



REVIEW OF ENVIRONMENTAL FACTORS



PR471 Construction of 132kV Aerotropolis Feeder from Luddenham to Kemps Creek (Stages 2B & 3B)



In accordance with Part 5 of the Environmental Planning & Assessment Act 1979 & State Environmental Planning Policy (Transport and Infrastructure) 2021.

August 2022

REF- Construction of 132kV Aerotropolis Feeder from Luddenham to Kemps Creek (Stages 2B & 3B)

Cover photo taken from: <https://www.architectureanddesign.com.au/news/sepp-public-display-western-sydney-aerotropolis>

EXECUTIVE SUMMARY

Endeavour Energy (EE) is a network electricity distribution servicing over 2.5 million people living and working across Sydney's Greater West, the Blue Mountains, the Southern Highlands, Illawarra and the South Coast of New South Wales (NSW).

EE proposes to install an approximately 4 kilometre (km) long 132 kilovolt (kV) underground transmission feeder route traversing through the suburbs Luddenham and Kemps Creek in the Greater Western Sydney region in NSW (the project). The project is part of the transmission supply strategy to meet increasing electricity demand from critical infrastructure at the Western Sydney Growth Area including the future Nancy-Bird Walton Airport (Western Sydney Airport) and surrounding supporting development. The installation is proposed over two construction stages commencing from January 2023 through to December 2023.

The proposed transmission feeder route will consist of Stage 2B and Stage 3B. The Stage 2B alignment commences at the South Erskine Park Zone Substation and travels south-west towards Bakers Lane. It traverses Bakers Lane eastwards towards the electrical conduit and the Fraser & Altis site. The Stage 3B alignment travels westerly from the Fraser & Altis site (on Bakers Lane) to connect to the Stage 4 alignment of the transmission feeder route at Luddenham Road.

The electrical conduit at the Fraser & Altis site is the subject of a separate Summary Environmental Report (SER).

Stages 2B and 3B of the proposed transmission feeder route (the project) are the subject of this Review of Environmental Factors (REF) only. Other construction stages and sections of the proposed transmission feeder route (stages 1, 2A, 3A and 4-7) have been assessed by EE separately and are not included in this REF.

This REF details the possible environmental impacts associated with the project and identifies mitigating measures to be incorporated into the design, construction and operation of the project to minimise potential environmental impacts.

The Determining Authority for the project is EE. The project is subject to the provisions of The Code of Practice (The Code) for Authorised Network Operators (ANO), State Environmental Planning Policy (Infrastructure) 2007 (Infrastructure SEPP) and requires assessment and approval under Part 5 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

The REF has determined that no significant environmental constraints are associated with the Project. Therefore, EE has concluded that there are no aspects of this project that have the potential to lead to, or result in, significant adverse impacts on the environment.

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LIST OF ABBREVIATIONS AND GLOSSARY OF TERMS

Term	Meaning
A	amp: the unit of measure for current (or load) which is the amount
AHIMS	Aboriginal Heritage Information Management System
ANO	Authorised Network Operator under the <i>Electricity Networks Assets (Authorised Transactions) Act 2015</i>
ASP	Accredited Service Provider
BC Act	Biodiversity Conservation 2016
CEMP	Construction Environmental Management Plan
DAWE	Department of Agriculture, Water and Environment
Determining Authority	Minister or public authority by or on whose behalf the activity is or is to be carried out or any Minister or public authority whose approval is required in order to enable the activity to be carried out.
DBYD	Dial Before You Dig
DC	Direct Current
DPE	Department of Planning and Environment
DM	Demand Management
EE	Endeavour Energy
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i> (NSW). Provides the legislative framework for land use planning and development assessment in NSW.
EP&A Regulations	<i>Environmental Planning and Assessment Regulation 2021</i>
EPA	Environmental Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth). Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process.
ES Act	<i>Electricity Supply Act 1995</i>
ESCP	Erosion and Sediment Control Plan
ESD	Ecologically sustainable development: is development which uses, conserves and enhances the resources of the community so that ecological processes on which life depends, are maintained and the total quality of life, now and in the future, can be increased.
EWP	Elevation Work Platform

Term	Meaning
Feeder	A set of electric conductors that distribute electricity
HDD	Horizontal Directional Drilling
HV	High Voltage
Hz	Hertz
Joint bay	Concrete bay constructed in various locations along a feeder route which is used for jointing lengths of cable together
km	Kilometre
kV	Kilovolts
LEP	Local Environmental Plan: a type of EPI made under Part 3 of the EP&A Act.
LGA	Local Government Area
m	metre
MNES	Matter of National Environmental Significance
NP	National Park
NPW Act	<i>National Parks and Wildlife Act 1974</i>
NPWS	National Parks and Wildlife Service (OEH)
OH	Overhead
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
REF	Review of Environmental Factors
Road	Includes the airspace above the surface of the road, the soil beneath the surface of the road and any bridge, tunnel, causeway, road-ferry, ford or other work or structure forming part of the road. The road reserve is inclusive of the carriageway and the footpath.
SCADA	Supervisory Control and Data Acquisition
SEPP	State Environmental Planning Policy: a type of EIP made under Part 3 of the EP&A Act
SER	Summary Environmental Report
SIS	Species Impact Statement
The Code	The Code of Practice for Authorised Network Operators (ANO) designed to regulate the ANOs decision making process as to the appropriate level of environmental assessment required relative to the impacts of a proposed project.

Term	Meaning
TMP	Traffic Management Plan
UGOH	Underground to overhead construction- a structure which facilitates the transition of underground cabling to aerial (overhead) construction
V	volt: the unit of measure for voltage which is the pressure that electricity is pushed through the wire
ZS	Zone Substation

Document Control

Revision	Prepared by and Company Name	Date	Reviewed by and Company Name	Comments
V1	Ruth Kelly, Lia Zwolinski and Ainslie Trenwith, EMM Consulting Pty Ltd	25 July 2022	Mohammad Alam Endeavour Energy	Review of first draft
V2	Lia Zwolinski, EMM Consulting Pty Ltd	12 August 2022	Mohammad Alam Endeavour Energy	Second draft based on reviewer comments
V3	Lia Zwolinski, EMM Consulting Pty Ltd	30 August 2022	Mohammad Alam Endeavour Energy	Final draft version based on reviewer comments

Document Approval

To the best of the knowledge of the below signatories, this REF has been prepared to be neither false nor misleading and is in accordance with The Code of practice for Authorised Network Operators approved under section 171 of the Environmental Planning and Assessment Regulation 2021.

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1.0 Introduction

1.1 Background

Endeavour Energy (EE) is a network electricity distributor operator servicing over 2.5 million people living and working across Sydney's Greater West, the Blue Mountains, the Southern Highlands, Illawarra and the South Coast of New South Wales (NSW).

EE proposes to install an approximately 4 kilometre (km) long 132 kilovolt (kV) underground transmission feeder route between the South Erskine Park Zone Substation in Kemps Creek to Luddenham Road in Luddenham within the Greater Western Sydney region in NSW (the project). The proposed transmission feeder route will be constructed below ground through trenching and underboring construction methods.

The project is part of the broader transmission supply strategy to meet increasing electricity demand from critical infrastructure at the Western Sydney Growth Area including the future Nancy-Bird Walton Airport (Western Sydney Airport) and surrounding supporting development. The entirety of the transmission feeder route is shown in Figure 1.1. The installation is proposed over two construction stages commencing from January 2023 for civils works, with cable laying from June 2023 followed by jointing and aiming to complete by December 2023.

The proposed transmission feeder route will consist of Stage 2B and Stage 3B. The Stage 2B alignment commences at the South Erskine Park Zone Substation and travels south-west towards Bakers Lane. It traverses Bakers Lane eastwards towards the Fraser & Altis site. The Stage 3B alignment travels westerly from the Fraser & Altis site to connect to the Stage 4 alignment of the transmission feeder route at Luddenham Road.

EMM Consulting Pty Ltd (EMM) has been engaged by EE to prepare a REF for the project. The project is subject to the provisions of NSW Code of Practice (the Code) for Authorised Network Operators (ANO), State Environmental Planning Policy (Transport and Infrastructure) 2021 (Transport and Infrastructure SEPP), and requires assessment and approval under Division 5.1, section 5.5 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

EE is the determining authority under section 5.5 of the EP&A Act for the project. In accordance with requirements under section 5.5 of the EP&A Act, EE is also responsible for assessing all matters affecting or likely to affect the environment as a result of the proposal.

The REF has been developed in accordance with section 171 of the NSW Environmental Planning and Assessment Regulation 2021 (EP&A Regulation) with consideration of measures that will be implemented to avoid or minimise the potential for environmental impacts as a result of construction and operation of the project. This REF is based on a desktop review of potential environmental sensitivities at the site, a site visit undertaken by EMM's project director, technical assessment reports and other relevant project documentation provided by EE.

Other construction stages and sections of the proposed transmission feeder route (stages 1, 2A, 3A and 4-7) have been assessed by EE separately and are not included in this REF.

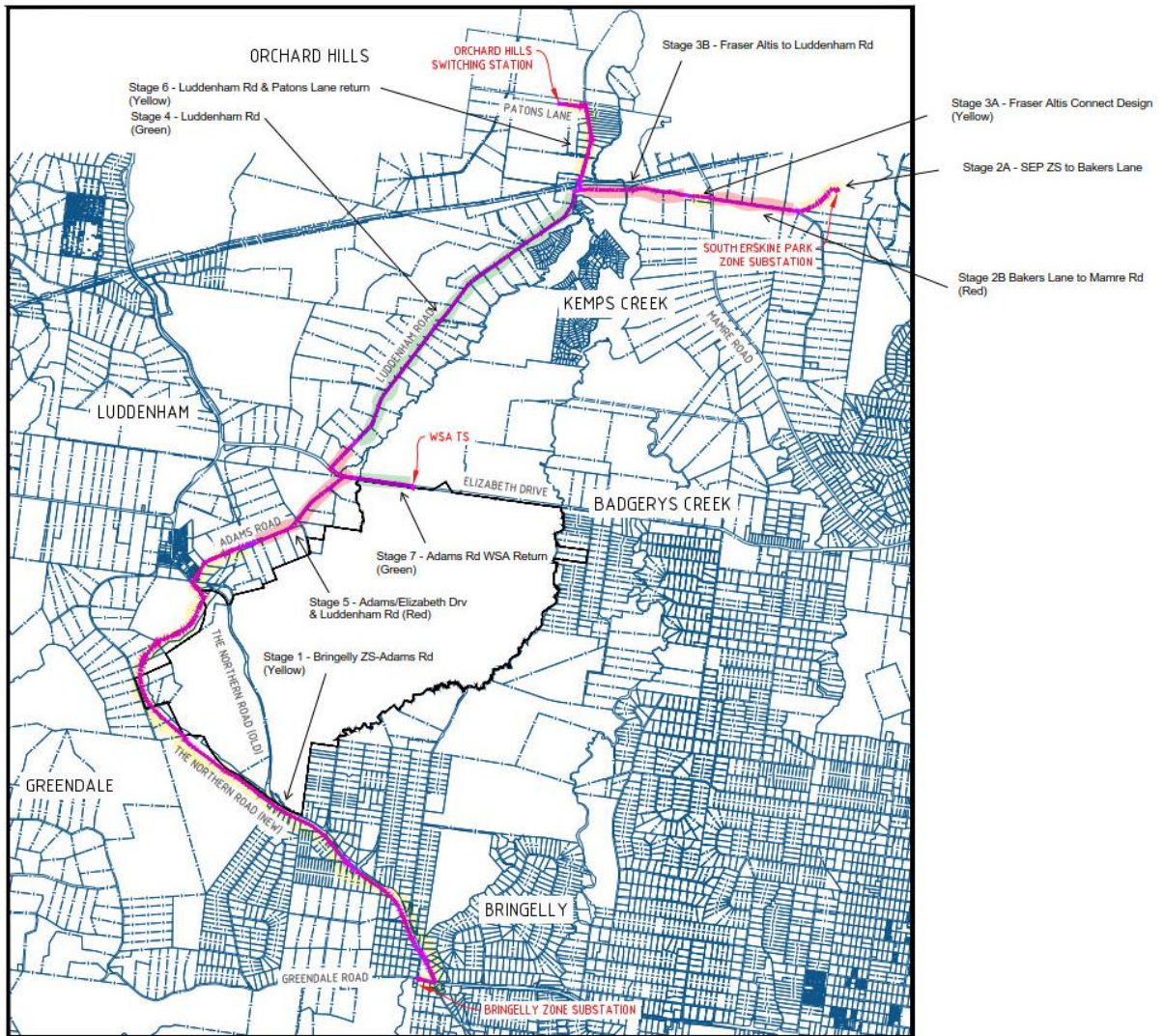


Figure 1.1 Endeavour Energy’s proposed transmission supply route in the Western Sydney Growth Area

1.2 Location of the study area

The Stage 2B alignment is approximately 2.6 km. It commences at the South Erskine Park Zone Substation in the suburb of Kemps Creek and travels south-west towards Bakers Lane. It then traverses Bakers Lane eastwards towards the Fraser & Altis site. The Stage 3B alignment is approximately 1.5 km and travels westerly from the Fraser & Altis site to South Creek. It traverses across South Creek and connects to the Stage 4 alignment of the transmission feeder route at Luddenham Road in the suburb of Luddenham.

The regional and local setting of the alignment is shown in Figure 1.2 and Figure 1.3. The alignment is located within the Penrith Local Government Area (LGA).



Figure 1.2 Regional setting of the approximate Stage 2B and Stage 3B alignment location (source: Google Earth)



Figure 1.3 Local setting of the approximate Stage 2B and Stage 3B alignment location (source: Google Earth)

1.3 Proponent

EE is the proponent of the project. EE is a safety focused and customer-centred business determined to be the best performing electricity provider in Australia. Proponent details are provided in the table below.

Table 1-1 **Proponent details**

Specification	Details
Proponent	Endeavour Energy
Address	51 Huntingwood Dr, Huntingwood NSW 2148
Website	https://www.endeavourenergy.com.au/
Contact	Mohammad Alam

1.4 Purpose of this REF

The purpose of this REF is to assess potential impacts that may result from the construction and operation of the project described in greater detail in Chapter 7 of this report.

The structure of this REF has been prepared in accordance with the table of contents presented on page 21 of EE's *Environmental Management Standard: Environmental impact assessment and environmental management plans (EMS 0001) Amendment no. 5* (EE 2014) and in accordance with requirements set out in the Code, with the exception of a few additional report sections that were added.

2 Project justification

2.1 Overview

The project route traverses along Bakers Lane between the South Erskine Park Zone Substation in the suburb of Kemps Creek and the Stage 4 alignment of the transmission feeder route at Luddenham Road in the suburb of Luddenham. The project is in the Greater Western Sydney region in NSW and is within the area also referred to as the 'Western Sydney Growth Area', 'Western Sydney Aerotropolis' (the Aerotropolis), and, most recently, the 'Western Sydney Parkland'. This chapter serves to describe the strategic context of the project, as well as the need, objectives and benefits of the project.

2.2 Strategic context

2.2.1 Greater Sydney Region Plan 'A Metropolis of Three Cities' – Western Sydney Parkland

Based on the NSW Government predictions, Sydney's population will continue to grow to nearly eight million people over the next 40 years (NSW Government 2021). For over a decade, the NSW Government has been preparing for the projected increase in population, by formalising strategies and investment that will secure jobs, infrastructure, education, health facilities and services within the different growth centres of Sydney.

One of the key growth areas has been the Western Sydney Growth Area. Government plans for Western Sydney have evolved in the last few decades, and especially with the release of the Greater Sydney Region Plan 'A Metropolis of Three Cities' (the Three Cities Plan) in 2018 (GCC 2018a). This has impacted the land use vision of Western Sydney; in particular, with the creation of the 'three cities' concept. Since the release of the Three Cities Plan, work on infrastructure and housing provision in Sydney's greater west has accelerated with significant investment in infrastructure, particularly with large scale projects such as the Western Sydney Airport, the Metro Rail service, the Bringelly Road, Elizabeth Drive and the Northern Road upgrades, and others (GCC 2022).

The project aligns with Greater Sydney Commission's (GCC) 'Our Greater Sydney 2056 Western City District Plan – connecting communities' (WSD Plan) (GCC 2018b) Planning Priority W1 Planning for a city supported by infrastructure, the objectives of which are to:

- foster infrastructure that supports the three cities;
- align infrastructure with forecast growth;
- adapt infrastructure to meet future needs; and
- optimise infrastructure use.

2.2.2 Western Sydney Aerotropolis Precinct Plan

Since the Federal Government's announcement of the Western Sydney Airport in 2014, the Government's vision of the land surrounding the airport has been detailed in a number of plans, policies and environmental planning instruments (EPIs). The most recent plan for the Aerotropolis is the Western Sydney Aerotropolis Precinct Plan (DPE 2022a) (the Aerotropolis Plan), which was published in March 2022 to support the provisions of the State Environmental Planning Policy (Western Sydney Aerotropolis) 2020 (WSA SEPP). The WSA SEPP, however, has since been consolidated into the State Environmental Planning Policy (Precincts – Western Parkland City) 2021 (Western Parkland City SEPP), as part of the government's wider suite of reforms to deliver a better planning system for NSW (DPE 2022b). The WSA SEPP has been consolidated into Chapter 4 'Western Sydney Aerotropolis' of the Western Parkland City SEPP. However, DPE is still in the process of adding all maps within the consolidated SEPPs to the NSW Planning Portal and Spatial Viewer and thus previous maps will remain and retain their current titles (DPE 2022b).

The project falls within the land application boundaries of the precinct that the Aerotropolis Plan applies to and is subject to the land use provisions under the Western Parkland City SEPP (refer to Section 3.4).

The project is crucial in supporting the development and servicing of the new growth area, which the State Government plans to transform into the following key precincts shown in the land use figure (Figure 2.1):

- the Western Sydney Airport (Nancy Bird Walton);
- the Aerotropolis Core Precinct;
- the Agribusiness Precinct;
- the Northern Gateway Precinct; and
- Badgerys Creek Precinct.

The project aligns with a number of objectives outlined in the Aerotropolis Plan under the 'Infrastructure and development staging: infrastructure delivery' theme:

- Ensure utilities and services are planned and delivered to meet demand from development (objective IO2).
- Deliver utilities, roads infrastructure and services in a manner that is safe, efficient and cost effective (objective IO4).
- Ensure utilities design and locations consider space for alternative future services and allow for multi-utility corridors in the future (objective IO6).

Furthermore, construction stages of this project (Stage 2B & 3B) partly fall within the 'first priority' area of the precincts defined in the Aerotropolis Plan (see Figure 2.2). 'First priority' areas align with the first stages of transport and utilities infrastructure delivery and are intended to be the initial stages of development, in line with working towards achieving the employment and population targets of the Aerotropolis Plan (DPE 2022).

Objectives of the 'Development sequencing' theme set out in the Aerotropolis Plan, which the project aligns with, are outlined below:

- Ensure that development proceeds in an orderly and efficient sequence, aligned with the efficient delivery of infrastructure (objective DS01).
- To enable the rate of development to keep pace with demand for jobs, housing and services within the Aerotropolis (objective DS02).
- To align the sequence of development with the Aerotropolis with the following criteria (objective DS03):
 - a) efficient infrastructure utility investment extending from existing infrastructure

Thus, the project is crucial in servicing new infrastructure and development in the Western Sydney Growth Area, and in particular, associated with the area surrounding the Aerotropolis. The growth of the entire area is dependent on the delivery of safe, efficient and cost-effective utilities, which EE is committed to providing in line with State Government plans, policies and targets. It is worthy of note that Western Sydney Aerotropolis Plan includes measures to be protective of Cosgrove Creek (objectives O4, O5 and O6). Cosgrove Creek will be under bored as part of this project which is a

construction measure that will be protective of the natural ecology and water quality of the waterway.

