia Pty Ltd	1,400 MW / 2 hour BESS	Uralla LGA	Mod 2 Approved (26 May 2023)	Stage 3a construction of the 200 MW/2hr BESS is underway and expected to be completed in 2026 which would not overlap with construction of the project. Stage 4a construction of the 1,200 MW/2hr BESS is expected to commence construction in 2027 which may overlap with the first 12 months of the project's construction.
Sundown Solar Farm	SSD-8911	Recurrent Energy (Australia) Pty Ltd	360 MW solar farm, 150 MW / 4 hour BESS	Inverell LGA	Approved	Sundown Solar Farm was referred to the IPC in June 2026 and approved in August 2026. While construction timeframes are uncertain, for the purpose of this CIA a conservative construction commencement has been assumed as starting in 2028, overlapping with the first 18 months of the project's construction, with project interaction relating to likely construction transport routes.
Ebor BESS	SSD-85362210	Bridge Energy Projects Pty Ltd	870MW BESS	Armidale LGA	Response to Submissions	Whilst around 80 km north-east of the project area, it has been conservatively assumed that there may be overlap associated with the construction workforce and workforce accommodation in Armidale with potential social impacts.

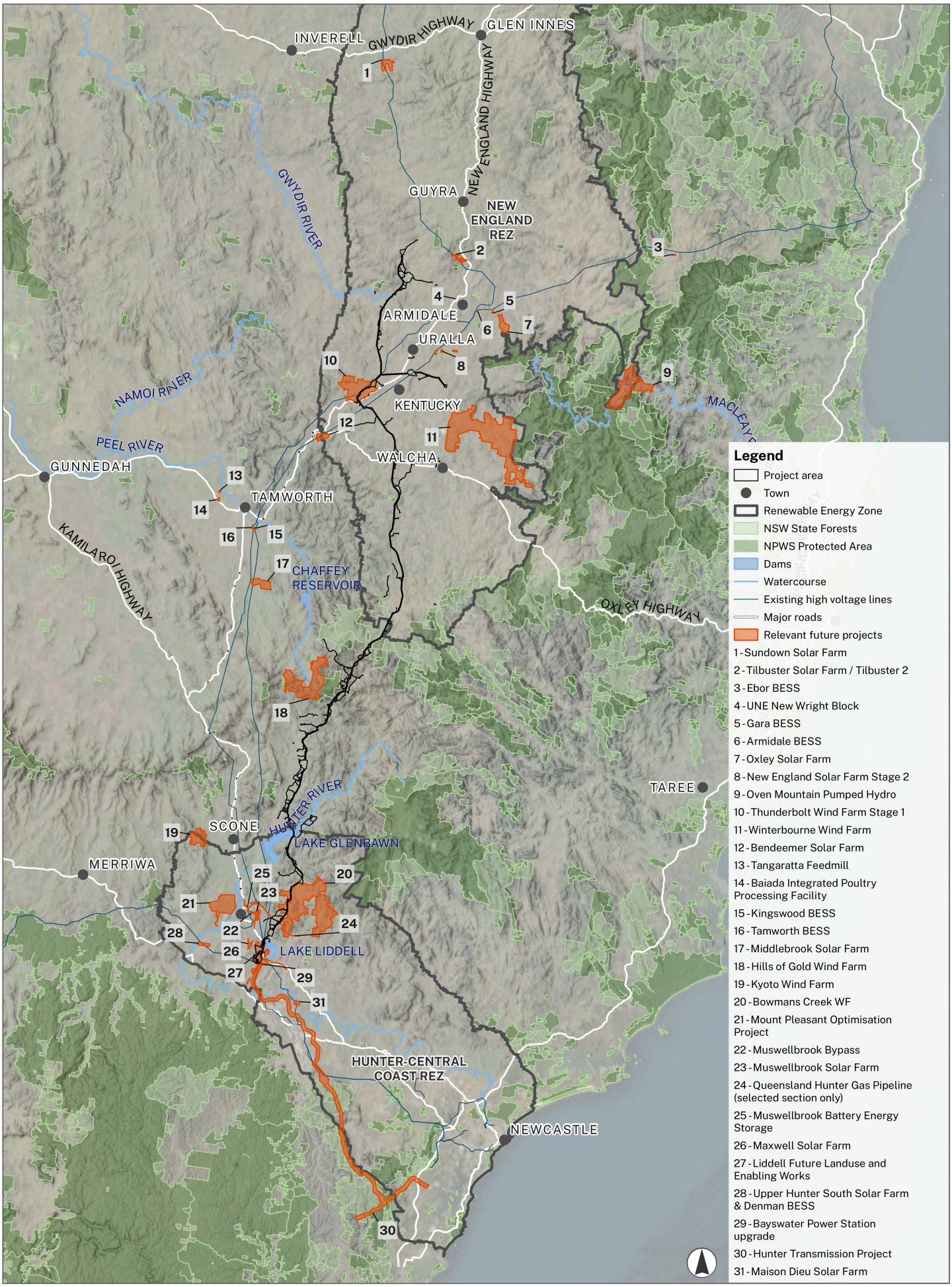
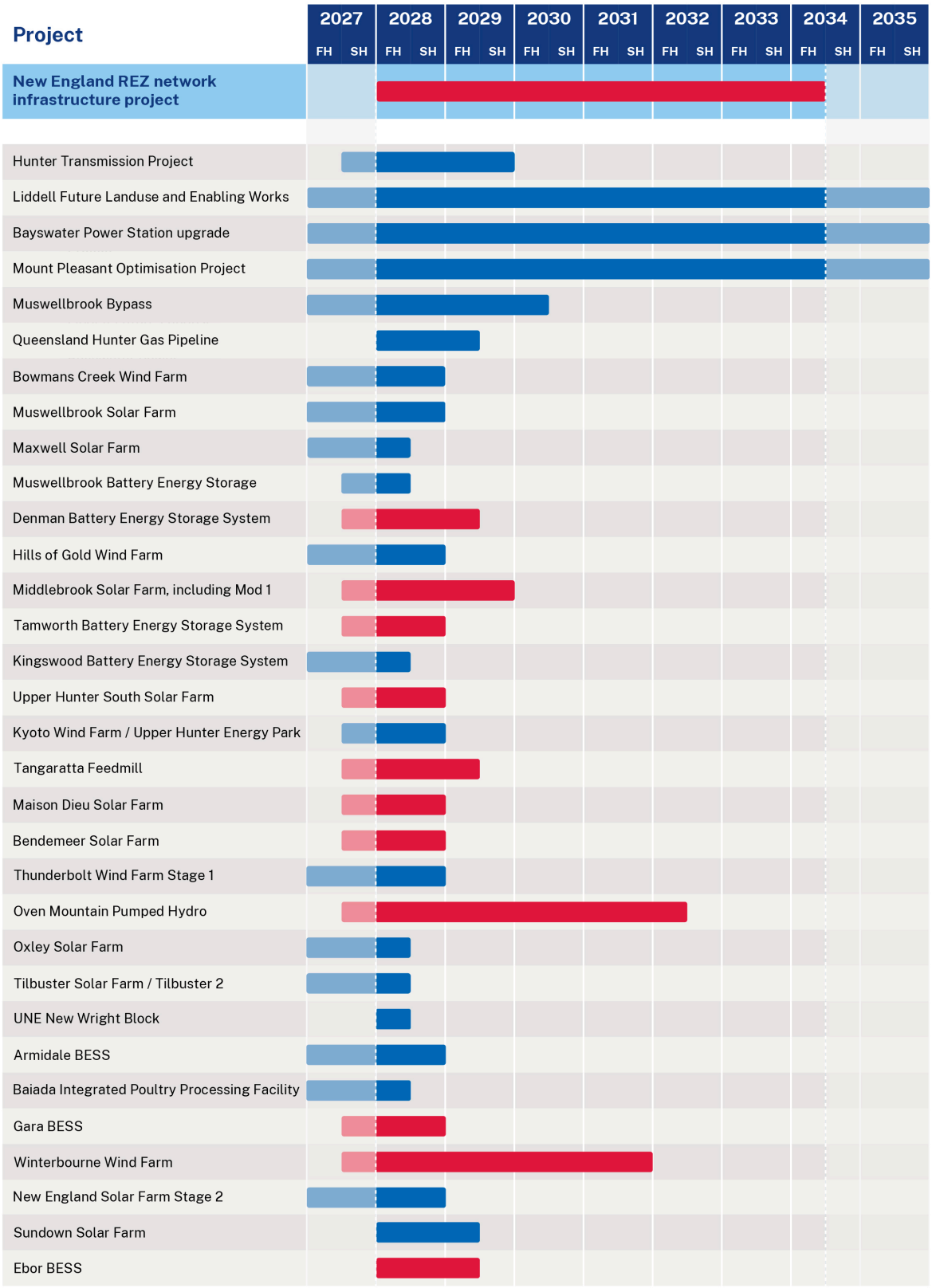


FIGURE 24.1 Relevant future projects considered in project level CIA

Image Source: ESRI Basemap (2026) | **Data Source:** NSW DFSI (2026), NSWSS (2026)

Scale 1:1,600,000 at A4
GDA2020 MGA Zone 56



Bar colours indicate the approval status of each project at the time of assessment (being August 2026). Projects with planning approval are shown in blue, while projects that have had their EIS exhibited, are under assessment, or not yet approved are shown in red. This distinction is provided to illustrate the level of certainty associated with each project's construction timing and its inclusion in the cumulative assessment.

Figure 24.2. Estimated construction programs - relevant future projects and the project

24.2.2 Assessment of cumulative impacts

This section provides a consolidated summary of the cumulative impact assessment outcomes. Further information is provided within each technical report.

24.2.2.1 Biodiversity

The BDAR includes an assessment of cumulative biodiversity impacts. The full assessment is provided in Technical Report 1 (refer in particular to Appendix C of the BDAR).

Under the NSW biodiversity assessment process, impacts to biodiversity values are quantified and residual impacts are required to be offset through the provision of biodiversity offset. The NSW biodiversity offset scheme is designed to achieve no net loss of biodiversity values at a State scale, meaning that the biodiversity impacts of all the projects considered in the cumulative assessment will be offset with no net loss of biodiversity occurring in NSW. This does not preclude, however, the occurrence of cumulative impacts at a local or regional scale, particularly where multiple projects affect similar vegetation communities or habitats over time in a local area.

The projects considered collectively in the cumulative assessment would impact approximately 4,900 hectares of native vegetation including a variety of threatened woodland and forest communities listed under the BC Act and EPBC Act. Of the 19 TECs listed under the BC Act and the 15 TECs listed under the EPBC Act identified as to be impacted by the 30 relevant future projects analysed within the BDAR, the project will impact upon 8 of these TECs. The project will also impact an additional 2 TECs which are not impacted by the future relevant projects. Many of the relevant future projects occur within a biodiversity landscape already affected by historical clearing and fragmentation, with cumulative impacts concentrated on woodland communities in the central and upper Hunter. Continued impacts to these TECs indicate an ongoing regional decline in both extent and condition.

Cumulative impacts to threatened species are most relevant for woodland and hollow-dependent fauna species which are consistently identified across multiple projects, reflecting continued habitat loss and fragmentation within the region. The project contributes to these cumulative impacts through vegetation clearing, impacts to TECs and disturbance to threatened species habitat.

While impacts have been minimised as far as practicable at the local scale through project design and mitigation measures, the project would contribute to broader regional habitat loss and degradation. Collectively, the project and other relevant future projects contribute to habitat fragmentation, increased edge effects, and disruption to fauna movement.

In accordance with the requirements of the NSW biodiversity offset scheme, which as noted above has the overarching objective of no net loss of biodiversity in NSW, the biodiversity impacts of the project would aim to be fully offset, as would the biodiversity impacts of other approved projects. This would result in biodiversity offsets contributing to substantially more native vegetation conservation in the region over the medium to long term.

24.2.2.2 Aboriginal cultural heritage

The ACHA includes an assessment of cumulative impacts to Aboriginal cultural heritage. The full assessment is provided in Technical Report 2.

A key finding of the cumulative assessment was that overall, the prevailing trend from existing projects near the New England Tablelands and Upper Hunter Valley and Highlands regions was that stone artefact sites, present as surface material and/or subsurface deposits, are most commonly subject to development impacts. The nature and significance of impacted sites vary between projects, however, stone artefact sites are by far the most common Aboriginal site type in the region and their widespread presence across the landscape is a testament to extensive and long-term Aboriginal occupation. Consequently, as the most common site type, stone artefact sites tend to experience a proportionally greater extent of impact in comparison to less common site types.

The assessment noted that the Aboriginal open stone artefact site resources within the study regions are not currently at risk of significant loss, particularly as the most significant deposits are often avoided by developers through flexible project design and layout refinement when in the context of renewable energy projects. Where avoidance has not been achieved, existing developments have generally sought to minimise impacts and employ salvage or other mitigation measures in consultation with RAPs.

Other, less common Aboriginal site types within the New England Tablelands study region have typically been designated for avoidance. CMTs are generally avoided unless they have already collapsed or are at imminent risk of collapse. In addition, grinding groove sites, stone quarries and potential stone arrangements have been avoided by the reviewed developments within the New England region. Burial sites are not known to have been impacted by existing developments.

Across the Upper Hunter Valley and Highlands study region, impacts to stone artefact sites are prevalent in the southern half of this study region associated with the long-running coal mining industry and more recently the increasing number of renewable energy projects. Fewer numbers of CMTs have been recorded in this study region but of these only a small number have been avoided by development. Several of these CMTs were recorded as a precaution, with post approval management measures including further assessment by arborists to determine their origin. Grinding groove sites and stone quarries have been avoided by the reviewed developments within the Upper Hunter Valley and Highlands. Stone arrangements are currently proposed to be impacted as part of development for the Hunter Transmission Project but with proposed management measures including deconstruction and relocation of the stone arrangements with detailed recording. Additionally, a burial encountered during salvage works at the Mount Arthur Coal Mine was subject to management measures in consultation with that project's RAPs.

24.2.2.3 Historical heritage

The HHIA includes an assessment of cumulative impacts to historical heritage. The full assessment is provided in Technical Report 3.

The project has the potential to contribute to cumulative impacts on historical heritage when considered in combination with existing infrastructure, historical land use patterns and other approved or proposed developments within the broader local and regional areas. Cumulative impacts may arise where multiple disturbances incrementally reduce the integrity, setting, legibility or archaeological potential over time, even where individual impacts are limited as is the case with the project, with measures implemented to avoid and minimise heritage impacts.

The project traverses a largely rural landscape characterised by pastoral land use, dispersed settlement, transport corridors and areas of forestry activity. Much of the project area has been subject to ongoing ground disturbance associated with clearing, pastoral land use, road construction, utility installation and rural development. Existing transmission infrastructure, local road upgrades, extractive industries, renewable energy projects and associated linear infrastructure within the region have already contributed to a gradual reduction in the integrity of some historic rural landscapes. Within this context, the project represents an additional layer of infrastructure development within a landscape that has experienced sustained modification since the mid-nineteenth century.

