

Sydney Science Park Zone Substation development

Review of Environmental Factors

Prepared for Endeavour Energy

October 2023

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Endeavour Energy

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October 2023

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5				

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Executive Summary

Endeavour Energy (EE) proposes to establish a new zone substation (ZS) constructing from July 2023 within part lot 6 DP 255578 at 480 -544 Luddenham Rd, Luddenham, NSW as part of the electricity distribution strategy for the Sydney Science Park (SSP) and surrounding areas (the project). EE is purchasing the land from Celestino and the ZS will be owned and operated by EE. SSP is a 288 hectare (ha) mixed use greenfield development which will deliver a range of land uses for residential, educational, commercial, research, retail, and recreational purposes.

The SSP site is located within the Broader Western Sydney Employment Area (WSEA) and is associated with the Western Sydney Airport growth precinct developments, which are described as a smart city that will create an internationally recognised epicentre for research, development, education, commercialism, and innovation. The establishment of a zone substation is required to connect infrastructure within the SSP and surrounding area to EE's broader electricity distribution network. The project is the subject of this Review of Environmental Factors (REF).

This REF has been informed by the following technical reports which can be found in the Appendix:

- Geotechnical Investigation
- Aboriginal Cultural Heritage Assessment Reports
- Heritage Impact Assessment
- Flora and Fauna Assessment
- Ecological Assessment
- Detailed Site Investigation
- Noise Impact Assessment.

This REF details the possible environmental impacts associated with establishment of the substation and identifies mitigation measures to be incorporated into the design, construction, and operation of the substation to minimise environmental impacts.

The main environmental risks associated with the project are around Aboriginal heritage and biodiversity. The project will result in unavoidable and direct disturbance to artefacts associated with an AHIMS site, however, two separate AHIPs will be sought by Celestino prior to the commencement of works. Additionally, 1.93 hectares (ha) of exotic vegetation and 0.51 ha of a poor condition Threatened Ecological Community (TEC), Cumberland Plain Woodland, will be disturbed. Disturbance is unlikely to result in a significant impact to the TEC.

Mitigation measures identified in Chapter 8 of this REF would be included in the Construction Environmental Management Plan prepared for the project for the purposes of managing any potential environmental risks associated with the project.

EE is the Determining Authority for the project. 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).

Decision Statement

The REF concludes that:

- The project is not likely to have a significant impact on the environment and accordingly, an Environmental Impact Statement (EIS) is not required.
- The project will not be carried out in an area of outstanding biodiversity value and is not likely to significantly affect threatened species, populations, ecological communities, or their habitats. The project is not likely to impact biodiversity, therefore a Species Impact Statement is not required.
- The project is not likely to significantly impact on matters of national environmental significance or the environment of Commonwealth land, therefore a referral to the Australian Government Department of Agriculture, Water and Environment is not required under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- Provided the mitigation measures identified in Chapter 8 of this REF are included in the CEMP and followed, the proposed activity is unlikely to significantly affect the environment.
- AHIPs will be sought by Celestino prior to the commencement of works.

Certification

I certify that I have reviewed and endorsed the contents of this REF document, and to the best of my knowledge, it is in accordance with the EP&A Act, the EP&A Regulation and the Guidelines for Division 5.1 Assessments approved under clause 170 of the EP&A Regulation, and the information it contains is neither false or misleading.

Prepared by	Approved by
Name: Ruth Kelly	Name: Mohammad Alam
Title: Associate Director	Title: Environmental Specialist
Company: EMM Consulting	Company: Endeavour Energy
Date: xxxx 2023	Date:
Signature:	Signature:

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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 Electricity Networks Assets (Authorised Transactions) Act 2015
ASP	Accredited Service Provider
CEMP	Construction Environmental Management Plan
DCCEEW	Department of Climate Change, Energy, the Environment and Water
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
EMP	Environmental Management Plan
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	Environmental Planning and Assessment Regulation 2021
EPA	Environment Protection Authority
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (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
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

Term	Meaning
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.
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

1 Introduction

1.1 Background

Endeavour Energy (EE) is a network electricity distributor operator servicing over 2.7 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).

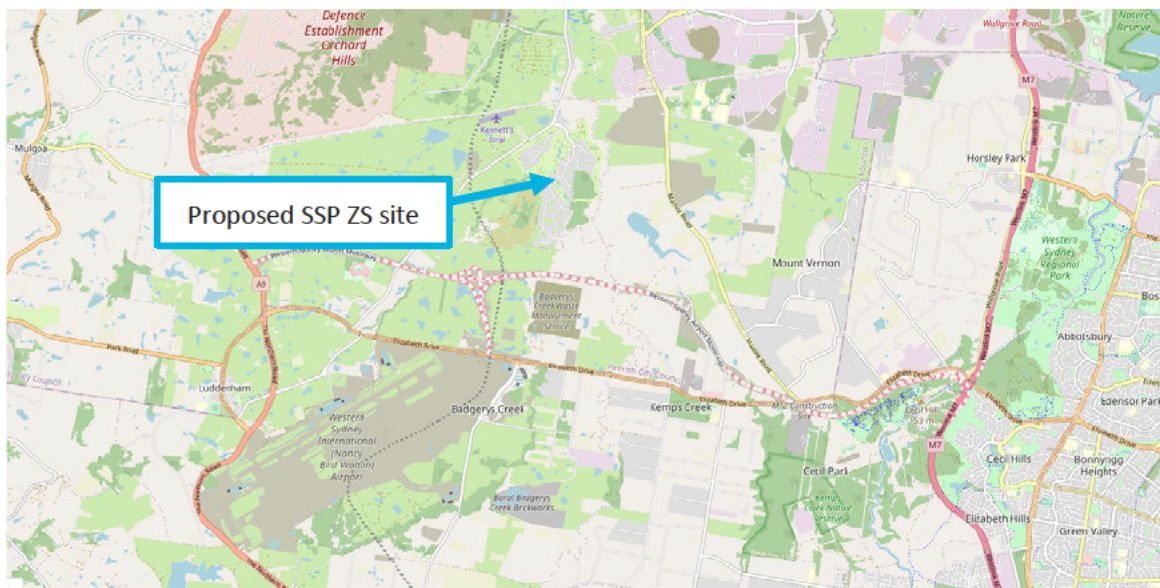
This proposal is for the establishment of a new zone substation (ZS) named Sydney Science Park (the project) in Luddenham, NSW by EE. The project is part of the electricity distribution strategy for the broader Sydney Science Park (SSP) and surrounding development. Establishment is proposed to commence in October 2023. EMM Consulting Pty Ltd (EMM) has been engaged by EE to prepare a Review of Environmental Factors (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).

The determining authority is EE 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.

This 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.

1.2 Location of the project

The project will be established at 480–544 Luddenham Road, Luddenham, legally defined as Lot 6 Deposited Plan (DP) 255578. The subject site is located approximately 23 kilometres (km) west of Parramatta and 42 km west of the Sydney Central Business District (CBD). The regional and local settings of the site are shown in Figure 1.1 and Figure 1.2.



Source: Metro Maps

Figure 1.1 Regional setting of Sydney Science Park Zone Substation



Source: Endeavour Energy

Figure 1.2 Local setting of Sydney Science Park Zone Substation

1.3 Proponent

Endeavour Energy is the proponent of the proposal. EE operate under national electricity laws, statutory instruments and policies which govern networks in the National Electricity Market. The EE network spans approximately 24,800 square kilometres and services over 2.6 million people across Sydney’s Greater West, the Blue Mountains, the Southern Highlands, Illawarra, and the South Coast of NSW.

EE is a regulated stand-alone power system pursuant to the National Electricity (NSW) Law, Section 6B.

EE is also constituted as a State-owned corporation under the *Energy Services Corporation Act 1995*.

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/

Table 1.1 **Proponent details**

Specification	Details
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 REF.

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 small number of additional sections added for greater clarity.

2 Project justification

2.1 Overview

The project site is located within the Greater Western Sydney suburb of Luddenham, which falls within a strategic growth area referred to as the 'Western Sydney Growth Area' and the 'Western Sydney Parkland'. The project is located within the Northern Gateway Precinct, a precinct of the Western Sydney Aerotropolis area, a growing area which is home to many new State Significant Precincts (SSP), State Significant Infrastructure (SSI), and State Significant Development (SSD) projects.

The project plays a key role within EE's broader distribution network to connect and provide electricity to this rapidly transforming part of Sydney, and to service new residential, commercial, retail, and educational premises within and around SSP.

This chapter describes 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 Parkland City

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 is the Western Parkland City, the location of which is shown in Figure 2.1. Government plans for Western Sydney have evolved in the last few decades, especially with the release of the Greater Sydney Region Plan 'A Metropolis of Three Cities' (the Greater Sydney Region Plan) in 2018 which projects the following growth for the Western Parkland City (GCC 2018a):

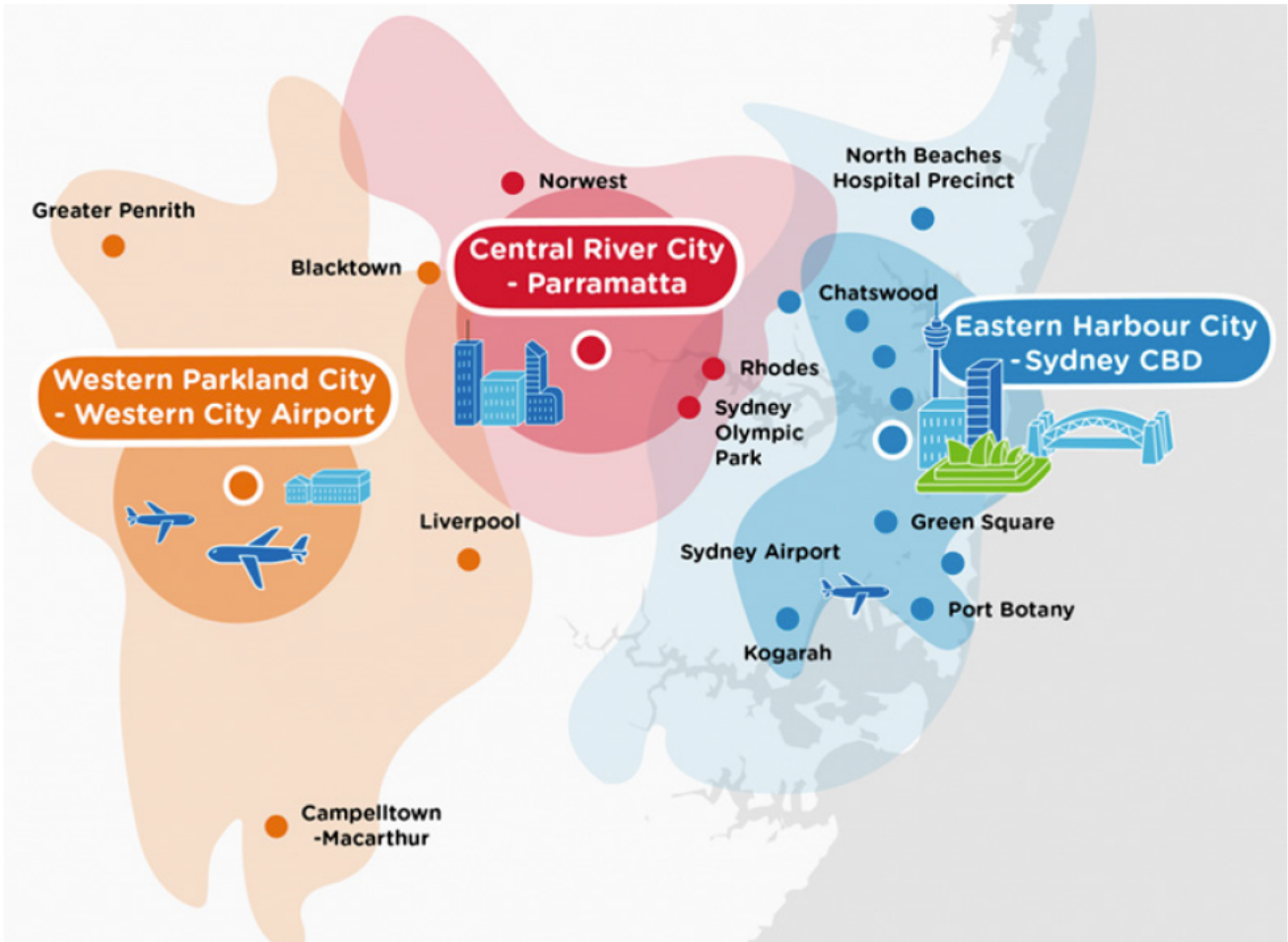
- Population increases from 740,000 in 2016 to 1,120,000 in 2036, which would include a 28% population increase in the 0–19-year-old bracket and a 17% increase in +65-year-old bracket.
- Approximately 210,000 additional dwellings between 2016–2036.
- Approximately 237,000 additional jobs between 2016–2036.

These projects have impacted the land use vision of Western Sydney; in particular, with the creation of the 'three cities' concept. Since the release of the Greater Sydney Region Plan, work on infrastructure and housing provision in Sydney's greater west has accelerated with significant investment in precincts, infrastructure, and development; particularly with large scale projects such as the Western Sydney Airport, the Sydney Metro, Sydney Science Park, Bringelly Road, Elizabeth Drive and the Northern Road upgrades, and others (GCC 2022). The provision of utilities is a critical component of this growth.

Furthermore, the proposal 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

- optimise infrastructure use.



Source: Investment NSW 2021

Figure 2.1 A Metropolis of Three Cities concept map

2.2.2 Western Sydney Aerotropolis Precinct Plan

Since the Federal Government’s announcement of Western Sydney Airport in 2014, the Government’s vision of the land surrounding the airport has been detailed in several 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.