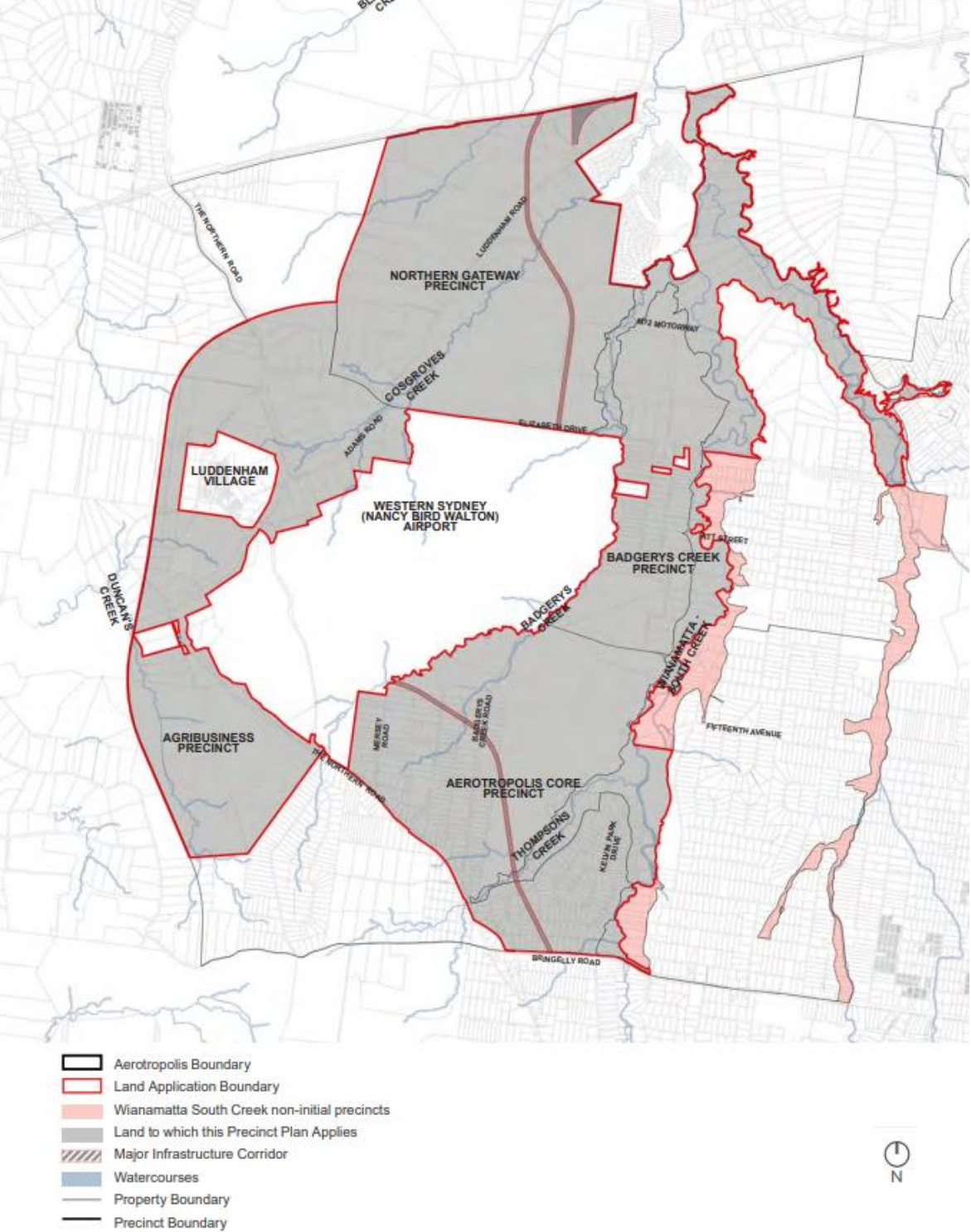


Figure 2.1 Land Application Map (Source: The Aerotropolis Plan DPE 2022a)

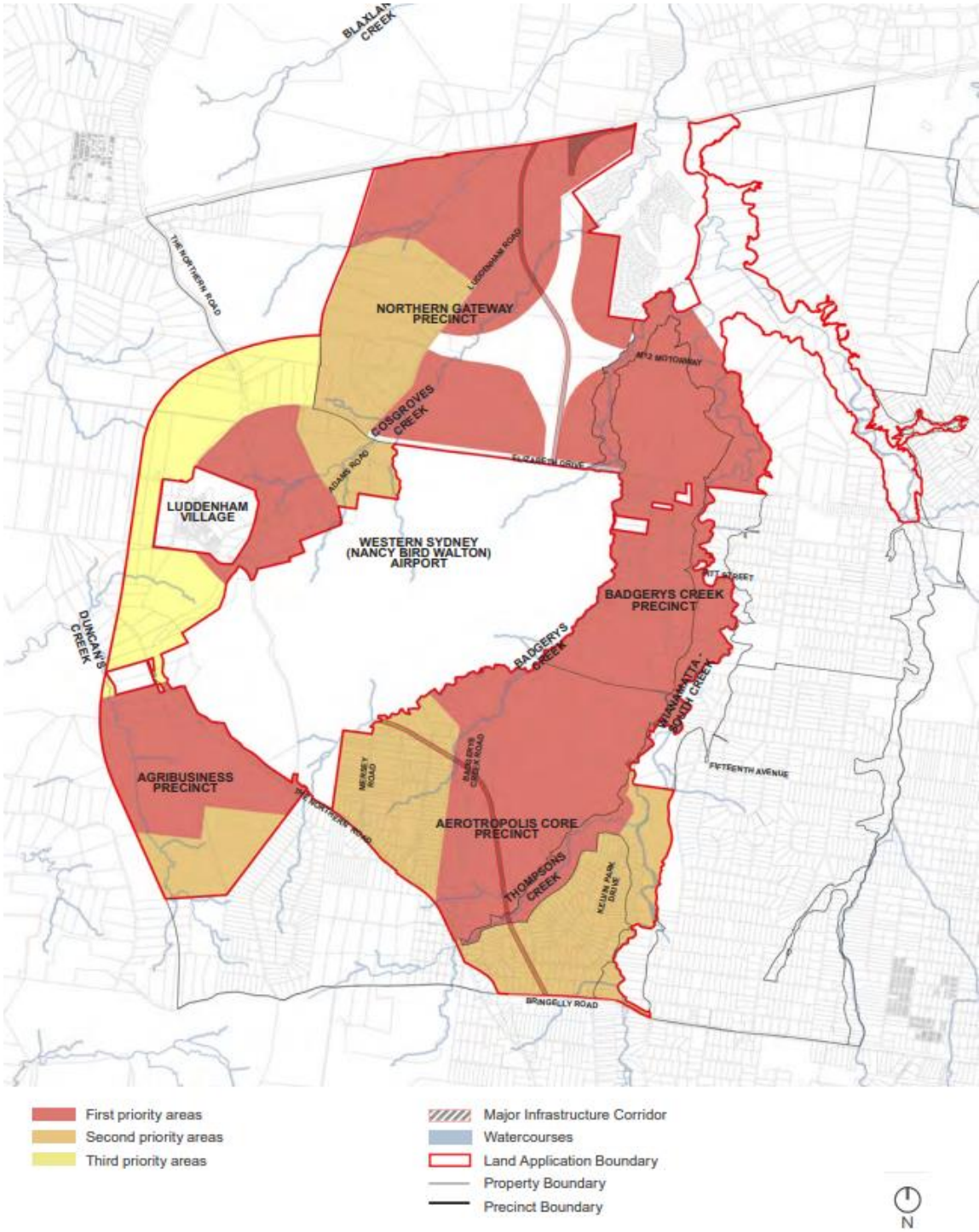


Figure 2.2 Priority areas - development sequencing (Source: The Aerotropolis Plan DPE 2022a)

2.3 Project need

The project is a part of the broader underground transmission feeder route, which traverses through the suburbs of Bringelly, Luddenham, Badgerys Creek and Orchard Hills. The overall transmission feeder is required to meet increasing electricity demand from critical infrastructure in the Western Sydney Growth Area in Sydney's south-east.

The transmission feeder will be the backbone electricity supply for the Western Sydney Growth Area, and is crucial in order to provide a stable and reliable source of electricity to new and critical infrastructure in addition to a range of different customers.

The Western Sydney Growth Area will provide greater opportunities for new homes, jobs, education, health, services, and infrastructure, including the Western Sydney Airport and Sydney Science Park within the Western Sydney Aerotropolis. The Western Sydney Growth Area is a priority growth area for the NSW Government.

The project will ensure that stable and reliable electricity continues to be supplied to households, while increasing capacity to service residential, industrial and commercial development growth within this region of Sydney.

2.4 Project objectives

The key objective of the project is to provide a reliable electricity supply and electrical network growth to the Western Sydney Growth Area, including the Western Sydney Airport and surrounding development of the Aerotropolis.

2.5 Project benefits

Residents, commercial and industrial business operators, and their customers will all benefit from safe, efficient and cost-effective and continuous electrical supply within this growth region.

The NSW Government will benefit from achieving its goals of transforming the Western Sydney Growth Area into the purposeful precincts that have been intended and planned out in the Aerotropolis Plan and the Western Parkland City SEPP.

3 Legislative framework

3.1 Overview

This chapter describes the legislative framework that applies to the project, including the approval pathway under the EP&A Act, and the land use context of the new Western Sydney Growth Area. An overview of the potential approval requirements under relevant Commonwealth and NSW legislation and environmental planning instruments (EPIs) is also provided.

3.2 Approval pathway

3.2.1 NSW *Environmental Planning and Assessment Act 1979*

The EP&A Act and the EP&A Regulation provide the framework for assessing environmental impacts and determining environmental approvals for 'development' and 'activities' in NSW. The EP&A Act also establishes state environmental planning policies (SEPPs) and local environmental plans (LEP) which may include provisions relevant to the project.

Under the EP&A Act, EE is classified as a proponent and a determining authority, in accordance with the provisions of Part 5 of the Act. A project can be assessed by a determining authority under Part 5 of the Act if it:

- may be carried out without a development consent;
- is carried out, or approved, by a determining authority;
- is not a prohibited development.

The project does not require development consent under Part 4 of the EP&A Act (refer to Section 3.2.2) and is not classified as State Significant Infrastructure (SSI) under Part 5.1 of the EP&A Act. Therefore, the project has been assessed under Part 5 of the EP&A Act.

This REF has been prepared to determine if the project is likely to have a significant impact on the environment and community. Under section 5.7 of the EP&A Act, if a determining authority decides an activity is likely to significantly affect the environment, it must prepare an environmental impact statement. This project is unlikely to have a significant impact on the environment.

Section 171 of the EP&A Regulation lists factors that must be taken into account when considering the likely impact of an activity on the environment. Table 3-2 includes a consideration of these factors for the project.

3.2.2 Transport and Infrastructure State Environmental Planning Policy 2021

The aim of the Transport and Infrastructure SEPP is to facilitate the effective delivery of transport and infrastructure across NSW.

Section 2.7 of the Transport and Infrastructure SEPP provides that the SEPP prevails over all other Environmental Planning Instruments including LEPs and SEPPs except in the case where section 2.7 (2) provides that the following SEPPs override all the requirements of the Transport and Infrastructure SEPP to the extent of any inconsistency:

- clauses 10, 11 and 19 of the State Environmental Planning Policy (Coastal Management) 2018 (Coastal Management SEPP); and
- all of the provisions of State Environmental Planning Policy (State Significant Precincts) 2005 (State Significant Precincts SEPP).

It should be noted that the Coastal Management SEPP does not apply to the project. The State Significant Precincts SEPP sets out the process for the rezoning of State Significant Precincts, which is no longer relevant given that the area of the project has already been rezoned under the WSA SEPP (and the more recent Western Parkland City SEPP) (refer Section 3.4). Furthermore, the State Significant Precincts SEPP has been consolidated into the State Environmental Planning Policy (Precincts- Regional) 2021 (Regional SEPP) (DPE 2022b).

By virtue of an ANO's status under the Transport and Infrastructure SEPP, certain activities will be subject to Division 5, Subdivision 1 'Electricity Transmission or Distribution Networks' for the purposes of development connected with electricity transmission or distribution. Under section 2.44 development permitted without consent:

- 1) Development for the purpose of an electricity transmission or distribution network may be carried out by or on behalf of an electricity supply authority or public authority without consent on any land..." excluding land reserved under the National Parks and Wildlife Act.

The Transport and Infrastructure SEPP's definition of an "electricity transmission or distribution network", as per section 2.34 of the SEPP, includes the following components:

- a) above or below ground electricity transmission or distribution lines (and related bridges, cables, conductors, conduits, poles, towers, trenches, tunnels, access structures, access tracks and ventilation structures) and telecommunication facilities that are related to the functioning of the network,
- b) above or below ground electricity kiosks or electricity substations, feeder pillars or transformer housing, substation yards or substation buildings,
- c) systems for electricity storage associated with component specified in paragraphs (a) and (b).

Given that the project can be classified as an 'activity' under Part 5 of the EP&A Act, EE therefore will not be required to submit a development application to the NSW Department of Planning and Environment (DPE) or Penrith City Council (PCC). However, PCC will be notified of the intention to carry out the proposed works and EE will consider any response received from the Council.

3.2.3 NSW Code of Practice for Authorised Network Operators

3.2.3.1 Determining authority

The Code is the approved Code under section 201 of the EP&A Regulation. The NSW Government has leased part of NSW's transmission and distribution network to privately managed network businesses, which are referred to as ANOs by the *Electricity Network Assets (Authorised Transactions) Act 2015* (Authorised Transactions Act). ANOs include TransGrid, Ausgrid and EE.

The NSW Government has prescribed the ANOs as prescribed determining authorities for the purposes of section 5.6 of the EP&A Act and the definition of 'public authority' under section 1.4 of the EP&A Act. This allows an ANO to be a Part 5 determining authority for development for the purposes of an electricity transmission or distribution network.

Therefore, as an ANO, EE can assess and self-determine activities that are not likely to significantly affect the environment and are conducted by or on behalf of EE for the purpose of electricity transmission or distribution.

The Code is deemed to be in force until it is revoked or varied in accordance with the EP&A Regulations.

3.2.3.2 Assessment class

The Code requires an ANO to classify its proposal into one of six possible assessment classes. The Code applies to Class 3, 4, 5 and 6 proposals only.

- **Class 3:** requires the preparation of a Summary Environmental Report (SER), which refers to projects which are expected on a reasonable basis to be minor and neither extensive nor complex.
- **Class 4:** requires the preparation of an REF and refers to projects which are expected on a reasonable basis to have impacts which go beyond minor, can be extensive and/or complex and at the discretion of the ANO be a project for which it is deemed appropriate to prepare, such as a project which may generate considerable public interest.
- **Class 5:** refers to projects as defined in Class 4, but also require the preparation of a Species Impact Statement (SIS).
- **Class 6:** refers to projects which are “likely to significantly affect the environment” and therefore an EIS is required.

The construction impacts of the project will be confined to the feeder route shown in Appendix A which will be within the road reserve where possible. Some impacts in areas of archaeological and biodiversity interest are not considered to be of such duration and severity that they would be considered significant (as discussed below). As such works are considered minor in nature.

Once construction is complete, work areas will be restored. The proposed work is not likely to significantly affect the environment, including critical habitat, threatened species populations or ecological communities or their habitats, therefore an EIS is not required.

In view of the above, the project is being assessed as a Class 4 proposal under the Code.

3.2.3.3 Assessment requirements

Section 2.4.3 of the Code specifies the requirements that must be included and addressed in an REF for a Class 4 proposal. The table below specifies the outlined assessment requirements and where they have been addressed in this REF.

Table 3-1 REF requirements specified in the NSW Code for Authorised Network Operators

Requirement	Summarised description	Addressed
The proposed activity	• Clear description of the activity that is proposed, including the nature, the purpose and the sites where it will take place.	Chapter 7 Proposed works
	• Sufficient detail about the proposed activity to demonstrate potential impact on the environment.	Chapter 7 Proposed works Chapter 9 Environmental assessment and mitigation

Requirement	Summarised description	Addressed
	<ul style="list-style-type: none"> Discuss viable alternatives and any mitigation measures to be implemented. 	Chapter 5 Consideration of alternatives
Certification	<ul style="list-style-type: none"> Statement signed and dated by the person with principal responsibility for preparing the REF (being an employee or agent of the ANO), as per the requirement specified on page 22 of the Code. 	Page 11
The proponent, determining authorities and any required approvals	<ul style="list-style-type: none"> Identify the proponent and all determining authorities and required approvals for the activity. 	Section 1.3 Section 3.2.33.2.3.1 NSW Code of Practice for Authorised Network Operators, Determining authority
The environment of the activity	<ul style="list-style-type: none"> A description of the environment of the site and the surrounding area, with a focus on the aspects of the environment that are of particularly high value, sensitive to impacts of the type the activity will have, or of importance to the community. 	Section 3.3 Commonwealth Environment Protection and Biodiversity Conservation Act 1999 Chapter 6 Existing environment Section 9.4 Biodiversity
	<ul style="list-style-type: none"> The REF must identify and describe Threatened Species Populations and Ecological Communities that are likely to occur in the area affected by the activity. 	Section 9.4 Biodiversity
The impacts of the activity	<ul style="list-style-type: none"> The likely environmental impacts for all phases of the activity and describe their extent, size, scope, intensity and duration. 	Chapter 9 Environmental assessment and mitigation
	<ul style="list-style-type: none"> As a minimum, the REF should document consideration of each of the factors listed in clause 228(2) of the EP&A Regulation and the document consideration of each of the factors listed in section 5A of the EP&A Act in relation to Threatened Species, Populations and Ecological Communities (including fish and marine vegetation), and their Habitats. 	3.5 NSW Environmental Planning and Assessment Regulation 2021
	<ul style="list-style-type: none"> List the sources and data the ANO relied on when preparing the REF. 	References (see end of RFI)

Requirement	Summarised description	Addressed
Mitigating measures that will apply to the activity	<ul style="list-style-type: none"> An ANO may conclude that the activity should be modified or adapted so that certain measures designed to mitigate the environmental impacts of the activity are observed. These mitigating measures should be documented. 	<p>Chapter 8 Environmental Management</p> <p>Chapter 9 Impact assessment and mitigation</p>
Summary of impacts	<ul style="list-style-type: none"> Include a section that summarises the individual impacts of the activity and provides an overarching view of the impacts of the activity on the environment. 	Chapter 10 Conclusion and recommendations
Consultation	<ul style="list-style-type: none"> Record the consultation undertaken for the purposes of preparing the REF in accordance with Section 2.3.7 of the Code. 	Chapter 4 consultation
Conclusions regarding an EIS and/or a SIS	<ul style="list-style-type: none"> The REF should describe: <ol style="list-style-type: none"> Whether the activity is likely to significantly affect the environment, in which case an EIS is required; and Whether the activity is likely to significantly affect Threatened Species, Populations, Ecological Communities, or their Habitats, in which case a SIS is required. Describe the reasons for these conclusions, referencing the more detailed assessments in the body of the REF for support. 	<p>Section 3.2.2 Transport and Infrastructure State Environmental Planning Policy 2021</p> <p>Section 9.4 Biodiversity</p> <p>Chapter 10 Conclusion and recommendations</p>
	<ul style="list-style-type: none"> In instances where the REF has been prepared by a third party it is important to note that irrespective of the conclusion of the REF, an ANO is ultimately responsible for deciding whether a proposed activity is likely to significantly affect the environment. 	Chapter 10 Conclusion and recommendations

3.3 Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

3.3.1 EPBC Act requirements

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) outlines the Commonwealth Government's role in regards to environmental assessment, biodiversity conservation, the management of protected species, populations and communities and heritage items.

The EPBC Act lists nine matters of national environmental significance (MNES) which must be considered when assessing the impacts of a proposal, including:

- world heritage properties;
- national heritage places;
- Ramsar wetlands of international importance;
- nationally threatened species and ecological communities;
- migratory species;
- Commonwealth marine areas;
- the Great Barrier Reef Marine Park;
- nuclear actions (including uranium mining); and
- a water resource, in relation to coal seam gas development and large coal mining development.

If an action will or is likely to have a significant impact on any of the matters of MNES, it is deemed to be a controlled action and requires approval from the Minister for the Environment and Energy or the Minister's delegate.

3.3.2 Assessment against the EPBC Act

An assessment of the project in consideration of flora and fauna protected under the EPBC Act was completed as part of the Draft Ecology Assessment (DAE) completed by Gingra Ecological Surveys (GES) (2022). This includes results of the Protected Matters Search Tool (PMST) as summarised in section 9.4 below.

3.4 Land use and permissibility

Section 1.9 of the Penrith Local Environmental Plan 2010 (Penrith LEP) stipulates:

- (1) This Plan is subject to the provisions of any State environmental planning policy that prevails over this Plan as provided by section 3.28 of the Act.

Given that the NSW Government issued the Western Parkland City SEPP in 2020, Part 2 of which outlines the permissibility in relation to land use zones in and surrounding the Aerotropolis, the Penrith LEP no longer take precedence in terms of land use planning along the project route.

The Aerotropolis plan includes a land use plan that shows the land use zoning to which the Western Parkland City SEPP applies (Figure 3.2) including the area of the project route. It is important to note that this zoning map has more detail than the land use zoning map provided in the NSW Government's Planning Portal and Spatial Viewer (the Planning Portal), however it is helpful in showing precinct, road, and local creek labels.

The Aerotropolis plan includes a land use plan that shows the land use zoning to which the WSA SEPP applies. With reference to Figure 3-1, the alignment is located within the Northern Gateway Precinct and approximately located within the land uses of enterprise and light industry (purple), outer Sydney orbital (dark grey), M12 Motorway (light grey), open space/stormwater land (light green), environment and recreation (dark green) and sub-arterial (orange).

The Planning Portal land use zoning map (refer Figure 3-2) shows that the alignment is partly located within the land use zoning under Aerotropolis plan, being EN2 Environment and Recreation (in the process of being changed to C2 Conservation). The remainder of the alignment is predominately zoned IN1 General Industrial under the Penrith Local Environmental Plan 2010 (Penrith LEP). Small areas of the alignment are zoned RE1 Public Recreation along South Creek and SP2 Infrastructure along Mamre Road also under the Penrith LEP.