Potential cumulative impacts to historical heritage are most likely to occur in relation to:

- localised impacts to historical and cultural landscapes through the introduction of additional linear infrastructure
- incremental visual change affecting the setting and appreciation of heritage items and the cultural landscapes of which they form part
- localised disturbance to areas with archaeological potential
- compounding impacts where multiple infrastructure corridors converge or parallel one another.

Despite these considerations, the cumulative historical heritage impact of the project is assessed as generally low. This is based on:

- the modified nature of the existing landscape
- the linear and localised nature of project impacts
- the avoidance and mitigation measures incorporated into project design
- the concentration of higher-impact works within already disturbed or infrastructure-influenced corridors where feasible (for example in association with established roads and/or tracks)
- the limited extent of direct impacts to listed heritage items. Potential direct impacts associated with the project are limited to local heritage items with no direct impacts to State listed heritage items
- impacts to areas of archaeological potential being limited to archaeological remains of potential local significance only, with impacts able to be managed and mitigated through archaeological investigation
- the limited number of potential heritage items identified in the project area.

Where potential heritage items and listed heritage items are present within the project area, cumulative impacts have been reduced through avoidance as the preferred option, and where avoidance cannot be achieved, through the application of management and mitigation measures.

The potential impacts the project presents to areas of archaeological potential across the project area may result in direct impacts to the historical archaeological resource, however, as identified in the literature review at Section 7 of the HHIA (Technical Report 3 of this EIS), the archaeological record for the local and regional context is limited. The further assessment and investigation of areas of archaeological potential within the project area presents a relatively unique opportunity to contribute meaningfully to the archaeological record and enhance understanding of the historical development of the local and regional areas in a way that other projects have not.

The project is not expected to result in substantial cumulative loss of heritage significance at a regional scale. While the project would contribute to the ongoing evolution of the broader cultural landscape, from a historical heritage perspective this change is considered consistent with the existing pattern of infrastructure and rural land use development that characterises local and regional areas. Subject to implementation of the recommended mitigation and management measures, the residual cumulative impact to historical heritage is therefore not anticipated to be significant.

24.2.2.4 Social

The SIA includes an assessment of potential cumulative social impacts associated with the project. The full assessment is provided in Technical Report 4, including consideration of combined CIA incorporating potential cumulative traffic and transport and social impact considerations. The key findings are summarised below.

Relevant to the SIA, potential cumulative impacts are expected to be most pronounced during the construction phase, particularly where development activity and workforce demand overlap. These impacts are likely to be concentrated around the energy hubs, workforce accommodation camps and key regional towns or service centres, where construction activities from multiple projects may occur concurrently (refer to section 5.3.1 of the SIA). In these locations, cumulative impacts may include increased demand for housing and short-term accommodation, pressure on community services and infrastructure, increased traffic movements, and changes to social amenity and community cohesion. Residents located near energy hubs and workforce accommodation camps may also experience a greater concentration of construction-related activity and associated amenity impacts over an extended period.

Workforce influx modelling undertaken as part of the cumulative social assessment indicates that incoming construction workforces across the 2 regions within which the project is located may cause varying levels of intensity of impact by locality and townships, depending on the timing and overlap of construction programs. The modelling indicates that concurrent project construction may result in prolonged workforce demand on local communities in some areas, which could increase pressure on transport networks and on people's access to local facilities and services. Smaller communities may be more sensitive to these pressures due to their comparatively lower capacity to accommodate increases in population and heightened service demand (refer to Section 5.3.2 of the SIA for further detail).

The cumulative impact on housing and accommodation capacity are key issues for the energy transition across the region. The project has addressed this issue through the proposed development of 5 workforce accommodation camps. These camps alleviate the pressure that the project's incoming workforce would otherwise have on housing and accommodation supply across the 2 regions during its construction.

The cumulative assessment also identified opportunities for increased employment, workforce development, business growth and regional investment associated with the energy transition. Consultation undertaken as part of the assessment highlighted the importance of maximising local employment and business participation while supporting longer-term social and economic benefits across the region.

The nature and extent of cumulative social impacts would depend on the timing, scale and duration of the concurrent developments. Collectively, the workforce modelling and stakeholder feedback highlight the importance of coordinated workforce accommodation planning, infrastructure planning and ongoing stakeholder engagement to manage cumulative social impacts and support positive social and economic outcomes across the region. The mitigation and management measures have been developed having regard to these cumulative social impact considerations.

More broadly across the New England REZ, and as described in Section 2.3, a range of government agencies and other stakeholders are coordinating efforts to support effective strategic oversight, particularly in relation to logistics planning, local infrastructure and services needs, broader regional changes and community legacy opportunities. This has included the preparation of a number of Regional Major Infrastructure Studies for the New England REZ, which, whilst being a separate broader study process, address some of the key strategic topics related to cumulative social impacts in the region. In addition, existing New England REZ-wide initiatives such as the Port to REZ program of road upgrades and the CEBP, are designed to also address cumulative social impacts across the region, and to maximise community benefits and legacy opportunities.

24.2.2.5 Landscape character and visual

The LCVIA includes an assessment of cumulative landscape character and visual impacts. The full assessment is provided in Technical Report 5, with the key findings summarised below.

The project is located within both the New England REZ and the Hunter-Central Coast REZ. These zones have been formally identified for the delivery of renewable energy generation, storage and transmission infrastructure and are expected to accommodate a high concentration of development over time. Multiple operational, approved projects, and projects under assessment are concentrated within the REZs and in proximity to the project. This reflects the intended function of REZs, where infrastructure is co-located to optimise network efficiency and support ongoing investment.

Given the volume of projects progressing through planning pathways, and the variability in their design, layout and delivery timeframes, it is not feasible to reliably define or assess a complete regional cumulative scenario that includes all future proposals. Projects that are in early scoping stages have therefore been excluded from this assessment, as their extent and interaction with the landscape are not sufficiently defined. It is anticipated that such projects will undertake their own cumulative impact assessments as they progress through the EIS phase. This is consistent with the CIA approach defined in the CIA guideline.

The LCVIA recognises that, within a designated REZ, broader regional landscape change is expected as an outcome of the planning framework and will continue to evolve over time.

At the broader scale, the project would contribute to cumulative landscape change associated with renewable energy, transmission and other major infrastructure within the New England REZ and surrounding region. However, these effects would generally be moderated by the scale of the landscape, landform, vegetation, existing modified land uses, existing infrastructure and the dispersed nature of the project.

At the sensitive receiver level (such as from individual houses), approved wind farms were considered where their visual study areas overlap with the project visual study area. Approved projects have defined assessment parameters and are considered to form part of the visual baseline of this CIA.

For the project-level visual CIA, 2 approved wind farms (Bowmans Creek Wind Farm and Thunderbolt Wind Farm) were assessed as their visual study area overlaps with portions of the project's visual study area. Cumulative visual impacts were assessed as low to moderate for the Bowmans Creek Wind Farm receivers, noting that the approved wind farm includes receiver-specific mitigation measures including neighbour agreements. Cumulative visual impacts associated with Thunderbolt Wind Farm were assessed as low.

24.2.2.6 Agriculture, land use and property

The AIA includes an assessment of cumulative impacts to agriculture associated with the project. The full assessment is provided in Technical Report 6, with the key findings summarised below. Land use and property impacts are also considered separately in Section 12, however, as the project area is primarily comprised of agricultural land, and potential cumulative land use impacts are largely related to agricultural production, these aspects have been addressed in a consolidated manner within this section.

Cumulative impacts on regional land use and agriculture are expected to be minor during construction and operation of the project in combination with the relevant future projects within the affected LGAs, and would be effectively managed through proposed mitigation measures. Across all projects considered, agricultural activities would largely continue within project sites, with only small areas of land removed from production relative to both individual sites and the broader regional agricultural area. As a result, impacts on overall agricultural production and employment are anticipated to be negligible (refer to Table 24.4 below). Construction-related cumulative impacts, including livestock disturbance, dust and biosecurity risks would be minor where works overlap or occur in close proximity, and negligible for more distant projects.

Table 24.4. Cumulative land use, property and agriculture impacts

Projects	Summary of potential cumulative land use, property and agriculture impacts
Wind Farms Bowmans Creek Wind Farm Hills of Gold Wind Farm Upper Hunter Energy Park (formerly Kyoto Wind Farm) Thunderbolt Wind Farm Stage 1 Winterbourne Wind Farm	Land within wind farm areas is predominantly used for grazing, with limited cropping, and is generally of low to moderate land and soil capability. During operation, cumulative impacts on agricultural production are expected to be minor at a local scale and negligible at a regional scale, with no impact on cropping and only minor to negligible impacts on grazing. Cumulative impacts during construction would be greater but remain limited due to the relatively low productivity of the affected land, the small disturbance footprint, and the ongoing capacity for some grazing. As such, construction-phase impacts at a regional scale would be minor. Cumulative impacts associated with reduced production, disruption to agricultural activities, aerial operations and biosecurity risks are expected to be negligible for projects located at a distance. However, the transmission line intersects the Bowmans Creek and Thunderbolt wind farm project areas, where some minor cumulative impacts may occur, including construction traffic, livestock disturbance, dust generation and increased biosecurity risk. These impacts would be minimised through the implementation of mitigation measures outlined in Section 13.7. The presence of transmission infrastructure in combination with wind turbine generators may also result in cumulative impacts on aerial agricultural operations in proximity to these projects. While some impacts are anticipated due to the co-location of infrastructure, they would be managed through the implementation of project-specific mitigation measures and are expected to be minor to negligible.
Solar Farms Muswellbrook Solar Farm Maxwell Solar Farm Middlebrook Solar Farm Upper Hunter South Solar Farm Maison Dieu Solar Farm Bendemeer Solar Farm Oxley Solar Farm Tilbuster Solar Farm New England Solar Farm Stage 2	The land potentially occupied by solar farms is relatively small compared to the total regional agricultural industry across the impacted LGAs, and the impact of lost productivity during construction at a regional level would also be minor. Consequently, the cumulative impacts on regional agricultural production during construction would also be minor. The cumulative impacts on regional agricultural production during operation would decline to negligible levels if continued grazing were implemented. Other impacts such as those related to disruption and biosecurity risks are also minor for the project and for the solar farms considered and can be mitigated by measures proposed for each project. Therefore, these cumulative impacts on agriculture would also be minor during construction and operation. Most of the solar farms are relatively distant from the project. The approved Maxwell Solar Farm is relatively close to the project and has a higher potential for cumulative impacts such as increased construction traffic, livestock disturbance, the generation of dust, and increased biosecurity risks. However, these impacts are still minor.

24.2.2.7 Traffic and transport

The TTIA includes consideration of cumulative traffic impacts associated with the project. The full assessment is provided in Technical Report 7, with the key findings summarised below. The TTIA assessed 2 representative stages. Stage 1 corresponds to the time when the greatest overlap of construction activity from cumulative projects is anticipated to occur (January 2030), representing a peak condition for concurrent external project traffic. Stage 2 aligns with the peak construction phase of the project itself, anticipated to occur in December 2030. These periods represent potential worst-case conditions for cumulative traffic, safety, and operational impacts on the road network and provide a robust basis for assessment. The cumulative impact of construction in the 2 identified stages is described in Table 24.5.

While cumulative impacts may occur where nearby projects overlap temporally and traffic volumes would increase, the assessment indicates that these impacts are not expected to result in a significant or unacceptable impact on the performance of the surrounding road network.

Table 24.5. Cumulative traffic impacts

Cumulative impact	Description of cumulative impact
Cumulative traffic generation	In the TTIA study area (Figure 14.1), daily traffic is expected to increase rapidly from early 2029, to the Stage 1 cumulative peak period in January 2030. This peak coincides with the overlap of multiple construction programs and represents the maximum cumulative impact across all project types. Among individual project types, projects such as HTP, the Bayswater Power Station upgrade, and Queensland Hunter Gas Pipeline are the dominant contributors, peaking at approximately 1,700 vehicles per day and remaining elevated for longer than solar, wind or BESS projects. Traffic volumes associated with solar and wind projects peak earlier at approximately 1,250 vehicles per day, while traffic associated with BESS projects peaks lower at around 800 to 900 vehicles per day, and hydro projects remain a minor contributor throughout. During the peak project construction period in December 2030 (Stage 2), there would be approximately 5,750 additional vehicles daily throughout the TTIA study area. Following the cumulative peak, overall daily traffic declines steadily from 2031 onwards, reducing to approximately 2,000 to 2,500 vehicles per day by the end of 2032.
Cumulative OSOM assessment	Overlap in OSOM activity during peak construction periods is anticipated to be minimal, as project sites are widely distributed across the TTIA study area. In addition, OSOM deliveries are expected to occur outside peak traffic periods, including during night-time hours. All OSOM movements would be accompanied by the required escort vehicles in accordance with TfNSW and NHVR requirements. A comprehensive assessment of OSOM transport requirements has been conducted as part of this project and includes the transportation routes and logistics for moving large components associated with wind farm development within NE REZ. The primary routes identified for OSOM transport encompass the New England Highway, Thunderbolts Way, and routes around major towns such as Muswellbrook and Tamworth have also been considered. Proposed geometric and infrastructure modifications along these main routes, as well as on lesser roads, aim to facilitate the movement of OSOM components. A summary of the OSOM corridors requiring modification is provided in Technical Report 7.

Cumulative impact	Description of cumulative impact
Cumulative road network impact	During the Stage 1 cumulative period (January 2030), which is the peak period for concurrent construction activity across the TTIA study area, traffic impacts are driven by the overlap of the project and multiple external generator and enabling works. The highest cumulative daily traffic volumes during Stage 1 are concentrated along key state and regional road corridors, most notably the New England Highway and Thunderbolts Way, which may experience increases of up to approximately 1,400 vehicles per day and 400 vehicles per day, respectively. While traffic impacts are broadly distributed across the TTIA study area, the most pronounced effects occur along strategic freight and access corridors and in proximity to energy hubs, the maintenance facility, and major project clusters, particularly in the Muswellbrook area. The assessment confirms that cumulative LoS impacts are confined to a small number of key corridors, with the greatest effects occurring on the New England Highway near Muswellbrook and on select lower capacity local roads. No widespread or network-wide deterioration in LoS is observed, and the majority of the road network continues to operate at LoS A or B under cumulative conditions. During the Stage 2 cumulative period (December 2030), notwithstanding this period coinciding with the peak construction phase of the project, cumulative traffic volumes across the proposed project transport routes are generally lower than those assessed for Stage 1 (January 2030). This reduction reflects the planned completion of several external generator projects and the transition of others to lower-intensity construction phases. Traffic demand remains focused around project infrastructure, energy hubs, and selected operational developments. The highest cumulative daily traffic volumes continue to occur along key State and regional road corridors, including sections of the New England Highway, Thunderbolts Way, and primary access routes servicing the maintenance facility and the central and north hubs. In the northern and central extents of the proposed project construction traffic routes, traffic volumes around the North Hub, Central Hub A, and Central Hub B remain elevated relative to adjacent road segments, however, volumes are noticeably lower than those recorded during Stage 1. An exception is the New England Highway between Armidale and Uralla, where traffic increases to approximately 820 vehicles per day, reflecting increased project construction activity in this area. The Stage 2 cumulative period does not introduce new network constraints, and LoS impacts remain confined to a known and limited set of corridors previously assessed under the worst-case January 2030 scenario.
Cumulative impact to intersections	The intersections most likely to be impacted by cumulative traffic are those along the key transport route of the New England Highway. A number of intersections have been identified for further consideration in the detailed construction traffic and haulage route planning due to the potential for cumulative impacts including the Sandy Creek Road, Middlebrook Road and Whitehouse Lane/Spains Lane intersections with the New England Highway. At other key intersections with the New England Highway, additional signage and targeted traffic management measures would be implemented, as required during peak construction periods, to maintain safe and efficient operation, as identified in Technical Report 7.