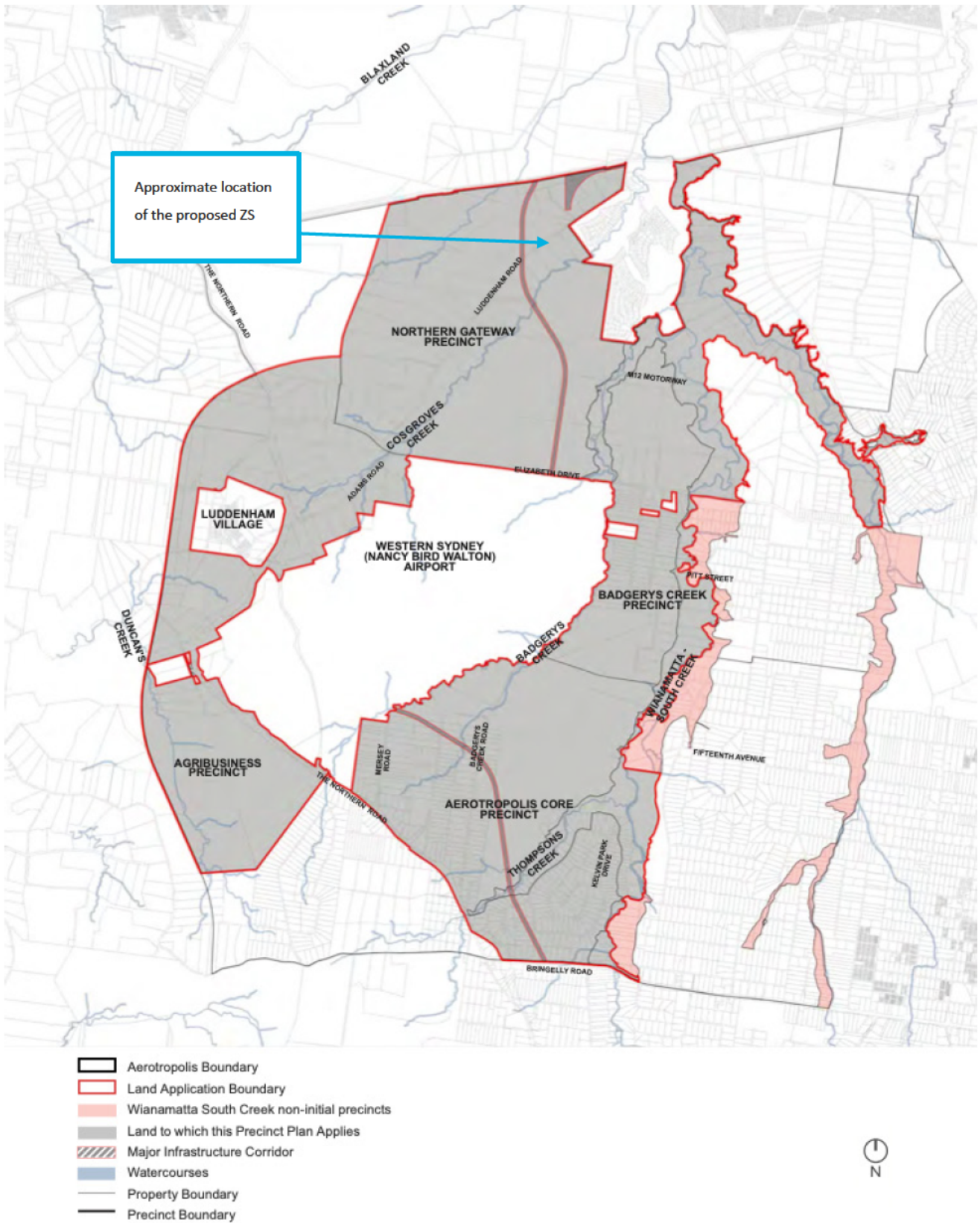
The project falls within the land application boundaries of the precinct that the Aerotropolis Plan applies to and is subject to the land use provisions under the Western Parkland City SEPP (refer to Section 3.4).

The project is crucial in supporting the development and servicing of SSP, which falls within the Northern Gateway Precinct – one of the key new state significant precincts within the Aerotropolis and the Western Parkland City.

The project aligns with several 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 utility designs and locations consider space for alternative future services and allow for multi-utility corridors in the future (objective IO6).

Thus, the project is crucial in servicing new infrastructure and development in the Western Sydney Aerotropolis Growth Area. The growth of the entire area is dependent on the delivery of safe, efficient, and cost-effective utilities, which EE is committed to providing as part of their broader transmission supply network in line with State Government plans, policies, and targets. The project is a key component of this broader transmission supply network, which will service the Aerotropolis and surrounding development.



Source: The Aerotropolis Precinct Plan DPE 2022a

Figure 2.2 Land application map

2.2.3 Northern Gateway Precinct and the Sydney Science Park

In 2018, the NSW Government projected that Penrith would have over 22,000 new local jobs as a result of the recent land use planning for land surrounding the Western Sydney Airport (PCC 2018). These new opportunities will be located within the Northern Gateway Precinct, at the entrance to the Western Sydney Airport.

The NSW Government has a vision to develop the Northern Gateway Precinct which will be the centre for employment opportunities focusing on high technology, education, research, and development, with links to food production and processing. The Northern Gateway Precinct will have synergies with the adjacent Western Sydney Airport Business Park, which will be situated to the south of Elizabeth Drive. Overall, the vision of this new precinct is to complement the world-leading developments already underway in this part of Sydney.

The Northern Gateway Precinct will include SSP at Luddenham, which will comprise a town centre with commercial and residential buildings. SSP is forecast to create over 12,000 specialised jobs and unique future opportunities for collaboration and growth, resulting in valuable opportunities for residents of the Penrith area (PCC 2018).

The project is crucial in helping the NSW Government achieve its objectives for the Northern Gateway Precinct, as set out in the Aerotropolis Plan, including:

- Facilitate the development of a high technology employment precinct (objective O2¹).
- Facilitate a variety of industrial and business enterprises and diverse residential development in locations that support the principles of transit-oriented development (objective O3).

It is worthy to note the Aerotropolis Plan also includes measures to protect Cosgrove Creek. Cosgrove Creek traverses the subject site; however, the project will avoid impacts to any environmentally sensitive areas along the creek vegetation corridor.

2.3 Project need

The SSP development site covers an area of approximately 288 ha and is bound by the Warragamba to Prospect Water Supply Pipeline to the north, Luddenham Road to the east and existing agricultural land to the south and west.

SSP has been designed as a mixture of commercial, educational, residential, and industrial facilities. It is driven by development of the future Western Sydney Airport and Metro Western Line, from St Marys to the Western Sydney Airport, which will pass through the SSP.

2.4 Project objectives

The key objective of the project is to provide reliable electricity to meet the residual and actual load demand of SSP and surrounding development.

2.5 Project benefits

Residents, commercial and industrial business operators, and their customers will all benefit from safe and reliable electricity supply within SSP and surrounding areas.

¹ Section 2.4 of the Aerotropolis Plan, available: <https://www.planning.nsw.gov.au/-/media/Files/DPE/Plans-and-policies/Plans-for-your-area/Western-Sydney-Aerotropolis-Precinct-Plan-March-2022-final.pdf?la=en>

The NSW Government will benefit from achieving its goals of transforming the Western Sydney Growth Area into purposeful precincts that have been intended and planned out in the Aerotropolis Plan and the Western Parkland City SEPP, as well as numerous other strategic plans for the area.

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 Aerotropolis 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

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 provides for State environmental planning policies (SEPPs) and local environmental plans (LEP) to regulate development.

Relevant provisions from statutory instruments are examined below.

3.2.1 NSW *Environmental Planning and Assessment Act 1979*

i Development

The EP&A Act includes a definition of 'development' (refer Section 1.5 of the EP&A Act) being:

- (1) For the purposes of this Act, **development** is any of the following:
 - (a) the use of land
 - (b) the subdivision of land
 - (c) the erection of a building
 - (d) the carrying out of a work
 - (e) the demolition of a building or work
 - (f) any other act, matter or thing that may be controlled by an environmental planning instrument.
- (2) However, development does not include any act, matter or thing excluded by the regulations (either generally for the purposes of this Act or only for the purposes of specified provisions of this Act).

The proposed works are therefore considered to be development and the EP&A Act, and its supporting instruments apply.

Section 3.18 further states that an environmental planning instrument may provide for specified development to be carried out without development consent, or with development consent.

Further, Section 4.2 of the EP&A Act provides that an environmental planning instrument (such as a local environmental plan or State environmental planning policy) may provide for development to be carried out with consent.

The TISEPP (considered further below) provides at Section 2.44(1) that 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 (unless the land is reserved under the NSW *National Parks and Wildlife Act 1974*).

Therefore, the proposed project is permitted without consent.

The provisions under Part 4 of the EP&A Act therefore do not apply to this proposed development but the provisions of Part 5 of the EP&A Act are triggered because Division 5.1 of Part 5 defines 'activities' to include (amongst other things) the use of land, erection of a building and the carrying out of a work, provided that the activity is not exempt development, prohibited development or development which requires consent under Part 4.

ii Determining authority

Under Section 5.1 of the EP&A Act, the term 'determining authority' is defined as a Minister or public authority and, in relation to any activity, means the 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.

In this case, EE is the public authority by or on whose behalf the activity is to be carried out and is therefore a determining authority.

iii Environmental assessment

The EP&A Act also provides, at Section 5.5, that a determining authority in its consideration of an activity shall, notwithstanding any other provisions of this Act or the provisions of any other Act or of any instrument made under this or any other Act, examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity.

If the activity is found to be likely to significantly affect the environment, then Section 5.7(1) requires an environmental impact statement (EIS) to be prepared. As this activity is not likely to significantly affect the environment, an EIS is not required.

3.2.2 Environmental Planning and Assessment Regulation 2021

Section 171 of the EP&A Regulation stipulates that the determining authority must take into account certain prescribed environmental factors (Section 171(2)).

It is also stated (Section 171(3)) that a determining authority must prepare a review of the environmental factors that demonstrates how environmental factors were taken into account.

Those factors are considered within the Review of Environmental Factors (REF). Table 3.2 includes an itemised list of factors for the project.

Finally, Section 171(4) requires the REF to be published if the activity has a capital investment value of more than \$5 million, if it requires a permit under certain other legislation (e.g. *Heritage Act 1977*), or if considered in the public interest to do so.

3.2.3 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 prevail 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)
- all 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 the area of the project has already been rezoned under the 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 2022).

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 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.

3.2.4 NSW Code of Practice for Authorised Network Operators (ANO)

i 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.

ii 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 boundaries of the site, as shown in Appendix A, which will be within the subject site. In view of the assessment outlined in Chapter 0, and considering the mitigation measures outlined in Chapter 0 and the attached technical reports are implemented, the project is being assessed as a Class 4 proposal under the Code.

iii 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

Table 3.1 REF requirements specified in the NSW Code for Authorised Network Operators

Requirement	Summarised description	Addressed
	Discuss viable alternatives and any mitigation measures to be implemented.	Chapter 5 Consideration of alternatives
Certification	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.	Following the Executive Summary
The proponent, determining authorities and any required approvals	Identify the proponent and all determining authorities and required approvals for the activity.	Section 1.3 Proponent Section 3.2.4 NSW Code of Practice for Authorised Network Operators, Determining authority
The environment of the activity	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 9.2 Aboriginal heritage Section 9.3 Historic heritage Section 9.1 Visual assessment
	The REF must identify and describe Threatened Species Populations and Ecological Communities that are likely to occur in the area affected by the activity.	Chapter 8.4 Biodiversity
The impacts of the activity	The likely environmental impacts for all phases of the activity and describe their extent, size, scope, intensity and duration.	Chapter 8 Environmental assessment and mitigation
	As a minimum, the REF should document consideration of each of the factors listed in clause 171(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.	Section 8.4 Biodiversity
	List the sources and data the ANO relied on when preparing the REF.	References Appendices
Mitigating measures that will apply to the activity	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.	Chapter 9 Impact assessment and mitigation
Summary of impacts	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 9 Impact assessment and mitigation

Table 3.1 REF requirements specified in the NSW Code for Authorised Network Operators

Requirement	Summarised description	Addressed
Consultation	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	<p>The REF should describe:</p> <p>Whether the activity is likely to significantly affect the environment, in which case an EIS is required; and</p> <p>Whether the activity is likely to significantly affect Threatened Species, Populations, Ecological Communities, or their Habitats, in which case an SIS is required.</p> <p>Describe the reasons for these conclusions, referencing the more detailed assessments in the body of the REF for support.</p>	<p>Section 3.2.1i Transport and Infrastructure State Environmental Planning Policy 2021</p> <p>Section 9.2 Aboriginal heritage</p> <p>Section 9.3 Historic heritage</p> <p>Section 8.4 Biodiversity</p> <p>Section 9.1 Visual assessment</p> <p>Chapter 10 Conclusion</p>
	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

3.3 Commonwealth Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) outlines the Commonwealth Government’s role regarding 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:

- 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)
- 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.

An assessment of the project in consideration of flora and fauna protected under the EPBC Act was completed against a search of the Protected Matters Search Tool (PMST), as summarised in Table 3.2 below.

Table 3.2 Assessment against the EPBC Act

MNES and other matters protected by the EPBC Act	Search result	Predicted impacts
MNES		
World heritage properties	There are no world heritage properties (including buffer zones) within the search area.	No significant impact predicted.
National heritage places	There are no national heritage properties (including buffer zones) within the search area.	No significant impact predicted.
Wetlands of international importance (listed under the Ramsar Convention)	There are no wetlands of international importance located within the search area.	No significant impact predicted.
Great Barrier Reef marine park	There are no Great Barrier Reef marine parks within the search area.	No significant impact predicted.
Commonwealth marine area	There are no Commonwealth marine areas within the search area.	No significant impact predicted.
Listed threatened ecological communities (TECs)	There are seven listed threatened ecological communities recorded in the search area.	Cumberland Plain was identified in the project area, however, was identified as non-compliant with the condition criteria for this TEC under the EPBC Act. Therefore, no Assessment of Significance was completed.
Listed threatened species	There are 43 listed threatened species recorded in the search area.	No threatened flora species were identified. Potential habitat for three threatened fauna species was identified, including the Regent Honeyeater, Grey-headed Flying-fox and Latham's Snipe. A Test of Significance was completed, which identified no impact from the project.
Listed migratory species	There are 15 migratory species recorded in the search area.	No migratory species were identified within the project site during site surveys.
Other matters protected by the EPBC Act		
Commonwealth lands	There are 13 parcels of Commonwealth land within the search area.	No impact predicted as project will be contained within the site boundaries.
Commonwealth heritage places	There is one Commonwealth heritage place listed in the search area 'Orchard Hills Cumberland Plain Woodland' (Place ID 105317), located on The Northern Road in the suburb of Orchard Hills.	No significant impact predicted as ground disturbance will be confined to the site boundary.
Listed marine species	There are 21 listed marine species recorded in the search area. This includes mostly migratory bird species.	No listed marine species were identified within the project site during site surveys.