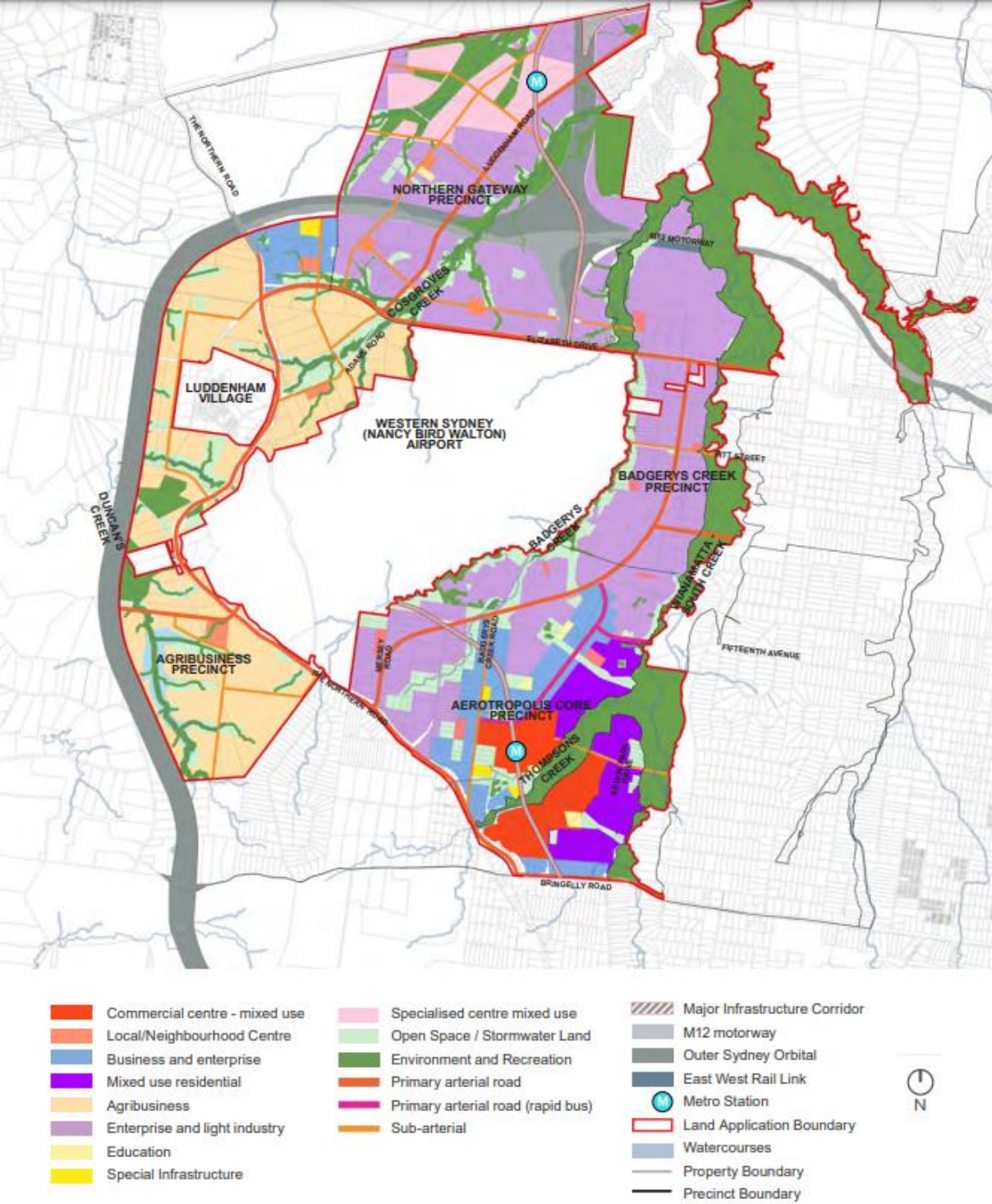
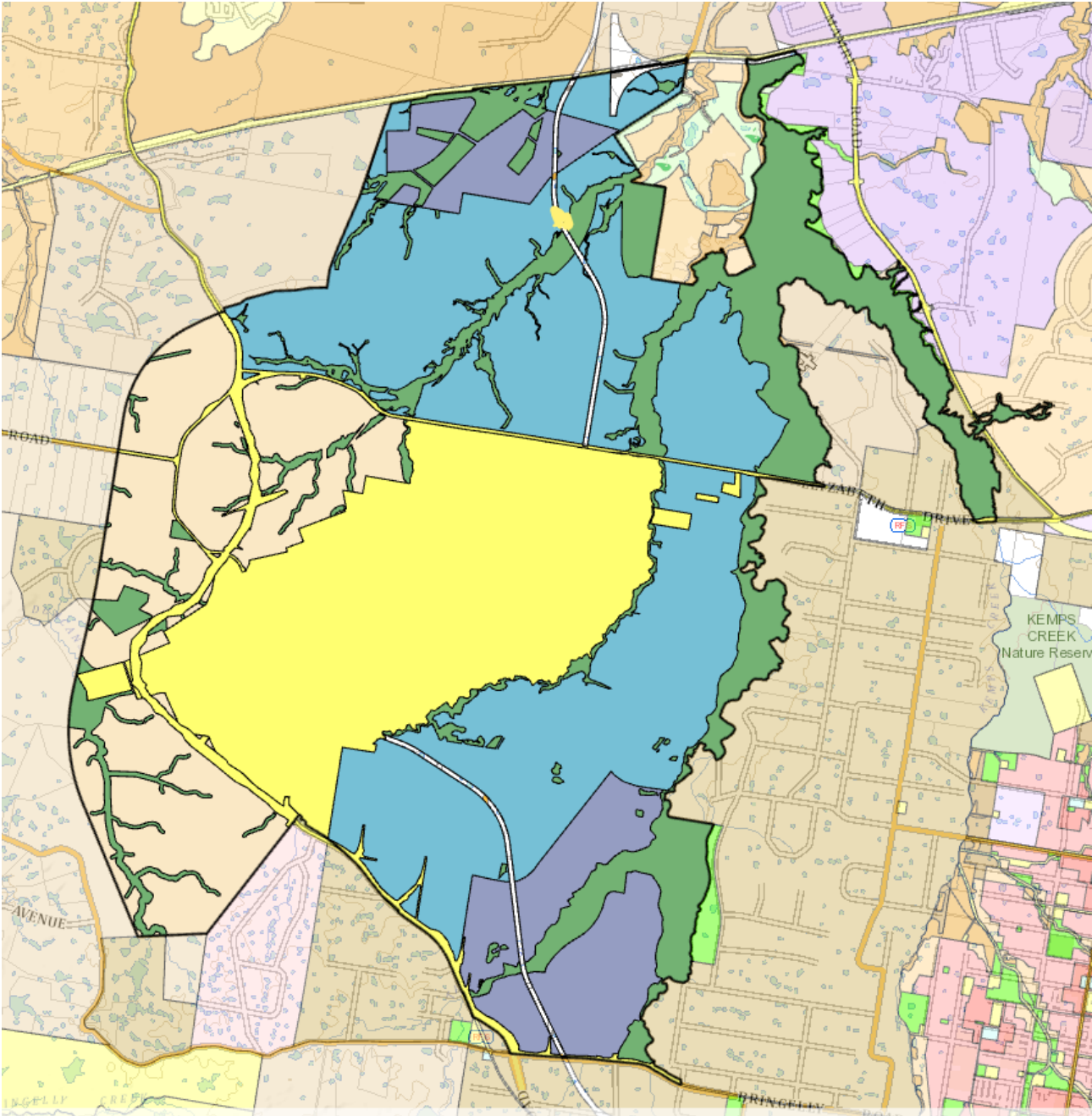


Figure 3.1 Land use and structure plan (Source: The Aerotropolis Plan DPE 2022a)



Note: zoning colours - SP2- yellow, AGB- light orange/apricot colour, ENT- blue, EN2/C2 – green, MU- purple.

Figure 3.2 Land zoning map for the Western Sydney Aerotropolis (Source: Planning Portal, DPE 2022)

3.5 NSW Environment and Planning Assessment Regulation 2021

Table 3-2 Section 171(2) Review of environmental factors – the Act, s 5.10(a)

Clause	Response
(a) the environmental impact on the community	<p>The construction of the project will have temporary impacts on road usage of Bakers Lane and Luddenham Road and surrounding residents and education and aged care facilities along the alignment. For example, parts of roads may be obstructed temporarily, or residents may experience elevated noise and visual impacts.</p> <p>It is important to note that any impacts will be short-lived.</p> <p>Should there be any planned electricity outages, relevant residents, educational, commercial and industrial premises will be notified.</p> <p>Furthermore, notification will be provided to affected residents prior to any planned construction works. Construction will be managed in accordance with the recommendations contained in this REF to minimise impacts on affected residents as much as possible.</p>
(b) the transformation of the locality	<p>Once the construction works have been completed, all areas under construction will be rehabilitated and thus the visual amenity of the area will remain unchanged. However, the entire Aerotropolis and surrounding area (precincts) are currently undergoing a transformation. Thus, even though the project may not directly contribute to the transformation, the locality will be transformed by other developments in the area.</p>
(c) the environmental impact on the ecosystems of the locality,	<p>The local ecosystems are not expected to experience any significant impacts.</p>
(d) reduction of the aesthetic, recreational, scientific or other environmental quality or value of the locality,	<p>The project will be constructed in such a way that it will not reduce the future environmental quality or value for the area. Moreover, it will provide a reliable electricity supply and meet the future electricity requirements of the Aerotropolis and the surrounding area.</p>

Table 3-2 Section 171(2) Review of environmental factors – the Act, s 5.10(a)

Clause	Response
<p>(e) the effects on any locality, place or building that has—</p> <p>(i) aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance, or</p> <p>(ii) other special value for present or future generations,</p>	<p>Potential impacts to Aboriginal and historic heritage are addressed in Sections 9.2 and 9.3 respectively.</p>
<p>(f) the impact on the habitat of protected animals, within the meaning of the Biodiversity Conservation Act 2016,</p>	<p>Potential impacts to biodiversity are addressed in Section 9.4 Biodiversity.</p>
<p>(g) the endangering of a species of animal, plant or other form of life, whether living on land, in water or in the air,</p>	<p>Refer to (f).</p>
<p>(h) long-term effects on the environment,</p>	<p>No long-term negative effects on the environment are expected as a result of project construction. The project is necessary to service the Aerotropolis and other new infrastructure and development in the Western Sydney Growth Area.</p>
<p>(i) degradation of the quality of the environment,</p>	<p>Refer to (h).</p>
<p>(j) risk to the safety of the environment,</p>	<p>Project components will be designed and constructed such that it will comply with all relevant Australian and EE Standards and in accordance with legislative and regulatory requirements.</p> <p>Any potential risks to the environment from construction of the project will be managed and mitigated in accordance with the mitigation measures outlined in this REF, as well as any approval(s) issued for the project.</p>
<p>(k) reduction in the range of beneficial uses of the environment,</p>	<p>The project will not have any long-term impacts that will reduce the beneficial uses of the surrounding environment.</p>

Table 3-2 Section 171(2) Review of environmental factors – the Act, s 5.10(a)

Clause	Response
(l) pollution of the environment,	Appropriate pollution controls including erosion and sediment pollution control measures will be in place to prevent pollution occurring during the construction of the project. Any potential risks of pollution from construction works or operation of the project will be mitigated by the works being implemented in accordance with the various requirements of this REF and EE Environmental Management standards.
(m) environmental problems associated with the disposal of waste,	All wastes associated with the project construction and operation will be disposed of at an approved facility and in accordance with EE Environmental Management Standard EMS 0007 Waste Management.
(n) increased demands on natural or other resources that are, or are likely to become, in short supply,	There will be no demand on resources that are in short supply. All of the materials required for construction of the project are readily commercially available and considered to be generally in supply.
(o) the cumulative environmental effect with other existing or likely future activities,	As noted in Section 9.15, the entire precinct surrounding the project is currently in the process of being transformed, and thus there are roadworks and other developments in the process of being undertaken. These may at some stage contribute to cumulative impacts, in terms of traffic volumes or noise, however the works are largely staged based on priority.
(p) the impact on coastal processes and coastal hazards, including those under projected climate change conditions,	The project is not located in a coastal environment.
(q) applicable local strategic planning statements, regional strategic plans or district strategic plans made under the Act, Division 3.1,	Refer to Chapter 2 Strategic context and Chapter 3 Legislative framework.
(r) other relevant environmental factors.	Refer to Chapter 9 Environmental assessment and mitigation.

3.6 Other legislative requirements

3.6.1 NSW *Electricity Supply Act 1995*

The NSW *Electricity Supply Act 1995* (ES Act) defines EE's licencing requirements and provides a framework for the development and maintenance of electrical infrastructure. In summary, it allows EE to trim and remove trees, carry out works on public roads and acquire land. The ES Act also requires

that works (other than routine repairs or maintenance works) must not be undertaken unless a minimum of 40 days' notice is supplied to the relevant local council. Any submission received must be considered by EE.

3.6.2 NSW Protection of the Environment Operations Act 1997

The NSW *Protection of the Environment Operations Act 1997* (POEO Act) provides a framework for the licensing of certain activities and is administered by the DPE (formerly Office of the Environment and Heritage (OEH)). Under the POEO Act, the construction and operation of the project must be conducted in such a manner so as:

- not to pollute the environment;
- any waste generated must be classified, handled, transported, and disposed appropriately; and
- environmental incidents involving actual or potential harm to human health or the environment must be reported to OEH.

3.6.3 NSW Biodiversity Conservation Act 2016

In accordance with the NSW *Biodiversity Conservation Act 2016* (BC Act), a number of factors need to be taken into account when making a determination as to whether an action, development or activity is likely to significantly affect threatened species, populations or ecological communities or their habitats. These factors are assessed in the ecological assessment prepared for the project (GES 2022).

3.6.4 Summary of legislative requirements

Table 3-3 Other legislative requirements

Legislation	Authority	Responsibility	Requirement	Comment
NSW <i>Contaminated Land Management Act 1997</i> (CLM Act)	DPE	Project manager/ Project supervisor	Notification – under s60 by a person whose activities have contaminated land or a landowner whose land has been contaminated is required to notify DPE when they become aware of the contamination.	If contamination is discovered the duty to report would be determined.
NSW <i>Electricity Supply Act 1995</i> (ES Act)	Local Council	EE	Notification – under s45, a 40 days' notice is required for proposed electricity works.	Councils will be notified as part of REF notification process.

Table 3-3 Other legislative requirements

Legislation	Authority	Responsibility	Requirement	Comment
NSW <i>Heritage Act 1977</i> (Heritage Act)	DPE / Heritage Council	EE/ Project manager	Consideration – under s139 as to whether a permit to excavate or disturb land is required.	The Aboriginal heritage assessments found that the site of the Project is highly disturbed due to construction associated with previous roadwork, historical infrastructure development and current construction work. The site has low archaeological sensitivity, apart from land associated with AHIMS site 45-5-5619 which holds moderate significance.
Transport and Infrastructure SEPP	Local Council	EE	Notification – under s13 – 15, 21 days' notice of substantial impact on Council related infrastructure and local heritage works in flood liable land that will change flood patterns other than to a minor extent.	Notified as part of REF notification process.
Transport and Infrastructure SEPP	Local Council	EE	Notification – under s42 of 21 days' notice for works involving new or existing feeders.	Notified as part of REF notification process.

Table 3-3 Other legislative requirements

Legislation	Authority	Responsibility	Requirement	Comment
<i>National Greenhouse and Energy Reporting Act 2007</i>	Clean Energy Regulator	EE	Reporting – under s19, a registered corporation is required to report information on energy production, energy consumption, and the amount of greenhouse gas emissions for the facilities under their operational control on an annual basis by 31 October following the financial year for which they are reporting.	Reporting will be undertaken each year by 31 October.

Table 3-3 Other legislative requirements

Legislation	Authority	Responsibility	Requirement	Comment
NSW <i>National Parks and Wildlife Act 1979</i> (NPW Act)	DPE	Project manager/ Project supervisor	Consideration/ Approval – under s90 to harm or desecrate Aboriginal objects or places. Determining authority for works on NPWS land.	Aboriginal artefacts have been identified at several locations associated with AHIMS site 45-5-5619, AHIMS site 45-5-5274 near the Stage 2B alignment and AHIMS site 45-5-5406 near the Stage 3B alignment (refer Section 9.2). An Aboriginal Heritage Impact Permit (AHIP) would be required if disturbance to these sites were to occur. An Aboriginal Cultural Heritage Assessment is being undertaken for the broader Stages 4 to 7 of the transmission feeder route, which is the subject of separate approvals. Stage 3B of the alignment connects to the Stage 4 to 7 portion of the alignment on Luddenham Road. An Aboriginal Heritage Impact Permit (AHIP) under the NPW Act would be required if disturbance to these sites is proposed.
NSW <i>Protection of the Environment Operations Act 1997</i> (POEO Act)	DPE	Project manager/ Project supervisor	General – under s120 no “dirty water” discharge into stormwater drains.	Refer section 9.5

Table 3-3 Other legislative requirements

Legislation	Authority	Responsibility	Requirement	Comment
POEO Waste Regulation	DPE	Project manager/ Project supervisor	General – under section 24 transportation of certain waste must be tracked.	Refer section 9.14
NSW <i>Roads Act 1993</i>	RMS	Project manager / Project supervisor	Approval – under s138 for work on a classified road.	Approval for works on Luddenham Road and Bakers Lane will be obtained by the project manager/ project supervisor before commencing any road works.
NSW <i>Rural Fires Act 1997</i>	NSW Rural Fire Service	Project manager/ Project supervisor	Consideration – under s63 public authorities must take all reasonable steps to prevent the occurrence and minimise the spread of bushfires on or from lands vested in or under its control/management.	Refer 9.13
NSW <i>Biodiversity Conservation Act 2016</i> (BC Act)	DPE	EE	Consideration – carry out a test of significance to determine whether the proposal is likely to have a significant impact or not, which requires a species impact statement.	Refer section 9.4
NSW <i>Water Act 1912</i>	Water NSW	Project manager/ Project supervisor	Consideration/ permit – under s113 to extract groundwater via any type of bore, well or excavation	It is not expected that a permit would be required for these works. The extraction of ground water is not part of this project.

4 Consultation

4.1 Overview

Endeavour Energy have a Stakeholder Engagement Framework that is based on the spectrum of participation developed by IAP2 (the International Association of Public Participation). The principles on which Endeavour Energy's framework is built are, that consultation must be:

- Purposeful
- Timely
- Transparent
- Inclusive
- Responsive
- Best practice
- Collaborative
- Measurable

This is combined into Endeavour Energy's overall framework which is summarised in the figure below.

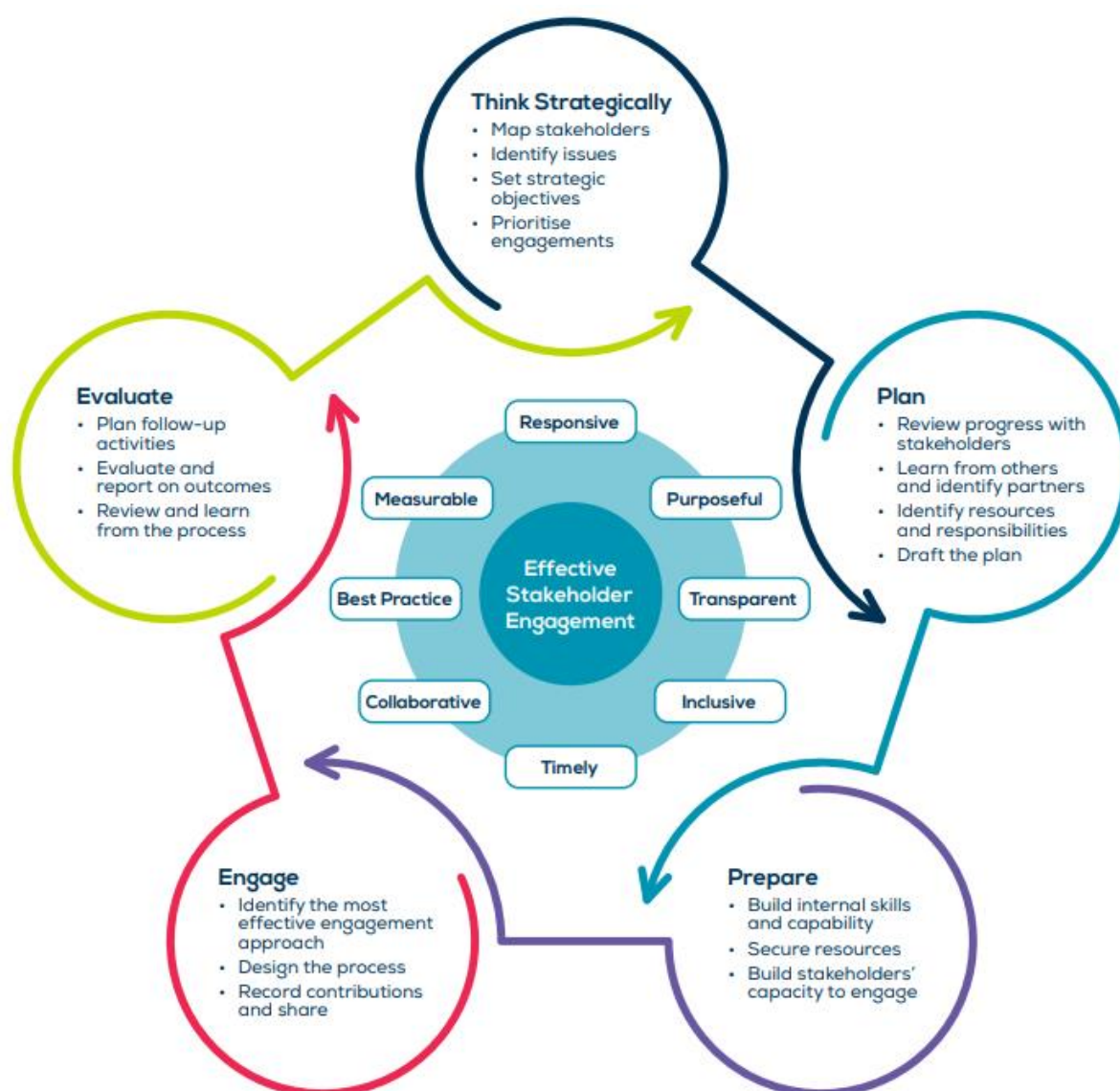


Figure 4.1 Endeavour Energy Stakeholder Engagement Framework

4.2 Project specific consultation

In accordance with the NSW *Electricity Supply Act 1995*, Endeavor Energy is required to consult with the relevant council and landowners that are directly impacted or nearby to the proposal, Letters providing notification of the proposal have been sent Penrith Council in addition to adjacent landowners on Bakers Lane and Aldington Road 19 August 2022.