Cumulative impact	Description of cumulative impact
Cumulative impact on road safety	An increase in construction traffic, particularly heavy rigid trucks and articulated vehicles, has the potential to affect road safety. Given that several of the most frequent and most severe crash types along the proposed project construction traffic routes already align with heavy vehicle conflict mechanisms, unmanaged increases in construction traffic would be expected to elevate both crash frequency and injury severity. Construction traffic would be actively managed to avoid adverse road safety impacts and the exacerbation of existing crash risks. Measures as provided in Section 14.6 will include controlled haulage routes, clear and well signed access points, speed and traffic management at high-risk locations, and restrictions on heavy vehicle movements where practicable. These controls are intended to manage speed differentials, turning conflicts and driver workload, so that project-related construction traffic does not increase crash frequency or severity, and does not affect the safe operation of the road network.
Cumulative impact on active transport	Cumulative construction traffic is not anticipated to result in material impacts to active transport networks. With the application of standard traffic management measures, the safety and operation of existing pedestrian and cyclist facilities is expected to be maintained throughout the construction period.
Cumulative impact on public transport	During the construction phase, potential cumulative impacts on public transport are expected to be localised, temporary and low in magnitude, even where construction activities overlap with other regional projects.

24.2.2.8 Economic

The Economic Assessment includes consideration of cumulative impacts, with a focus on impacts to population and accommodation, regional job growth, stimulus to regional economic activity and impacts to agriculture and other sectors of the economy. The full assessment is provided in Technical Report 8, with the key findings summarised below.

Planned development within the New England and Upper Hunter regions would create a large demand for a suitably qualified construction workforce, with resulting demand for housing associated with an influx of workers. The provision of workforce accommodation camps as part of the project is expected to mitigate the project's contribution to increased competition for labour and housing in the region.

Cumulative projects in regional NSW would provide a substantial boost in direct economic activity in the regions as well as flow-on economic activity to suppliers of goods and services. Cumulative project construction is most likely to directly impact the heavy and civil engineering construction sector, construction services sector and non-residential building construction sector, however, any business that can provide the goods and services required for project construction and operation, and for the project workforce (through salary expenditure), would benefit from cumulative economic activity.

Notwithstanding the above, excess demand for construction workers and inputs to construction (for example, quarry materials, concrete etc.) can result in rising prices and potential shortages. The extent of these short-run impacts for regional economies would depend on the balance of labour supply from inside the region, outside the region and drive-in/drive-out, fly-in/fly-out, as well as adjustment of the overall labour market, and other markets, in response to increased demand. However, in the medium term, markets would adjust to some extent (for example, increased labour force participation, new quarry proposals to supply demand for aggregate etc.) and enable wages and prices to return to previous levels.

The assessment indicates that regional economic impacts from the use of agricultural land would be very small, relative to the positive regional economic activity from the project. Additionally, most impacts would be temporary, as grazing can continue under transmission lines, wind farms and solar farms once they become operational. The cumulative impact of projects on the regional economic activity of agriculture is therefore likely to be minor.

The assessment outlines measures to minimise potential negative cumulative economic impacts and maximise regional economic benefits from the project. This includes initiatives to maximise local workforce and industry participation through:

- the preparation and implementation of a Local Workforce Development Plan, Local Industry Participation Plan and Australian Industry Participation Plan
- engagement with local councils, economic development organisations and local chambers of commerce to provide opportunities to support local workforce and business participation.

Together with the provision of workforce accommodation camps, these measures would help manage cumulative labour and housing pressures associated with concurrent major projects in the region.

Subject to the implementation of the proposed mitigation measures, the construction and operation of the project, in combination with other foreseeable projects, is expected to have a net positive impact on the level of economic activity in the New England and Upper Hunter regions and in NSW.

24.2.2.9 Noise and vibration

The NVIA includes an assessment of cumulative construction and operational noise impacts associated with the project. The full assessment is provided in Technical Report 9, with the key findings summarised below.

It is noted the NSW construction noise guideline (the ICNG) does not include provisions for the cumulative assessment of construction noise from different projects. Notwithstanding, a qualitative assessment of potential cumulative construction noise from other major projects in the vicinity of the project has been conducted, with the key findings summarised in Table 24.6. Projects with no or minimal potential for cumulative impacts have been excluded from this table.

Table 24.6. Cumulative construction noise and vibration impacts

Project	Summary of potential cumulative construction noise and vibration impacts
Bowmans Creek Wind Farm	Construction of the Bowmans Creek Wind Farm is predicted to generate noise levels of 39 dBA to 49 dBA at distances of approximately 1.4 km. If project-related construction works coincide with Bowmans Creek Wind Farm construction works in the vicinity of some receivers in the Muscle Creek and Rouchel Brook areas, an additional consideration of reasonable and feasible mitigation measures would be undertaken to mitigate these cumulative impacts, noting some landholders are subject to private agreements associated with noise impacts generated by Bowmans Creek Wind Farm.
Thunderbolt Wind Farm	Construction of the Thunderbolt Wind Farm is predicted to generate noise levels of approximately 58 dBA at 400 m, reducing to 49 dBA at 1.3 km. As such potential cumulative impacts may occur in the areas near Central Hub A. If project-related construction works coincide with Thunderbolt Wind Farm construction works in the vicinity of sensitive receivers, an additional consideration of reasonable and feasible mitigation measures would be undertaken to mitigate these cumulative impacts, noting some landholders are subject to private agreements associated with noise impacts generated by Thunderbolt Wind Farm.

24.2.2.10 Hazards - preliminary risk screening

A cumulative impact assessment has been conducted as part of the Preliminary Risk Screening (refer to Technical Report 10) to identify any potential cumulative impact risks associated with the storage and handling of hazardous chemicals at nearby projects. Noting that during operations hazardous chemicals are only proposed to be stored within the energy hubs and the maintenance facility, the cumulative impact from nearby projects during operations was assessed by reviewing the nearest project adjacent to each of the energy hubs and the maintenance facility.

The potential cumulative impacts associated with the storage of hazardous chemicals during operation of the project are described in Table 24.7.

Table 24.7. Cumulative hazardous chemicals impacts

Project element	Nearest project	Cumulative impact consideration
Central Hub A	Thunderbolt Wind Farm Stage 1	• The footprint of Thunderbolt Wind Farm and Central Hub A overlap. • The risk screening provided in the Thunderbolt Wind Farm concluded that the development was not potentially hazardous and a PHA was not required. However, as the Thunderbolt Wind Farm is located immediately adjacent to Central Hub A, the potential for cumulative impact was considered. • The Thunderbolt Wind Farm will involve the storage of diesel in a self-bunded tank and use of explosives during construction. • A review of the Thunderbolt Wind Farm conceptual project layout shows that the wind farm infrastructure where hazardous chemicals may be handled (that is, concrete batch plant) nearest to the Central Hub A is located more than 2 km away.

Project element	Nearest project	Cumulative impact consideration
		• The nearest Thunderbolt Wind Farm infrastructure is a wind turbine which is approximately 900 m from Central Hub A. Therefore, impacts from hazardous chemicals during operation are not expected to propagate from the wind farm to Central Hub A, due to the separation distance. • Potential cumulative impacts may exist during construction of both the Thunderbolt Wind Farm and the project from use of explosives for blasting. These impacts would be mitigated by compliance with the NSW *Explosives Act 2003* and the NSW Explosives Regulation 2024 and handling of explosives only being carried out by licensed contractors. The Thunderbolt Wind Farm EIS indicates that the development would implement a blast monitoring program, and blasting would be conducted by a suitably qualified person. The potential cumulative vibration related impacts from blasting have been assessed as part of the NVIA (refer to Technical Report 9).
Project area	Queensland Hunter Gas Pipeline	• The Queensland Hunter Gas Pipeline traverses the project area south of Muscle Creek. • No cumulative impacts from hazardous chemicals are anticipated during construction or operation. • During the construction of the Queensland Hunter Gas Pipeline and prior to its commissioning, the pipeline would not contain gas, and as such, there would be no potential for gas release, fire or explosion, should the construction periods for the 2 projects overlap. • Where the project is constructed after or during commissioning of the Queensland Hunter Gas Pipeline, there is potential for project construction-related excavation and vibration to damage the pipeline, resulting in a loss of containment. However, these risks can be effectively managing through the implementation of a Dial Before You Dig process prior to ground disturbance, and a detailed NVBMP to mitigate potential vibration impacts. • No blasting is anticipated in the area of the Queensland Hunter Gas Pipeline. • During operation of the project, transmission infrastructure has the potential to interact with the Queensland Hunter Gas Pipeline, including EMF and electrical interference effects associated with transmission lines. EMF impacts are discussed in Section 24.2.2.13. An updated risk assessment will be completed for the gas pipeline as part of the detailed design process in accordance with AS 4853 – Electrical Hazards on Metallic Gas Pipelines. The final design will include mitigation measures as required to mitigate any identified hazards.

The project has been identified as potentially offensive. The potential for offense due to noise, air or water pollution, and the potential cumulative impacts of those elements, have been assessed in the respective noise and vibration, air quality and surface and groundwater technical reports supporting the EIS.

24.2.2.11Aviation

The aviation impact assessment includes consideration of cumulative aviation impacts. The full assessment is provided in Technical Report 11, with the key findings summarised below. Detailed assessment of project specific impact considerations including impacts on uncertified aerodromes, aerial firefighting and aerial agricultural activities are assessed in detail in Technical Report 11 and Section 17.2. This section focuses specifically on cumulative impacts due to interactions with other projects.

The project transmission line traverses the Bowmans Creek Wind Farm project area and is located adjacent to the Thunderbolt Wind Farm Stage 1 project area. While transmission line infrastructure alone is generally not expected to result in significant impacts on nearby aerodrome operations, several uncertified aerodromes are located within the area potentially affected by both the proposed wind farm developments and the transmission line.

Accordingly, there is potential for cumulative impacts on the operation of these uncertified aerodromes arising from the combined presence of the wind turbines and the transmission line infrastructure. Aviation safety risks associated with the wind turbines and associated infrastructure would be mitigated under the respective approvals for both wind farms, including provision of coordinates and elevations for all wind turbines and meteorological masts to key agencies (including CASA and Airservices Australia), along with the installation of night-time obstacle lighting (if required by CASA). Similarly, the project transmission line infrastructure coordinates and elevations would be provided to key stakeholders once final designs are confirmed and prior to commencement of construction (refer to Section 17.2.6). This process enables project details to be reflected in aeronautical information databases, maps and charts used by pilots, so that obstacles can be avoided.

24.2.2.12 Bushfire

The bushfire assessment includes consideration of cumulative impacts. The full assessment is provided in Technical Report 12, with the key findings summarised below.

The assessment identified the potential risk of any fire associated with a development affecting NSW RFS resources and response times if multiple fires from natural or human-made causes occur at the same time. Access arrangements contained in the Emergency Plan would mitigate the potential impacts of increased heavy construction vehicle movements, traffic management restrictions and road works during potential road treatments on emergency access/egress routes and firefighting efforts. In addition, the access and road and intersection treatments proposed for various projects will allow for better access for NSW RFS firefighting appliances and enhance fire suppression measures and egress routes.

24.2.2.13 EMF

The EMF assessment includes consideration of cumulative human health effects associated with the project. The full assessment is provided in Technical Report 13, with the key findings summarised below.

Of the relevant projects identified for consideration for cumulative impacts, 4 have been flagged for potential cumulative EMF impacts associated with the project transmission lines. All other projects considered are located outside the project's zone of influence. The potential for cumulative EMF impacts for the 4 identified projects are summarised in Table 24.8.

Table 24.8. Cumulative EMF impacts

Project	Potential for cumulative impacts
Queensland Hunter Gas Pipeline Project	The Queensland Hunter Gas Pipeline Project involves the construction of an underground gas pipeline at an approximate depth of 2 m within a 30 m easement. The proposed pipeline route would cross the project's dual 500 kV transmission lines. It is anticipated that impacts to the pipeline would be minimal, as the proposed crossing is approximately perpendicular to the 500 kV transmission lines, resulting in lower induced voltages compared to a pipeline running parallel to the transmission corridor. No material cumulative impacts are anticipated. As discussed in Section 24.2.2.10, an updated risk assessment will be completed for the gas pipeline as part of the detailed design process.
Bowmans Creek Wind Farm	The Bowmans Creek Wind Farm partially overlaps with the project area and involves construction of wind turbines and associated electrical infrastructure, including both above and below ground 22 kV or 33 kV assets. Where the proposed 22 kV or 33 kV overhead lines cross or run parallel to the project 500 kV transmission lines, there is potential for interaction between their respective electric and magnetic fields. At crossing locations, the electric and magnetic fields from each line interact, resulting in a combined field distribution that may vary spatially and is typically influenced by the dominant source. Where lines run in parallel, cumulative effects may also occur depending on separation distances and alignment. Based on typical field levels associated with comparable transmission and distribution lines, the resulting magnetic field levels are expected to remain well within the applicable guideline limits. No material cumulative impacts are anticipated.
Thunderbolt Wind Farm Stage 1	Thunderbolt Wind Farm Stage 1 is located in proximity to Central Hub A and overlaps with the project area. The scope of the Thunderbolt Wind Farm Stage 1 project includes the construction of a substation and switching station, with connection to the existing 330 kV Transgrid network traversing the site. Cumulative impacts associated with the existing 330 kV Transgrid transmission line running parallel to the project 500 kV transmission line have been assessed in Technical Report 13. The electric and magnetic field levels associated with the parallel 500 kV transmission lines and the Central Hub A are within applicable guideline and project adopted limits. No material cumulative impacts are anticipated.

Project	Potential for cumulative impacts
Hunter Transmission Project	The Hunter Transmission Project includes new transmission lines and a new Bayswater South switching station south of the existing Bayswater substation. The potential for cumulative EMF impacts from the Bayswater Power Station substation extension have been assessed in Technical Report 13. Based on typical field levels associated with comparable transmission and distribution lines, the resulting magnetic field levels are expected to remain well within the applicable ICNIRP guideline limits, and the resulting electric fields are expected to remain within the project adopted limits. As such, no cumulative impacts are expected.

In addition, a number of locations have been identified across the project where one of the proposed transmission lines would either cross over or run parallel to existing high voltage transmission lines.

The assessment considered these interactions and concluded that all overcrossings would be compliant within the adopted project field limits for magnetic field and electric field. All the parallel sections with the existing Transgrid 330 kV transmission lines would also be compliant.