Table 3.2 Assessment against the EPBC Act

MNES and other matters protected by the EPBC Act	Search result	Predicted impacts
Whales and other crustaceans	No whales or other crustaceans have been recorded in the search area.	No significant impact predicted.
Critical habitat	There are no critical habitats in the search area	No significant impact predicted.
Commonwealth reserves terrestrials	There are no Commonwealth reserves terrestrials within the search area.	No significant impact predicted.
Australian marine parks	There are no Australian marine parks within the search area.	No significant impact predicted.
Habitat critical to the survival of marine turtles	There is no habitat critical to the survival of marine turtles within the search area.	No significant impact predicted.

3.4 Land use and permissibility

As previously noted, the subject site is located within the Penrith LGA. 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 takes precedence in terms of land use planning at the subject site.

The Aerotropolis Plan (DPE 2022a) shows the land use zoning to which the Western Parkland City SEPP applies including the area of the project (Figure 3.1). It is important to note that this land use zoning map has more detail than the land use zoning map provided in the NSW Government’s Planning Portal and ePlanning Spatial Viewer (Figure 3.2), and it is helpful in showing precinct, road, and local creek labels.

The subject site is predominately zoned ENT Enterprise, with a small portion of land on the north-west and south-east borders of the site zoned ENZ Environment and Recreation. The objectives of each zone are outlined below.

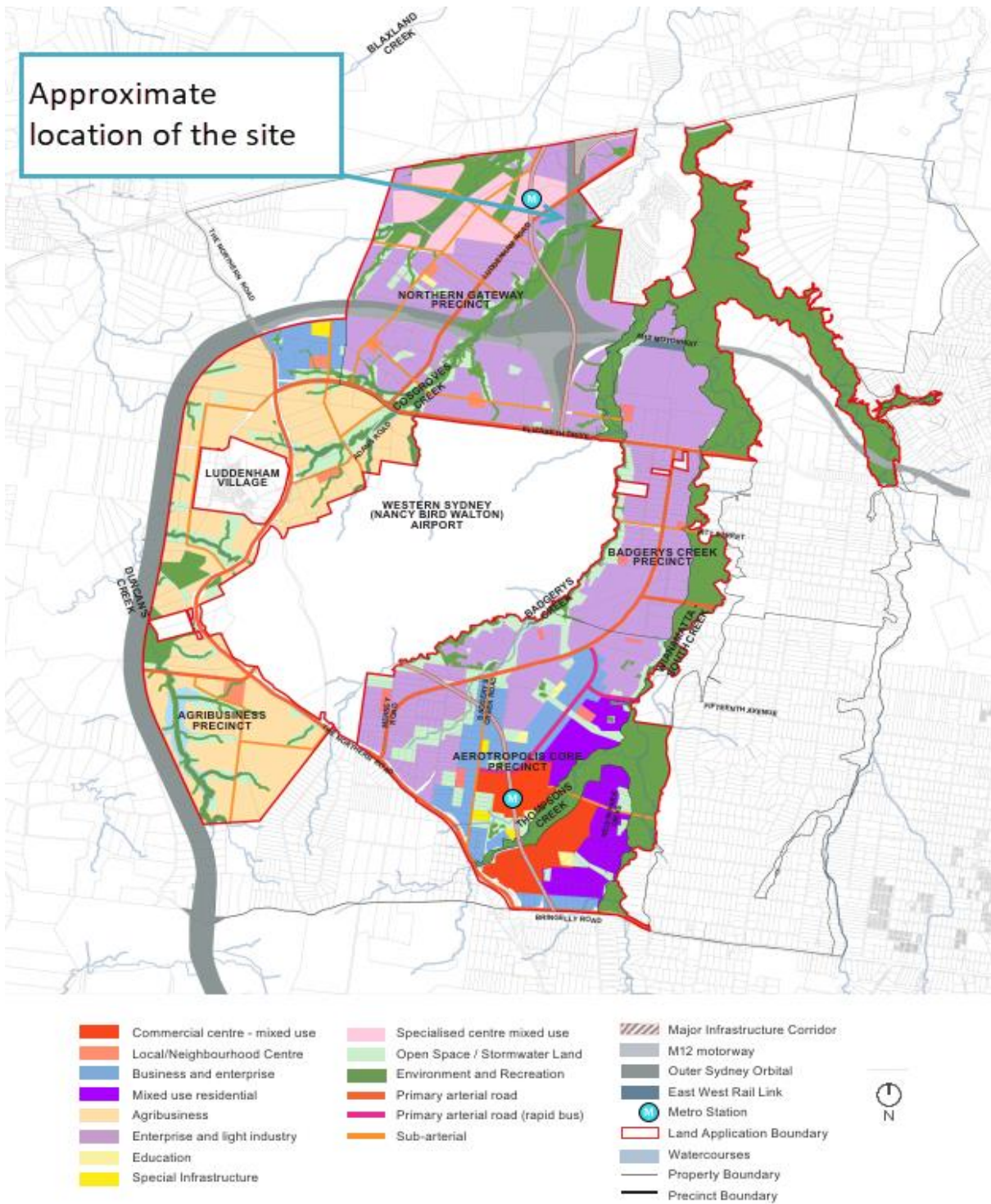
The state SEPP (Western Sydney Aerotropolis) 2020 stipulates the objectives of ENT zoned land:

- To encourage employment and businesses related to professional services, high technology, aviation, logistics, food production and processing, health, education, and creative industries.
- To provide a range of employment uses (including aerospace and defence industries) that are compatible with future technology and work arrangements.
- To encourage development that promotes the efficient use of resources, through waste minimisation, recycling, and re-use.
- To ensure an appropriate transition from nonurban land uses and environmental conservation areas in surrounding areas to employment uses in the zone.
- To provide facilities and services to meet the needs of businesses and workers.

The state SEPP (Western Sydney Aerotropolis) 2020 stipulates the objectives of ENZ zoned land:

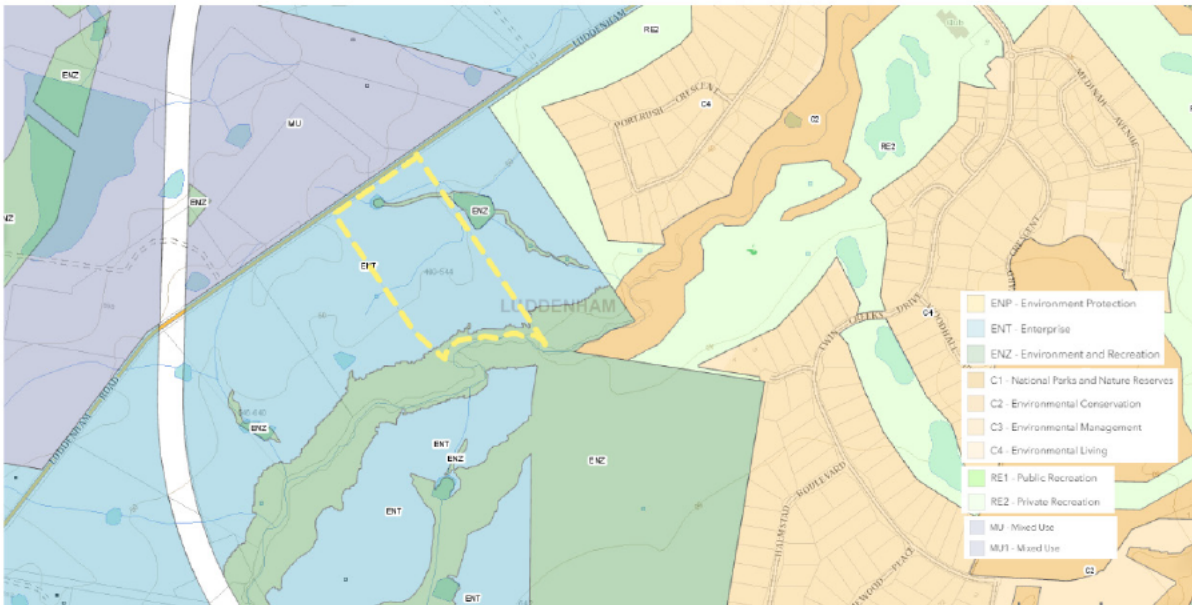
- To protect, manage and restore areas of high ecological, scientific, cultural, or aesthetic values.
- To protect the ecological, scenic, and recreational values of waterways, including Wianamatta-South Creek and its tributaries.
- To provide arrange of recreational settings and activities and compatible land uses.
- To protect and conserve the environment, including threatened and other species of native fauna and flora and their habitats, areas of high biodiversity significance and ecological communities.

The project is consistent with the Enterprise Zone objectives under the Western Parkland City SEPP as it will support the zone objectives by providing SSP with connection to an essential service, so it can grow and develop. Furthermore, the project will avoid impacts to any environmentally sensitive areas along the creek vegetation corridor, which is in line with the objectives of ENZ zoned land.



Source: The Aerotropolis Plan DPE 2022a

Figure 3.1 Land use and structure plan



Source: Planning Portal, DPE 2022

Figure 3.2 Land zoning map for the western Sydney Aerotropolis

3.5 NSW Environment and Planning Assessment Regulation 2021

Table 3.3 Section 171(2) Review of environmental factors – the Act, s 5.10(a)

Clause	Response
(a) the environmental impact on the community	<p>The closest residential dwellings are approximately 100–200 m south-east of Luddenham Road, and approximately 300 m north of the subject site. The community may temporarily be impacted by elevated noise, vibration, and dust; however, these impacts will be short-term and only for the duration of the works.</p> <p>Visual impacts will be longer term; however, these will be in line with the changes and development which will be experienced within the broader area.</p> <p>Should there be any planned electricity outages, relevant residents, 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>The substation will be visible from Luddenham Road and from surrounding land lots, however, the entire SSP, the Aerotropolis and surrounding area (precincts) are currently undergoing a transformation. The project is minor compared to the magnitude of the surrounding development within the locality.</p>
(c) the environmental impact on the ecosystems of the locality,	<p>Construction works proposed as part of the project will involve clearing of vegetation including 0.48 ha of native vegetation. The ecological assessment prepared for the project concluded that the works will not impact on intact native vegetation corresponding to Plant Community Type (PCT) 3320 and Cumberland Plan Woodland CEEC. The assessment concluded that any impacts on MNES, including EPBC listed flora and fauna, are unlikely.</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 SSP and the surrounding area.</p> <p>As previously mentioned, the entire area is undergoing in a transformation and the project will be in line with the wider transformation.</p>

Table 3.3 Section 171(2) Review of environmental factors – the Act, s 5.10(a)

Clause	Response
(e) the effects on any locality, place or building that has— (i) aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific, or social significance, or (ii) other special value for present or future generations,	Potential impacts to Aboriginal and historic heritage are addressed in Sections 8.2 and 8.3 respectively and involve partial loss of value to one Aboriginal Heritage Information System (AHIMS) site, AHIMS [REDACTED].
(f) the impact on the habitat of protected animals, within the meaning of the Biodiversity Conservation Act 2016,	Potential impacts to biodiversity are addressed in Section 8.4 Biodiversity. Impacts to native flora and fauna are not expected.
(g) the endangering of a species of animal, plant or other form of life, whether living on land, in water or in the air,	Refer to (f).
(h) long-term effects on the environment,	No long-term negative effects on the environment are expected as a result of project construction. The project is necessary to service new infrastructure and development in the Western Sydney Aerotropolis Area.
(i) degradation of the quality of the environment,	No long-term negative effects on the quality of the environment are expected as a result of project construction.
(j) risk to the safety of the environment,	<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>Furthermore, a geotechnical investigations report has been prepared by Celestino Developments SSP Pty Ltd (Celestino) which will assist with mitigating any issues with regards to risk and safety to the environment, during construction in particular.</p>
(k) reduction in the range of beneficial uses of the environment,	The project will not have any long-term impacts that will reduce the beneficial uses of the surrounding environment. The area is not well known for recreational uses.
(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 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 8.10, the entire project precinct and surrounding precincts are currently in the process of being transformed, 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.

Table 3.3 Section 171(2) Review of environmental factors – the Act, s 5.10(a)

Clause	Response
(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.

The consultation undertaken in accordance with these requirements is provided in Section 4.2.

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
- environmental incidents involving actual or potential harm to human health, or the environment must be reported to OEH (refer chapters 8 and 9 for management measures).

3.6.3 Environment Operations (Waste) Regulation 2014

The Environment Operations (Waste) Regulation 2014 (Waste Regulation) is a key piece of legislation for the regulatory framework in NSW and includes strict thresholds for Environmental Protection Licences (EPLs). Under the Waste Regulation, a Resource Recovery Exemption and a Resource Recovery Order allow for the reuse of virgin excavated natural materials (VENM) or excavated natural materials (ENM) for the purpose of application to land as engineering fill or for use in earthworks. Resource recovery orders and exemptions have been developed by the NSW Environment Protection Authority (EPA) to ensure that “the use of waste must be genuine, fit-for-purpose and cause no harm to the environment or human health” (2015).

According to the EPA, all soil stockpiles for the purpose of re-use as fill must be classified as either VENM or ENM to be transported and used as fill. Excavated natural material is defined as:

...natural material that:

has been excavated or quarried from areas not contaminated with manufactured chemicals or process residues, as a result of industrial, commercial, mining, or agricultural activities

does not contain sulphidic ores or soils, and includes natural material that meets such criteria for virgin excavated natural material...

In addition to a range of criteria for chemical and other attributes, the material must comply with to be classified as VENM. The in-situ material at the site will be assessed for relevant contaminants of concern.

3.6.4 NSW Biodiversity Conservation Act 2016

In accordance with the NSW *Biodiversity Conservation Act 2016* (BC Act), several factors need to be considered 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 (Appendix D). The report identifies that there will be no impacts to threatened species.