With regards to landowners, the majority of the alignment is in the road reserve. Adjacent and directly impacted landowners have both been notified via letter. Should construction planning and detailed under bore design result in direct impacts to a landowner's property, Endeavour Energy will also immediately and directly engage with them.

The Construction Environmental Management Plan (CEMP) for the project will include consultation measures. This will include engagement prior to and during construction. It will also include:

- The type of consultation to be undertaken and by what medium
- The frequency of consultation
- The information to be provided
- The mechanisms by which affected stakeholders can communicate with EE
- A complaints and grievance handling process.

Under section 171(4) of the EP&A Regulations 2021 require that all REFs be published on the determining authority's website if above a particular monetary threshold. This project's capital investment value is above that threshold and so, in accordance with the Regulations, has been displayed at <https://www.endeavourenergy.com.au/in-the-community/works-in-your-area/proposed-orchard-hills-to-bringelly-transmission-line>.

In addition, EE has placed a notification in the Western Weekender published on 26 August. This is to further ensure people know about the project and have an opportunity to access the REF and provide comments.

As listed above and in accordance with section 45(4) of the Electricity Supply Act 1995, EE notified Penrith Council on 18 August 2022. Notification of the Penrith Council is required no less than 40 days prior to the commencement of construction. This allows Penrith Council to provide comment to, or ask questions of, EE on the project and the environmental assessment.

EE will also notify the relevant members of the NSW State Parliament and other utilities and organisations, including:

- the NSW State Parliament Member for Mulgoa;
- the NSW State Parliament Member for Camden;
- Sydney Water;
- Transport for NSW;
- Telstra; and
- WaterNSW.

4.3 Aboriginal engagement

An Aboriginal Cultural Heritage Assessment Report (ACHAR) is being undertaken for Stages 4 to 7 of the adjoining alignment with reference to areas where construction works may not be able to avoid areas of identified archaeological potential. An ACHAR process includes consultation with Registered Aboriginal Parties (RAPs) in accordance with Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW 2010a).

5 Consideration of alternatives

A number of alternatives were considered to address the primary objectives of the project. EE's Asset Planning and Performance (APP) division identified the need for network expansion and augmentation to cater for the required demand forecasts of the Western Sydney Aerotropolis Growth Area (WSAGA).

A 132kV transmission electricity supply strategy was proposed by Endeavor Energy, that would interconnect the recently built South Erskine Park zone substation (ZS) in Oakdale West and Bringelly ZS in Bringelly. Two route options were taken forward as outlined below.

Route 1 (shown on Figure 5-1 below as pale blue and magenta) was proposed to commence at the new South Erskine Park ZS in Kemps Creek, then heading south via the new Oakdale West subdivision on to Bakers Lane. From there, the route traversed west via Bakers Lane, crossing Mamre Road and then on to Luddenham Road at Luddenham. From there, the route extended south via Luddenham Road, on to Adams Road and then join the new Northern Road (TNR). The proposal would then traverse south via TNR and connect to Bringelly ZS.

Route 2 (shown on Figure 5-1 below as red and magenta) was proposed to commence at TransGrid's Sydney West Bulk Supply Point (BSP) at Eastern Creek, following the existing 330kV overhead feeder '39' easement to the west, then south through multiple land parcels on to Elizabeth Drive at Luddenham. The route would then traverse east on Elizabeth Drive, then south on to Adams Road and then join the new TNR. Like Route 1, the feeder then traverses south via TNR and connects to Bringelly ZS.

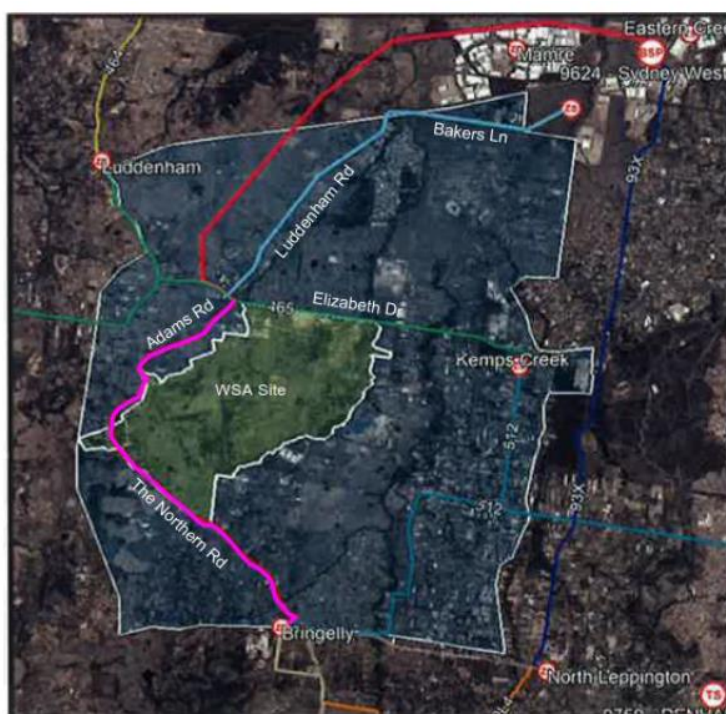


Figure 5.1 Proposed route options

Route 1 was determined as the preferred route. The preferred route was determined by Endeavour Energy following the feeder route options study, and it is in keeping with the essential infrastructure corridors agreed to by the Western Sydney Utilities Collaboration (which includes MOU partners, TransGrid, Transport for NSW and the Department of Planning, Industry & Environment).

The proposed route was short-listed for its existing powerline footprint / corridor, route-length and the presence of an existing public road reserve network.

6 Existing environment

6.1 General context

The proposed alignment is within the Penrith LGA and the Greater Western Sydney region of NSW. The eastern most end of the alignment (the South Erskine Park Zone Substation) is located approximately 18 km west of Parramatta and 37 km west of the Sydney Central Business District.

The surrounding land consists of mostly cleared farmland which is gently undulating and largely sloping towards the west.

The alignment of Stage 2B is located mostly within the road verge of Bakers Lane (refer Figure 6.1 and Figure 6.2). Bakers Lane is a single two-way divided road which connects to Aldington Road in the east and Mamre Road in the west. The intersection of Mamre Road and Bakers Lane is signalised. Bakers Lane continues west past the intersection with Mamre Road, however it turns into a paved road which leads into private residential driveway. Exiting development which fronts Bakers Lane includes two educational facilities on the northern side of the road near Aldington Street. The alignment of Stage 3B mostly traverses between Bakers Lane and Luddenham Road across cleared agricultural land, including both South Creek and Cosgroves Creek (refer Figure 6.2 and Figure 6.3).



Figure 6.1 Eastern end of the Stage 2B alignment terminating at the South Erskine Park Zone Substation

The Fraser Altis site sits between Stages 2B and 3B as shown in Figure 6.2 below. Figure 6.3 then shows where Stage 2B and the Fraser Altis sites transition into Stage 3B.

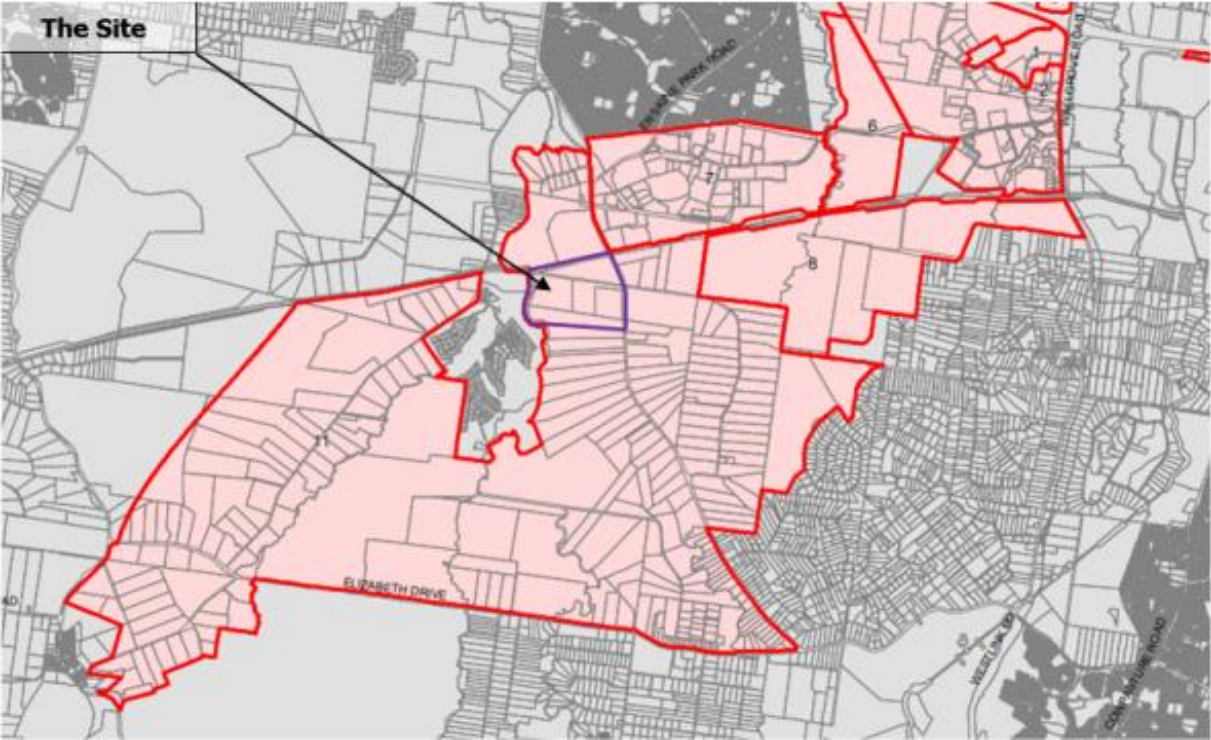


Figure 6.2 Location of the Fraser Altis site (referred to as 'the site' in the figure)¹



Figure 6.3 Stage 2B and Stage 3B alignment traversing along Bakers Lane and South Creek

¹ https://shared-drupal-s3fs.s3-ap-southeast-2.amazonaws.com/master-test/fapub_pdf/AA%20Mamre%20Road/24+-+Fraser+Property+Industrial+and+Altis+Property+Partners.PDF



Figure 6.4 Western end of the Stage 3B alignment connecting to the Stage 4 alignment at Luddenham Road

Major construction work has commenced on the eastern side of the Mamre Road/Bakers Lane intersection as part of 'The Yards', which includes industrial, retail and residential land uses developed by Fraser & Altis. The site of 'The Yards' is the junction of the Stage 2B and 3B alignment via an electrical conduit. Major construction associated with the Oakdale West Industrial Estate is also occurring surrounding the eastern end of the Stage 2B alignment and where it connects to the South Erskine Park Zone Substation (refer Figure 6.1).

Of note, the entire local and regional area is transforming. This includes construction of The Yards and Oakdale West Industrial Estate, both directly adjacent to the proposed alignment. This major construction work will continue to change the overall land use of the local area. Land use changes associated with the broader area are associated with the Western Sydney Airport and the Aerotropolis, which is currently underway with bulk earthworks and road infrastructure upgrades. The Western Sydney Airport is quickly becoming a dominant land use in the area. Other surrounding land uses in the local and regional area include a mixture of agricultural, rural industrial, rural commercial and rural residential development.

6.2 Physical context

The project is located within the Sydney Basin, specifically the Wianamatta Group geological formation. The Wianamatta Group geological formation is characterised by gently undulating rises with local relief of 10-30 metres (Artefact 2022b). Slopes are generally >5% with broad crests and ridges (200-600 metres). The study area is predominantly situated across a moderate to gradual mid-slope that trends upwards to the south (Artefact 2022b).

The vegetation surrounding the alignment would have once included open Cumberland Plain Woodland, which is typical of the Wianamatta Group shale geology, but native vegetation has been subject to extensive vegetation clearance (Artefact 2022b).

Native trees remaining in the area are characteristic of the open forest and woodland that once used to dominate the area, and include species such as spotted gum, broad-leaved ironbark, woollybutt, forest red gum, narrow-leaved ironbark, grey box and spotted gym. Grasses found in the area include speargrass, bordered panic, kangaroo grass and paddock lovegrass. Now vegetation near the alignment includes scattered trees and shrubs.

The alignment of Stage 2B is predominately located within the road verge of Bakers Lane, with the alignment of Stage 3B traversing cleared agricultural land and South Creek and Cosgroves Creek. There is a relatively wide strip of riparian vegetation along Cosgroves Creek and a narrower and more disjointed strip along South Creek, the main drainage lines within the area (GES 2022).

6.3 Cultural setting

The area surrounding the project has been subject to agricultural land use for about 200 years, until more recent times when subdivisions have changed the dominant land use in the area (GES 2022).

As previously noted, the area surrounding the project is sparsely populated. The closest densely populated areas are the suburbs of Luddenham and Orchard Hills, which belong to the 'Mulgoa – Luddenham – Orchard Hills region' as categorised by the Australian Bureau of Statistics (ABS 2020). The total estimated resident population of this region is 11 934 persons, spaced over an area of 15,868 hectares (ha). Approximately 1.7 ha of the entire region includes protected land area.

At present, the area has about 1,308 businesses, with 65.7% of the population classified as working age population (aged 15-64 years).

The area has a rich Aboriginal and European history, which is further discussed in Section 9.2 and Section 9.3 respectively.

7 Proposed works

7.1 Overview

EE is proposing to construct a new approximately 4 km long 132 kV underground transmission feeder route as Stage 2B and Stage 3B of a broader transmission feeder route to meet increasing electricity demand from critical infrastructure at the Western Sydney Growth Area including the future Nancy-Bird Walton Airport (Western Sydney Airport) and surrounding supporting development. The broader transmission feeder route includes stages 1, 2A, 3A and 4-7, which are the subject of separate REFs.

The Stage 2B alignment is approximately 2.6 km. It commences at the South Erskine Park Zone Substation in the suburb of Kemps Creek and travels south-west towards Bakers Lane. It then traverses Bakers Lane eastwards towards the Fraser & Altis site. The Stage 3B alignment is approximately 1.5 km and travels westerly from Fraser & Altis site South Creek. It traverses across South Creek and connects to the Stage 4 alignment of the transmission feeder route at Luddenham Road in the suburb of Luddenham.

An electricity conduit will be constructed at 'The Yard', which is currently being developed by Fraser & Altis. The Stage 2B alignment will extend easterly from this electric conduit to the South Erskine Park Zone Substation, and the Stage 3B alignment will extend westerly from the electrical conduit towards Luddenham Road. The electrical conduit is the subject of a separate SER.

7.2 Description of work

The entity of the Stage 2B and Stage 3B transmission feeder alignment will be underground and constructed through a combination of trenching and underboring techniques.

Most of the transmission feeder alignment will be installed via trenching. This will require excavation to an approximate width of 0.8 m and maximum depth of 2 m.

However, underboring will be used at the following locations:

- from a launch pit near Luddenham Road to an exit pit in the Twin Creeks area (approx. 150 m);
- from Twin Creeks, an under bore to the eastern side of Cosgroves Creek (approx. 200 m and a maximum of 300 m); and
- under bore under South Creek to near Joint Bay 35 (approx. 200 m and a maximum of 300 m).

The lengths noted above are approximate and the detailed under bore design will be dependant on geotechnical and soils information.

The underboring will occur at an approximate depth of 2 m and have an approximate diameter of 600 m to accommodate the electrical conduits. The entry and exit points will require excavation for an approximate length of 1.5 m, width of 1.5 m and depth of 2 m.

7.3 Methods to be used

7.3.1 Trenching

When occurring in the road verge of Bakers Lane, trenching will occur beneath the road pavement and no closer than 0.5 m to the white line markings on either side of the paved road surface (with the exception of joint bay construction) (refer Figure 7.1). This method means that verge and other undisturbed areas can largely be avoided. Construction would occur wholly within the paved road area, with traffic management measures in place. This would consist of one closed lane for construction on

Bakers Lane. Any activities that require additional space are discussed further in sections 7.3.2 and 7.3.3.

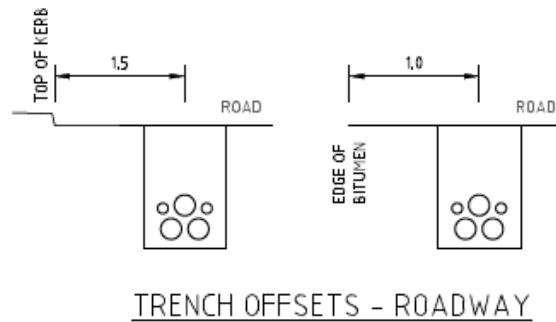


Figure 7.1 Typical trench offsets within a roadway

Typically, trenches are approximately 0.8 m wide and up to 2 m deep. A 5 m wide construction corridor is required along the length of the trenching activities. A cross section of a typical trench is shown in Figure 7.2 below. Once the trench is excavated, and the concrete conduits placed in a bed of 14:1 sand mix. The rest of the excavated trench is filled with road base or river sand.

This means that up to approximately 6,400 m³ of fill material is removed from site. This is based on 0.8 m x 2 m x 4 km of excavated trench. Assuming a 13-tonne end tipper truck with a 33 m³ capacity, this will mean that 194 trucks of material will need to be moved from the 4 km alignment over the course of the excavation works.

As noted above, certain portions of the Stage 2B and 3B alignment will be installed via underboring techniques. The approximate and calculated fill amounts noted above have assumed a worst case scenario of the whole 4 km alignment installed via trenching.

Assuming that 14:1 sand mix and a road base or similar top constitutes around 70% of the trench fill (the other 30% of area taken up by the conduits) this will mean that just over 4480 m³ of material will need to be brought to site. Assuming the same sized truck, this will require approximately 136 trucks of material to be brought to the construction area. The trenching and backfill activities would be undertaken over 6 months for the civil works and so the removal of waste plus the incoming fill materials would mean 330 trucks, or 660 truck movements (ie entering and exiting the site). This averages at 14 trucks or 28 truck movements per week.

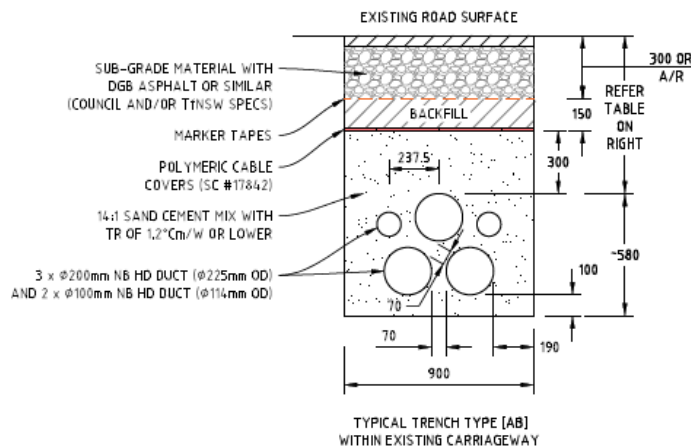


Figure 7.2 Typical cross section of trenched activities for a transmission feeder route

7.3.2 Under boring

In key locations, as noted above, under boring would be required to avoid sensitive areas including South Creek. The depth of under boring can vary dependant on the geology and specific conditions in the area. A typical cross section is shown on Figure 7.3.

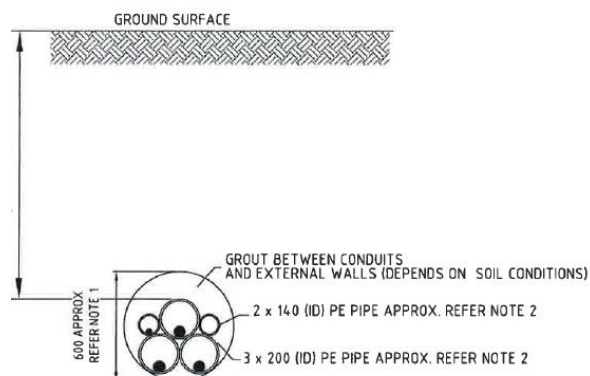


Figure 7.3 Typical cross section of under boring construction

Typically, an under bore operation requires an entry and exit point on either side of the area being under bored. The entry and exit points will require excavation for an approximate length of 1.5 m, width of 1.5 m and depth of 2 m.

This means that under boring activities will need additional areas and will not be able to be undertaken wholly within the paved road reserve.

7.3.3 Joint bays

In addition to the trenching and under boring, construction works will involve the formation of joint bays. These are larger pits, which are normally concrete lined and wider than the trenches. Joint bays allow the pulling of the cables through the conduits and provide the space for cable connection and earthing.

Typically, the construction of a joint bay is 3 m x 8m and so requires an area of 5 m x 10 m for construction. As with the under boring, there are some areas where the joint bays will need additional space for construction. As with the under bores, this has been taken into account in the technical environmental studies undertaken for this REF.



Figure 7.4 Typical joint bay during construction

7.4 Timing, duration, hours of work

As noted above, the trenching, conduit laying and back filling is scheduled to commence in January to June 2023 over approximately 6-months. Impacted landowners will be notified about proposed construction activities in a timely manner.

In general, trenched construction works progress at approximately 60 m per day, with 2 weeks required at each joint bay.