Cumulative impacts resulting from multiple major field sources (including switching stations and transformers) within each of the project's 5 proposed energy hubs and the Bayswater Power Station substation extension have also been assessed in relation to public exposure limits for magnetic and electric fields. Calculated levels at the perimeter security fences of all facilities were well below relevant limits.

24.2.2.14 Telecommunications

An assessment of the potential impacts of the proposed transmission line, towers and energy hubs on existing telecommunication services is incorporated in the EMF assessment (refer to Technical Report 13).

While there is some potential for cumulative impacts with relevant future projects (particularly wind farms), the assessment indicates that the project's impacts to telecommunications services are generally minor, and limited to:

- radio users, where sensitive receivers are located in close proximity (within 426 metres) of the transmission line centreline
- farmers using VHF alongside GPS for agricultural machinery when in the vicinity of the lines or if the lines happen to be in direct line of sight of their communication systems
- one NSW Telco Authority microwave point to point link between Turkey Mountain and Uralla.

These impacts can be effectively managed using a range of potential mitigation measures (if required), including signal boosting or equipment upgrades, in consultation with affected stakeholders. On this basis, the project is not expected to be a material contributor to cumulative impacts to telecommunications services.

24.2.2.15 Surface water and flooding

The SWA (Technical Report 14) and Flooding Assessment (Technical Report 15) both included an assessment of cumulative impacts with reference to approved and proposed projects in proximity to the project area.The Flooding Assessment determined that the flooding impacts of the project during construction would be negligible outside of the project area with potential to occur for only short durations during construction. Changes in flooding conditions during the operational phase of the project are minor and not expected result in any adverse impacts to waterways, surrounding properties or flood immunity of any third-party infrastructure and would not extend outside of the project area.

The SWA considered potential cumulative impacts to surface water quantity and quality, and the timing of water supply and sourcing. Contamination of common receiving waterways from erosion and sedimentation or contaminant/wastewater spills during overlapping construction periods is considered negligible provided the recommended mitigation measures are implemented.

While the project itself would have negligible impacts on water supply in the surrounding areas, the number of nearby projects could cause cumulative impacts due to competing demands, however this is expected to be negligible in the context of the regional township water supply capacity. Further detail is provided in Table 24.9.

Table 24.9. Cumulative surface water supply impacts

Project and approval status	Summary of potential cumulative surface water supply impacts
Oxley Solar Farm (Approved)	Negligible cumulative impacts This project proposes to source water from the Gara River Water Source and Commission Waters Water Source which are not water sources for the project.
Thunderbolt Wind Farm Stage 1 (Approved)	Negligible cumulative impacts Whilst there is no current specified start date for Thunderbolt Wind Farm (Stage 1), there is potential overlap with the project. The proponent of the Thunderbolt Wind Farm reports that the wind farm will require a total of approximately 80 ML to 100 ML which is proposed to be sourced from an existing dam on Pine Creek via a temporary above-ground pipeline. If WALs are required, these are proposed to be sourced from the WSPs of the Namoi and Peel Unregulated Rivers Water Sources 2012 WSP and Gwydir Unregulated River Water Sources 2012 WSP, which are also WSPs relevant to the project. It is indicated in the assessment for Thunderbolt Wind Farm Stage 1 that the proposed pipeline will meet demand, so it is considered that the cumulative impacts are negligible as the project is not currently considering drawing water from this dam on Pine Creek.

Project and approval status	Summary of potential cumulative surface water supply impacts
Oven Mountain Pumped Hydro (Assessment)	Negligible cumulative impacts Whilst there is no confirmed start date Oven Mountain Pumped Hydro project has a proposed construction duration of 4 to 5 years, and therefore has the potential to overlap with the project. The Oven Mountain Pumped Hydro project is located approximately 56 km from the project area and proposes to obtain its water supply from the Macleay River which is approximately 30 km away from the project area. Therefore, overlapping water supply sources and demand are unlikely.
Bendemeer Solar Farm (Assessment)	Negligible cumulative impacts. A review of the Bendemeer Solar Farm planning documents indicates that the project is expected to require approximately 100 ML/year during a construction period of up to 18 months, with demand reducing to 2 ML/year during operations. With construction currently anticipated to occur during 2027 and 2028, there may be potential temporal overlap with project construction. The Bendemeer Solar Farm proposes to source water from the Mid Macdonald River Water Source (within the Namoi and Peel Valley Unregulated Rivers Water Sharing Plan) and the New England Fold Belt Groundwater Source in the Water Sharing Plan for the Murray-Darling Basin Fractured Rock Groundwater Source. Nevertheless, the forecast water requirements of the project and the Bendemeer Solar Farm are relatively minor when considered in the context of the WALs available within the Mid Macdonald River Water Source and the wider unregulated water sources. The combined demand is not expected to materially affect water availability within the Mid-Macdonald water source or constrain access for other entitlement holders.
Winterbourne Wind Farm (Assessment)	Cumulative impacts unlikely to be significant The Winterbourne Wind Farm proposes to source water from a combination of nearby existing groundwater bores and external supply for an indicative water demand of 116 ML. The Winterbourne project is not approved, however it has a proposed construction duration of around 52 months and has been assumed would therefore overlap with timelines of the project. Whilst the specific bores and external water sources are not specified for Winterbourne Wind Farm project, it is unlikely that significant cumulative impacts would occur with the project as the project is more likely to source from collected water on site under Harvestable Rights Provisions or from harvested runoff from farm dams under agreement with associated landholders.

24.2.2.16 Groundwater

The Groundwater Assessment includes consideration of cumulative groundwater impacts associated with the project. The full assessment is provided in Technical Report 16.

EnergyCo's broader work to coordinate the development of the New England REZ, including consideration of water resources for project water supply has been considered in the Regional Major Infrastructure Studies for the New England REZ, discussed in Section 2.

The cumulative assessment considered nearby projects with the potential for cumulative groundwater impacts and found that the cumulative impacts relating to groundwater are expected to be temporary and localised across the areas where projects intersect during construction. Cumulative impacts were considered to be limited to issues relating to groundwater dewatering, groundwater take and groundwater quality during construction stages. With appropriate mitigation measures in place, cumulative groundwater impacts from the project and other developments are expected to be low to negligible.

Projects with potential for overlapping groundwater impacts are summarised in Table 24.10 below.

Table 24.10. Cumulative groundwater impacts

Project and approval status	Summary of potential cumulative groundwater impacts
Hunter Transmission Project (Approved)	• overlaps with the project area • potential minor localised and temporary cumulative impacts expected where linear developments overlap during construction.
Liddell Future Land Use and Enabling Works (Approved)	• overlaps with the project area • potential minor localised and temporary cumulative impacts where developments intersect during construction.
Bayswater Power Station upgrade (Approved)	• overlaps with the project area • potential minor localised and temporary cumulative impacts where developments intersect during construction.
Queensland Hunter Gas Pipeline (Approved)	• overlaps with the project area • potential minor localised and temporary cumulative impacts expected where linear developments intersect during construction.
Bowmans Creek Wind Farm (Approved)	• overlaps with the project area • potential minor localised and temporary cumulative impacts where developments intersect during construction.
Thunderbolt Wind Farm Stage 1 (Approved)	• overlaps with the project area • potential moderate localised and permanent cumulative impacts where developments intersect, depending on the level of ground disturbance as Central Hub A would have permanently drained excavations.

Further detail on the cumulative impact assessment is provided in Section 8 of the GWIA (Technical Report 16).

24.2.2.17 Air quality

The AQIA includes consideration of cumulative air quality impacts associated with the project. The full assessment is provided in Technical Report 17, with the key findings summarised below.

The AQIA identified that consideration of potential cumulative air quality impacts is most relevant for projects which are in relatively close proximity and for projects with similar or greater air quality issues (for example mines or quarries). More specifically, these criteria can be inferred to be projects within approximately 5 kilometres to 10 kilometres of the project and where the key issue during construction or operation is dust.

Table 24.11 provides a summary of projects identified with the above criteria which may lead to an increased potential for cumulative air quality impacts with the project. The air quality impact assessment noted that some of the projects may have overlapping construction periods and similar potential for dust generating works and impacts, therefore the development of management measures as presented in Section 20.6 includes consideration of cumulative impacts.

Table 24.11. Cumulative air quality impacts

Project and approval status	Summary of potential cumulative air quality impacts
Hunter Transmission Project (Approved)	• Overlapping construction activities have the potential to contribute to local air quality. • Negligible operational air quality impacts are expected. • There are similar levels of construction activity to the project, leading to a similar risk profile. • Management measures for air quality will consider potential interactions in the early construction phase of the project.
Liddell Future Land Use and Enabling Works (Approved)	• Overlapping construction activities have the potential to contribute to local air quality. • There are less significant dust generating activities than the project, leading to lower risk profile. • Cumulative impacts are unlikely to be significant in terms of assessment outcomes for air quality.
Bayswater Power Station upgrade (Approved)	• Overlapping decommissioning and construction works have the potential to contribute to local air quality. • The overlapping decommissioning and construction works are concentrated to the southern area of the project which is further from sensitive receivers. • Management measures for air quality will consider potential interactions in the concurrent construction phases.

Project and approval status	Summary of potential cumulative air quality impacts
Muswellbrook Bypass (Approved)	• Overlapping construction activities have the potential to contribute to local air quality. • Negligible operational air quality impacts are expected. • There are similar levels of construction activity to the project, leading to a similar risk profile. • Management measures for air quality will consider potential interactions in the overlap period.
Queensland Hunter Gas Pipeline (Approved)	• Overlapping construction activities have the potential to contribute to local air quality. • Negligible operational air quality impacts are expected. • There are lower levels of construction activity relative to the project, leading to a lower risk profile. • Cumulative impacts are unlikely to be significant in terms of assessment outcomes for air quality.
Bowmans Creek Wind Farm (Approved)	• Overlapping construction activities have the potential to contribute to local air quality. • Negligible operational air quality impacts are expected. • There are similar levels of construction activity to the project, leading to a similar risk profile. • Management measures for air quality will consider potential interactions in the overlap period.
Muswellbrook Solar Farm (Approved)	• Overlapping construction activities have the potential to contribute to local air quality. • Negligible operational air quality impacts are expected. • There are lower levels of construction activity relative to the project, leading to a lower risk profile. • Cumulative impacts are unlikely to be significant in terms of assessment outcomes for air quality.
Maxwell Solar Farm (Approved)	• Overlapping construction activities have the potential to contribute to local air quality. • Negligible operational air quality impacts are expected. • There are lower levels of construction activity relative to the project, leading to a lower risk profile. • Cumulative impacts are unlikely to be significant in terms of assessment outcomes for air quality.

Project and approval status	Summary of potential cumulative air quality impacts
Muswellbrook Battery Energy Storage (Approved)	• Overlapping construction activities have the potential to contribute to local air quality. • Negligible operational air quality impacts are expected. • There are lower levels of construction activity relative to the project, leading to a lower risk profile. • Cumulative impacts are unlikely to be significant in terms of assessment outcomes for air quality.
Thunderbolt Wind Farm Stage 1 (Approved)	• Overlapping construction activities have the potential to contribute to local air quality. • Negligible operational air quality impacts are expected. • There are similar levels of construction activity to the project, leading to a similar risk profile. • Management measures for air quality will consider potential interactions in the overlap period.

24.2.2.18 Contamination

The contamination assessment includes consideration of cumulative contamination risks associated with the project. The full assessment is provided in Technical Report 19, with the key findings summarised below.

The contamination assessment identified a number of nearby relevant projects with overlapping contamination related risks with the project, and concludes that each of these project risks would be managed and mitigated under their individual project specific approvals. The nearby relevant projects and their potential cumulative contamination risks are summarised in Table 24.12.

Table 24.12. Cumulative contamination impact

Project	Cumulative contamination impact
Hunter Transmission Project **Liddell Future Land Use and Enabling Works** **Bayswater Power Station Upgrade**	There is potential overlap between the project and these 3 projects as they are all located within the vicinity of each other on the lands associated with Bayswater and Liddell Power Stations and there are areas where these projects intersect with the project access roads, transmission lines and connections to the substations. There is potential for overlapping AECs which may contribute to the following cumulative impacts: • disturbance of asbestos fibres (if/where present) and migration off site • impacts to surface water due to contamination run off • impacts to surface water due to discharge of groundwater or tailings. Potential impacts would be mitigated through project specific management measures during construction under each project approval.

Project	Cumulative contamination impact
Queensland Hunter Gas Pipeline	While there is overlap with the project, no AECs that would pose a cumulative impact risk that requires management were identified.
Bowmans Creek Wind Farm	While there is overlap with the project, no AECs that would pose a cumulative impact risk that requires management were identified.
Thunderbolt Wind Farm Stage 1	While there is overlap with the project, no AECs that would pose a cumulative impact risk that requires management were identified.

24.2.2.19 Waste

As discussed in Section 23, EnergyCo has undertaken a regional waste and circular economy study for the New England REZ. This study indicates that without intervention, the volume of waste generated from major projects may exceed the existing capacity of local waste infrastructure, such as landfills, which are typically set up to manage residential waste. Local waste systems may need to be upgraded to manage expected volumes and types of waste, especially during peak construction.

EnergyCo is currently consulting with local government, generators and other stakeholders including waste management providers to identify suitable waste management facilities, haulage routes and waste stream destinations for the project and the broader New England REZ.

Waste generated by the project would be managed in accordance with a Waste Management Plan based on circular economy practices and the waste hierarchy, prioritising avoidance, reduction, reuse, and recycling prior to off-site disposal. The management of waste would comply with the requirements of the POEO Act, its regulations, and other relevant legislation, policies, and guidelines.

EnergyCo's broader work to coordinate the development of the New England REZ, including consideration of waste management has been considered in the Regional Major Infrastructure Studies for the New England REZ, discussed in Section 2.

24.2.3 Combined cumulative impact assessment

24.2.3.1 Combined impacts

The CIA Guideline seeks an overall summary of the combined effects of different cumulative impacts of the project on key matters, sensitive receivers or important features with other relevant future projects. This section addresses this aspect of the Guideline.

The timing of development approvals and construction commencement of relevant future projects are key determinants of the likelihood and extent of combined cumulative impacts, particularly in relation to traffic, noise, dust and broader amenity outcomes. As discussed in Section 24.2.1, the actual timing of renewable energy developments in the New England REZ will depend on which projects are awarded access rights, and the timing for connections would ultimately be determined by AEMO which will drive the construction timeframes.

Combined cumulative impacts are expected to be most concentrated around the proposed energy hubs in the Uralla and Walcha LGAs, where an increased level of concurrent construction activity is anticipated. Potential impacts include elevated noise and dust levels, as well as increasing industrialisation of the landscape and landscape character and visual amenity impacts associated with energy hub development and future generator projects and connections to the project. The proposed project infrastructure has been sited in areas of low density of sensitive receivers to minimise potential impacts.

Combined cumulative traffic impacts would be distributed across the project area but are expected to be concentrated along strategic transport route corridors and in proximity to the energy hubs, maintenance facilities, and localities with existing industrial development, particularly on the New England Highway and on select lower capacity local roads. However, based on a worst-case scenario of overlapping project timeframes in early 2030, whilst there will be material increases in daily traffic movements in these periods, they will generally remain within the capacity of the road network and no widespread or network-wide deterioration in road network level of service is expected.