3.6.5 Summary of legislative requirements

Table 3.4 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.
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 impact to ‘Luddenham Road alignment’ should be identified and mitigated prior to commencement of the project. Refer to Section 9.3 for further information.

Table 3.4 Other legislative requirements

Legislation	Authority	Responsibility	Requirement	Comment
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.
<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.
<i>NSW National Parks and Wildlife Act 1979 (NPW Act)</i>	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 within an Aboriginal site on the subject site (SSP 7, AHIMS [REDACTED]). An Aboriginal Due Diligence Assessment (ADDA) and Aboriginal Cultural Heritage Assessment (ACHAR) have been prepared for this REF. An Aboriginal Heritage Impact Permit (AHIP) will need to be sought for heritage impacted project areas prior to work commencement in those areas.
<i>NSW Protection of the Environment Operations Act 1997 (POEO Act)</i>	DPE	Project manager/ Project supervisor	General – under s120 no “dirty water” discharge into stormwater drains.	Refer Section 8.5
POEO Waste Regulation	DPE	Project manager/ Project supervisor	General – under section 24 transportation of certain waste must be tracked.	Refer Section 8.15

Table 3.4 Other legislative requirements

Legislation	Authority	Responsibility	Requirement	Comment
NSW Roads Act 1993	TfNSW	Project manager/ Project supervisor	Approval – under s138 for work on a classified road.	Consultation with PCC for cable connection at the road verge and stormwater drainage works will be obtained by the project manager/project supervisor prior to commencing any works on Luddenham Road. A two-way ZS access driveway will be via new Road 1, which will not impact Luddenham Road.
<i>Rail Safety National Law (NSW) 2012</i>		Project manager/ Project supervisor		Proposed works will not affect any railways.
NSW Rural Fires Act 1997	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 8.14
NSW Biodiversity Conservation Act 2016 (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 8.4.4
NSW Water Act 1912	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.

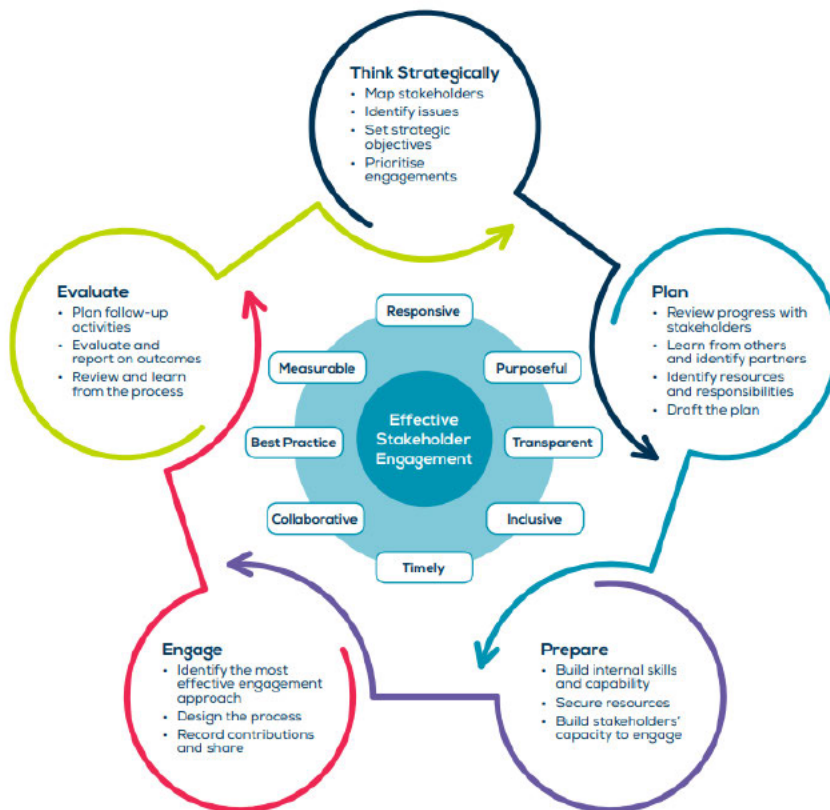


Figure 4.1 Endeavour Energy Stakeholder Engagement Framework

4.2 Project specific consultation

4.2.1 Council notification and requirements

In accordance with the NSW *Electricity Supply Act 1995*, Endeavour Energy is required to consult with the relevant councils, no less than 40 days prior to the commencement of construction. Letters providing notification of the proposal was sent to Penrith City Council 10 October 2023. No response has been received to date.

A public notice in relation to the draft REF will be published in the Western Weekender. The draft REF will also be published on the EE website.

A notification was sent to local MP Mrs Tanya Davies on 10 October 2023.

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 so, in accordance with the Regulations, will be displayed. If any member of the public has questions or concerns, EE have a connection point via EE "Your Say" at <https://yoursay.endeavourenergy.com.au/>.

4.2.2 Notification of nearby landowners

Adjacent landowners will be notified by letter prior to the commencement of works. Should construction planning result in direct impacts to a landowner's property, Endeavour Energy will also immediately and directly engage with them.

4.2.3 Future consultation

The Construction Environmental Management Plan (CEMP) for the project will include site specific control measures as required. In addition, the Project Manager will develop a project specific complaints and grievance handling protocol to be adhered to.

4.2.4 Aboriginal engagement

An Aboriginal Cultural Heritage Assessment Report (ACHAR) is being undertaken for the broader SSP development area, which includes lot 6 DP 255578. The ACHAR is being undertaken for 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

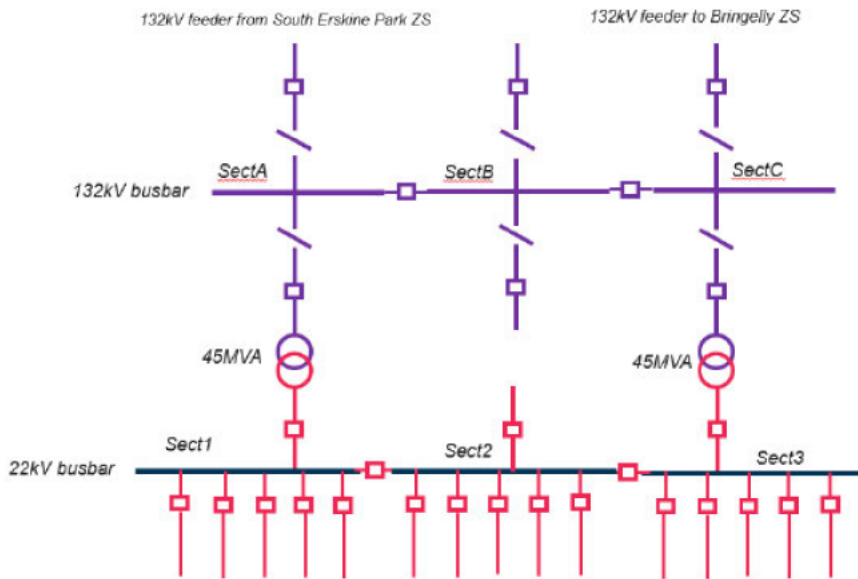
Sydney Science Park covers approximately 288 hectares and is expected to have load of 45 MVA by 2036. Endeavour Energy's RIT-D entitled 'Providing Supply to the Sydney Science Park and the Surrounding Area (2022)' identified the need for this investment as 'reliability corrective action' since investment is required to comply with National Electricity Rules obligations to connect customers. The existing distribution network in the development area is insufficient to meet the supply needs of SSP and surrounding areas. As the expected load requiring connection will exceed the existing network capacity, there will be significant unserved energy requirements if no corrective action is taken.

A suite of options was considered by EE in their Case for Investment (CFI) for the supply to Sydney Science Park and surrounding area (March 2022). The report assessed the anticipated load requirements and alternative sources of spare capacity as well as assessing outcomes of no action.

The RIT-D identified two possible options:

- Option 1 – Establishment of a 132/22kV zone substation with staged installation of two 45MVA transformers:
 - establish 132/22 kV Sydney Science Park ZS
 - install one 45MVA transformer in 2024/2025
 - connect ZS to Aerotropolis backbone feeder
 - install second 45MVA transformer in 2033/2034.
- Option 2 – establishment of a 132/22kV zone substation with installation of two MVA transformers at the time of commissioning:
 - establish 132/22kV Sydney Science Park ZS
 - Install two 45MVA transformers at the time of commissioning the ZS
 - connect ZS to Aerotropolis backbone feeder.

Although options were similar in price and ranking, Option 2 was selected as the preferred option as it leads to higher net market benefits because it is expected to eliminate all load risk into the foreseeable future.



Source: Supply to Sydney Science Park and Surrounding Area, EE 2022

Figure 5.1 Single line diagram of proposed ZS

6 Existing environment

6.1 General context

The project site is located within the suburb of Luddenham, which is part of the Greater Western Sydney region and is located approximately 20 km north-west of the city of Liverpool, 25 km south-west of the city of Parramatta and approximately 43 km south-west of the city of Sydney.

Luddenham falls within both Liverpool and Penrith LGAs however, the project site is entirely within the Penrith LGA and is characterised by a rural landscape with undulating hills and scenic background. More recently, the surrounding area is undergoing a fast-paced transformation with the development of the Western Sydney Airport.

The project site is located at 480–544 Luddenham Road, Luddenham, legally defined as Lot 6 in DP 255578, which is on the eastern side of Luddenham Road, approximately 4 km north of the junction with Elizabeth Drive. The project site is situated at approximately 40–50 m Australian height datum (AHD).

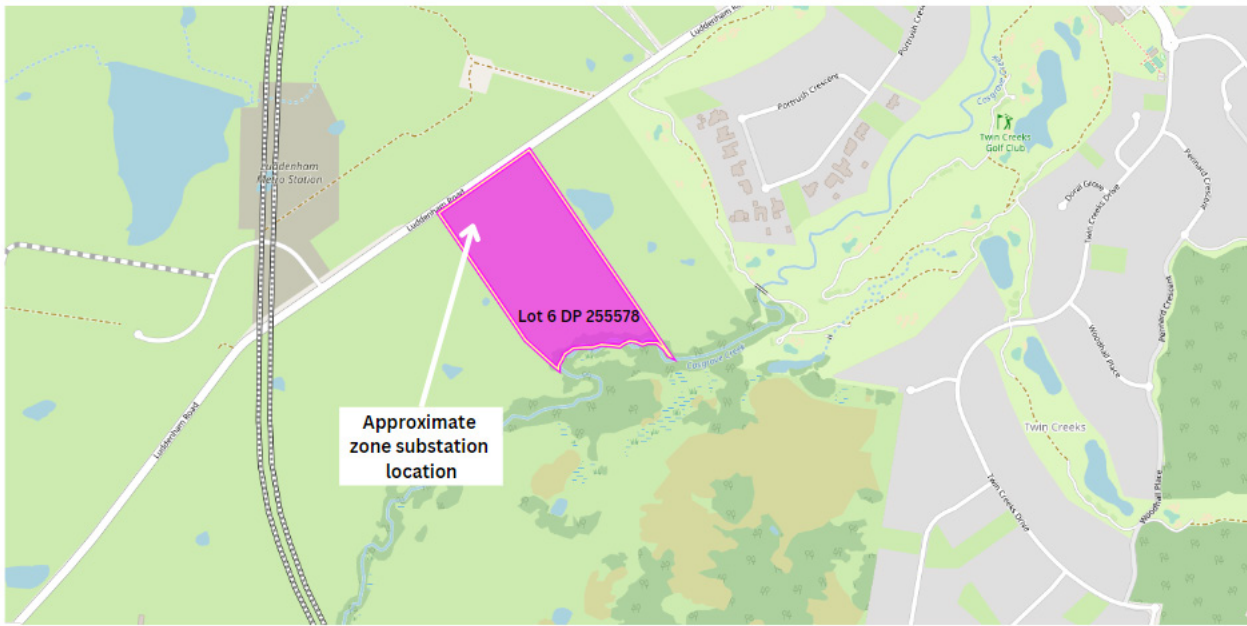
Cosgroves Creek runs along the south-eastern boundary of the site. Cosgroves Creek flows into South Creek, located approximately 1.5 km to the north-east of the site. Cosgroves Creek is mapped as Key Fish Habitat by the Department of Primary Industries – Fisheries (DPI- Fisheries) (Eco Logical 2022).

The project site is on a terrace above Cosgrove Creek, on land characterised by cleared paddocks with a long history of agricultural land use (GES 2022). The land generally slopes down from Luddenham Road to the south-east, towards Cosgroves Creek at the eastern boundary of the project site. Most of the land has been cleared for grazing and is covered by healthy grass cover. It is currently leased by a neighbouring landowner for agistment of cattle.

The Dam Dewatering Plan (Ecological 2022) identifies one dam (identified as Dam 2) located on the site (Lot 6 DP 255578). There are two dams (Dam 3 and Dam 4) located on Lot 5 DP 255578 (west of the site) and one dam (Dam 1) located on Lot 7 DP 255578 (east of the site). Most of the surrounding rural residential and commercial premises are sparsely populated, apart from one area that is somewhat denser. This is the cluster of residential dwellings either adjacent to or set about 100–200 m south-east of Luddenham Road, and approximately 300 m north of the subject site. This residential cluster is connected to Luddenham Road by the roundabout at the Luddenham Road/Twin Creeks Drive intersection.

However, the entire area is transforming given that the construction of the Western Sydney Airport, the Sydney Metro and the Aerotropolis is currently underway, including bulk earthworks and road infrastructure upgrades. The Western Sydney Airport is quickly becoming a dominant land use in the area. Other surrounding land uses include a mix of agricultural, rural industrial and commercial, and rural residential development.

Luddenham town centre is located over 5 km south-west of the subject property. Two Water NSW Warragamba pipelines intersect with Luddenham Road approximately 900 m north of the subject property.



(Source: EE 2022)

Figure 6.1 Location of proposed Sydney Science Park Zone Substation

6.2 Physical context

The project is located within the Sydney Basin within a topography of gently undulating rises over Wianamatta Shale sediments, predominantly, shales with some areas of sandstone and interbedded claystones and ironstones. The floodplain to the east of the project site is underlain by Quaternary alluvial deposits.