Construction works will be undertaken during standard working hours:

- 7am to 6pm Monday to Friday.
- 8am to 1pm on Saturdays.
- No works on Sundays or public holidays.

Where there may be a variation to this is at intersections where works need to be completed to avoid disruption to road users. In addition, if the under bore operations are required to occur in a 24/7 operation to ensure safe completion.

Endeavour Energy can construct for two consecutive nights without approval. However, this eventuality would not be undertaken without consultation with nearby landowners. Should any longer than two nights of out of hours work be required, the construction manager would apply to Endeavour Energy to progress approval for those works.

7.5 Equipment and materials required

The general plant and equipment required for the works include:

- Trenching, conduit laying and backfilling:
 - Excavators
 - Tippers
 - Agitators
 - Flatbed trucks
 - Bob cat
 - Crew/tool truck
 - Vac truck
- Cable pulling at the joint bays:
 - Crane
 - Winch
 - Cable trailers
 - Drum stand
 - Crew/ tool truck
- Under boring:
 - Excavators
 - Tippers
 - Agitators
 - Flat-bed trucks

- Crane
- Boring machine
- Vac truck

7.6 Workforce and construction laydown areas

The construction workforce numbers would include:

- Civil construction crew (ie the trenching and backfilling works) of 8-12 people per crew.
- Cable installation crew of up to 12 people.
- Cable joining crew of up to 8 people.

There may be multiple crews working concurrently.

Construction laydown areas would include where needed, parking for construction works, office areas and ablutions as well as storage areas for raw materials and plant and equipment.

These laydown areas have not been nominated at this point and are expected to be nominated by the construction contractor. Where areas are nominated by the contractor, an environmental assessment (addendum REF or Summary Environmental Report (SER)) of those areas will be required to demonstrate that there would be no environmental impacts and to receive approval from EE. The environmental assessment will be based on a broader area.

8 Environmental management

8.1 Environmental management standards

To ensure that appropriate steps are taken to manage environmental aspects of infrastructure projects, EE has developed a number of Environmental Management Standards.

EE Environmental Management Standard *EMS0001 Environmental Impact Assessment and Environmental Management Plans* (EMS 0001) has the stated purpose of ensuring 'that all works on EE's Network is undertaken in such a manner as to manage any actual or potential environmental impacts. Activities are to be carried out using a due diligence approach, in accordance with industry and other appropriate standards to ensure positive environmental outcomes and compliance with relevant legislation'. A copy of EMS 0001 is available on EE's Standard and EE's Accredited Service Provider (ASP) website.

8.2 Environmental management plan

This REF has identified a number of mitigation and management measures to minimise adverse environmental impacts that could potentially arise from the project. These mitigation and management measures would mostly be implemented during the construction phase of the project.

EE will require the preparation of a site-specific Construction Environmental Management Plan (CEMP) for the proposed construction works, which will provide a clear framework for how these measures will be implemented and who will be responsible for their implementation. The CEMP will be prepared prior to commencement of any construction works, and will be reviewed and certified by EE's environment team, prior to the commencement of any on-site works.

The CEMP will be a working document, and will be subject to ongoing updates as required to respond to specific requirements. The CEMP will be developed in accordance with the specifications set out in the EMS 0001.

Furthermore, the construction of the project will be subject to audits by EE to ensure that the works are carried out in an environmentally satisfactory manner. The assessment has not identified any issues that cannot be managed by employment industry 'best practice' environmental management techniques.

8.3 Monitoring of impacts

Environmental monitoring will be undertaken in accordance with environmental mitigation and management measures proposed for each of the environmental aspects assessed as part of this REF.

In addition, in accordance with EMS 0001, environmental inspections for 'Class 4 activities' will be conducted by EE's Sustainability and Environment (S&E) team at the commencement, completion (close out inspection) and periodically during works for activities being carried out in environmentally sensitive areas, or where the activity duration exceeds six months. The frequency of these periodic inspections will be determined at the commencement of the construction phase of the works by the Project Manager or the Environmental Services Manager or the technical specialists that have full knowledge of the environmental impact assessments for this REF.

Environmental monitoring and inspections will be undertaken in accordance with EMS 0001 where any potential non-conformance identified from the inspection will be discussed, recorded and addressed.

9 Environmental assessment and mitigation

9.1 Overview

The following environmental factors were assessed in detail to determine the environmental impacts associated with the project:

- Aboriginal heritage;
- heritage; and
- biodiversity.

The assessment reports are provided in appendices B, C and D respectively, and summarised in the following sections. Lower risk environmental factors for the project that are required to be considered under Clause 171 of the EP&A Regulation and the Code are also addressed in this section and comprise water, utilities and services, roads, traffic and access, land use, landscape and visual, socio-economic impacts, noise, air quality and dust suppression, safety and hazards, bushfire, waste generation storage, and cumulative impacts.

Prior to the commencement of construction, a construction contractor will develop a CEMP with the approval of EE, which will capture the management and mitigation measures presented in this REF, providing further site-specific detail where appropriate and responsibilities and timing for their implementation.

9.2 Aboriginal heritage

9.2.1 Overview

This section utilises information from two separate Aboriginal heritage due diligence assessments completed for the alignment.

Firstly, a Aboriginal Heritage Due Diligence Assessment (AHDDA) was prepared to assess the Stage 2B alignment by Artefact Heritage Services (Artefact) (2022a). Information from the AHDDA (2022a) has been used to determine the Aboriginal heritage impacts associated with construction of the Stage 2B alignment, which is provided in full in Appendix B.

Secondly, an Aboriginal Heritage Due Diligence Assessment (AHDDA) was completed by Artefact (2022b) which assesses the Aboriginal heritage impacts associated with the entirety of the transmission feeder route (i.e stages 1 to 7 as shown in Figure 1.1). The AHDDA (2022b) is also provided in full in Appendix C.

For both assessments, potential impacts on Aboriginal heritage from the project were assessed in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (due diligence guidelines) (DECCW 2010b). The objectives of both assessments were to:

- identify if registered Aboriginal objects, Aboriginal places or potential Aboriginal archaeological deposits are likely to occur in the areas of the project;
- determine if the project is likely to harm Aboriginal objects, Aboriginal places or potential Aboriginal archaeological deposits (if present); and
- determine if further archaeological investigation is required.

9.2.2 Existing environment

i Aboriginal history of the locality

Given that the majority of the alignment will be installed by a combination of trenching and under boring beneath road pavement on Bakers Lane, the findings of the assessments is an important component of this REF.

The AHDDA (Artefact 2022a) notes that the Stage 2B alignment on Bakers Lane is located within the traditional lands of the Darug people (noted to extend between Port Jackson and Botany Bay in the east, the Georges River to the south and south-west, the Hawksbury River in the north-west and in the west to the Blue Mountains). This can be extended out to include the Stage 3B alignment as well. A detailed summary of the Aboriginal history in the locality of the alignment is provided in Chapter 2 of the AHDDA (Artefact 2022a).

The broader transmission feeder alignment extends across the traditional lands of the Darug, Dharawal and Gandangara people. Details of the Aboriginal history of the broader transmission feeder alignment is provided in Section 1.4 of the AHDDA (Artefact 2022b).

The oldest archaeological evidence of Aboriginal activity in the Sydney region is from Cranebrook Terrace, which is located approximately 15 km north-west of the alignment. Sediments from an archaeological excavation at this site have been dated to 41,700 years Before Present (BP) (ANU-4016). Interactions with Aboriginal people across Sydney and surrounds are documented from early 1800s, from which point their population declined. Descendants of the Dharug, Gandangara and Dharawal groups continue to live across the Cumberland Plain along with Aboriginal people from other areas of NSW.

ii European history of the locality

The AHDDA (Artefact 2022b) notes that exploration of the area within Western Sydney began soon after first settlement, given that the sandy shallow soils of coastal Sydney were unsuitable for cultivation and it was necessary to find more fertile land. Early residential settlement in Western Sydney, predominantly surrounding Penrith and Parramatta, was driven by agriculture.

The study area was first visited by Europeans in the 1800s. The earliest European land use in the study area was likely to have been associated with timber getting, grazing and pastoralism from the early 19th century onwards. Analysis of historical aerial imagery shows that most of the study area had roads constructed prior to the earliest photographs being taken in the 1930s.

Land grants in the local area were granted in as early as 1805 (Artefact 2022a). This included sizeable local holdings of up to 2500 acres but mostly included 20 acre 'farm and orchard blocks' (Artefact 2022a). Mamre Road was constructed by 1985 (Artefact 2022a).

iii Previous archaeological investigations and research

Section 2.7 of the AHDDA (Artefact 2022a) provides details of previous archaeological assessments undertaken nearby to the alignment, including developments on Mamre Road and Aldington Road in Kemps Creek amongst other locations. These assessments have contributed to an understanding of the locations where artefacts are most likely to be found.

Archaeological investigations across the Cumberland Plain over the past 30 years have been comprehensive, and have concluded that artefact densities are most likely to be greater on terraces and lower slopes within 100 m of freshwater resources. Investigations and predictive models identified that ridgelines and crests located between drainage lines are likely to contain archaeological evidence.

Furthermore, previous documentary and archaeological research indicates that archaeological evidence is likely to be found with certain landforms, largely as a result of the resources that were associated with these landforms. OEH (now DPE) lists five such landforms:

- within 200 m of waters;
- within a sand dune system;
- on a ridge top, ridge line or headland;
- within 200 m below or above a cliff face; and
- within 20 m of or in a cave, rock shelter, or a cave mouth.

iv Aboriginal Heritage Information System (AHIMS) database search

Aboriginal Heritage Due Diligence Assessment (Artefact 2022a)

As part of the AHDDA, the Aboriginal Heritage Information Management System (AHIMS) was searched on 22 June 2022 to determine the location of Aboriginal sites surrounding the Stage 2B alignment. The search results are summarised in Table 9.1.

Table 9-1 Frequency of recorded site types near the Stage 2B alignment (Artefact 2022a)

Site features	Frequency	Percentage
Artefact	45	85
Artefact, potential archaeological deposit (PAD)	3	5.5
PAD	5	9.5
Total	53	100

A total of 51 Aboriginal sites were identified within the search area. The Stage 2B alignment will traverse through the recorded extent of AHIMS site 45-5-5619 and just north of AHIMS site 45-5-5274.

It is worth noting that AHIMS site 45-5-5619 is already located within a disturbed environment due to historic construction associated with Bakers Lane (which also runs through the extent of the site). The AHDDA (Artefact 2022a) notes that underboring will occur at this location regardless to avoid disturbance to this AHIMS site. AHIMS site 45-5-5274 is located approximately 20 m south of Bakers Lane and the Stage 2B alignment. Ground disturbance will be confined to the 5 m construction corridor surrounding the alignment. The search area and results are shown on Figure 9.1 and Figure 9.2.

The AHDDA (Artefact 2022a) also identified an area of archaeological potential associated with AHIMS site 45-5-5406 also shown on Figure 9.3, which is located near the most western end of the Stage 3B alignment. Impacts to this site was assessed in the AHDDA (Artefact 2022b), as described further below. Impacts to this site is being considered further in an Aboriginal Cultural Heritage Assessment Report (ACHAR) currently being undertaken.

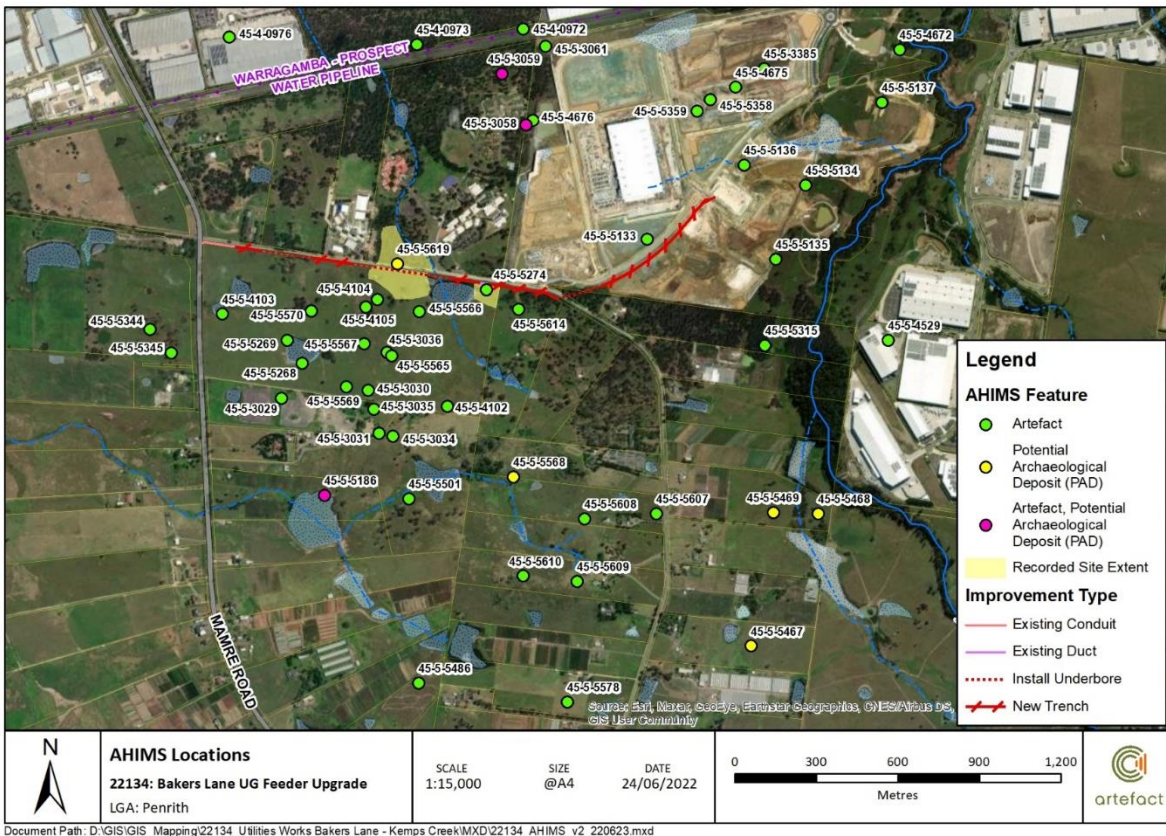


Figure 9.1 AHIMS search results of the Stage 2B alignment (Artefact 2022a)

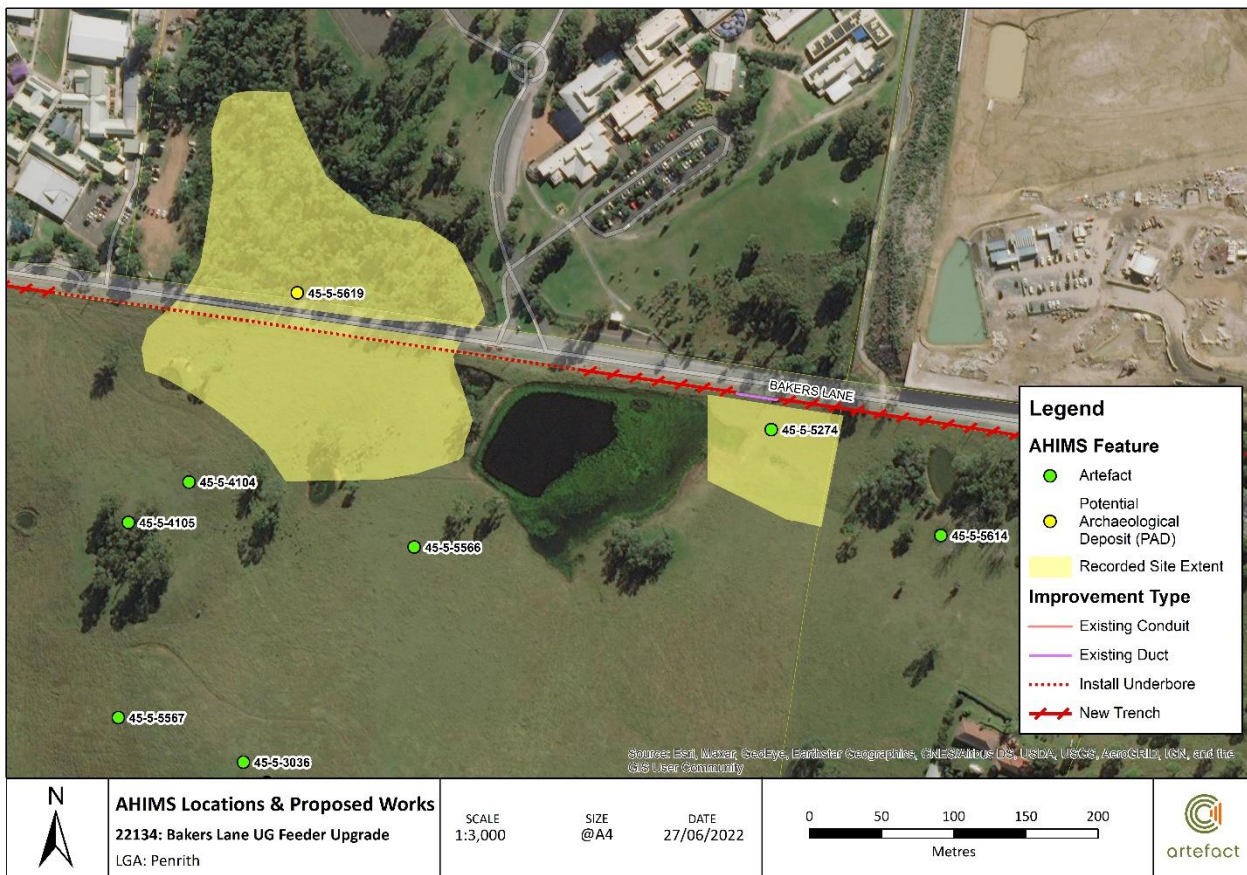


Figure 9.2 Location of AHIMS sites 45-5-5274 and 45-5-5619

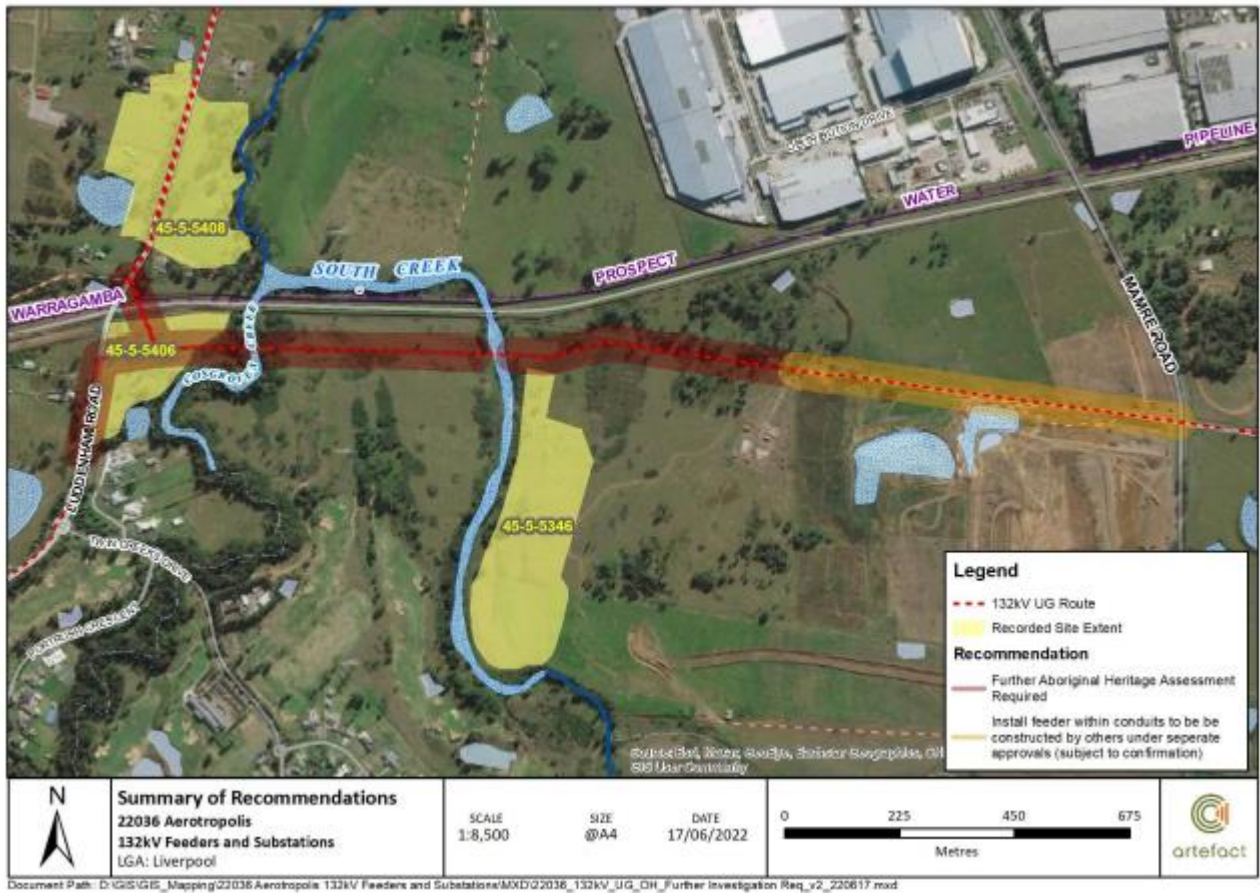


Figure 9.3 Location of AHIMS sites 45-5-5406 and area of potential archaeological interest

Aboriginal Heritage Due Diligence Assessment (Artefact 2022b)

As part of the AHDDA (2022b), the AHIMS was searched on 2 and 9 May 2022 for the study area surrounding the broader transmission feeder alignment. The AHIMS search identified a total of 331 sites within approximately 1000 m of the study area. The results of the search are shown in Table 9-2 and in Figure 9.4.