The cumulative workforce demand is expected to vary across impacted LGAs. The townships of Muswellbrook and Tamworth are forecast to experience the earliest and most intense workforce peaks, driven by the overlap of multiple large-scale projects, resulting in short but highly concentrated periods of workforce demand from the late 2020s. Uralla and Walcha experience slightly later but more prolonged workforce demand peaks through the early 2030s, reflecting the construction timeframe of the projects. Armidale and Scone are forecast to experience lower overall workforce demand but extended periods of cumulative presence due to overlapping projects progressing over multiple years.

Cumulatively, these workforce pressures have the potential to affect housing and accommodation availability, community services, local infrastructure and community cohesion. Larger service centres such as Armidale, Tamworth and Muswellbrook are generally better positioned to accommodate short-term demand, while smaller townships including Uralla, Walcha and Scone may be more susceptible to prolonged cumulative pressures. The project is addressing its contribution to this cumulative impact issue through the provision of construction workforce accommodation camps which will house the vast majority of construction workers for the project.

Whilst the project has clear strategies to address its contribution to these issues, in a broader cumulative context, the combined cumulative social impacts highlight the need for coordinated workforce accommodation, infrastructure planning and ongoing engagement to manage cumulative social impacts across the New England REZ and avoid disproportionate effects on smaller communities. The proposed SIM Plan, CSEP, Local Industry Participation Plan, and Workforce Management Plan would be prepared and implemented for the project with the aim of managing combined cumulative impacts by facilitating ongoing engagement with local communities and outlining strategies to avoid over-concentration of workforce pressures in individual towns.

More broadly across the New England REZ, and as described in Section 2.3, a range of government agencies and other stakeholders are coordinating efforts to support effective strategic oversight, particularly in relation to logistics planning, local infrastructure and services' needs, broader regional changes and community legacy opportunities. This has included the preparation of a number of Regional Major Infrastructure Studies for the New England REZ. In addition, existing New

England REZ-wide initiatives such as the CEBP, are designed to also address cumulative social impacts across the region, and to maximise community benefits and legacy opportunities.

There are also combined cumulative visual and noise impacts in the Muscle Creek and McCullys Gap localities associated with the project and other relevant future projects such as the Bowmans Creek Wind Farm that would require management. As summarised in Section 24.2.2.5, cumulative visual impacts were assessed as low to moderate for the Bowmans Creek Wind Farm receivers and were assessed as low for the Thunderbolt Wind Farm as the impacts are generally isolated to limited landholders and mitigated by existing neighbour agreements which apply to the Bowmans Creek Wind Farm.

In summary, the key negative combined cumulative impacts with potential to occur include:

- increased construction noise and dust impacts associated with the project and overlapping construction of relevant future projects
- material increases in daily traffic movements during peak construction periods
- water demand during construction has the potential to contribute to cumulative impacts where multiple projects draw on shared water sources over similar timeframes
- cumulative landscape and visual impacts caused by an increased concentration of transmission infrastructure, wind farms and solar farms across the New England REZ as well as around specific generator projects in proximity to the project outside of the New England REZ
- pressure on community services from the influx of workers associated with multiple projects operating concurrently, particularly within smaller communities and service centres
- pressure on local waste infrastructure during peak construction periods, with cumulative waste volumes from major projects potentially exceeding the capacity of existing regional waste facilities without upgrades or intervention
- loss and fragmentation of native vegetation and wildlife habitat from the combined vegetation clearing associated with the project and other relevant future projects. This contributes to broader regional habitat loss, increased edge effects and disruption of fauna movement, noting residual impacts would be offset for no net loss under the BOS.

24.2.3.2 Combined benefits

There are many benefits associated with the combination of the project and other relevant future projects across the New England REZ and broader NSW electricity network. The combined effect of these projects would deliver social, economic and environmental benefits at local, regional, and state scales.

A key cumulative benefit would be the contribution to Australia's transition to a lower emissions energy system through the increased supply and transmission of renewable energy. Collectively, the development of generation, storage and transmission infrastructure across the New England REZ would support the reduction of greenhouse gas emissions, strengthen energy security and improve the resilience and reliability of the electricity network. These benefits would be realised across communities throughout the NEM through increased access to renewable energy and progress towards climate change mitigation objectives.

At a local scale, the project, other relevant future projects and the broader operation of the New England REZ would facilitate the realisation of the major benefits of the New England REZ. Broadly, the project and relevant future projects would:

- support the NSW Government's strategy to deliver affordable, reliable and clean electricity for homes and business in NSW
- attract more than $24 billion in private sector investments by 2035 and is expected to bring thousands of construction jobs and ongoing operational jobs. It will also create additional demand for workers in local manufacturing, retail and transport, and in the supply of goods and services
- provide for 6 gigawatts of new transmission network capacity in the New England region,
- provide up to $600 million for landholder in lease payments
- bring new investment and funding for local projects, as well as programs to support small business development, training and local employment opportunities through the CEBP
- support the Commonwealth and NSW Governments' energy security, cost and sustainability objectives, including reducing greenhouse gas emissions associated with energy generation and supporting NSW and Australia on the path to achieving net zero emission.

24.2.4 Management and mitigation

Environmental management for the project would be undertaken in accordance with the environmental management strategies and management plans detailed in Section 25.

Mitigation measures to address issue-specific impacts are described in the relevant EIS sections and technical reports and consolidated in Appendix F. Implementation of these measures would reduce the potential cumulative impacts arising from interactions between the project and other relevant future projects.

In addition, the measures outlined in Table 24.13 have been developed to support ongoing engagement and coordination with the proponents and key stakeholders of relevant future projects to identify, manage, mitigate and where practicable avoid cumulative impacts associated with overlapping construction activities and timeframes. Cumulative impacts will be considered in construction planning and sequencing with the objective of further minimising potential cumulative impacts as described in this section.

Table 24.13. Proposed mitigation and management measures – cumulative impacts

Reference	Impact	Mitigation measure	Timing	Relevant location(s)
CI1	Cumulative impacts	Consultation will be undertaken with construction contractors, proponents, councils, and affected landholders as required to coordinate construction staging and timing with the aim of minimising and managing potential cumulative impacts.	Detailed design Construction	All locations

Reference	Impact	Mitigation measure	Timing	Relevant location(s)
		This will include: • identifying the potential for cumulative impacts associated with concurrent construction programs (for example shared access routes, works, resources) • developing mitigation measures to mitigate cumulative impacts as they arise where practicable.		
CI2	Cumulative impacts	Cumulative impacts will be considered in construction planning and sequencing of the project with the objective of minimising potential cumulative impacts where practicable.	Detailed design Construction	All locations

Environmental management and mitigation



Section 25

25 Environmental management and mitigation measures

This section describes the environmental management approach for the project during detailed design, construction and operation, and identifies the management and mitigation measures that would be implemented as part of the project. It also outlines the proposed framework for inspections, monitoring, auditing and reporting of environmental compliance.

25.1 Approach to environmental management

The project's approach to environmental management would be consistent with:

- the objective of avoiding and minimising impacts throughout detailed design, construction and operational stages
- the conditions of approval and other licences, permits and consents (if granted for the project)
- this EIS, including the management and mitigation measures as consolidated in Appendix F
- an Enabling Works Management Plan (EWMP)
- a Construction Environmental Management Plan (CEMP)
- an Operational Environmental Management Plan (OEMP)
- issue-specific environmental management plans.

The overall approach of environmental management is shown on Figure 25.1 below.

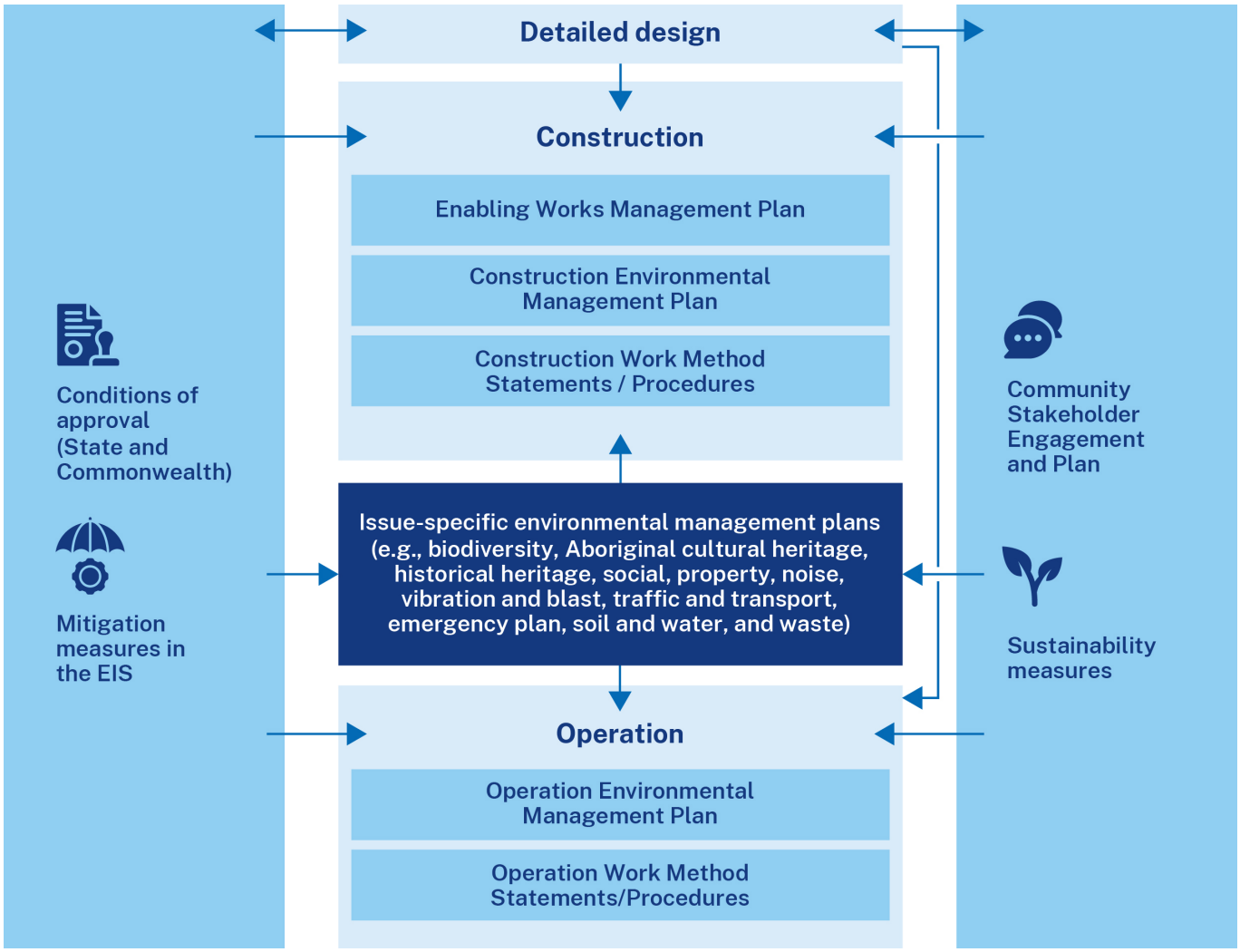


Figure 25.1. Environmental management of the project

Stakeholder engagement would be ongoing throughout the project's detailed design, construction and operational stages, including with the community and other key stakeholders including government authorities. The existing community and stakeholder engagement plan (CSEP) would be updated by the network operator to detail the approach to engagement between the network operator, the community, community groups, government authorities and other identified stakeholders during detailed design, construction, and operation of the project.

The community and stakeholder engagement plan would:

- identify people, organisations, councils, and government agencies and other stakeholders to be consulted
- outline how information about project activities, progress, impacts and key milestones would be communicated
- describe the approach to community and stakeholder engagement, including distribution of accessible information and opportunities to participate and provide feedback
- identify communication and engagement risks, issues and management measures

- set out procedures for managing enquiries, feedback and complaints, including how people can contact the project team
- outline processes for working with councils, government agencies and other stakeholders
- establish mechanisms for monitoring, reporting and continuous improvement of communication and engagement activities.

25.2 Construction environmental management

25.2.1 Enabling works

Enabling works are activities that would occur early in the overall construction program. Enabling works are described in Section 3.3.4 and would be of minor and low impact, and typically not involve impact to features of high environmental or heritage significance or result in significant amenity impacts to nearby receivers.

Enabling works would be managed in accordance with:

- relevant conditions of approval
- relevant management and mitigation measures as detailed in Appendix F
- Enabling Works Management Plan (or similar) to be prepared by the network operator specific to the enabling work being undertaken.

Enabling works for the project are identified as works which can begin prior to the approval of environmental management plans for main construction activities, including the CEMP. However, an Enabling Works Management Plan would be required for these activities and must comply with all relevant approval conditions and implement management measures consistent with this EIS. Any work that is not considered to be of minor/low environmental impact or otherwise provided for in the conditions of approval would be carried out following the approval of relevant environmental management plans.

25.2.2 Construction environmental management plan

Construction activities are described in Section 3.3. Construction activities that would occur following pre-construction and enabling works would be managed in accordance with a CEMP and accompanying strategies and procedures to be prepared and implemented by the network operator.

The CEMP would be prepared and implemented with regard to the Environmental Management Plan Guideline for Infrastructure Projects (DPIE, 2020d) and Independent Audit Post Approval Requirements (DPHI, 2026e). The CEMP would be kept as an internal management document which would guide the use of the issue-specific environmental management plans, strategies and procedures provided in Section 25.4.

The CEMP would likely include:

- the environmental policy and objectives
- a description of construction activities

- reference to relevant statutory and other obligations, including approvals, licences, permits and consents
- location assessment protocol for additional construction ancillary sites that defines environmental, social and constructability criteria to guide site selection and minimise impacts, while maintaining flexibility for construction
- environmental performance targets
- references to the relevant issue-specific environmental management plans, strategies and procedures detailing how construction activities would be managed and monitored to avoid or minimise impacts
- clear articulation of the roles and responsibilities for environmental management, including the relationship between EnergyCo, the network operator, the construction contractor and the appointed Environmental Representative
- roles and responsibilities of the construction workforce with respect to the planning, implementation, maintenance and monitoring of environmental controls
- environmental management induction, training and awareness for the construction workforce
- processes and procedures for complaints handling and ongoing communication with the community and other stakeholders
- processes for demonstrating compliance with the commitments made in the EIS and relevant approval conditions, including procedures for the control of environmental records and a compliance tracking and auditing program
- processes for managing non-conformances, including identifying and implementing corrective and preventative actions.

Construction would not commence until the relevant issue-specific environmental management plans, strategies and procedures (as described in Section 25.4) are approved by the Planning Secretary of NSW DPHI.

Environmental Work Method Statements / Procedures would be developed by the network operator for the construction of the project. These work method statements would support the CEMP and contain instructions for contractors on how to implement the environmental management measures outlined in the CEMP and issue-specific environmental management plans developed for the construction of the project.

25.3 Operational environmental management

Operational activities are described in Section 3.4. Operational activities would be managed in accordance with:

- relevant conditions of approval
- management and mitigation measures as detailed in Appendix F
- an OEMP to be prepared and implemented by the network operator.