The ecological assessment undertaken for the project identified that soils at the subject site are generally red podzolics with a moderately deep profile (GES 2022). They are of moderate fertility and have a moderate erosion hazard. Soils in lower lying areas tend to have a yellow B horizon and higher levels of salinity.

Vegetation associated with the landscape at the subject site comprises extensively cleared open forest and eucalypt woodland (JBS&G 2022). The landscape is characterised by moderately reactive highly plastic subsoil, low soil fertility, poor soil drainage and localised water erosion hazard. The South Creek landscape is mainly cleared floodplains, valley flats and drainage depressions of the channels on the Cumberland.

The ecological assessment undertaken for the project (ELA 2022) identified the site to contain a patch of PCT 3320 Cumberland Shale Plains Woodland (in poor condition), surrounded by cleared/exotic vegetation.

The ground layer is improved pasture dominated by *Paspalum dilatatum* and White Clover (*Trifolium repens*). This is a standard pasture mix for grazing properties on the Cumberland Plain, including the CSIRO and University of Sydney farms which were located about 3 km to the south of 'Cloverdale'.

6.3 Cultural setting

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

The area surrounding the project is sparsely populated, though there is a small subdivision approximately 300 m north-east of the subject site. According to the 2021 census, Luddenham's population was only 456, with 153 private dwellings (ABS 2021).

Aboriginal and European history is further discussed in Section 8.2 and Section 8.3 respectively.

7 Proposed works

7.1 Overview

EE is proposing to construct and operate SSP ZS, which will be contained wholly within Lot 6, DP 255578 at 480-544 Luddenham Road, Luddenham NSW. The project will provide the required source of electricity to meet the residual and actual load demand of the Northern Gateway Development including SSP.

The project will take approximately 18 months to complete and is expected to commence in October 2023.

The land is currently held by Celestino and is planned to be acquired by EE, per a Heads of Agreement between the two organisations. Celestino will undertake the ZS site benching works to EE's design requirements as well as construction of a 6m wide temporary all weather access road suitable for heavy construction, as per section 3.0 of EE's document entitled "Minimum Requirements for Substation Sites Provided by Developers."

Celestino will, as part of their broader development works, construct duct infrastructure which includes a 132kV Feeder duct for connection to the ZS.

The ZS construction works, and the operation and maintenance of the site will then be undertaken by EE.

7.2 Description of work

7.2.1 Zone substation

SSP ZS forms part of an electricity distribution and transmission network and connects and converts higher voltage sub-transmission networks to the lower voltage distribution network. EE have many zone substations within their broader transmission and distribution network, which convert high voltage electricity to lower voltages using transformers that typically generate a low frequency 'hum' at 100 hertz (Hz).

The project will include construction and operation of a 132/22 kV substation including all associated equipment and access, which will have an initial firm capacity of 90 MVA with two 45 MVA transformers in an N-1 arrangement. In case of network failure, customers will be supported by a 22 kV interconnected network. The ZS will be connected to the 132 kV Aerotropolis underground transmission feeder between Orchard Hills SS and the Western Sydney Airport TS and the interconnected 22 kV network. SSP ZS will include underground cables from the ZS to Luddenham Road, where it will connect to the Aerotropolis underground transmission feeder. The Aerotropolis underground transmission feeder is the subject of separate environmental approvals.

7.3 Site layout components

Key project components that will need to be constructed and installed are listed below.

To be undertaken by Celestino as per civil engineering plans provided in Annexure A:

- construction of a 6m wide temporary all weather access road
- benching works
- installation of 132kV Feeder ducts between the subject site and Luddenham Road to connect the ZS to the broader development
- site drainage works

To be undertaken by EE design plans supplied in Annexure A:

- establishment 132/22 kV zone substation with two 45 MVA transformers providing a firm (n-1) transformer capacity of 45 MVA
- establishment of associated equipment including switchgear, protection and control panels, SCADA and communications
- establishment of building on suspended concrete slab to house the zone substation and two controls that will house the associated equipment. The building will be approximately 3 to 3.5 m high
- establishment of separate amenities building to house a meal room and toilet facilities
- fire management system and fire hydrant system including fire extinguishers and fire hydrant enclosure boosters within the building
- other ancillary plant, equipment and components including:
 - one 22 kV/415 V 315 kVA external auxiliary power transformer
 - two 110V DC 300 Ah 10 hr batteries with a 110 VDC to 49 VDC DC/DC converter to be located within separate control room
 - earthing system
 - lighting protection and insulation coordination
 - exterior building lighting
 - four control cable pits (CCPs)
 - two safety deluge showers (DSs)
 - rooftop solar photo-voltaic (PV) panels
 - security alarm system.
- installation of 22 kV ducts from the cable marshalling area to the existing Aerotropolis underground transmission feeder
- concrete pavement areas for site access and egress points (access for two-way traffic movement via new Road 1), flexible pavement for the area close to site access, and gravel pavement for all other areas of the site
- on-site water and stormwater management systems including:
 - a mains water supply booster pump-house structure in the north-west corner of the subject site
 - temporary water storage tanks along the western buffer area
 - above ground detention tank and water quality basin
 - underground stormwater pipes
 - sub soil drainage and flushing point

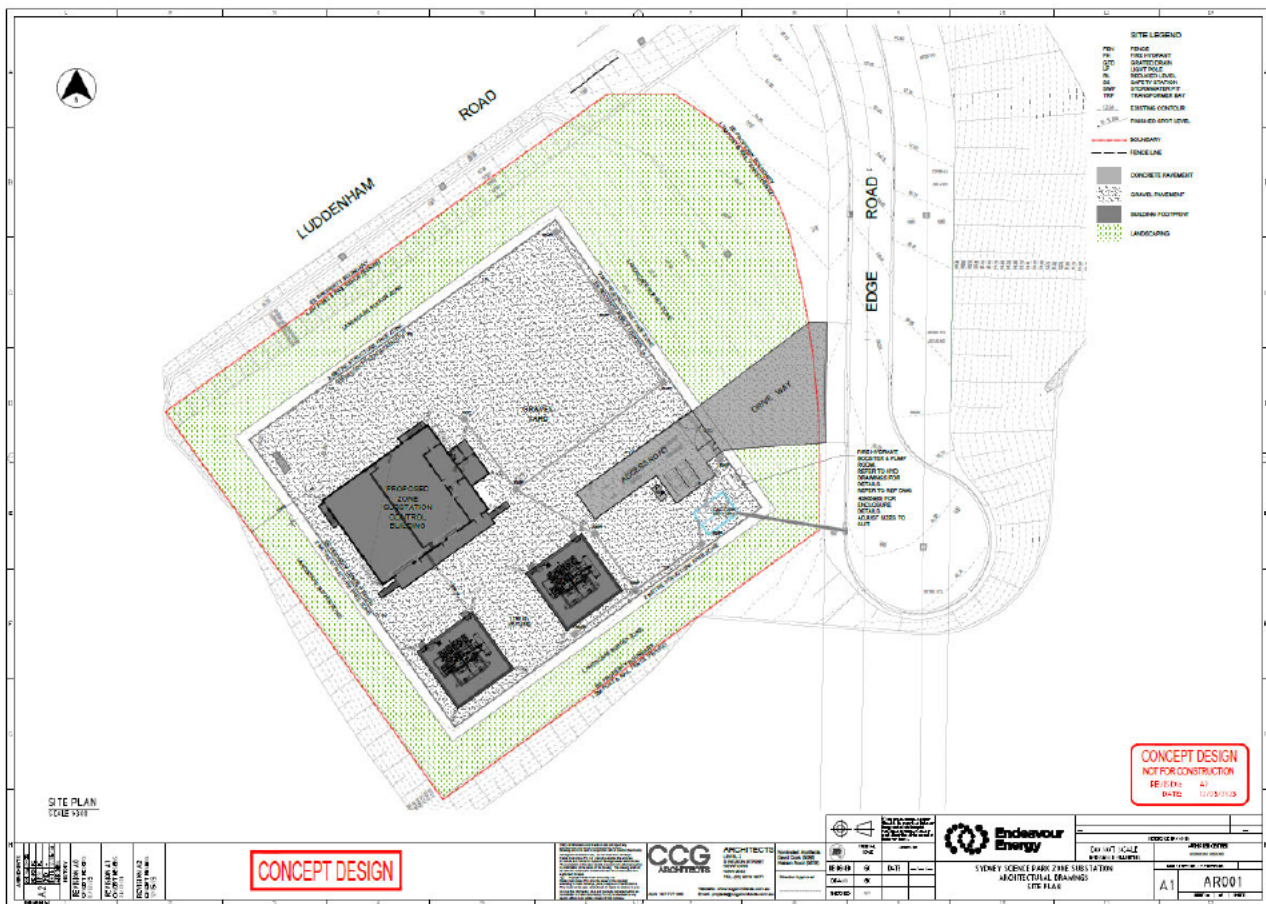
- a grated trench drain
- parking spaces for two light vehicles
- two electric vehicle charging stations, with the ability to accept heavy vehicles
- double security perimeter fencing, with a 1.8m high palisade security fence and a 1.2m post and rail fence. The two fences will be approximately 10 m apart, with a grassed landscape area between the fences. This area will be vegetated with appropriate native flora species.
- temporary construction sheds and laydown areas will be established on site during the construction works. The temporary construction sheds and laydown areas will be removed upon completion and commissioning of the project
- landscaping as per EE approved landscape design.

Furthermore, it is understood that prior to commissioning the ZS, the property must be connected to mains water, storm water drainage and telephone of a suitable design and capacity for the operation of the ZS.

Site plans are provided in Appendix A. The project design and footprint presented in Appendix A is indicative and may be subject to revision as the project is progressed through the detailed design phase. Upon any change or revision to the design or footprint of the project, this REF will be updated where necessary to assess any new or enhanced environmental impacts.

7.4 Stages of construction

SSP ZS will be constructed over an 18-month period. Construction will include two stages - benching of the site (undertaken by Celestino) and construction of the ZS (undertaken by EE).



Source: Endeavour Energy

Figure 7.1 Site plan and construction zone of the project

7.5 Methods to be used

7.5.1 Dam dewatering works

A Dam Dewatering Plan (DDP) has been prepared by Eco Logical (2022) for the subject site and the adjoining two land lots shown in Figure 7.2. As shown in the figure, there are four dams traversing the three sites, which are all connected by waterways. Only Dam 2 is located on the subject site.

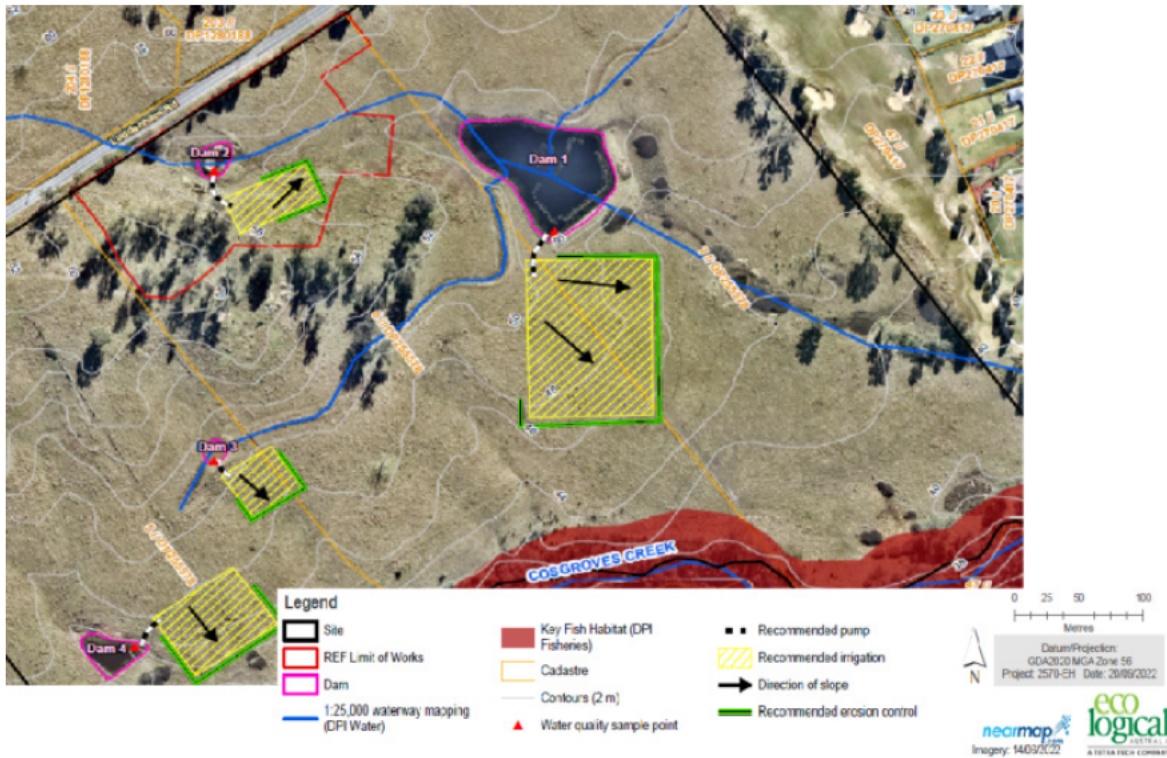
The DDP notes that the works associated with dewatering can be completed at any time of the year, provided that daytime temperature does not exceed 36 degrees Celsius (°C) during the final stages (to prevent stress to fauna and ecologists). The DDP recommends dewatering the dam(s) using the following method:

- Prior to the removal of any vegetation, water should be pumped and slowly irrigated across the adjacent grassland.
- The intake pipe should be caged or shield to minimise injury to aquatic fauna.
- Pumped water should be released at the highest ground and allowed to infiltrate the soil with minimal overland flow. Irrigation water should not be applied at a rate that oversaturates the receiving soil, and should it become oversaturated it should be adjusted accordingly.
- Sediment controls, including silt fence or hay bales, are recommended to filter sediments from any excess overland flow.

- The bottom sludge material and any remaining turbid water should be excavated and dried onsite. All turbid water and sediment must be prevented from entering other waterbodies. Breaching the wall is not recommended as it collects clays and fines from the wall structure, resulting in turbid flows.

The DDP provides a timeline of fauna relocation which should be coordinated with dam decommissioning work method procedure.