Table 9-2 Frequency of recorded site types near the overall transmission feeder alignment (Artefact 2022b)

Site features	Frequency	Percentage
Artefact	304	91.9
Artefact, potential archaeological deposit (PAD)	14	4.2
PAD	8	2.4
Modified tree (scarred or carved)	4	1.2
Grinding groove	1	0.3
Total	331	100

The findings are consistent with previous archaeological investigations within the Cumberland Plain, in that although Aboriginal occupation covered the whole of the landscape the availability of fresh water, and associated resources, was a significant factor in repeated and long-term occupation of specific areas within

the landscape. Certain site types, such as culturally modified trees, are particularly sensitive and can be easily destroyed throughout historical occupation, while others, such as stone artefacts, are more resilient.

The AHDDA (Artefact 2022b) also identified AHIMS site 45-5-5619 and 45-5-5274 (as described above) located in or near the Stage 2B alignment on Bakers Lane. In addition, the search identified that the Stage 3B alignment at its connection with Luddenham Road will traverse through AHIMS site 45-5-5406 (refer Figure 9-3).

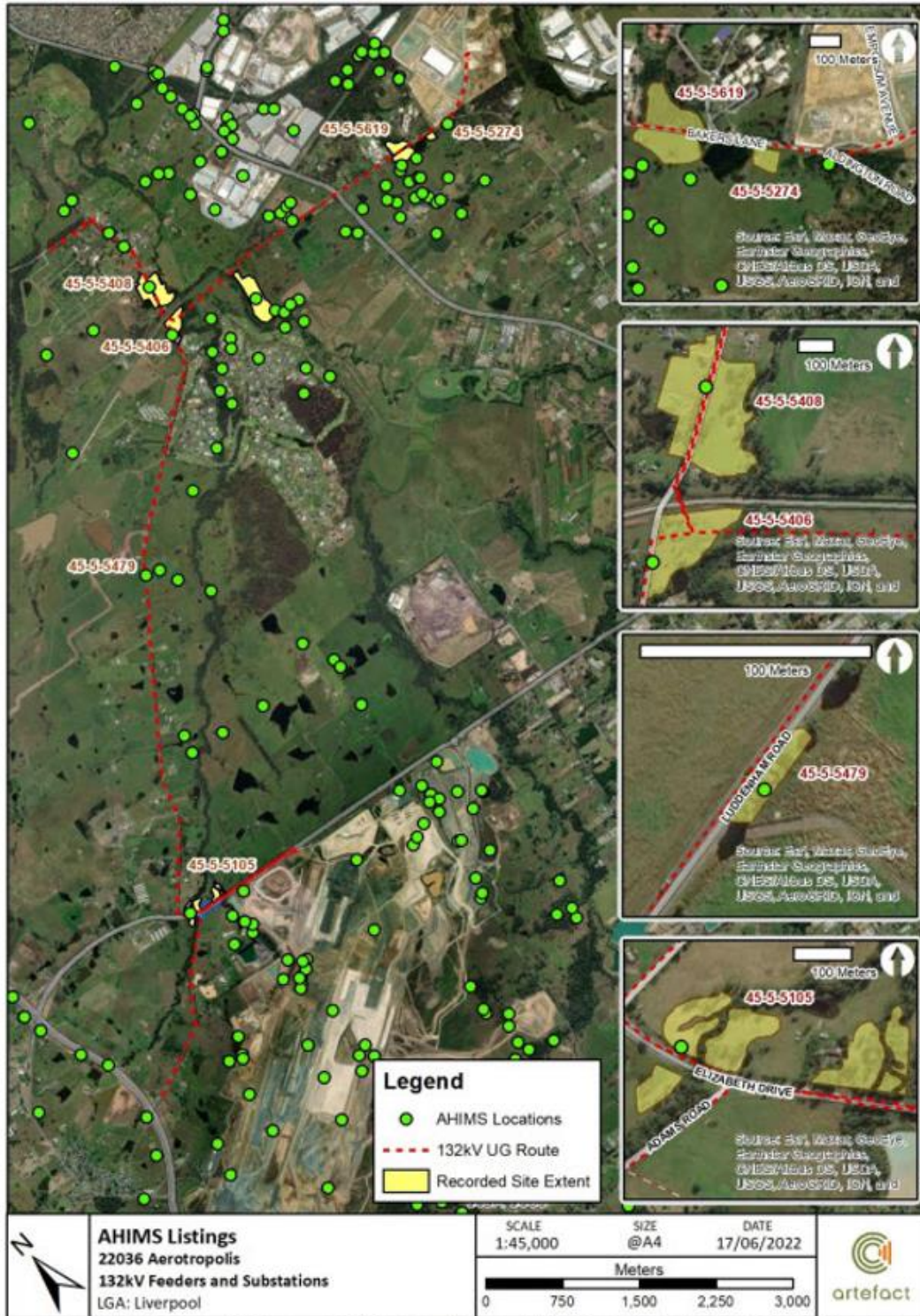


Figure 9.4 AHIMS search results of the overall transmission feeder alignment (Artefact 2022b)

v Site inspection

A due diligence assessment was carried out on 18 May 2022 as part of the AHDDA (Artefact 2022b) by Artefact and EE representatives. This included an inspection of paved roads, including Luddenham Road. The due diligence assessment for the AHDDA (Artefact 2022b) was carried out on 24 June by Artefact representatives. This included an inspection of Bakers Lane.

vi Archaeological sensitivity

Archaeological potential is closely related to levels of ground disturbance. However, other factors are also taken into account when assessing archaeological potential, such as whether artefacts were located on the surface, and whether the area is within a sensitive landform unit according to the predictive statements.

The study area of the AHDDA (Artefact 2022b) is located in close proximity to an ephemeral waterway but approximately 700 metres from the nearest permanent watercourse. Aboriginal sites have been recorded in the surrounds of the study area, however, the study area has been subject to significant historical disturbance.

vii Predicted impacts

The AHDDA (Artefact 2022b) identified that the western end of the the Stage 3B alignment at its connection with the Stage 4 alignment will traverse through AHIMS site 45-5-5406 at the Twins Creeks Golf Club in the suburb of Luddenham. The alignment will be constructed via underboring technique to limit ground disturbance, however disturbance to AHIMS site 45-5-5406 is still anticipated associated with excavation of the entry and exit points.

The AHDDA (Artefact 2022a) notes that the Stage 2B alignment is closely located to an ephemeral waterway (South Creek) however the landform is highly disturbed. Observations from the site inspection of Bakers Lane (including AHIMS site 45-5-5619 and AHIMS site 45-5-5274) also noted the disturbed nature of the landform from previous roadwork, historical infrastructure development and current construction works. This includes the introduction of mixed fill on areas of ground exposure. These exposures were inspected during the site inspection, and no Aboriginal objects were identified. The PAD associated with AHIMS site 45-5-5619 was noted to be heavily vegetated and therefore visibility was disturbed.

Land north-east of Bakers Lane was noted to be heavily disturbed and stripped of vegetation due to major earthworks associated with recent construction and therefore the potential presence of in-situ archaeological sites is nil. No Aboriginal artefacts or additional areas of archaeological potential were identified in the site inspection.

The AHDDA (Artefact 2022a) notes that the amount of historical disturbance associated with the area has rendered the archaeological sensitivity of most of the study area to be low. However, AHIMS site 45-5-5619 holds moderate significance in terms of Archaeological sensitivity and any impacts would require an Aboriginal Heritage Impact Permit (AHIP) prior to works commencing. The alignment in this area will be constructed via underboring technique to limit ground disturbance, with excavation of the entry and exit points occurring outside of the AHIMS site's extent.

9.2.3 Management and mitigation measures

The following management and mitigation measures are recommended in the AHDDA (Artefact 2022a) and AHDDA (Artefact 2022b):

- In accordance with the Due Diligence Code of Practice the proposed works can proceed with caution and will not require further archaeological investigation.
- All intermittent trenching activity along Bakers Lane must be contained within the paved bitumen surfaces of the road corridor towards the centre of the road lane, and no closer than 500 mm to the white lane markings which are located towards the outer edge of the paved road surface.
- The proposed works must avoid the recorded extent of AHIMS Site ID 45-5-5619 (PAD), including underboring to an adequate depth beneath the area of potential, and entry and exit pits outside of the PAD extent.
- Additional Aboriginal heritage assessment must be undertaken where it is identified that trenching will occur outside the white lane markings and/or in the road verge.
- Additional Aboriginal heritage assessment must be undertaken where it is identified that the proposed works require activities within the road verge (which is currently being undertaken).

- Unexpected Aboriginal objects remain protected by the NP&W Act. If any such objects, or potential objects, are uncovered in the course of the proposed works, work in the vicinity must cease and Heritage NSW, Deerubbin Local Aboriginal Land Council (LALC) (for areas north of Elizabeth Drive and Gandangara LALC (for areas south of Elizabeth Drive), and a qualified archaeologist must be contacted for advice. Further assessment and permits may be required before works can recommence.
- If human remains are found, work must cease, the site must be secured, and the NSW Police and Heritage NSW, DPE must be notified.
- All workers should be provided with a heritage induction so that they are aware of their obligations under the NPW Act and the locations of Aboriginal sites within or in close proximity to the study area. The induction is to make any on site personnel aware that penalties apply for harm to an Aboriginal object, to define that harm can include destruction, defacing, damaging or moving an Aboriginal object and that Aboriginal objects, or suspected Aboriginal objects, are to be reported to Heritage NSW and penalties apply for non-compliance.
- Aboriginal objects cannot be impacted without an AHIP (which would also require the preparation of an ACHAR and test excavation).
- A copy of this report should be forwarded to the Deerubbin Local Aboriginal Land Council (LALC) for their records.

At the time of writing this REF, the AHIMS sites have been formally surveyed in relation to the proposed alignment. Where the proposed alignment route could not avoid the AHIMS locations, these are being assessed in the ACHA. Until they have been properly assessed and subjected to test excavation and (if needed) an AHIP, these areas remain as “no go” areas. That means, while this REF might be approved, a condition of its approval is no works to be undertaken in these no-go areas until they have been cleared by test excavation, or an AHIP approval has been granted. This includes a no go area for the following sites near the Stage 2B and Stage 3B alignment:

- AHIMS site 45-5-5619 on Bakers Lane near the Stage 2B alignment;
- AHIMS site 45-5-5408 near the western end of the Stage 3B alignment; and
- AHIMS site 45-5-5406 near the western end of the Stage 3B alignment.

Of note, other AHIMS sites near the stages 4 to 7 alignment are also being assessed in the ACAHR and the subject of a no go area but have not been identified in this REF.

9.3 Historic heritage

9.3.1 Overview

A non-Aboriginal (historic) heritage impact assessment (HIA) was prepared by Artefact (2022c) to identify any areas of European heritage that are within the vicinity of the project.

The HIA was prepared in accordance with the guidelines outlined by the NSW Heritage Office (now Heritage NSW) including the *NSW Heritage Manual: Assessing Heritage Significance*, *NSW Heritage Manual: Statement of Heritage Impact*, *Assessing Significance for Historical Archaeological Sites and ‘Relics’* and the Australian International Council on Monuments and Sites (ICOMOS)’s *Charter for Places of Cultural Significance*.

The study area of the HIA includes the overall transmission feeder route as shown in Figure 1.1. This section provides a summary of the HIA which is provided in Appendix D.

9.3.2 Existing environment

viii Non-statutory heritage items

The Register of the National Estate (RNE) was searched for any non-statutory heritage items, and identified that there are no non-statutory heritage items within the study area or within 50 m of the study area that are listed on the RNE.

ix Listed heritage items

A search of the State and local heritage registers identified two items within 50 m of the study area, as shown in Table 9-3. These items are shown in Figure 9.4 and are closest to the western most end of the Stage 3B alignment.

Table 9-3 **Historic heritage items within the study area**

Register	Listing	Significance
Water NSW Section 170 Register	Warragamba Supply Scheme (SHI# 4580161)	State
Penrith LEP 2010	Luddenham Road Alignment (LEP item no. 843)	Local
SEPP (Western Sydney Aerotropolis) 2020	Luddenham Road Alignment (item no. 18)	Local



Figure 9.5 Location of historic heritage items near the study area

x History of the locality

Chapter 3 of the HIA in Appendix D outlines the history of the locality of the project, including the history of Luddenham Road and Warragamba pipelines and the value of the surrounding developments. Key historical heritage features of the area are summarised below:

- The first settlers were attracted to different regions of Western Sydney due to rich alluvial soils and local waterways required for agriculture. The availability of several local waterways including Badgerys Creek added to the attraction of the area surrounding Badgerys Creek.
- The first land grants in the area were made in 1808, which allowed settlers to establish rural estates. The study area passes through several early land grants, which were made to emancipated convicts. Private soldiers, free settlers, officials and officers between 1811 and 1821.
- Notable individuals that were granted land within the study area include wealthy landowner Gregory Blaxland and government official Captain John Piper. A portion of the study area also crosses Cosgrove Creek and South Creek, where Lot 222 DP 270417 identified as part of a 60-acre area granted to William Cosgrove in 1811.
- Works on the original Warragamba Emergency Scheme began in 1936 and was completed in 1940, whereby water was conveyed via a 48-inch pipeline across Megarrity's Creek Bridge at Warragamba, 16 km to the Prospect Reservoir. The Warragamba Dam was commissioned in 1960. The original Warragamba pipeline was upgraded in 1953 to an 84-inch pipeline, and a second 84-inch pipeline from Warragamba to Prospect was constructed between 1957 and 1969. No other major works have occurred on these pipelines, other than basic maintenance.

Artefact's (2022c) HIA concludes that land development has changed little in the area, although some intensification has occurred such as in dairy and poultry farming, aviary activities and market gardening. Early slab cottages, homesteads, cisterns, sheds and vineyards persist as reflections of the districts former character.

Given the area is sparsely populated and is characterised by an open landscape, the location has seen it used for projects including defence and government radio infrastructure, and most recently and more widely, the construction of the Western Sydney Airport.

xi Site inspection

A site inspection of the study area was conducted on 27 May 2022 by Artefact's Technical Director and Heritage Consultant (J. Symons and E. Jones respectively). The site inspection served to investigate the project route including the landscape surrounding the road corridors.

No original road fabric was observed during the site inspection, as all existing road surfaces were observed to consist of modern bitumen with concrete culverts present at intervals. Several culverts along Luddenham Road within the study area were able to be inspected; however, access to a small number of culverts was not possible due to roadworks hampering access and due to safety concerns. The inspection revealed that the culverts were likely installed at the same time as the modern road surfaces.

The road corridors inspected were bordered by posts and rail fencing along their alignments. The SHI listing for the Luddenham Road Alignment notes that this fencing is a remnant of previous pastoral uses for the surrounding land and serves as a contributory element for the item's significance. However, the fencing along Luddenham Road appears very new, suggesting that it is in fact not original, significant fabric.

9.3.3 Impact assessment

xii Archaeological assessment

Artefact (2022c) conducted an assessment of archaeological potential and significance, based on analysis of available historical plans, secondary sources and an understanding of previous impacts within the study area. For the purpose of this assessment, it was assumed that no ground disturbance works would occur outside the road corridor. A summary of archaeological potential and significance is provided in Table 9-4.

Table 9-4 Summary of archaeological potential

Phases	Potential remains	Archaeological potential	Archaeological significance	Potential for 'relics'
Early land grants	1809 - 1978 Luddenham Road corridor: Evidence of land clearing (tree boles, burnt soil), undocumented evidence of agricultural uses (postholes associated with fencelines/huts/agricultural structures, water management, structural evidence of huts, artefact scatters).	Nil	n/a	No
	1811 – present day Lot 22 DP 270417: Evidence of former masonry buildings or structures (brick or stone footings, associated deposits), occupation deposits (underfloor accumulations), yard scatters, rubbish pits), paving associated with external yard divisions and landscaping, postholes associated with fence lines, beaten earth or paved surfaces, hearth, chimney remnants, refuse deposits associated with external kitchen, evidence of landscaping (such as stone or brick retaining walls, edging, hard surfaces indicating former pathways, stone flagging), rubbish pits.	Moderate	Local	Yes: Assessed as part of the REF for Stages 4-7 and so not considered further here.
Luddenham Road	Pre-1879 - c.1920 Compressed earth surface, table drains, stone culverts.	Nil-low	Local	No
	1920 - 1950 Gravel ballast, table drains, stone/concrete culverts.	Low	Nil	No
	1950 - current Bitumen and modern road surfaces, table drains, concrete culverts.	Extant (not archaeological)	Nil	No

xiii Impacts to archaeological items

Lot 222 DP 270417 has been identified as having the potential to contain archaeological resources associated with Cosgrove's Farm and a 'pre-1906' homestead. The Stage 3B alignment runs along the northern boundary of Lot 222 DP 270417. The HIA has identified that trenching works have the potential to impact on

the potential archaeological remains at this residence. Those impacts were assessed as part of the REF for Stages 4-7 and so are not considered further here. The HIA identified that there is overall limited potential for substantially intact archaeological remains associated with the early land grant or pound to be located within the area proposed for trenching.

The proposed trenching also avoids the main structures present on 20th century aerial photographs of the site. Overall, the proposed excavation works are unlikely to result in more than minor impact to the potential archaeological site at Lot 222 DP 270417

xiv Impacts to heritage items

No other heritage items or areas of historic archaeological interest were identified.

9.3.4 Management and mitigation measures

The following management and mitigation measures are recommended in the HIA:

- Unexpected finds procedure: An unexpected finds procedure should be implemented for all excavation works not subject to archaeological monitoring. All relevant construction staff, contractors and subcontractors must be made aware of their statutory obligations for heritage to ensure no archaeological remains or heritage fabric are impacted during the proposed works without appropriate mitigation measures in place.

9.4 Biodiversity

9.4.1 Overview

A draft ecological assessment (DEA) for the project was prepared by Gingra Ecological Surveys (GES) (2022) in order to assess whether the project route may support any flora and fauna species listed under the BC Act.

The DEA involved desktop searches and a field survey, which was undertaken on 1 June 2022. The study area of the assessment included land eastern of Luddenham Road (the Stage 2B and 3B alignment) including those portions of the alignment with traverse Cosgrove Creek and South Creek.

The desktop assessment and field survey assessed habitat that could be impacted by the alignment, including threatened species and ecological communities, through the completion of an Assessment of Significance (5-part test).

This section provides a summary of the ecological assessment which is provided in Appendix E.

9.4.2 Existing environment

The study area is within the Hawkesbury Nepean catchment and is within the Central Coast botanical subdivision. It lies within the Cumberland Plain landscape unit.

xv Desktop searches

GES conducted searches of the Atlas of NSW Wildlife and EPBC listed threatened flora for flora species present within 5 km and 10 km of the project. The results are presented in Table 9-5. For a full description of habitat preferences, presence in locality and whether it could possibly be affected, refer to Table 2 and Table 3 of the ecological assessment in Appendix E.

The targeted threatened species search focussed on *Grevillea juniperina* subsp. *juniperina* as this species have been recorded in the locality and the habitat at the site was considered suitable. There are up to 5 *Grevillea juniperina* subsp. *juniperina* plants along the alignment. An Assessment of Significance has been undertaken for this species and summarised below in Section 9.4.3.

Table 9-5 **Threatened flora desktop search results**

Scientific name	Common Name	Atlas of NSW Wildlife *recorded within 5 km radius	EPBC listed threatened flora search *recorded within 10km radius
<i>Acacia bynoeana</i>	Bynoe's Wattle		X
<i>Acacia pubescens</i>	Downy Wattle	X	X
<i>Allocasuarina glaericola</i>			X
<i>Cryptostylis hunteriana</i>	Leafless Tongue-orchid		X
<i>Cynanchum elegans</i>			X
<i>Dillwynia tenuifolia</i>		X	
<i>Genoplesium baueri</i>	Yellow Gnat-orchid		X
<i>Grevillea juniperina</i> subsp. <i>juniperina</i>		X	
<i>Grevillea parviflora</i> subsp. <i>parviflora</i>		X	X
<i>Haloragis exalata</i> subsp. <i>exalata</i>	Wingless Raspwort		X
<i>Acacia pubescens</i>	Downy Wattle	X	X
<i>Dillwynia tenuifolia</i>		X	
<i>Grevillea juniperina</i> subsp. <i>juniperina</i>		X	
<i>Grevillea parviflora</i> subsp. <i>parviflora</i>		X	X
<i>Isotoma fluviatilis</i> subsp. <i>fluviatilis</i>		X	
<i>Marsdenia viridiflora</i> subsp. <i>viridiflora</i>		X	
<i>Persoonia nutans</i>		X	X
<i>Pimelea spicata</i>	Spiked Riceflower	X	X
<i>Pultenaea parviflora</i>		X	
<i>Allocasuarina glaericola</i>			X
<i>Cryptostylis hunteriana</i>	Leafless Tongue- orchid		X
<i>Cynanchum elegans</i>			X
<i>Genoplesium baueri</i>	Yellow Gnat-orchid		X
<i>Haloragis exalata</i> subsp. <i>exalata</i>	Wingless Raspwort		X

Table 9-5 Threatened flora desktop search results

Scientific name	Common Name	Atlas of NSW Wildlife *recorded within 5 km radius	EPBC listed threatened flora search *recorded within 10km radius
<i>Melaleuca deanei</i>			X
<i>Persicaria elatior</i>			X
<i>Persoonia hirsuta</i>	Hairy Geebung		X
<i>Pimelea curviflora</i> var. <i>curviflora</i>			X
<i>Pomaderris brunnea</i>			X
<i>Pterostylis gibbosa</i>	Yallah Greenhood		X
<i>Pterostylis saxicola</i>			X
<i>Pultenaea parviflora</i>			X
<i>Rhizanthella slateri</i>	Eastern Australian Underground Orchid		X
<i>Thesium australe</i>	Austral Toadflax		X

Notes: sp. – species, subsp. – subspecies, var. – variety

GES conducted a search of the Atlas of NSW Wildlife and EPBC listed threatened fauna for fauna species present within 5 km and 10 km of the project. The results are presented in Table 9-6. For a full description of habitat preferences, presence in locality and whether it could possibly be affected, refer to Table 2 and Table 3 of the ecological assessment in Appendix E.