The OEMP would likely include:

- the performance outcomes, commitments and mitigation measures identified in the EIS
- environmental policies, standards and principles to be applied to operations
- a process for ongoing environmental risk analysis enabling the identification of new or changing environmental risks
- the roles and responsibilities of all key personnel
- procedures and plans to address key issues such as vegetation management, biosecurity risks, and emergency responses
- management of access with relevant landholders
- an engagement strategy for updating and engaging with the local community and other stakeholders
- review, audit and monitoring processes to measure environmental performance and identify opportunities for improvement.

The OEMP would be supported by a range of issue-specific environmental management plans, strategies and procedures as shown on Figure 25.2 that would document relevant specific environmental management measures during operation (as relevant). The OEMP would be kept as an internal management document which would guide the use of these issue specific environmental management plans, strategies and procedures during operation of the project.

25.4 Issue specific management

As shown on Figure 25.1, the CEMP and OEMP would be supported by a range of issue-specific environmental management plans, strategies and procedures that would document specific environmental management measures during construction and operation (as relevant to each phase). An outline of the associated issue-specific environmental management plans, strategies and procedures is provided in Figure 25.2. The CEMP, OEMP and issue-specific environmental management plans, strategies and procedures would be periodically reviewed and updated as required.

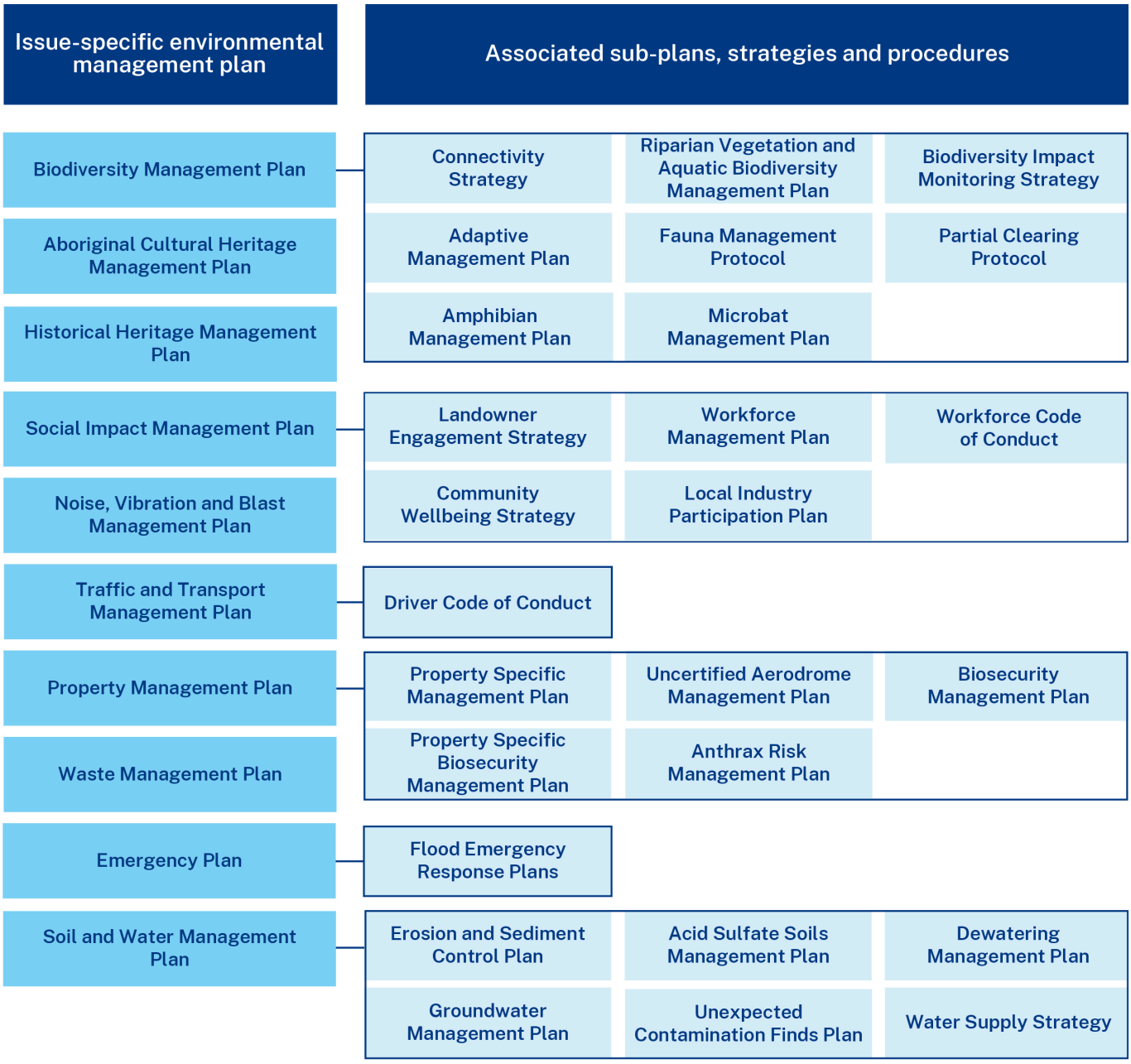


Figure 25.2. Issue-specific environmental management plans, strategies and procedures

The issue-specific environmental management plans, strategies and procedures would be prepared, approved and implemented in accordance with the mitigation measures and commitments detailed in this EIS and the conditions of approval (both State and Australian Government) for the project.

In addition to the above requirements, the issue-specific environmental management plans, strategies and procedures would be developed regarding applicable policies/standards/guidelines, such as the Environmental management guidelines for construction (edition 4) (DPIE, 2020f) and to refer to the relevant industry guidelines for specific issues and activities. For example, erosion and sediment would be managed following the Managing Urban Stormwater: Soils and construction - Volume 1 (Landcom, 2004) (also known as the 'Blue Book').

25.5 Summary of management and mitigation measures

The project would be undertaken in accordance with the conditions of approval and the proposed management and mitigation measures as discussed in Section 7 to Section 24 of the EIS and which are collated in Appendix F.

These management and mitigation measures may be revised post EIS exhibition during the response to submissions phase and incorporated into the Submissions Report, or within any Amendment Report. This would include an updated list of all management and mitigation measures which would be incorporated into the project's CEMP, issue-specific environmental management plans, strategies, procedures and environmental work method statements/procedures developed for construction, and the OEMP for the operation of the project (as relevant).

25.5.1 No-impact areas and habitat connectivity corridors

No-impact areas have been identified within or proximate to the project area as designated areas where EnergyCo has committed to avoid impact due to their environmental, cultural, or ecological sensitivity. These areas have been mapped so that future project design refinements and construction clearly avoid these locations. No impact areas mapped in Figures F1–F3 inclusive within Appendix F do not form part of the disturbance footprint and therefore disturbance is not proposed in these areas. In addition to no-impact areas, habitat connectivity corridors would be established to retain connectivity and avoid impact to riparian and other important biodiversity areas. Indicative locations of the habitat connectivity corridors have been identified (refer to Figure F.1 in Appendix F) and would be confirmed during detailed design.

25.6 Design refinements and project change management

25.6.1 Design refinement and project change

As discussed in Section 3.2.1, the project area presented in this EIS represents the area within which the construction and operation of the project would occur and provides flexibility for the final siting of project infrastructure and the disturbance footprint. The final siting of the infrastructure and disturbance footprint can move within the assessed project area subject to recommended environmental management measures and avoidance of identified 'no-impact' areas.

The EIS has been prepared based on a reference design and using information available at the time of preparation to provide a conservative assessment of project impacts.

Any changes resulting from detailed design (including any refinements) would be reviewed for consistency with the approved project and compliance with the conditions of approval.

The post approval approach to managing project uncertainty associated with inaccessible land and cumulative impacts are detailed in Table 25.1.

Table 25.1. Project uncertainties – assessment approach

Project uncertainty	Assessment approach	Timing
Partial field survey coverage for biodiversity assessment associated with inaccessible land	Additional biodiversity field survey will be undertaken in unsurveyed portions of the project area relevant to the final disturbance footprint before and/or after project approval. Survey methods will be consistent with those employed for the BDAR. Whilst the BAM provides a rigorous and repeatable framework for biodiversity assessment in NSW, there are still project impacts that are difficult to confidently predict and remain uncertain. To address this uncertainty, assumed presence has been adopted for many biodiversity entities to provide a conservative assessment outcome. Adaptive management provides an accepted method for dealing with uncertain impacts, through the development and implementation of an adaptive management plan. An adaptive management plan (as part of the BMP) would be developed by the network operator and would address the requirements of the BAM, as listed below and described in further detail in Section 8.5 of the BDAR (refer to Technical Report 1): • the threatened species and/or TECs likely to be impacted • a monitoring program of sufficient scope and duration to provide data that can inform when direct and indirect impacts on biodiversity occur • thresholds or triggers associated with the monitoring program that identify when a prescribed impact has occurred or is likely to occur. The adaptive management plan would include justification for which of these will trigger the implementation of adaptive management actions • suite of potential adaptive management actions to be implemented during the construction or operational phases. The management actions can be targeted at minimising or mitigating the prescribed impact, or in response to meeting or exceeding a threshold or trigger. The adaptive management plan would be designed to manage the uncertain impacts to threatened species and communities that have been assumed present within the BDAR. The strategy would be designed to confirm the presence or absence of threatened species in previously inaccessible areas prior to the commencement of construction where possible and where construction constraints do not allow for this type of adaptive management, the full assumed presence will be retained for each threatened entity.	Detailed design Pre-construction

Project uncertainty	Assessment approach	Timing
Partial field survey coverage for Aboriginal cultural heritage assessment associated with inaccessible land	Additional targeted archaeological investigations (including survey, test excavation, culturally modified tree verification) will be undertaken within unsurveyed areas relevant to the final disturbance footprint before and/or after project approval, as required. Survey methods will be consistent with those employed for the ACHA. Additional archaeological field survey undertaken post approval would be managed through post approval processes via the Aboriginal Cultural Heritage Management Plan (ACHMP) to be developed in consultation with RAPs and Heritage NSW. The proposed management framework prioritises avoidance, followed by impact minimisation and mitigation. The ACHMP would establish protocols for further investigation, management of known and newly identified sites, ongoing consultation and implementation of mitigation measures. It would also provide procedures for unexpected finds and set out requirements for the curation and analysis of salvaged materials.	Detailed design Pre-construction
Partial field survey coverage for historical heritage assessment associated with inaccessible land	Additional targeted historical heritage field investigations (including targeted visual inspection) will be conducted in unsurveyed portions of the project area relevant to the final disturbance footprint before and/or after project approval, as required. Survey methods would be consistent with those employed for the HHIA. Additional field survey undertaken post approval would be managed through post approval processes via the Historical Heritage Management Plan (HHMP). The management framework prioritises avoidance, followed by impact minimisation and mitigation. The HHMP would establish protocols for further investigation, management of known and newly identified potential sites, ongoing consultation and implementation of mitigation measures. It would also provide procedures for unexpected finds.	Detailed design Pre-construction
Cumulative impacts based on current publicly available project information and in some cases unknown or estimated project timeframes.	EnergyCo and the network operator will coordinate with other approved projects to manage potential cumulative impacts during construction and operation. This would involve collaboration and scheduling measures to minimise the potential cumulative impacts to sensitive receivers and maximise employment opportunities in local communities.	Detailed design Pre-construction Construction Operation

Project justification and conclusion



Section 26

26 Project justification and conclusion

This section outlines the justification for the project having regard to the environmental, social and economic impacts assessed in this EIS and the requirements of the Environmental Planning and Assessment Regulation 2021.

It summarises the strategic need for the project, demonstrates how the project objectives are met and evaluates the overall findings of the EIS, including the extent to which the project satisfies relevant statutory requirements.

26.1 Strategic considerations

26.1.1 Project need

The NSW energy system is undergoing a profound structural transformation, shifting from a highly centralised electricity supply model dominated by large coal-fired generators located near metropolitan centres to a more decentralised system based on renewable energy generation, primarily wind, solar and energy storage, located where environmental conditions and resource availability permit. This transition requires substantial investment in transmission infrastructure. The existing transmission network was designed to support a small number of large, centrally located generators and does not have the capacity or geographic reach to accommodate the scale and location of new renewable generation now being developed throughout NSW. This fundamental shift is reshaping the spatial distribution of electricity generation across NSW and the National Electricity Market (NEM).

It is critical that the State's energy supply is secured and replaced before the remaining coal-fired generators close, or NSW's major load centres face the risk of reliability shortfalls during peak demand periods and NSW consumers face the possibility of significant price increases. With the closure of Liddell Power Station in 2023, NSW's remaining 4 coal-fired generators are all currently scheduled to retire within the next 14 years – Eraring Power Station is scheduled to close by April 2029 following a temporary extension to manage system reliability, Bayswater Power Station and Vales Point B Power Station are both expected to close around 2033 and Mount Piper Power Station, the last of NSW coal-fired generators, is scheduled to retire by 2040.

Providing reliable energy at the lowest possible cost and in places that work for regional and rural communities is a key priority of the NSW Government. The 2026 ISP identifies renewable energy connected with transmission and distribution, firmed with storage and backed up by gas-powered generation as the lowest-cost way to supply electricity to homes and businesses. Similarly, the CSIRO's GenCost 2025-26 Report (Graham et al., 2026) concluded that solar and onshore wind, supported by hydro, storage, transmission and either gas or hydrogen (or a combination of both) provide the lowest-cost pathway for Australia's electricity system to efficiently contribute to achieving net zero emissions by 2050.

REZs are a place-based way to build and coordinate electricity assets, with a more holistic approach to the needs of the energy transition. Importantly, they can greatly reduce the overall cost and disruption of the energy transition and deliver significant regional benefits. REZs group new renewable energy generation into locations where it can be efficiently stored and transmitted across NSW, which will help deliver lower wholesale electricity costs and place downward pressure on customer bills through increased competition, while also supporting new local jobs and business opportunities during construction and operation.

The NSW Government has formalised making the electricity system transition a strategic priority, with REZs the centrepiece of the Roadmap. The Roadmap's supporting legislation, the EII Act, identifies the New England REZ, declared on 17 December 2021 as the largest of the 5 REZs with an intended network capacity of 8 GW. The establishment of the New England REZ will allow the region to play a pivotal role in supporting energy system reliability and the delivery of affordable, clean electricity for homes and businesses. The journey towards more sustainable forms of energy generation will also bring with it significant jobs and investment for the region.

The project includes the construction and operation of new high-voltage electricity transmission lines and associated infrastructure that is required to connect energy generation and storage projects within the New England REZ to the transmission network. The project is essential for the operation and energisation of the New England REZ and is therefore a critical part of the implementation of the Roadmap.

EnergyCo has identified 9 objectives for the project and the New England REZ as a whole as shown below.

ENERGYCO'S OBJECTIVES FOR THE NEW ENGLAND REZ

STRATEGIC

Emissions reduction

Support government emissions reduction targets and the transition of the National Electricity Market from traditional energy sources to lower emission renewable energy generation and storage.

Network resilience

Improve energy security and reliability by connecting new large scale renewable energy generation and storage projects to the National Electricity Market.