Furthermore, the DDP provides an aquatic fauna handling procedure.



Source: Eco Logical 2022

Figure 7.2 Dam Dewatering Plan: Luddenham Road, Luddenham (Lots 5, 6, 7 DP 255578)

7.5.2 Platform preparation and earthworks

Benching works will be undertaken by Celestino. Information is provided in this REF for reference of all works to be undertaken to construct the ZS.

i Earthworks

The geotechnical investigations carried out for the site provide in-depth information about the soil characteristics at the site (Geotechnique 2022). The information collected as part of these studies will assist with platform preparation and earthworks proposed at the subject site.

It is expected that cutting and filling will be carried out at the subject site, to establish the site for further works. Civil plans (Appendix A) specify approximately 34,200 m³ of soil will be imported to the site for cut and fill balance.

Excavation in overburden soils and low strength shale and sandstone bedrock can be carried out using conventional methods, including excavator or dozers (Geotechnique 2022). However, excavation in medium to high strength bedrock, if encountered, would be more difficult and will require the use of hammers or saw cutters.

Groundwater/seepage was not encountered to the termination depths of the boreholes, and thus significant groundwater inflow in shallow excavation is not expected (Geotechnique 2022). Minor seepage, if encountered, could be handled using a conventional pump and sump system. However, issues could arise locally during wet weather or if water is allowed to pond at the site. Geotechnique (2022) proposes using a layer of recycled gravel at the subject site to provide a good working platform.

ii Batter slopes and retaining structures

Advice for shallow and deeper excavation and structures is provided on page 4 of the geotechnical investigations report (Geotechnique 2022).

iii Footings

Based on subsurface conditions encountered in the boreholes at the project site, the proposed structures can be supported on shallow (pad or strip type) or deep footings. Different specifications are provided for each on page 6 of the geotechnical investigations report (Geotechnique 2022). The ZS will likely be constructed on concrete footings.

iv Other project components including subgrade preparation

The geotechnical investigations report provides advice for other project components and works including advice on pavement thickness design, subgrade preparation, and fill placement (Geotechnique 2022). Importantly, it is proposed to strip existing topsoil and stockpile separately for possible future reuse. All soil being used as backfill is to be certified clean fill and an Asbestos Clearance Certificate from an Occupational Hygienist must be provided to Celestino to certify the site is declared free of detectable asbestos.

7.5.3 Construction works

SSP ZS will be a digital substation and will include construction of a building to accommodate 132kV and 22kV switchgear, protection and control panels, SCADA, communications and batteries. The building will have a suspended slab type construction with a cable marshalling area.

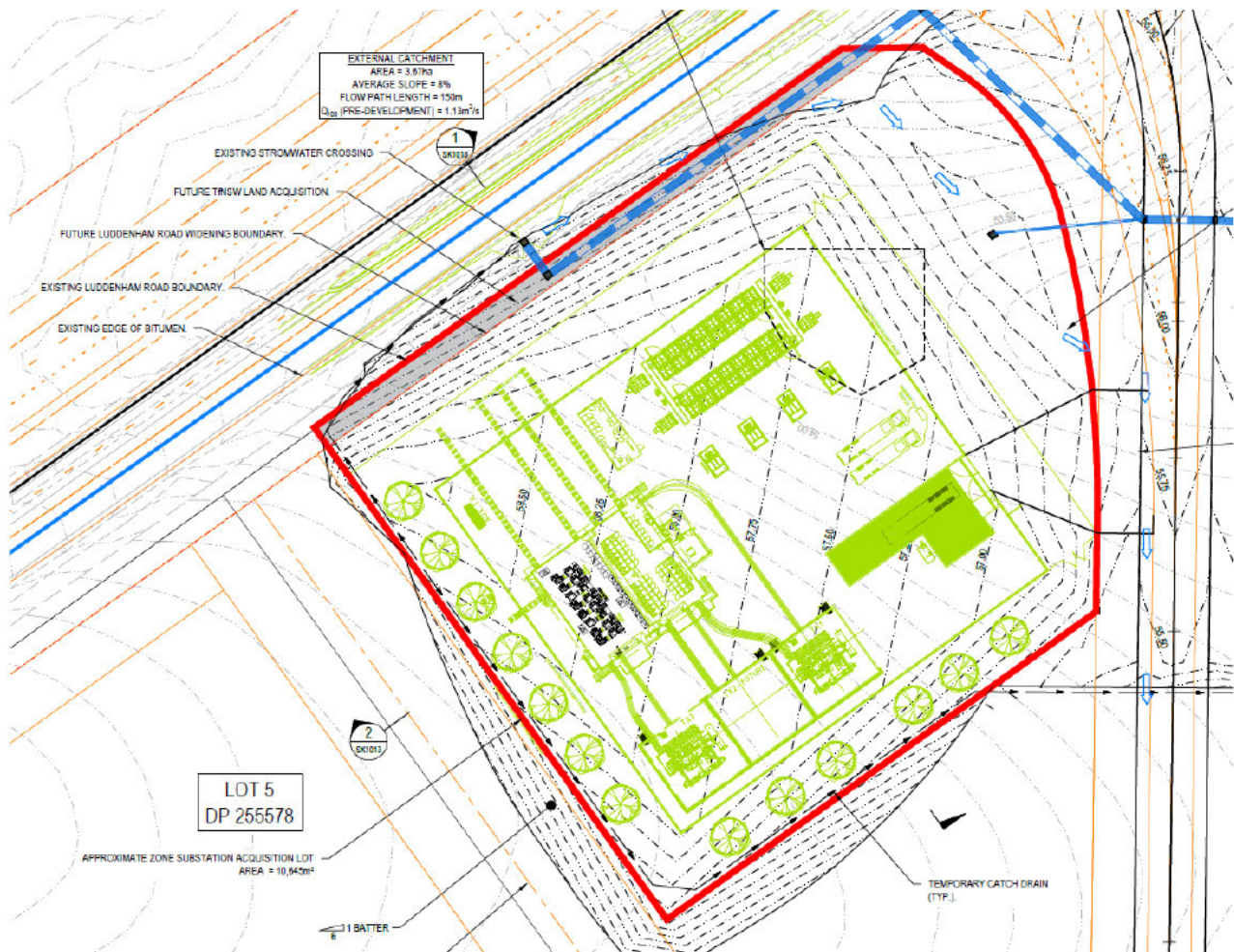
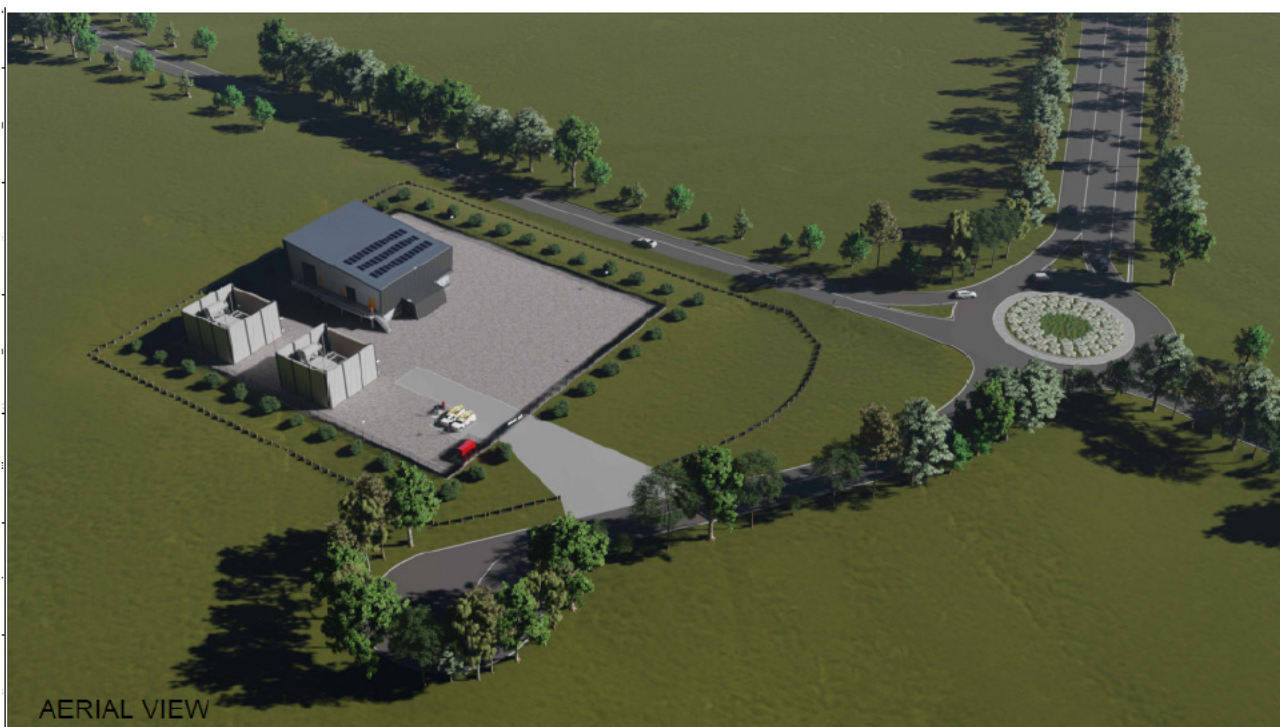


Figure 7.3 SSP ZS Site Plan

The key elements for construction can be found in Appendix J and are listed below:

- installation of new 132kV GIS equipment and 22kV switchgear
- installation of amenities building to house the meal room and toilet
- establishment of two 132kV feeders and associated communications connections
- installation of 22kV ducts from the cable marshalling area to the future BESS equipment
- installation of one 22kV/415V 315kVA auxiliary transformer in accordance with SDI511
- installation of two 110V DC 300Ah at 10hr rate battery systems, with a 110VDC to 48VDC DC/DC converter. Each battery system shall be accommodated in a separate control room.
- design and installation of an earthing system in accordance with EDI516
- design and installation of lightning protection and insulation coordination as per SDI520
- installation of protection and control, SCADA and communications systems
- installation of a fire management system for the control building as per SDI503

- installation of a security system in accordance with SDI537
- installation of a fire hydrant system in accordance with SDI509
- installation of deluge showers in accordance with SDI522
- installation of signage and labelling in accordance with SDI528
- provision of substation yard lighting as per SDI529
- design and installation of drainage for the site as per SDI532
- installation of security fencing and associated gates in accordance with SDI524
- installation of post and rail fence on the property boundary



Source: Endeavour Energy

Figure 7.4 Concept design of Sydney Science Park Zone Substation

7.6 Plant and equipment 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.
- under boring:
 - excavators
 - tippers
 - agitators
 - flat-bed trucks
 - crane
 - boring machine
 - vac truck.

7.7 Workforce

The construction workforce will include approximately 10 to 12 personnel at any one time.

7.8 Construction laydown areas

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. The laydown areas will be located within the ZS site.

7.9 Timing, duration, hours of work

As noted above, project works are scheduled to commence in October 2023 over approximately 18-months. Impacted landowners will be notified about proposed construction activities in a timely manner.

Construction works will be undertaken during standard working hours:

- 7:00 am to 6:00 pm Monday to Friday
- 8:00 am to 1:00 pm on Saturdays
- no works on Sundays or public holidays.

Should unexpected out of hours works be required, the process for undertaking out of hours works as described in EE's Environmental Handbook will be followed. Appropriate internal and external approvals shall be obtained where required prior to any out of hours works being carried out.

Approval from the Endeavor Energy Environmental Services Team will be required for more than two consecutive nights of out of hours works. In the event works are required for more than two consecutive nights, nearby sensitive receivers and EPA will be notified.

8 Environmental assessment and mitigation

8.1 Overview

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

- Aboriginal heritage
- historic heritage
- biodiversity
- noise
- water
- contamination
- visual.

Assessment reports are provided as Appendices and summarised in the following sections. The technical reports in the appendices were prepared by subject matter experts on behalf of EE. Other reports were prepared on behalf of Celestino and provided to EE and EMM for use in this REF.

Lower risk environmental factors for the project that are required to be considered under Clause 171 of the EP&A Regulation and the Code addressed in this section include: 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, contamination, and cumulative impacts.

Each section below provides an overview, existing environment, impact assessment, and mitigation and management. It should be noted however that the mitigation and management is also provided in the following chapter in one consolidated table. 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.

8.2 Aboriginal heritage

8.2.1 Overview

An Aboriginal cultural heritage assessment report (ACHAR) for EE's SSP ZS development footprint and a separate ACHAR for Celestino's enabling works were prepared by Keller Nightingale Consulting Pty Ltd (KNC) and can be found in Appendix B and C. The ACHARs were prepared to accompany AHIP applications and provide information on:

- the significance of the Aboriginal places that are the subject of AHIP applications
- the actual or likely harm to Aboriginal objects or places from the project
- any practical measures that can be taken to protect and conserve Aboriginal objects or places
- any practical measures that can be taken to avoid or mitigate actual or likely harm to Aboriginal objects or places.

The ACHARs identified that the edge of an Aboriginal PAD site (SSP 7 / AHIMS [REDACTED]) is located just within the boundary of the ZS site and the Celestino enabling works site.