Table 9-6 Threatened fauna desktop search results

Scientific name	Common Name	Atlas of NSW Wildlife *recorded within 5 km radius	EPBC listed threatened flora search *recorded within 10km radius
Birds			
<i>Ixobrychus flavicollis</i>	Black Bittern	X	
<i>Stictonetta naevosa</i>	Freckled Duck	X	
<i>Hieraetus morphnoides</i>	White-bellied Sea-Eagle	X	
<i>Hieraetus morphnoides</i>	Little Eagle	X	
<i>Burhinus grallarius</i>	Bush Stone Curlew	X	
<i>Lophoictinia isura</i>	Square-tailed Kite	X	
<i>Rostratula australis</i>	Australian Painted Snipe	X	X
<i>Lathamus discolor</i>	Swift Parrot	X	X
<i>Ninox strenua</i>	Powerful Owl	X	

Table 9-6 Threatened fauna desktop search results

Scientific name	Common Name	Atlas of NSW Wildlife *recorded within 5 km radius	EPBC listed threatened flora search *recorded within 10km radius
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper	X	
<i>Chthonicola sagittata</i>	Speckled Warbler	X	
<i>Daphoenositta chrysoptera</i>	Varied Sittella	X	
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	X	
<i>Petroica boodang</i>	Scarlet Robin	X	
<i>Stagonopleura guttata</i>	Diamond Firetail	X	
<i>Botaurus poiciloptilus</i>	Australasian Bittern		X
<i>Numenius madagascariensis</i>	Eastern Curlew		X
<i>Calidris ferruginea</i>	Curlew Sandpiper		X
<i>Falco hypoleucos</i>	Grey Falcon		X
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo		X
<i>Hirundapus caudacutus</i>	White-throated Needletail		X
<i>Grantiella picta</i>	Painted Honeyeater		X
<i>Anthochaera phrygia</i>	Regent Honeyeater		X
<i>Pycnoptilus floccosus</i>	Pilotbird		X
Mammals			
<i>Petaurus australis</i>	Yellow-bellied Glider	X	X
<i>Pteropus poliocephalus</i>	Grey-headed Flying Fox	X	X
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail Bat	X	
<i>Micronomus norfolkensis</i>	Eastern Coastal Free-tailed Bat	X	
<i>Falsistrelle tasmaniensis</i>	Eastern False Pipistrelle	X	
<i>Myotis macropus</i>	Southern Myotis	X	
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	X	
<i>Miniopterus australis</i>	Little Bent-winged Bat	X	
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	X	
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat		

Table 9-6 Threatened fauna desktop search results

Scientific name	Common Name	Atlas of NSW Wildlife *recorded within 5 km radius	EPBC listed threatened flora search *recorded within 10km radius
<i>Dasyurus maculatus maculatus</i> (SE mainland population)	Spotted-tailed Quoll		X
<i>Phascolarctos cinereus</i>	Koala		X
<i>Petauroides volans</i>	Greater Glider		X
<i>Petrogale penicillata</i>	Brush-tailed Rock Wallaby		X
<i>Pseudomys novaehollandiae</i>	New Holland Mouse		X
Gastropod			
<i>Meridolum corneovirens</i>	Cumberland Plain Land Snail	X	
<i>Pommerhelix duralensis</i>	Dural Land Snail		X
Fish			
<i>Macquaria australasica</i>	Macquarie Perch		X
<i>Prototroctes maraena</i>	Australian Grayling		X
Frogs			
<i>Heleioporus australiacus</i>	Giant Burrowing Frog		X
<i>Litoria aurea</i>	Green & Golden Bell Frog		X
Reptile			
<i>Delma impar</i>	Striped Legless Lizard		X

xvi Field surveys

A total of 36 plant species were detected during the field surveys, including 16 locally native species and 20 exotic species. GES (2022) notes that this is considered to be a very low level of native plant diversity reflecting the disturbance which has occurred in the local area for over 200 years, given that the area has been subject to agricultural land use for approximately 200 years. A list of plant species found within the study area is included in Appendix 1 of Appendix E.

Field survey results showed the following in relation to the flora and fauna identified in database searches (refer Table 9-5 and Table 9-6):

- None of the flora species were detected and the disturbed nature of the habitat across the area of impact means it is highly unlikely that any would occur.
- The proposed works are to take place within areas of riparian forest and grassland with dense riparian thickets providing shelter for small birds. The alignment will be located in disturbed grassland, with no hollow bearing trees or structures likely to support any of the threatened species listed in Table 9-6 to be impacted.

9.4.3 Impact assessment

None of the EPBC Act listed threatened fauna or flora are likely to be affected by the proposed activity. The nature of the proposed works is not of a scale or nature which would warrant EPBC Act referral.

Installation of the transmission feeder route will require use of vehicles along the alignment, including ground disturbance associated with underboring and trenching construction methods. Underboring will be used to avoid trenching across Cosgrove Creek and South Creek. This will require the establishment of drill pads either side at the entry and exit points. Vehicle access will be necessary from Luddenham Road, as well as through the Twin Creek Country Club and from Mamre Road. Access will be via existing roads and tracks or through cleared land.

Works will not impact on intact native vegetation (Cumberland Plain Woodland and Coastal River-flat Eucalypt Forest) within the riparian areas either side of Cosgrove Creek and South Creek.

The Assessment of Significance is included in Chapter 7 of the DEA in Appendix E. The assessment concluded that even though the project involves "clearing of native vegetation" which is a key threatening process (KTP) relevant to the species, the extent of vegetation clearing is extremely minor and well below thresholds prescribed in the BC Act. Thus, it was concluded that:

- It is highly unlikely that the development will significantly affect the regional or local population status of *Grevillea juniperina subsp. juniperina*, and
- There is no need to provide a Species Impact Statement or a BDAR.

9.4.4 Management and mitigation measures

The following management and mitigation measures are recommended in relation to biodiversity:

- Consideration should be given to minimising the impact upon vegetation during construction wherever possible.
- The minimal feasible amount of vegetation clearing should be undertaken for construction purposes.
- Where feasible, dead wood, fallen branches and logs should be retained as habitat. Where removal of dead logs or wood is required, these should be relocated (not removed from the site) into adjacent areas that will not be disturbed by construction workers.
- Weed control measures (eg herbicide spraying) should be undertaken prior to construction commencing in areas where high densities or infestations of weeds occur. This will help to reduce the risk of weeds being spread as a result of the proposed project.
- To reduce the likelihood of spreading weeds, tyres and undercarriages of vehicles are to be washed and cleaned out/ or sprayed after working with weed infested areas, and prior to entering

9.5 Water

9.5.1 Overview

This section assesses the potential hydrology, flooding, water quality, soil erosion and sedimentation aspects and impacts of the project.

9.5.2 Existing environment

xvii Hydrology and water quality

The project is within the Hawkesbury-Nepean catchment, and more specifically within the Wianamatta South Creek catchment (South Creek catchment). South Creek rises in Sydney's south-western suburbs, approximately 4 km north-east of Narellan and 7 km west of Minto, and generally flows north. It is joined by numerous tributaries including Badgerys Creek, Kemps Creek, Ropes Creek and Eastern Creek until it reaches its confluence with the Hawkesbury River close to Windsor. South Creek flows through many Western Sydney suburbs including Bringelly, Badgerys Creek, Kemps Creek, Orchard Hills. South Creek is joined by Badgerys Creek and Kemps Creek at the suburb of Badgerys Creek, by Blaxland Creek at Orchard Hills, and by Cosgrove Creek at Luddenham.

The floodplains and watercourses set within the catchment area are largely interrupted by storages for grazing and cropping with drainage infrastructure provided in some more urbanised areas (Sydney Metro 2020). However, it is important to note that the existing flow paths and runoff of the surrounding waterways, in particular levels and velocity, will be altered by the construction of the Western Sydney Airport and

surrounding development, due to the introduction of hard stand areas, levelling of existing topography and introduction of water management infrastructure such as detention basins or culverts (Sydney Metro 2020). The Aerotropolis and surrounding precincts have been designed to incorporate specific landscape and waterway features of the surrounding landscape.

Numerous surface water and groundwater studies have been undertaken for the infrastructure and development currently being built or planned in the Western Sydney Growth Area; and thus the impacts of large scale urban growth and cumulative development would have been considered in greater detail in the assessment documentation for the various projects. Studies undertaken over the last few years have shown that the existing water quality of some of the local creeks, including the South Creek, Badgerys Creek, and Cosgrove Creek, is generally poor and does not meet the Australian Water Quality Guidelines for Fresh and Marine Waters (NSW Government 2020). Previous studies have identified that the South Creek is one of the most degraded catchments in the wider Hawkesbury-Nepean catchment (Sydney Metro 2020). The high nutrient concentrations and subsequent algal and aquatic weed growth are a result of the following pollution sources (Sydney Metro 2020):

- effluent released from five sewage treatment plants in the lower parts of the catchment: and
- urban and agricultural runoff from market gardens, cattle and sheep grazing and intensive agriculture such as poultry farming.

Further potential impacts to water quality within the catchment can be managed through adequate management and mitigation measures and erosion and sediment controls.

xviii Flooding

Western Sydney Parkland SEPP shows the extent of the 1 in 100 annual exceedance probability (AEP) flood extent over the Aerotropolis (refer Figure 9.6). It shows that the Stage 2B and 3B alignment is partly located within this flood mapping. Flood modelling undertaken for the Sydney Metro project shows that regular rainfall events indicate that regular flood events are generally confined to the main channels and flow away relatively quickly to the lower portions of the South Creek catchment (Sydney Metro 2020).

The urbanised areas of the Aerotropolis have more formalised drainage systems that discharge into the main watercourse (Sydney Metro 2020). Further development, and the introduction of further hard surfaces and water management infrastructure in the area, will most likely further mitigate any flooding risk.

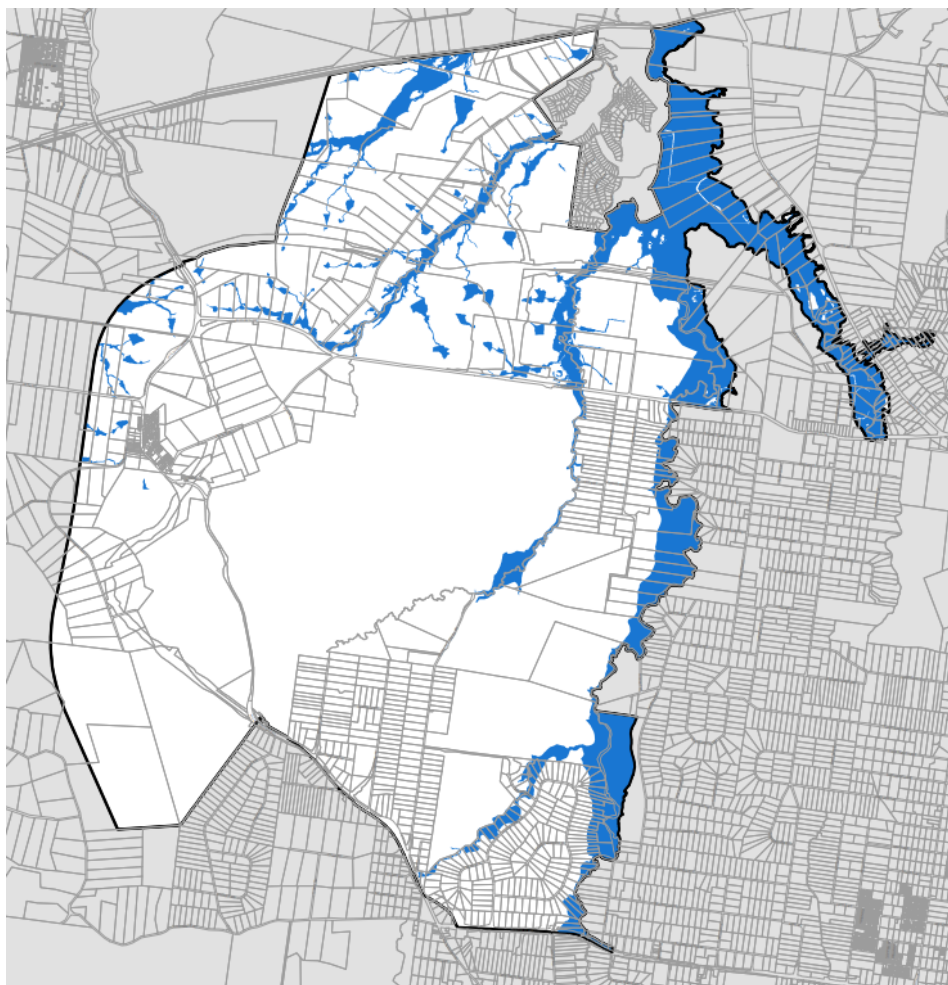


Figure 9.6 1 in 100 AEP flood extent (Source: SEPP Western Sydney Parkland maps).

xix Geology and soils

The project is located within the Sydney Basin and traverses a number of geographic formations. In some areas, the project overlies areas of Ashfield Shale and Bringelly Shale formations (Artefact 2022a). Ashfield Shale composes of laminate and dark grey shale, and is separated from Bringelly Shale by Minchinbury Sandstone, a medium to fine grained lithic quartz sandstone. Bringelly sandstone consists of shale, calcareous claystone and laminate. In places closer to streams and waterlines, the underlying geology within the study area consists of Quaternary alluvium which is derived from Wianamatta Group shales and Hawkesbury Sandstone. One small area of the project along Elizabeth Drive is situated within the Londonderry clay formation.

The project also covers a number of soil landscapes, predominantly the Luddenham Erosional landscape and the Blacktown Residual landscape. (Artefact 2022a). Luddenham soils are generally shallow (<100 centimetres (cm)), dark Podzolic Soils of massive Earthy Clays on crests. On upper slopes, soils consist of moderately deep (70 – 150 cm) Red Podzolic Soils. On lower slopes and drainage lines, soils are generally moderately deep (<150 cm) Yellow Podzolic Soils and Prairie Soils. Blacktown soils are shallow to moderately deep (>100cm) hard-setting and mottled Red and Brown Podzolic Soils on crests. On lower slopes and drainage lines, Yellow Podzolic soils occur. In portions of the study area that are located closer to streams and waterlines, soils of the South Creek alluvial landscape can be found. These soils are very deep layered soils that overlie bedrock or relict soils.

xx Future land use vision

NSW Government's Western Sydney Aerotropolis 'What we heard: Community consultation report' (NSW Government 2019) (WSA Community Report) notes that the Aerotropolis has been planned around the network of waterways to create environmental, social and amenity benefits. The Government has sought innovative approaches to incorporate specific landscape and waterway features into the design of new communities.

EE will undertake its work in line with Government objectives and will ensure that any works undertaken consider the natural landscape and waterway features into its project design, as well as the assessments undertaken for the project and outlined in this REF.

9.5.3 Impact assessment

The project will be contained within the road reserves, apart from key locations where under boring will occur (refer to Chapter 7) and where joint bays are required. The depth of the under boring activities will vary depending on the underlying geology and specific conditions in each of the boring locations, however will occur to an approximated depth of 2 m. The typical cross section and further information about boring is provided in Section 7.3.2 of this REF.

Under bore activities will be planned in detail supported by geotechnical investigations, to ensure that the depth of boring is appropriate and all necessary construction techniques are observed for the specific context of the under bore area.

Activities such as trenching and under boring, that have the potential to impact on the water quality of the surrounding area need to be managed. Disturbance to the soil and risk of erosion and sediment run-off will be greatest during the construction of the project, which can occur as a result of:

- rain occurring whilst trenches are open;
- groundwater entering the holes and trenches; and
- inadequate erosion and sediment control measures.

Given the presence of the Luddenham Erosional landscape, and the erosion risk associated with the presence of dispersive soils priority should be given to the prevention, or at least minimisation, of soil erosion rather than allowing erosion to occur and relying on sediment control measures to trap and contain sediment and turbid runoff. The risks of erosional soils reduce closer to waterways. Given that road surfaces are covered by sealed surfaces, the risk of sedimentation will be greatly reduced. It will be easy to regularly sweep and clean these areas. The greatest erosion risks during the construction works when potentially dispersive soils are exposed such as with open trenches.

Another risk is the storage and/or stockpiling of fill material that will need to be removed from site. Stockpile management will be a key element for inclusion in the CEMP, particularly in relation to location, drainage and appropriate handling and removal from site.

Given that the works will be contained within road reserves, and temporary in nature, the risk of flooding should not affect the project. The surrounding landscape is currently undergoing a transformation that will mitigate any future risks associated with flooding events.

There is the potential for frac-outs to occur when water and/or other lubricants used in the boring process escape from the confines of the borehole. Frac-outs will be known immediately by the operator from a drop in pressure. Once a pressure drop occurs, the machine will be switched off and visual inspection for frac outs will commence. Frac outs can be managed using the mitigation measures outlined in the section below.

A combination of management and mitigation measures should be implemented to control offsite impacts of this risk, in particular when working close to any waterways.

9.5.4 Management and mitigation measures

The key objective of any water management and mitigation measures should be prevention of pollution, erosion prevention and sediment control. The practices that will be implemented during construction, and in particular any under boring activities, are described below.

Pollution control measures, erosion and sediment control

The objective of erosion and sediment control practices will be to take all reasonable and practicable measures to minimise short- and long-term soil erosion, while minimising sediment transport. This will be achieved by applying the principles of erosion and sediment control detailed in Landcom (2004) to the identified site constraints and erosion hazards.

The following management and mitigation measures will be applied during construction:

- spill kits will be available at all work sites, and all persons undertaking construction works will be made aware of EE's incident response procedures.

- soil and water management will be conducted in accordance with EE's standards and Environmental Guidelines Handbook;
- the Project Manager/ Supervisor responsible for construction works will be required to develop a site specific Erosion and Sediment Control Plan as part of the CEMP;
- disturbance will be restricted to those areas of the project route required for the active stage of works;
- detailed geotechnical investigations will be undertaken if necessary prior to establishing the underbores along the underground section of the project route;
- any soil tracked on the roadways will be swept up on a regular basis;
- no fuels, oils or other chemicals are to be stored at worksites unless small amounts are required for that specific days' work;
- refuelling and maintenance of vehicles, plant and equipment will not be carried out on site. All vehicles, plant and equipment are to be refuelled prior to arriving on site;
- the sequencing of construction and drainage, erosion and sediment control works will allow for the installation of the temporary drainage system, and preferably the permanent stormwater drainage system as soon as practicable;
- where necessary, additional erosion and sediment controls will be installed during periods of highest rainfall risk (April to October);
- all drainage, erosion and sediment control measures will be maintained in proper working order until their function is no longer required;
- flagging tape or bunting will be used during construction to minimise the potential or any disturbance outside of the designated work areas;
- upon decommissioning any stage of works, erosion and sediment control measures, all materials used to form the control measures will be removed and/or disposed of appropriately;

Excavated material measures

- Excavated materials are to be taken off site each day. Where it is necessary to store spoil or other loose materials on site, sediment fences are to be constructed on the down slope side of the stockpile;
- permission of the landowner is to be sought prior to establishing site compounds or stock piling on their land;
- spoil management and dewatering of worksites will all be managed in accordance with the following EE Standards and the Environmental Guidelines Handbook which are all available on the EE Standards and ASP Website:
 - EMS 0007 – Waste Management;
 - EMS 0008 – Environmental Incidence Response and Management;
 - EMS 0013 – Spoil management;
 - EMS 0014 – Dewatering worksites;

Contamination of soil measures

- an unexpected finds protocol will be prepared and implemented, as part of the CEMP, to manage any contamination which may be encountered during construction works;
- should contamination be identified, an assessment of deeper soils, leachability and/or groundwater may be necessary to assess potential impacts to South Creek and Cosgroves Creek;
- in the event that acid sulphate soils (ASS) are exposed during excavation works, these soils will be managed in accordance with EE's Generic Acid Sulphate Soil Management Plan – Annexure C of EMS0013 Spoil Management;

Inspection and maintenance

- the construction, inspection and maintenance requirements for all drainage, erosion and sediment control measures will be specified in the CEMP;
- inspections will be undertaken 24 hours prior to predicted rainfall events and immediately following rainfall events that cause run-off, and weekly during periods of no rain; and
- all clean and dirty water, debris and sediment removed from drainage, erosion and sediment control measures will be disposed of in a manner that will not create erosion, sedimentation or a pollution hazard.