Value for money

Deliver the REZ in a way that protects the long-term financial interests of NSW energy consumers and helps improve the affordability of the energy supply through lower generation costs and increased competition.

Private investment

Encourage the development of viable grid-scale renewable energy projects in the REZ and reduce barriers to investment.

DELIVERY

Stakeholder coordination

Work collaboratively with generators, government and other stakeholders to coordinate the delivery of the REZ in a way that minimises impacts to local communities.

Community

Carry out meaningful engagement with landowners, communities and stakeholder groups, including Aboriginal and Torres Strait Islander communities.

Environment and land use

Protect natural and cultural resources through the planning and delivery of the REZ and minimise impacts to biodiversity, heritage, high value agricultural land and other sensitive land uses.

Jobs, skills and supply chain

Encourage local participation and deliver long-term benefits for regional communities through employment, training and supplier opportunities.

Safety

Protect the safety of workers and communities during construction and operation through a robust safety culture and policy framework.

26.1.2 Consistency with strategic context

The Australian and NSW governments have developed a detailed policy framework that guides the transition to renewable energy and for achieving net-zero emissions by 2050. The project is consistent with key strategic policies and plans as detailed in Section 2, including:

- Australia's Nationally Determined Contribution Communication 2025: The project is consistent with Australia's NDC Communication 2025 under the Paris Agreement which sets an economy-wide target to reduce greenhouse gas emissions by 62–70 per cent below 2005 levels by 2035 and net zero emissions by 2050, facilitating the longer-term transition to low emission energy sources from the New England REZ and into the NEM.
- Australia's Net Zero Plan and Electricity and Energy Sector Plan: The project directly supports the net zero greenhouse gas emissions target by facilitating connection of renewable energy and firming resources, strengthening system resilience, and enabling efficient sharing of renewable energy generation across jurisdictions and the NEM.
- 2026 Integrated System Plan: The project is identified in the 2026 ISP as an 'anticipated project' being delivered under the NSW EII Act 2020 (advancing from its 'actionable project' status in the 2024 ISP). This means it is a project that is in the process of meeting the relevant commitment criteria, optimises benefits for consumers and which should be progressed as urgently as possible. Within the 2026 ISP's optimal development path, the project is a key enabling investment that supports the least-cost transition to a renewable-dominated system by facilitating large-scale renewable generation, replacing retiring coal-fired capacity, improving system reliability, and delivering substantial net market benefits through enhanced network efficiency.
- 2025 Infrastructure Investment Objectives Report: The project is recognised as a critical project, providing the network infrastructure to connect renewable energy generation projects from the New England REZ and enabling the availability of at least 6 GW of renewable energy to the NEM.
- Network Infrastructure Strategy: The project is a 'Deliver Now' project under the Network Infrastructure Strategy to support the delivery of the Roadmap.
- Staying Ahead: State Infrastructure Strategy 2022–2042: The project aligns directly with the SIS by supporting regional productivity, leveraging NSW's renewable energy resources, and enabling the efficient integration of clean energy into the electricity system.
- New England North West Regional Plan 2041: In addition to meeting Objective 9 (lead renewable energy technology and investment) through enabling the connection of new renewable energy infrastructure projects in the New England REZ to the existing transmission network, the project would also contribute to Objective 8 (adapt to climate change and natural hazards and increase climate resilience) through unlocking network capacity for low emissions technology and contributing to the State's objective to reach net zero emissions by 2050.

- **Hunter Regional Plan 2041**: The project contributes to Objective 1 of the regional plan which defines the strategic framework for the diversification of the Hunter's mining, energy and industrial capacity as NSW moves towards a net zero economy and acknowledges that REZs, by connecting multiple generators and storage in the same location, capitalise on economies of scale to deliver cheap, reliable and clean electricity for homes and businesses in NSW.
- **NSW Net Zero Plan Stage 1: 2020–2030:** The project is aligned with this plan, as it would provide transmission infrastructure that would enable the uptake of proven emissions reduction technologies that grow the economy, create new jobs and reduce the cost of living.
- **NSW Electricity Infrastructure Roadmap:** The project is aligned with the Roadmap as it would facilitate the delivery of lower-cost renewable energy sources to the NEM. The project would contribute to the Roadmap goal of 12 GW of new transmission capacity by providing 6 GW of transfer capacity in the New England REZ by 2034, with potential for additional capacity in the future which would be subject to separate planning approval.
- **NSW Transmission Infrastructure Strategy:** The project is consistent with the aims of this strategy and would enable the connection of eligible renewable energy projects in the New England REZ to the NEM, providing certainty to private sector investors and cost savings to energy consumers.
- **NSW Electricity Strategy:** The project would assist in delivering on the commitments of this strategy, facilitating the delivery of renewable energy sources to the NEM.

26.2 Statutory considerations

The project was declared CSSI under section 5.13 of the EP&A Act on 27 June 2024 and requires approval from the NSW Minister for Planning and Public Spaces under section 5.14 of the EP&A Act. The project is also a Controlled Action under the EPBC Act. Whilst the project is being assessed under the NSW Assessment Bilateral Agreement, a separate approval from the Commonwealth Minister for the Environment and Water under the EPBC Act is also required.

This EIS has been prepared to support EnergyCo's application for approval of the project in accordance with the requirements of Division 5.2 of the EP&A Act. The EIS addresses:

- the project SEARs dated 7 April 2026 and the Supplementary SEARs addressing the requirements under the EPBC Act
- the requirements of the EP&A Regulation.

The EIS has been prepared with regard to the State Significant Infrastructure Guidelines (DPHI, 2026a), Undertaking Engagement Guidelines for State Significant Projects (DPHI, 2026b), Cumulative Impact Assessment Guidelines for state significant Projects (DPHI, 2026c) and the NSW Government's Renewable Energy Planning Framework.

The project is likely to require several other approvals as discussed in Section 4. These approvals will be dependent on the final design, consultation and construction methodology outcomes for the project, which are not currently finalised. The project's compliance with the statutory requirements is further outlined in Section 4 and Appendix D.

26.3 Consideration of community and stakeholder feedback

As described in Section 5, engagement about the project with landholders, communities, Aboriginal and Torres Strait Islander people, local councils, government agencies and many other stakeholder groups has been ongoing since mid-2023. Feedback received from engagement has influenced the design of the project with the aim of minimising impacts on people and the environment.

The key issues raised and feedback provided by the community and stakeholders, and how these have been considered in project design and the environmental assessments, are summarised in Table 26.1, with further details provided in Section 5 and Appendix E.

Table 26.1. Summary of community engagement outcomes

Feedback themes and topics raised	How the project has considered and addressed community feedback
Strategic context • inability to influence design in a meaningful way • design based on desktop assessment with no evidence of meaningful on-ground assessment or engagement • need for certainty on program design to allow landholders to plan appropriately • project costs including cost and impact of revising corridor and cost of changing the route	Ongoing stakeholder engagement has been undertaken throughout project development, including targeted consultation with affected landholders, community groups and key stakeholders. This process has provided opportunities for ongoing input, with feedback documented, considered alongside technical assessments, and used to inform iterative design refinement. Stakeholder feedback has resulted in a number of changes to the project design (refer to Section 26.4.1 and Appendix B). Project planning and design have been informed by a combination of field investigations, technical assessments and ongoing engagement with landholders and stakeholders. Feedback on feasibility, constraints and local conditions has informed corridor refinement and the identification of the EIS project area. EnergyCo has communicated design updates and next steps through project updates, community information sessions and direct landholder engagement to support understanding of project progression and timing. EnergyCo meets its statutory reporting obligations by publishing relevant financial and project information, including REZ cost data, in its Annual Reports. These reports are publicly available and provide transparent detail on project expenditure, delivery progress and associated costs.
Engagement • dissatisfaction with community engagement approach and process • ongoing consultation fatigue	A stakeholder engagement program, as outlined in Section 5 and Appendix E, has been implemented using a broad range of mechanisms and approaches. Engagement activities have been progressively refined in response to stakeholder feedback, including the introduction of more diverse formats such as regional mobile offices, webinars and targeted briefings, to improve engagement effectiveness and meet community preferences, where practicable. These measures have aimed to streamline engagement processes, provide clear and timely information, and minimise duplication and stakeholder fatigue.

Feedback themes and topics raised	How the project has considered and addressed community feedback
Project design and alternatives • lack of trust in the route selection criteria including concerns regarding fairness, transparency and consideration of landholder inputs • inability to influence route selection and design • justification of hub locations • undergrounding vs overhead lines • constraints of revised corridor including terrain and elevation, access tracks and local roads, geology and ground conditions	Detailed multi-disciplinary assessments (engineering, environmental, social, economic) have been undertaken to inform route selection and hub locations, including constraints associated with terrain, geology, access and weather conditions. Community and easement-affected landholder feedback, including suggested alternatives, has also been considered and incorporated where feasible into corridor refinement, as discussed in Section 2.6 and Appendix B. Mitigation measures and construction planning controls have been identified to manage residual constraints. As part of the design options process, EnergyCo considered undergrounding the transmission lines but identified several significant constraints, including challenges in steep or complex terrain, potential environmental impacts, including to biodiversity and Aboriginal cultural heritage values associated with extensive trenching, as well as restrictions on land use within the easement. Underground cables are also substantially more expensive (approximately 4 times the cost for 330 kV and 8 times for 500 kV lines), require longer construction timeframes, and are more difficult to maintain and repair, potentially leading to prolonged outages. This is discussed in Section 2.6 and Appendix B.
Environmental, social and economic impacts • increased traffic movements • biodiversity impacts • Aboriginal and historical heritage impacts • increased bushfire risk • impacts to rural amenity and landscape character • impacts to surface water and groundwater • impacts on agricultural operations • noise impacts • health concerns due to EMF • impacts on housing and social infrastructure • cumulative impacts • mental health impacts due to project uncertainty and presence • compensation for easement-affected and proximal landholders	Detailed environmental, social and economic assessments have been undertaken to assess potential impacts. These were based on legislative and policy requirements, stakeholder feedback and the environmental and social context of the area. Key findings and outcomes of the environmental, social and economic assessments are presented in Section 7 to Section 24 of the EIS. Impact avoidance and minimisation have been embedded throughout the project's iterative route selection and design process with the objective of reducing environmental, social and economic impacts (Appendix B). Mitigation and management measures will be implemented for residual impacts (Appendix F), including those relevant to potential cumulative impacts with other projects under development. Regional major infrastructure studies and related initiatives are being progressed to identify key issues and potential opportunities associated with the broader development of the New England REZ, with coordination between generation proponents, councils and government agencies informing mitigation strategies and project design to manage these cumulative effects. In May 2026, the NSW Government also announced an initial $60 million funding commitment under the New England REZ CEBP to support local infrastructure, services and employment opportunities across the region, reinforcing the broader strategic approach to managing impacts while delivering tangible benefits to host communities.

Feedback themes and topics raised	How the project has considered and addressed community feedback
	Land acquisition and compensation frameworks, including the *Land Acquisition (Just Terms Compensation) Act 1991* and Strategic Benefit Payments Scheme apply to easement-affected landholders.
Broader issues (outside the scope of the project) • Broader energy policy, REZ planning and perceived inequity in distribution of impacts and benefits • Impacts of generator projects	Community benefit concerns are being addressed through the development of the CEBP and broader REZ initiatives. Ongoing engagement with stakeholders is informing the distribution and prioritisation of benefits, supported by findings from the Regional Major Infrastructure Studies. Concerns relating to generation projects are being addressed through broader REZ planning processes and coordination between EnergyCo and generation proponents. The EIS includes a project-level cumulative impact assessment (refer to Section 24) and ongoing engagement will be undertaken to coordinate development and manage cumulative effects.

26.4 Environmental, social and economic considerations

26.4.1 Actions to avoid and minimise impacts

Impact avoidance and minimisation have been embedded throughout the project's iterative route selection and design process with the objective of reducing environmental, social and economic impacts while maximising project benefits. Across all stages, from early planning to refinement of the EIS project area, route selection and design decisions have prioritised reducing impacts on communities and landholders, avoiding sensitive environmental areas, and improving constructability outcomes. This has included progressively refining the corridor to reduce its length, footprint and proximity to dwellings, while incorporating stakeholder feedback and technical investigations to optimise the alignment and infrastructure siting.

Project refinements have reduced impacts to landholders, land use and key industries. Corridor narrowing and realignments have progressively decreased the number of affected landholders and nearby dwellings, while targeted refinements have sought to reduce impacts to dwellings in response to community concerns in areas such as Rouchel, Gundy, Waverly, Barry and Niangala.

Biodiversity impact avoidance has also been a key consideration, where early planning avoided high-value environmental areas such as national parks, wetlands and critical habitats, with later refinements further reducing impacts through shortening the corridor, providing for a reduction in vegetation clearing. Corridor realignment has also avoided impacts to the biodiversity offset area associated with Chaffey Dam, the mapped extent of the sensitive karst systems at Timor and Barry (with project elements now limited to minor road upgrades at Timor) and associated sensitive habitats including threatened species habitat and watercourses. Broader design measures (for example spanning waterways, retaining habitat corridors, and siting infrastructure in disturbed areas) have further minimised biodiversity impacts.

Similar principles apply to heritage, with a structured avoidance hierarchy ensuring high-value Aboriginal and historical heritage sites are avoided where practicable, supported by no-impact areas and ongoing design refinement to further reduce impacts.

Broader route selection decisions, particularly the move to the new study corridor in October 2025 (and now subsequently refined for the project area assessed in this EIS), have improved constructability, reduced steep terrain constraints and construction risks, lowered vehicle movements and environmental disturbance, and enhanced bushfire resilience and aviation safety outcomes. Overall, impact avoidance and minimisation have been a primary driver of the route selection and design refinement process, with ongoing opportunities for further avoidance and minimisation to be considered during detailed design.

26.4.2 Summary of impacts

A comprehensive analysis of the key environmental, social and economic impacts associated with the project is provided in Section 7 through Section 23 and supporting Technical Report 1 to Report 22. Cumulative impacts are assessed in Section 24 and in the respective technical assessments.

Extending across 8 LGAs and 4 IBRA bioregions, the project traverses a diverse landscape across its length, with varying land use, topography and vegetation communities, from the New England Tableland plateau traversing down to the broad floor of the Hunter Valley near Muswellbrook. The project passes through the regional water catchments associated with the Gwydir, Macleay, Namoi, Manning and Hunter Rivers. Covering a length of around 300 kilometres of transmission corridor, the project has the potential to interact with a wide range of environmental, social and economic values.

In recognition of the project's scale and complexity, extensive technical investigations and assessments, stakeholder consultation and iterative project design has been undertaken to assess the project's potential effects on biodiversity, Aboriginal cultural heritage, historical heritage, social, landscape character and visual amenity, land use and property, agriculture, traffic and transport, noise and vibration, hazards and risks (including aviation, aerial firefighting, and bushfire), water resources, air quality, GHG and climate change, and regional economic outcomes. Through the cumulative impact assessment, potential interactions and combined effects with other approved and proposed developments have been identified and evaluated to understand how environmental values, communities and land uses may be affected.