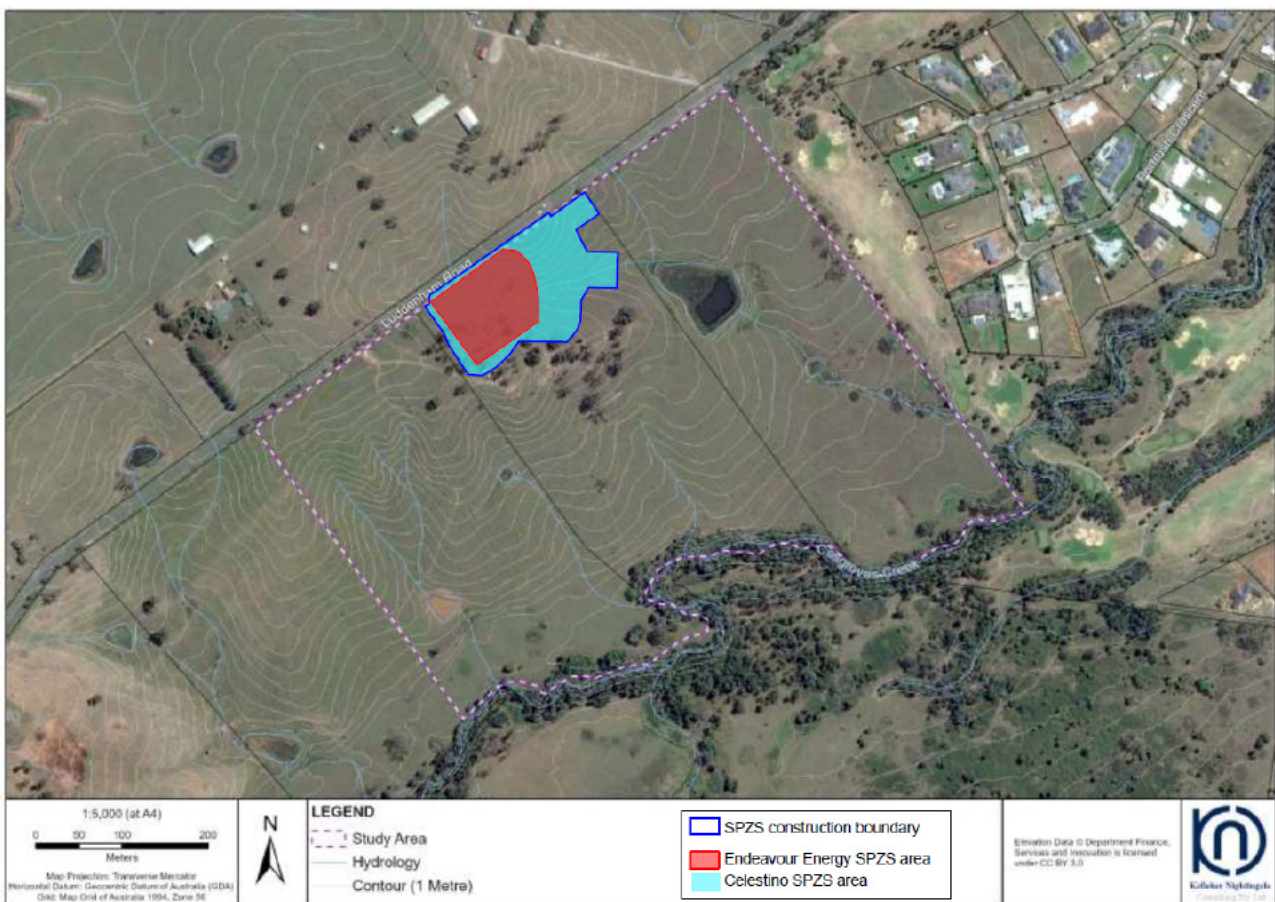
The ACHARs include a full consultation process with Aboriginal stakeholders in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*.

This section serves to summarise the findings of the ACHARs, which are appended in B and Appendix C respectively.

8.2.2 Existing environment

i Study area

Both the SSP ZS site ACHAR and the Celestino enabling works ACHAR identified the study area as the portion of the overall Sydney Science Park development area east of Luddenham Road comprising Lots 5, 6, and 7 of DP255578, as seen in Figure 8.1.



Source: KNC 2023

Figure 8.1 Map showing the ACHAR study area including the SSP ZS (as SPZS) construction boundary and the Celestino enabling works boundary (as Celestino SPZS)

ii Aboriginal history of the locality

The ACHAR study area is located in the traditional lands of the Darug, Dharawal and Gandangara people. KNC note that the study area was important to, and intensively used by Aboriginal people (KNC 2023a). The ACHAR describes in detail the ethnohistoric context of the study area and broader Sydney area in Chapter 3 (KNC 223a).

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 study area. 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.

iii Previous archaeological investigations and research

Several archaeological assessments were conducted in locations of similar topography to the study area, across Western Sydney, including the suburbs of Quakers Hill, Oakdale, Horsley Park, and Erskine Park, contributing 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
- within 20 m of or in a cave, rock shelter, or a cave mouth.

One of the most significant investigations was KNC's Aboriginal Heritage Assessment for the SSP planning proposal in 2013, KNC's Sydney Science Park East, Luddenham NSW ACHAR in 2022 and archaeological test excavation for the SSP development.

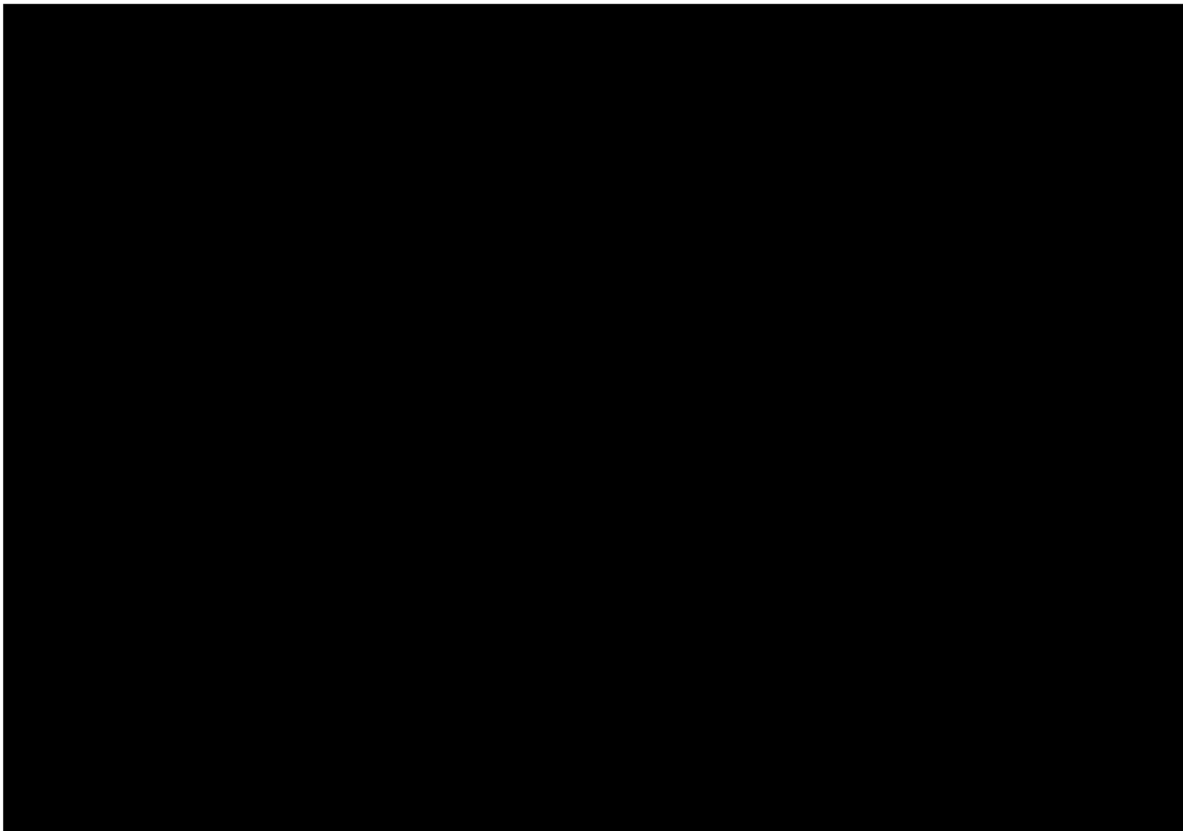
Aboriginal assessments undertaken as part of proposed rezoning of the broader area, for SSP, identified five Aboriginal archaeological site locations and three areas of Potential Archaeological Deposit or PAD (KNC 2022). Identified sites included RPS LTPAS01 (AHIMS [REDACTED]) and newly recorded sites Sydney Science Park 1 (SSP 1), Sydney Science Park 2 (SSP 2), Sydney Science Park 3 (SPP 3) and Sydney Science Park 4 (SSP 4). Two PAD areas were also identified in this broader assessment area, including Sydney Science Park PAD 1 (SSP PAD 1) and Sydney Science Park PAD 2 (SSP PAD 2). One additional PAD, Sydney Science Park PAD 3 (SSP PAD 3), was identified in a subsequent 2016 field inspection (KNC 2022), which overlaps part of the project site. An Aboriginal heritage due diligence assessment (AHDDA) was undertaken in 2022 for Lot 6, DP255578 by Artefact.

An archaeological test excavation program was undertaken across the study area including the project site, with the aim of collecting more information about the nature and extent of subsurface Aboriginal objects at previously identified sites and PADs including SSP PAD 3.

The test excavation program established the presence of subsurface archaeological deposit in all six of the test excavation areas including PAD 3 (Figure 8.2). Excavated PAD areas (SSP PAD 1, SSP PAD 2 and SSP PAD 3) were subsequently designated as SSP sites, with SSP PAD 3 redesigned as Aboriginal site SSP 7 and registered on the AHIMS site register as AHIMS [REDACTED].

Only AHIMS ID [REDACTED] / SSP 7 is affected by project works, given that the remainder of the sites are located within the broader assessment area. The artefacts uncovered at this site are described in great detail in Section 4.3 of the Sydney Science Park East Luddenham ACHAR (KNC 2022).

An AHIP C0003861 was subsequently granted on 23 July 2019 for proposed works associated with Sydney Science Park (integrated mixed-use development) (KNC 2022).



Document Path: D:\GIS\GIS_Mapping\22036 Aerotropolis 132kV Feeders and Substations\MXD\22036_132kV_UG_Zone_Substation_Previous_Test_Excavation_v1_220829.mxd

(Source: Artefact 2022)

Figure 8.2 Map showing location of previous test pits in 2018

8.2.3 Aboriginal Heritage Information System (AHIMS) database search

The Aboriginal Heritage Information System (AHIMS) was searched on 9 May 2022 for the study area with a 2,500 m buffer. The AHIMS search identified a total of 111 sites within the search area.

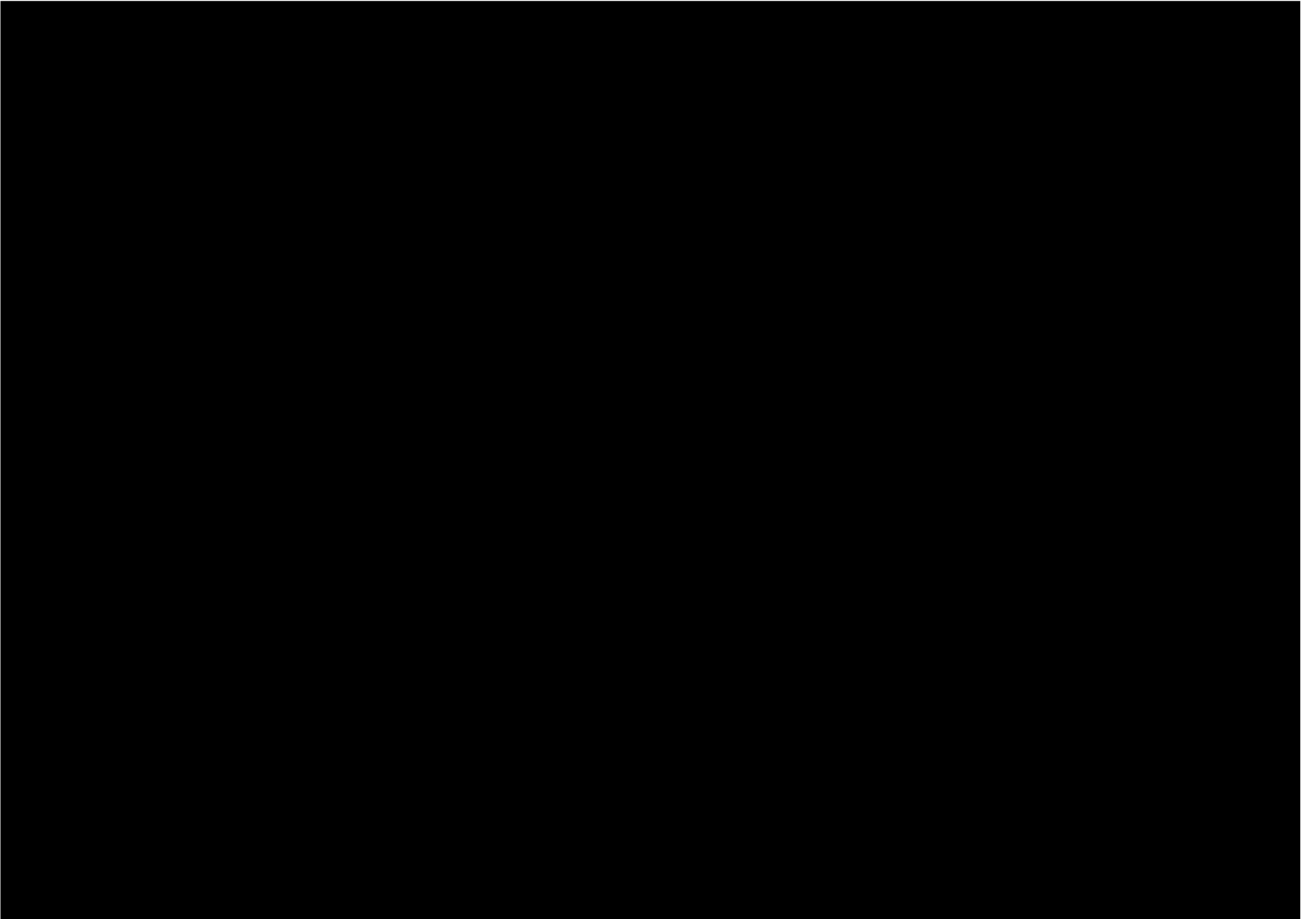
DPE – Heritage lists 20 standard site features that can be used for each site, the frequency of which is summarised in Table 8.1.

Table 8.1 Frequency of recorded site types

Site features	Frequency	Percentage
Artefact	102	91.9
Artefact, potential archaeological deposit (PAD)	3	2.7
PAD	6	5.4
Total	111	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 ACHARs identified the location and extent of SSP 7 / AHIMS [REDACTED], a PAD site, in relation to SSP ZS and Celestino's enabling works boundaries as seen in Figure 8.3.