Under bore management

Drilling Management Plan to minimise effects of impacts, including:

- Contain and monitor drilling fluids at entry/exit points
- Identify and manage frac outs
- Re-use and/or disposal of drilling fluids
- The drilling reception and launch site will be restored back to original or better conditions on completion of the works.
- Double sediment and erosion controls and a standby vac truck are required during under bore works. This will act as a second line of defence to stop any run-off/ frac-out exiting the work area.
- In the event of a frac-out, works would immediately cease, and spill kits/vacuum trucks would be used to clean up the sediment. The drilling contractor would be responsible for ensuring that spilled fluids are suitably disposed of or recycled where appropriate.
- The Site Supervisor would notify the Environmental Advisor and Project Manager who will co-ordinate any clean up actions.
- Drilling fluid/waste will be collected and stored in sealed holding tanks and recycled as appropriate. Excess fluid/waste will be removed from site via a licensed vacuum truck and disposed of at a licensed waste facility. No water will be released on to the ground.
- Drilling water and lubricating fluids will be reused wherever possible prior to their disposal at a licensed waste management facility.
- A functioning 'spill kit' will be kept near the drill rig at all times for immediate clean-up of accidental chemical/fuel spills. Any contaminated spill rags are to be disposed of at an approved waste facility

9.6 Utilities and services

A detailed Dial Before You Dig (DBYD) search will be conducted for all services in the vicinity of the project route as part of the final project design and prior to construction commencing. Where necessary, relevant authorities and customers will be contacted regarding potential impacts on their services.

9.6.1 Management and mitigation measures

- The Project Manager will conduct DBYD searches prior to works commencing on site.
- The Project Manager will notify impacted residents and businesses regarding any potential interruptions to electricity supply prior to these outages occurring in accordance with National Energy Customer Framework (NECF) requirements.

9.7 Roads, traffic and access

9.7.1 Overview

As previously noted, the project will involve the installation of the feeder along an approximately 4 km stretch on Bakers Lane extending westerly to Luddenham Road. The construction works will predominantly occur within the road reserves, and any trenching activity will be contained within the bitumen surfaces of the road corridor towards the centre of the road lane and no closer than 500 mm to the white lane markings which are located towards the outer edge of the paved road surface.

The following section describes the road, traffic and access impacts resulting from the construction and operation of the project.

9.7.2 Existing environment

xxi Local road network

The local road network carries high volumes of passenger vehicle and truck movements, and some parts may even carry plant and machinery for farming given the proximity to agricultural premises.

The project traverses predominately Bakers Lane and extends westerly to Luddenham Road.

The project will impact the Mamre Road/Bakers Lane intersection.

xxii Traffic movements

Traffic movements anticipated during the construction of the project are outlined in Chapter 7.

xxiii Crash and casualty statistics – NSW general view

A search of TfNSW's Centre for Road Safety 'Crash and casualty statistics – NSW general view' has identified 2 separate crashes on Bakers Lane:

- non-casualty (tow away) at the intersection of Bakers Lane and Mamre Road; and

- moderate injury at the intersection of Bakers Lane and the access road to Trinity Primary School, Emmaus College and Emmaus Retirement Village.

9.7.3 Impact assessment

xxiv Construction

Traffic accessing adjoining residential, commercial and industrial premises could be affected during road works. For this reason, EE will need to manage road closures, partial road closures, traffic and pedestrian access around worksites and property access during the construction of the project.

The linear nature of the project route will ensure that the works will be progressively moving along the project route and that access to driveways and properties will not be completely restricted or restricted for extended periods of time. Impacts will be short term only, at any given location.

In instances where access will be restricted for longer periods, such as in the vicinity of cable joining works and under boring works, notification to and consultation with the affected residents will be undertaken in advance of their access being blocked.

Project works may require sections of impacted roads to be closed for specific period of time over the construction period. Road occupancy permits will be obtained from TfNSW and Councils as required.

Use of electronic signage in advance of construction commencing may be appropriate in strategic locations along the project route to advise residents and road users of the upcoming works.

Delivery, construction and workers vehicles will be parked safely on the road verges and within private properties in a safe and appropriate manner at all times.

xxv Operation

Following completion of construction works, vehicle movements will return to current operational levels. This will also involve the intermittent access by EE and its contractors to the feeder line easement for maintenance purposes.

9.7.4 Management and mitigation measures

The following management and mitigation measures will be implemented to minimise traffic and access impacts:

- Transportation and equipment deliveries will be in accordance with TfNSW and Council requirements.
- All other appropriate permits will be obtained from the relevant road authorities prior to construction commencing, and works will be conducted with these permits.
- A Traffic Management Plan (TMP) will be prepared as required, and included as part of the overarching CEMP.
- Designated worksite areas along the route are to be of sufficient size to accommodate skip bins if required and include room for the loading, unloading and manoeuvring of trucks.
- Electronic signage may be used if considered appropriate in advance of construction commencing to advise residents and road users of the upcoming works.
- Traffic control and safe pedestrian pathways will be established and maintained around worksites, as required for the duration of the construction works.
- Every effort will be made to restore access to properties at the end of each day's work.
- Sufficient notice will be given to residents along the project route before construction commences.
- Open points and trenches will be covered and/or fenced when workers are not in attendance at these sites.
- Vehicles will not block access to residents' properties at any time.
- Worksites and any other assets, including lawns and grass verges along the project route will be restored to the condition that they were in prior to construction commencing.

9.8 Visual assessment

The project will result in temporary changes to the appearance of the project route, along the impacted road network. However, as previously noted, all construction works will be temporary in nature and works will be rehabilitated as soon as they are completed. The feeders will all be underground with none of the alignment

utilising overhead poles. Thus, in the long-term the project is not expected to have any impacts to the visual nature of the area.

9.9 Socio-economic impacts

The project may temporarily affect the local community as a result of minor increases in dust and air quality emissions, noise, traffic and access and visual amenity. These impacts have been considered in the REF and mitigation measures proposed in order to manage and/or mitigate these impacts, which will be temporary in nature.

The project will, however, result in long-term social benefits for the Western Sydney Growth Area, the Western Sydney Airport and the many new precincts and infrastructure projects in this area. The project will provide safe, reliable and cost-effective electricity supply for local residents, commercial and industrial users/operators.

Furthermore, economic benefits associated with the project include an increase in employment during the construction phase of the project.

Project needs and benefits are addressed in Section 2.3.

9.10 Noise

9.10.1 Construction noise

Construction works associated with the project will result in some noise generation. Typical noise generation for the construction of the project will include concrete cutting and excavation machinery, large backhoe and trench digging equipment, directional digging and under bore equipment. It will also include other small items of plant, and light and heavy vehicles used by the construction contractors and traffic controllers.

Construction will generally be restricted to standard construction hours:

- Mondays to Fridays: 7:00 am to 6:00pm;
- Saturdays: 8:00 am to 1:00 pm;
- Sundays and Public Holidays: No work.

Should construction works need to be conducted outside the times specified above, specific management measures will be implemented to notify nearby residents and other receivers of the works to be undertaken. This might include under bore operations which may (subject to geotechnical information and detailed under bore design) need to be completed outside of standard work hours, if continues works are required to ensure safe completion of the operation. The approximate locations of the under bore operations from Luddenham Road to Twin Creeks, Cosgrove Creek and South Creek are shown on the figure below in relation to potential stakeholders (as green dots) who might be affected by out of hours noise.

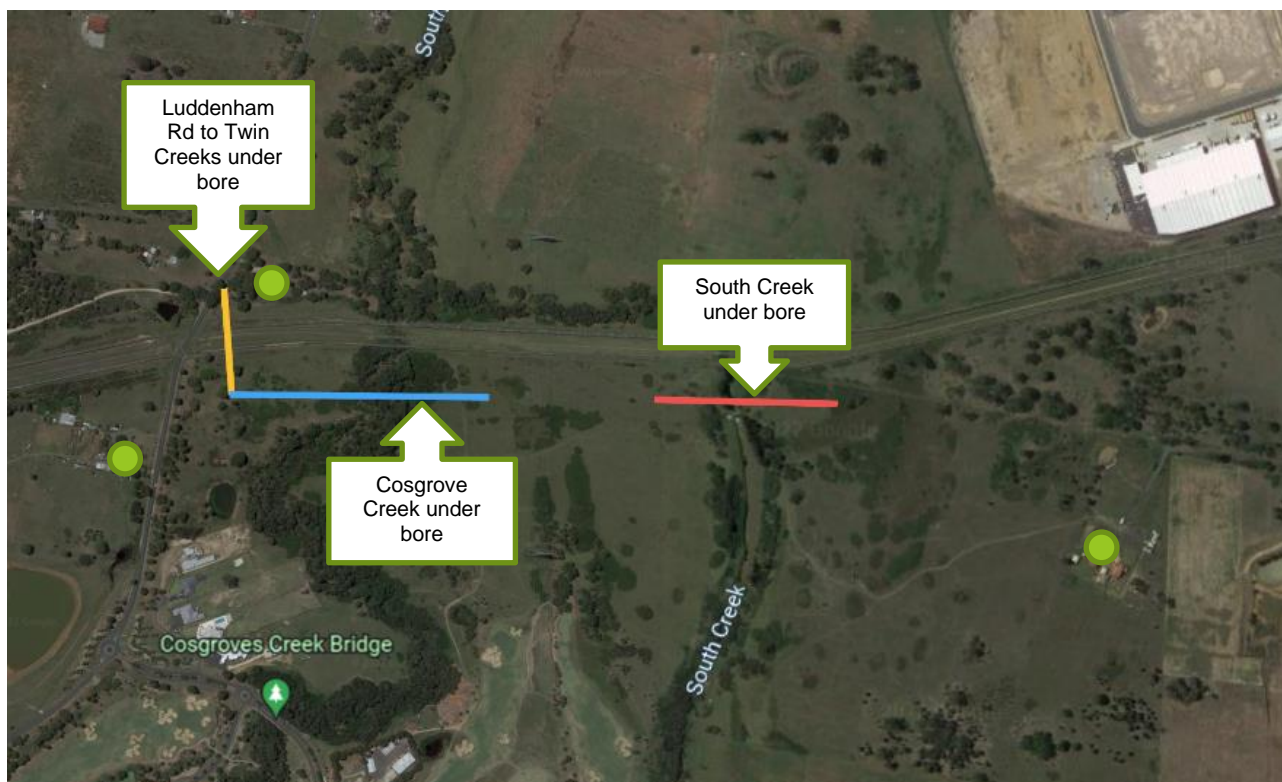


Figure 9.7 Under bore locations and potential sensitive receptors

Given that the feeder is being constructed mostly through rural areas, it is anticipated that construction noise should not greatly disturb many residential, commercial, and industrial premises. There are several sensitive receivers located along the Stage 2B and 3B alignment, including Mamre Anglican School, Emmaus Catholic College in addition to private residences. These receivers may be affected by the noise from construction works. However, it is important to note that construction works will only be for a duration of 6 months for civil works and another 6 months for cable laying and pulling across multiple locations within the 4 km alignment. The lineal nature of the works is such that noise generation will transit or move along the feeder route and not occur at a particular location for an extended period, and will thus be short-lived.

Feasible and reasonable noise mitigation and management measures will be implemented for the duration of construction works.

9.10.2 Operational noise

Once commissioned, the project (ie the feeder) will operate continuously, 24 hours a day, 7 days a week. It will generate no noise when in operation.

9.10.3 Management and mitigation measures

The following management and mitigation measures are recommended for the duration of construction works:

- Appropriate approvals are to be obtained from the affected Councils and the TfNSW as required prior to commencing construction.
- All potentially affected residents should be notified prior to the commencement of construction works. Details are to include the likely duration of the works and 24-hour contract details for the Project Manager and Construction Contractor.
- Construction works must be carried out within normal working hours unless otherwise approved. Any out-of-hours-works will be carried out in accordance with the requirements of EE's Environmental Guidelines Handbook.
- Should power generators be required to supply private properties during any stage of the construction works, the Project Manager must liaise with the S&E team. If generators are required to operate at night, acoustic consultants may be required to undertake noise assessment prior to their use.

9.11 Air quality and dust suppression

9.11.1 Construction

The project has the potential to generate dust and other air emissions as a result of the construction works including trenching, excavation, under boring, vehicle emissions and vehicle driving over any loose construction material or unsealed surfaces.

As previously mentioned, areas disturbed by construction works will be progressively rehabilitated as works are completed.

Dust and exhaust emissions, such as exhaust emissions generated from construction plant and vehicles, would be temporary.

Thus, the impact of the project on the air quality in the surrounding environment will be temporary and minor.

9.11.2 Operation

During operation, the project is expected not to have any impact on air quality of the surrounding environment. Minor emissions are expected to be generated by maintenance vehicles, which will be comparable to that of other vehicles on the roads of the local road network.

9.11.3 Management and mitigation measures

The management and mitigation measures listed below will be implemented to ensure the amount of dust and emissions generated by the construction works are minimal.

- Visually monitor dust levels during construction works. If excessive dust generation is occurring on site, causing a safety issue or complaints are received, immediately follow appropriate mitigation options.
- Any disturbed areas will be revegetated or resurfaced as soon as possible after works have been completed in that area.
- Traffic movement and speed will be restricted over disturbed areas of ground and unsealed access tracks.
- Ensure any soil/spoil tracked onto roadways is swept up on a regular basis.
- Excavated materials are to be either spread out on site or removed off site immediately; no loose or stockpiled materials are to be stored without appropriate sediment controls or left uncovered for a long time.
- Vehicles and machinery are not to be left idling when not in use so as to reduce exhaust emissions.
- Dust suppression techniques, including wetting down surfaces will be used as necessary.
- Reference is to made to EE's Environmental Guideline Handbook for dust mitigation and management techniques.

9.12 Safety and hazards

9.12.1 Construction

All components of the project will be designed and constructed in such a manner so as to meet all statutory safety requirements in accordance with the EE's design and construction standards, and the relevant Australian Standards.

Safety precautions will be implemented throughout the construction works for the protection of the surrounding community, the workforce, road users, pedestrians, and local residents. Hazards which may arise during the construction works, such as open pits, open trenching, under boring entrance and exit pits, machinery and vehicle movements and changes to road and traffic conditions will be managed appropriately.

9.12.2 Operation

Once in operation, project components will be inspected and maintained in accordance with EE's maintenance standards and electricity industry requirements.

9.12.3 Management and mitigation measures

The following mitigation measures will be implemented to ensure management of safety and hazards

- Any worksite areas will be cordoned off with security fencing to direct pedestrians away from any excavations or open manholes.
- Safety signage, barriers, fencing, etc will be placed around construction areas, as required. These will be checked on a regular basis to ensure they are in adequate working condition.
- The works will not occur on days that have extreme or catastrophic fire rating.

- Any recommendations in the TMP will be implemented during the construction works.
- Any open holes that are left unattended at any time will be covered and fenced as necessary to prevent access.
- All works will be undertaken in accordance with Safework NSW requirements, EE standards and procedures and any other applicable requirements.

9.13 Bushfire

Bushfire prone land is mapped within a local Government area, which becomes the trigger for planning for bushfire protection. The results of the NSW Rural Fire Service search for 'bush fire prone land' conducted on 24 July 2022 shows that most of the project route falls within bush prone land of some category.

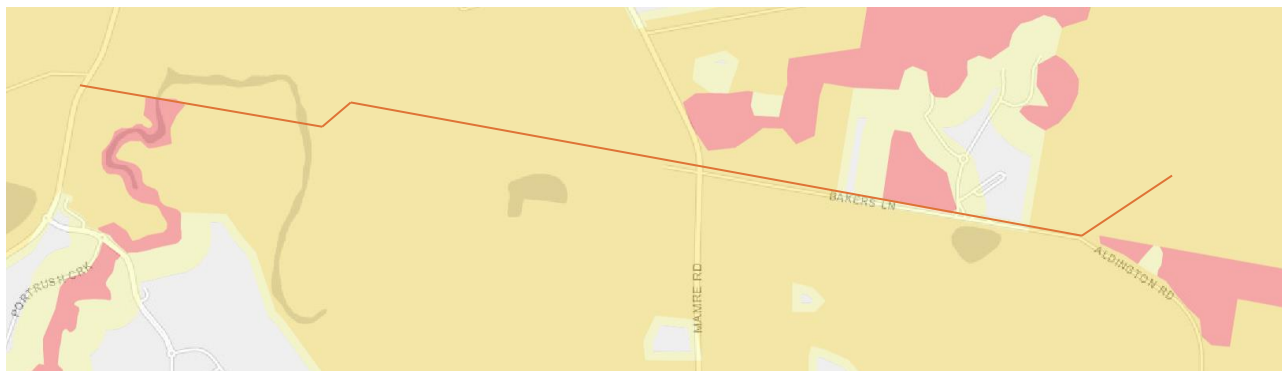


Figure 9.8 NSW Rural Fire Service search results for 'bush fire prone land' along the Stage 2B and 3B alignment (approximate alignment location shown in red)

9.13.1 Management and mitigation measures

The CEMP prepared for the project will make provision for the following bushfire protection measures:

- a site induction for contractors working on the project will include general bushfire protection measures and requirements;
- electrical equipment, plant and equipment to be used for construction works will be maintained in operational order to prevent any potential sparks;
- all legislative requirements regarding safe work procedures will be adhered to, including chemical handling and storage;
- an emergency management plan will be developed as part of the CEMP, which is to include protocols in how to respond to bushfire incidents, including evacuation during construction;
- any works that have the potential to generate heat and sparks will be restricted on days of declared catastrophic fire danger;
- vegetation clearances will be established to construct the feeder and maintained thereafter;
- construction waste will be removed from the site in a timely manner so as not to cause a fire risk or obstruct emergency vehicle access; and
- the project will be constructed and maintained in accordance with EE Company Procedure GAM 0011.

9.14 Waste

9.14.1 Construction

Activities associated with the construction of the project have the potential to generate waste, including surplus construction materials, old conductors and cables, general waste and excess spoil. As previously noted in Chapter 7, approximately 6,400 m³ of fill material is expected to be removed from site.

Other wastes might include:

- Drilling fluids
- Construction worker generated general waste
- Unused raw materials
- Wastewater

All waste generated during construction will be reused if appropriate, or removed, transported, and disposed from site in accordance with the NSW Environment Protection Authority's *Waste Classification Guidelines* (EPA 2014) and the POEO Act.

9.14.2 Operation

Once constructed, the project will generate minimal waste, with the exception of any maintenance works that may be required throughout its operational life.

9.14.3 Management and mitigation measures

Measures to prevent adverse impacts in relation to generated waste will include:

- Waste mitigation and management strategies will be documented in the CEMP and in accordance with EE's Environmental Management Standard EMS 0007 Waste Management.
- Waste material generated on site will not be left on site once the works have been completed.
- Any excess waste or spoil will be disposed of at a licensed waste or recycling facility as appropriate.
- All excavated spoil will be classified prior to disposal and/or re-use. Waste disposal dockets will be obtained from the licensed waste disposal facility and copies retained for audit purposes.
- Where excavated spoil is suspected to be contaminated, works will immediately cease and the Project manager and the relevant Environmental Specialist notified. Spoil suspected of being contaminated will be tested to provide a waste classification for disposal.
- All other waste materials, including drilling fluid or materials, will be removed from the work site at the end of each working day and transported to an appropriately licensed waste facility if required. Where items are able to be recycled, the materials will be sorted and stored at an appropriate site (eg the nearest Field Service Centre) for collection and recycling.

9.15 Cumulative impacts

The NSW Government is working closely with Councils and industry stakeholders to coordinate and refine development associated with the Aerotropolis and the surrounding precincts. Together, the different levels of government are coordinating the delivery of multiple projects that have been planned out for the Western Sydney Growth Area. Some of these projects include:

- Bringelly Road upgrade
- Elizabeth Drive
- The Northern Road Upgrade
- M12 Motorway linking the M7 Motorway to the Western Sydney Airport
- Sydney Metro – Western Sydney Airport
- The development of multiple precincts within the growth region that will contribute to agriculture (food security), education and technology, health, services, jobs and infrastructure

The cumulative impacts of all these developments have been considered in each of their respective environmental assessment documents. This project is small in comparison to the development and infrastructure works currently transforming the Western Sydney Growth Area, and will only be minor in terms of impacts that will arise from these larger projects. Nevertheless, any immediate cumulative impacts such as traffic congestion, noise or air quality and dust impacts will be addressed on a case-to-case basis using the management and mitigation measures provided in this REF, and standard best practice approach that EE employs during the construction of their projects.

In addition to those regional projects listed above associated with the Western Sydney Growth Area, local projects located within the close vicinity of the Stage 2B and 3B alignment include construction of 'The Yards' and the 'Oakdale West Industrial Estate'. Construction for these projects have already commenced.

10 Conclusion

The investigations undertaken as part of this REF have shown that the construction of the new Stage 2B and 3B alignment will have minimal environmental impacts and should proceed subject to the mitigation measures outlined herein and in accordance with any other additional management and mitigation measures (or conditions) required by the determining authority.

There are some aspects that require further investigation

- Potential impacts to AHIMS sites that require an ACHA, test excavation and potentially an AHIP approval; and
- Development of detailed under bore design to underpin appropriate consultation with nearby receptors should out of hours operations be required.

Notwithstanding, the environmental assessment has concluded that the project will not have a significant effect on the environment.

It is therefore concluded that:

- an EIS is not required for the project;
- EE makes a formal determination in relation to the project;
- a separate REF will be prepared for other construction stages of the project; and
- it is required that all works be undertaken in accordance with this REF, any Notice of Determination issued in relation to this REF, the associated CEMP and any other specific mitigation measures that have been developed for this project.

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Appendix A Design Plans

Appendix B Aboriginal Heritage Due Diligence (Artefact 2022a)

Appendix C Aboriginal Heritage Due Diligence (Artefact 2022b)

Appendix D Historic Heritage Assessment (Artefact 2022c)

Appendix E Draft Flora and Fauna Assessment (GES 2022)