The designation of no-impact areas and proposed habitat connectivity corridors provide further avoidance measures as part of the project. A comprehensive suite of mitigation and management measures has been developed to address potential impacts identified through the assessment, including a framework for environmental management throughout the life of the project.

26.5 Ecologically sustainable development

An objective of the EP&A Act is to encourage ecologically sustainable development (ESD) within NSW. This section provides an assessment of the project in relation to the principles of ESD. Principles of ESD are also set out in Section 3A of the Commonwealth EPBC Act.

To justify the project with regard to the principles of ESD within NSW, the benefits of the project in an environmental and socio-economic context should outweigh any negative impacts. The principles of ESD from both the EP&A Act and the EPBC Act encompass the following:

- the precautionary principle
- intergenerational equity
- conservation of biological diversity and ecological integrity
- improved valuation, pricing of resources and incentive mechanisms.

Essentially, ESD requires that current and future generations should live in an environment that is of the same or improved quality than the one that is inherited.

26.5.1 The precautionary principle

Section 193 of the EP&A Regulation defines the precautionary principle as:

> *'if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In applying the precautionary principle, public and private decisions should be guided by:*
>
> *(a) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and*
>
> *(b) an assessment of the risk-weighted consequences of various options. '*

In order to achieve a level of scientific certainty in relation to the potential impacts associated with the project, this EIS has undertaken an extensive evaluation of all the key components of the project. Detailed assessment of all key issues and necessary mitigation and management measures has been undertaken and comprehensively documented in this EIS.

The preparation of this EIS has involved a detailed analysis of the existing environment (refer to Section 2.3 and Section 7 through to Section 24), and the use of desktop analysis, site-specific survey and monitoring and scientific modelling (where relevant) using established scientific and assessment methodologies to assess and determine potential impacts as a result of the project. The EIS and the detailed technical assessments have considered relevant statutory and agency requirements and guidelines.

The decision-making process for the design/refinement, impact assessment and development of management and mitigation measures has been transparent in the following respects, detailed below.

Key government and community stakeholders have been consulted during EIS preparation (refer to Section 5). This has enabled comment and discussion regarding potential environmental and social impacts and proposed management and mitigation measures. This process also provided for community feedback to inform the refinement of the project. As discussed in Section 2.6 and Appendix B, this has involved a number of refinements to the project based on stakeholder feedback.

The EIS and technical assessments have assessed a project area as well as a reference design and disturbance footprint that would be further refined during detailed design. The EIS and technical assessments have adopted conservative approaches, with any uncertainty in the data used for the assessment being appropriately identified with assumptions applied to represent a conservative worst-case analysis to assess a range of potential impact scenarios (refer to Section 6), including:

- where land access has prevented field-based survey, assumed presence (biodiversity) and predictive modelling (Aboriginal heritage) has been used until survey can be completed
- where final construction methodologies or final design is yet to be determined, the most conservative assumptions have been used in noise modelling and vibration assessment for construction and operation.

The network operator would be required to prepare and implement a CEMP, OEMP and relevant issue-specific management plans, which would implement best practice management, incorporate all identified mitigation and management measures identified in this EIS, and the design refinement and project uncertainties processes described in Section 6. Additionally, should the project be approved, it would be subject to an independent auditing and verification process consistent with relevant requirements for SSI projects. The network operator would report on monitoring outcomes and compliance with the conditions of approval should the project be approved. It is expected that any project approval would include non-compliance notification procedures. Should the project require an EPL, relevant compliance reporting would also be required.

26.5.2 Intergenerational equity

Section 193 of the EP&A Regulation defines the principle of intergenerational equity as:

> *'that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.'*

Intergenerational equity requires that the needs and requirements of today's generations do not compromise the needs and requirements of future generations in terms of health, diversity and productivity.

As discussed in Section 1.2 and Section 2, the project supports the New England REZ, a defined area planned for renewable energy development by the NSW Government. The project is consistent with the objectives of the NSW Electricity Infrastructure Roadmap (DPIE, 2020a) by connecting large-scale renewable energy generation and storage projects to consumers, providing electricity generation that is affordable and reliable. It will also support a move away from fossil fuels which increasingly carry a higher operating risk, carbon impacts and stranded asset risk. The project is being proposed at a time when transmission is increasingly seen as a system-enabling public good, whilst also recognising that it has local impacts. Notwithstanding the direct impacts the project would have within a defined corridor, the project itself would support fundamental change in the way that electricity is generated, stored and distributed in NSW. The project can be considered as one where the benefits of the project outweigh the disbenefits resulting in an overall enhancement of the environment for future generations.

With a proposed transfer capacity of 6 GW, the project would make a material contribution to the NEM and support the State's transition away from fossil fuel reliance, and therefore reduce greenhouse gas emissions from the electricity sector. Greenhouse gas emissions are linked to anthropogenic climate change, and reducing emissions would ensure that future impacts from climate change are minimised, as the project directly supports the decarbonisation of the NEM.

The assessment findings outlined in Section 7 through to Section 24 indicate that while there would be environmental and social impacts associated with the project, the extent of impact has been minimised through the design process and where impacts are predicted, EnergyCo and the network operator commit to management, mitigation and offset measures to address these residual impacts (refer to Section 25 and Appendix F). Future generations will benefit from a decarbonised NEM through a reduction in greenhouse gas emissions from the electricity sector, and the project would contribute to achieving this outcome.

26.5.3 Conservation of biological diversity and ecological integrity

Section 193 of the EP&A Regulation identifies that the principle of conservation of biological diversity and ecological integrity should be a fundamental consideration in the decision-making process. The conservation of biological diversity refers to the maintenance of species richness, ecosystem diversity and health and the links and processes between them. Environmental components, ecosystems and habitat values potentially affected by the project are described in this EIS (refer to Section 7 and Technical Report 1) and measures to ameliorate negative impacts are outlined in Appendix F.

The project reference design has been developed to avoid and minimise impact to key biodiversity values, where practicable. Following the application of avoidance and mitigation measures, the BAM assessment has identified the biodiversity credit requirement to offset the residual impacts of the project and the required management and mitigation measures to be implemented.

Considering the close nexus between nature and climate, the overall contribution of the project to decarbonising the NEM and reducing greenhouse gas emissions would, over time, result in reduced stressors on the natural environment and biodiversity. The principle of conservation of biological diversity and ecological integrity has been considered with regard to the project.

26.5.4 Improved valuation, pricing of resources and incentive mechanisms

This principle has been defined in Section 193 the EP&A Regulation as:

> *'that environmental factors should be included in the valuation of assets and services, such as:*
>
> *(a) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement, and*
>
> *(b) the users of goods and services should pay prices based on the full life cycle of costs of providing the goods and services, including the use of natural resources and assets and the ultimate disposal of waste, and*
>
> *(c) established environmental goals should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems'.*

EnergyCo has intrinsically valued the environmental resources by designing the project to avoid and minimise potential environmental and social impacts where practicable as outlined in Section 2.6 and Appendix B.

Project considerations have included the costs of management measures to minimise potential environmental and social impacts. There would also be additional costs associated with meeting the project's biodiversity offset liability. The project would enable the connection of large-scale renewable energy generation and storage projects to consumers, supporting the provision of electricity generation that is affordable and reliable, while reducing greenhouse gas emissions and the impacts of climate change, supporting the State's transition away from fossil fuel reliance.

At a broader level, transmission infrastructure allows relevant public goods, such as system reliability of the electricity system, to be valued. In the current fossil fuel based electricity generation system, environmental externalities are not fully priced.

The further roll out of renewable energy generation and storage, facilitated through connection by transmission infrastructure will see NSW move from a system where fossil fuels appear 'cheap', because their impacts are largely unpriced, to one where the true system costs drive investment. This means that over time, current externalities are internalised into a project's economics.

This will also enable the efficient pricing of dispatchability, reliability and long-term system value, with efficient pricing to include the cost of network externalities.

The project, as a key enabler of the decarbonisation of the NEM, will have a direct impact on ensuring that costs can be spread to enable the least-cost generation mix. It therefore directly meets the principle of improved valuation, pricing of resources and incentive mechanisms.

26.6 Sustainability in infrastructure development

EnergyCo has established sustainability commitments and performance requirements that will be implemented throughout the detailed design, construction and operation of the project. These commitments include reducing greenhouse gas emissions, improving climate resilience, maximising energy and water efficiency, sustainable procurement, materials and waste management, and broader environmental, social and economic outcomes. Compliance with these commitments will be demonstrated through project management plans, performance monitoring and reporting, and independent verification and assurance processes.

26.7 Evaluation and conclusion

Both the Australian and NSW Governments recognise the strategic importance of the project. The delivery of the project will achieve, or support achievement of, key strategies in Commonwealth and NSW strategic plans.

The specific requirement for new transmission infrastructure to support the New England REZ was first identified in the 2020 ISP. Since then, all major electricity strategic planning reports at Commonwealth and State levels have highlighted the critical need for the project.

The project would unlock the potential renewable generation capacity within the New England REZ by providing 6 GW of additional network transfer capacity to connect renewable generation (wind, solar, hydro and storage) to the NEM. As the remaining coal-fired power stations in NSW close, the project would support energy system reliability and the delivery of inexpensive, clean electricity for homes and businesses in NSW.

The project would also contribute significant capital investment within the New England and Upper Hunter regions, generate jobs during the construction and operation phases, provide indirect benefits to local services throughout the life of the project, and deliver additional income (strategic benefit payments) to landholders of the land on which the transmission line easements are located. By facilitating the development of the wider New England REZ, the project would also assist in providing benefits to the local community through the implementation of the CEBP, which will generate hundreds of millions of dollars for local communities.

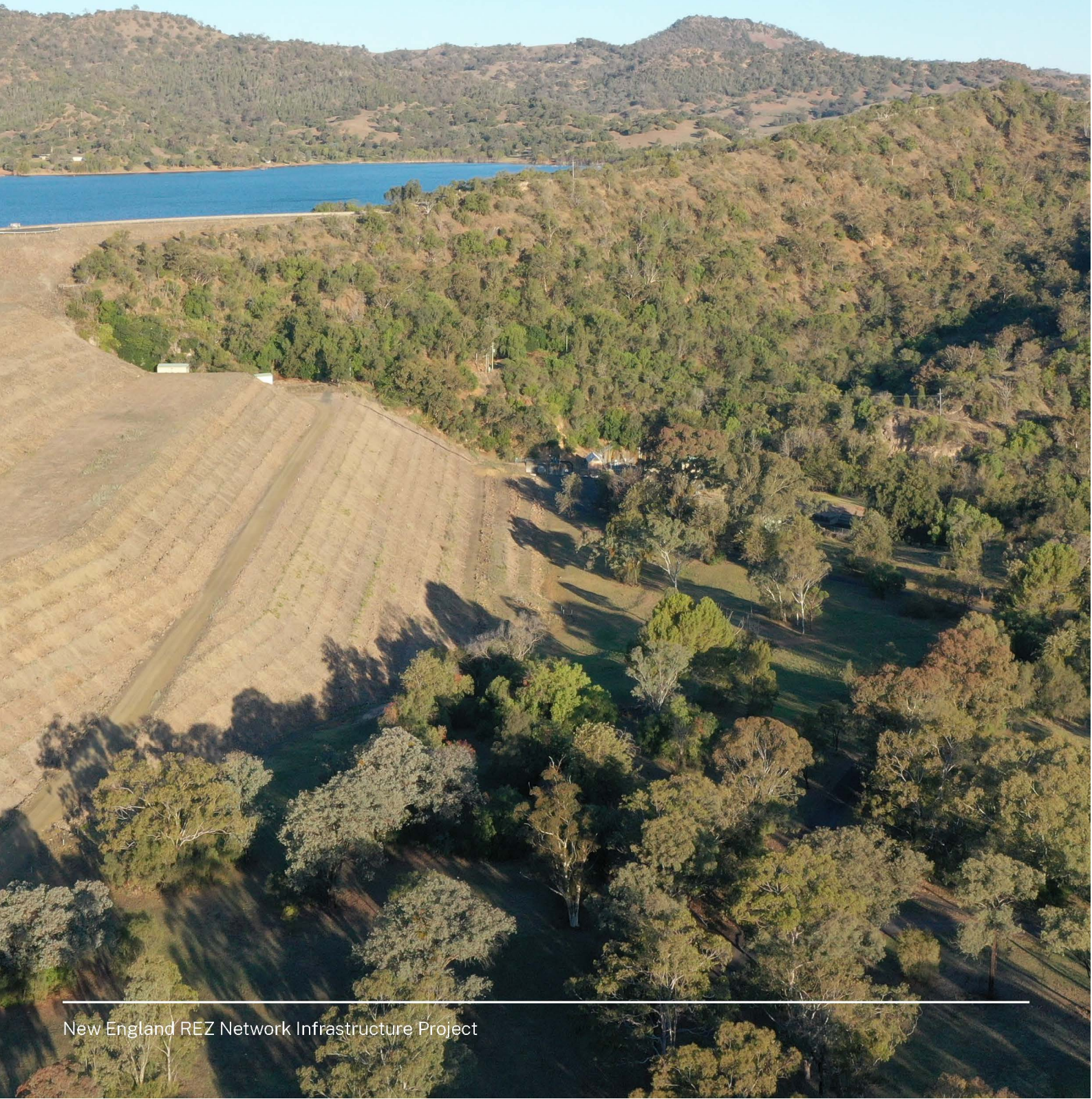
The project has been developed following a robust and iterative design process that has involved substantial consideration of alternatives and route options, environmental impact assessment outcomes and stakeholder engagement. Where feasible and reasonable, the project has aimed to avoid and minimise impacts to people and the environment. This has included refining the corridor to reduce and balance impacts to private landholders, communities, and environmental values, including biodiversity and Aboriginal heritage values. The designation of no-impact areas and proposed habitat connectivity corridors provide further avoidance measures to the project.

Whilst the planning, design and assessment process has sought to avoid and minimise impacts, given the nature and scale of the project, unavoidable impacts remain. The project includes a range of mitigation and management measures to reduce the likelihood, magnitude and consequences of these residual impacts, and where necessary, to offset these impacts in accordance with relevant legislation. This includes:

- further project refinement through detailed design and development of the construction methodology, with the objective of further avoiding and minimising potential impacts on people and the environment
- ongoing stakeholder engagement as defined in Section 5 during the construction and operation of the project to facilitate ongoing provision of project-related information to landholders, community and other stakeholders
- the implementation of the mitigation measures set out in Appendix F, including the development and implementation of detailed management plans, strategies and monitoring programs
- offsetting of residual biodiversity impacts – EnergyCo will seek to enter into a SODA under clause 6.3A of the BC Regulation 2017
- ongoing monitoring, reporting and auditing in compliance with conditions of approval, if granted.

Overall, the project is a critical component in strengthening the supply of clean and reliable electricity to consumers, providing security of electricity supply in NSW as coal-fired power stations close and delivering long-term benefits to the NEM. It is for this reason that the project has been identified by the NSW Government as a CSSI project, recognising that it is essential to the State for economic, environmental or social reasons. On balance, it is considered that the strategic need and benefits of the project outweigh the mitigated project impacts and, therefore, it would be reasonable for the determining authority to determine that the project is justified and would be in the public interest.

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