Source: KNC 2023a

Figure 8.3 Map showing the extent of AHIMS [REDACTED] (SSP 7) in relation to SSP ZS's (SPZS) construction boundary and Celestino's enabling works boundary (SPZS area) within the ACHAR study area

8.2.4 Site inspection

A site inspection of the study area was carried out on 3 June 2022 by C. Jurd and M. Alam from Endeavour Energy, and N. Smith and E. Jones from Artefact Heritage. The site inspection consisted of pedestrian inspection of the study area and the buffer around the study area. The study area was not surveyed or delineated on the ground. The site inspection served to inspect the surface ground area, and the different landforms that stretch over the subject site.

8.2.5 Archaeological sensitivity

Archaeological sensitivity is closely related to levels of ground disturbance, whether artefacts are located on, or close to, the surface, and whether the area is within a sensitive landform unit according to the predictive statements.

AHIMS [REDACTED] overlaps with the southern portion of the ZS site and Celestino's enabling works boundary. Archaeological test excavation undertaken in 2018 confirmed the presence of Aboriginal objects beneath the ground surface in the study area. Test excavation results also indicated areas of isolated disturbance, which is confirmed by the identification of five artefacts in a potentially disturbed context on the ground surface during site inspection.

AHIMS [REDACTED] was also found to extend further to the north towards Luddenham Road, and thus the study area is identified as archaeologically sensitive based on landform context and the identification of Aboriginal objects both on the ground surface and beneath the ground surface.

Isolated areas of disturbance are present across the study area, with confirmation from test excavation and surface inspection that Aboriginal objects are likely to remain in those disturbed contexts as well as adjoined less disturbed contexts.

8.2.6 Consultation with Aboriginal stakeholders

Preparation of the ACHARs included consultation with Aboriginal people in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* and the requirements of Clause 60 of the NPW Regulation 2019. Given the length of time elapsed since the commencement of the initial consultation process used for the existing SSP ACHAR assessments, a new round of consultation specific to the current study area was undertaken. Previously registered active stakeholders for the wider SSP project were included in the new consultation.

Relevant consultation activities undertaken are listed in Section 5.1 of each ACHAR, and registered Aboriginal stakeholders are listed in Section 5.2 of each ACHAR (KNC 2023a, KNC 2023b).

The Aboriginal cultural values identified as part of the consultation process show that the broader study area (including the subject site) has cultural value for the local Aboriginal community. The identified cultural value is a feeling of attachment and responsibility for the land (KNC 2023a, KNC 2023b). These values become tangible when tied to identified Aboriginal objects found at archaeological sites. In this way the Aboriginal objects can be seen as exhibiting both scientific information and cultural meaning, knowledge about the past tied with social values and belief system.

The ACHARs note that the presence of Aboriginal objects is not required for a site to hold value for the Aboriginal community. Aboriginal sites may have social, spiritual and landscape values which are not tangible.

The ACHARs provide a summary of the Aboriginal cultural heritage values expressed by stakeholders include:

- strong association with the land
- responsibility to look after the land, including the heritage sites, plants and animals, creeks, and the land itself
- scarred trees
- artefact sites and landscape features
- creek lines, especially Cosgroves Creek, South Creek and tributaries and their floodplains
- indigenous plants and animals

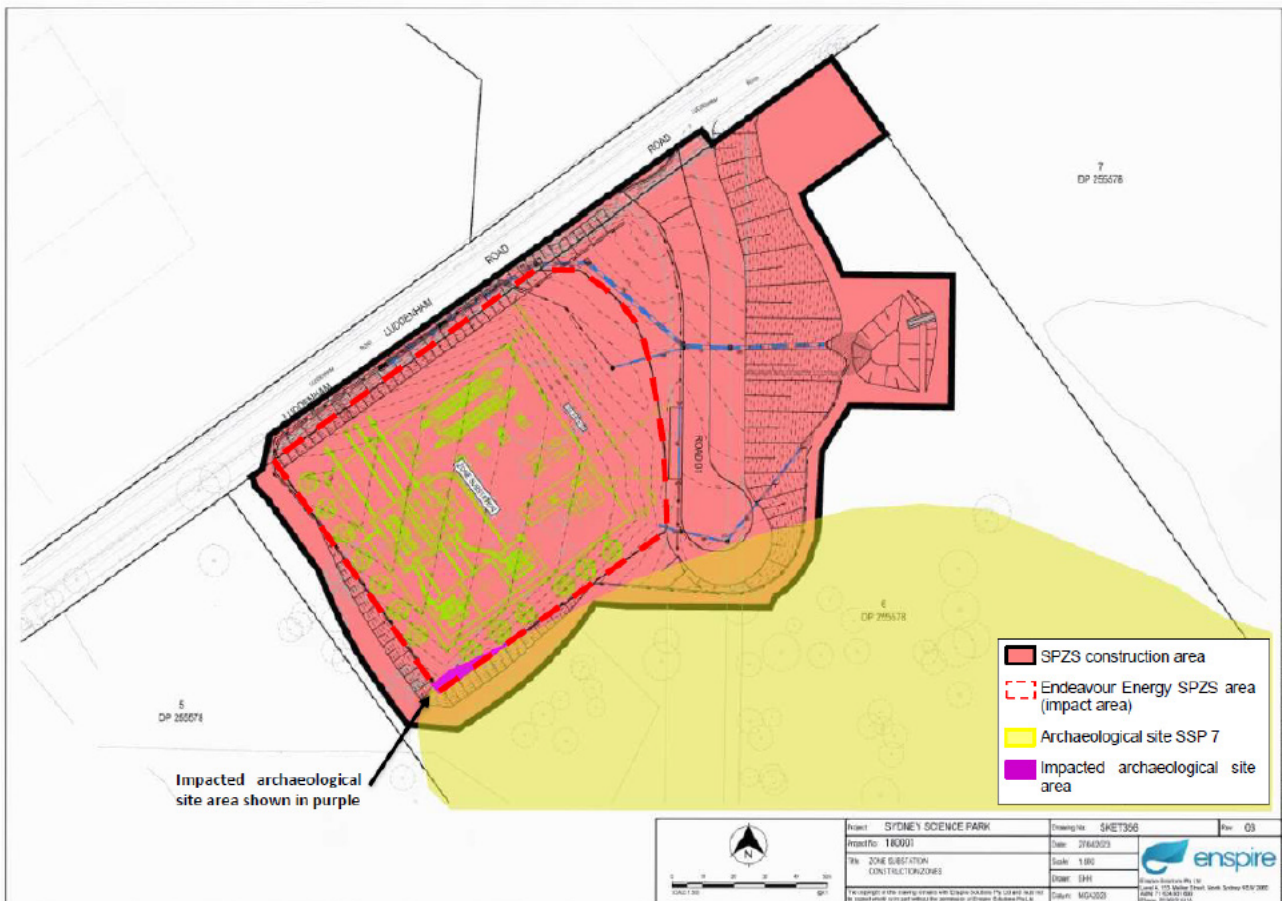
- connection between sites
- general concern for burials, as their locations are not always known and they can be found anywhere.

8.2.7 Cultural heritage values and statement of significance

The ACHARs considered the cultural heritage values of the study area for Aboriginal people, by assessing the cultural/social, historic, scientific/archaeological significance and aesthetic values of the Aboriginal site uncovered. A detailed statement of significance can be found in section 7.2 of the ACHARs. Overall, SSP7 / AHIMS is considered to display 'moderate archaeological significance', though the assessed significance within the impact area of both EE's SSP ZS and Celestino's enabling works is considered low (KNC 2023a, KNC 2023b).

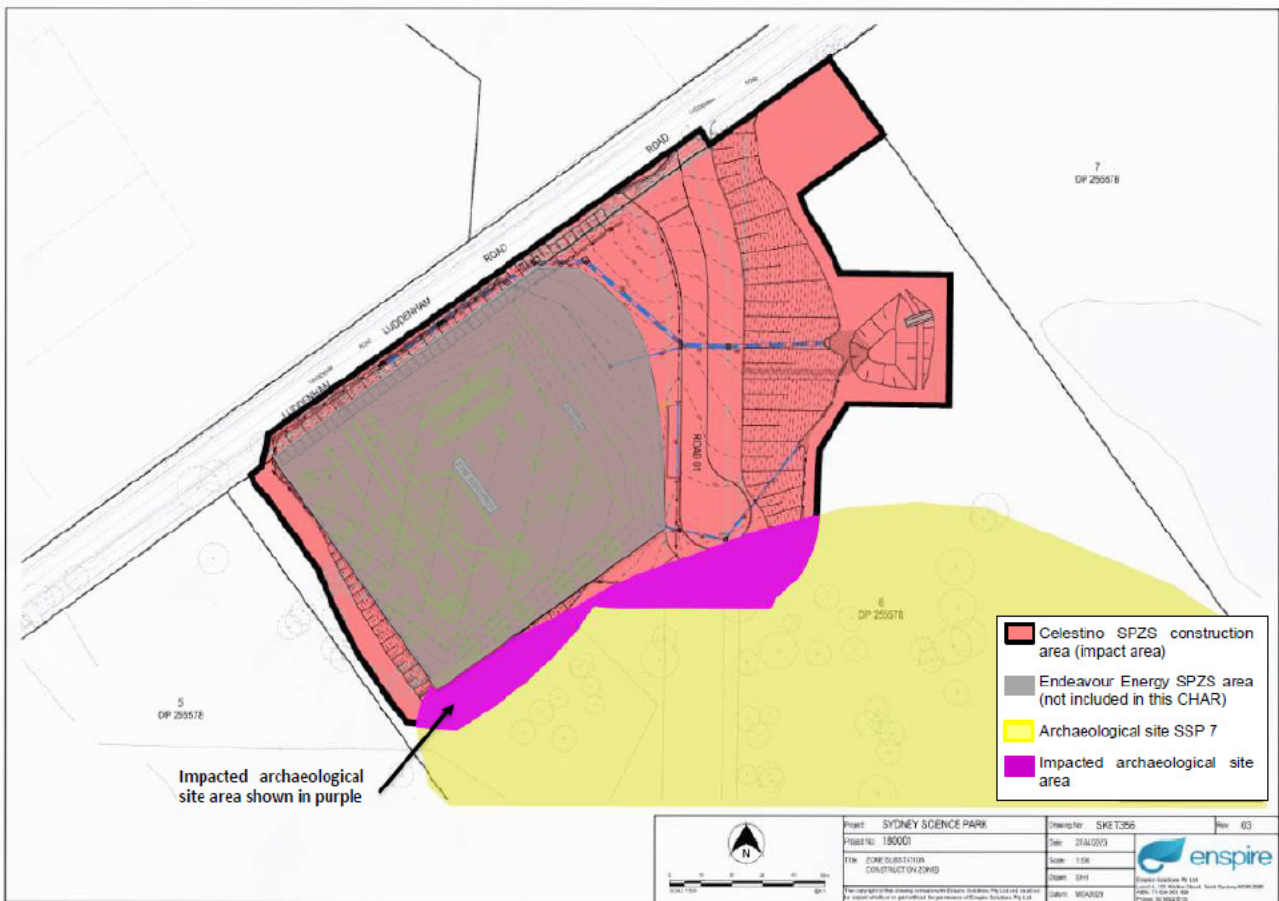
8.2.8 Impact assessment

The SSP ZS ACHAR concluded that only a small portion, 0.06% of SSP 7 / 45-5-5073 would be impacted by EE's works (Figure 8.4). The Celestino enabling works ACHAR concluded that 1.7% of SSP 7 / 45-5-5073 would be impacted by Celestino's enabling works, including earthworks and benching (Figure 8.5).



Source: KNC 2023a

Figure 8.4 Impact assessment of EE's SSP ZS works on SSP 7 / AHIMS



Source: KNC 2023b

Figure 8.5 Impact assessment of Celestino's enabling works on SSP 7 / AHIMS

8.2.9 Management and mitigation measures

Since the size of the impact area is so small, both the EE SSP ZS ACHAR and the Celestino enabling works ACHAR did not recommend salvage excavation. Instead, the ACHARs recommended the following measures:

- AHIP required prior to commencement of works within the archaeology affected area within EE's SSP ZS works area
- AHIP required prior to commencement of works within the archaeology affected area within Celestino's enabling works area
- identification of no-go zones on maps within the CEMP
- protective fencing along construction boundary where required
- all staff inducted as to appropriate Aboriginal heritage protection measures and requirements to comply with the conditions of the AHIP

An AHIP for the EE SSP ZS works area will be sought prior commencement of works in affected areas. The AHIP application area can be seen in Figure 8.6. A separate AHIP for the Celestino enabling works area will be sought prior to the commencement of works within affected areas. The AHIP application area can be seen in Figure 8.7.



Source: KNC 2023a

Figure 8.6 SSP ZS AHIP application area



Figure 8.7 Celestino enabling works AHIP application area

8.3 Historic heritage

8.3.1 Overview

A Statement of Heritage Impact (SoHI) was prepared by Heritage Now (2023) for the project’s potential impact upon ‘Luddenham Road alignment’. The site adjacent to the southern section of the alignment was formally listed as a heritage item with local significance on the Aerotropolis SEPP (item #18). The section of the alignment adjacent to the site, between Elizabeth Drive and the Warragamba Pipeline, was delisted in March 2022. The northern section of the alignment, between the Warragamba Pipeline and Mamre Road, Orchard Hills, remains a heritage item with local significance listed on Schedule 5, Part 1 of the Penrith Local Environmental Plan 2010 (item #843).

The Statement of Significance for the Luddenham Road alignment notes that the item provides evidence of early nineteenth century pastoral activities and a link between historical estates in the area. The statement also considers the visual landscape surrounding the Luddenham Road alignment, in addition to long surviving post and rail fencing which also provides evidence of predominant pastoral activities.

8.3.2 European history of the locality

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 project 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 (Artefact 2022).

Analysis of historical aerial imagery shows the following historical changes that took place within the study area (Artefact 2022):

- the project area had been cleared by the mid-twentieth century
- by 1965, a dwelling had been constructed close to Luddenham Road
- between 1965–1970, a number of trees were planted in the north-west of the study area
- little change occurred between 1970 and the early years of the twenty-first century
- earthworks appear to have occurred between 2002 and 2005, as spoil heaps are present in the aerial imagery from 2005
- between 2013 – 2014, the dwelling within the project area was demolished

8.3.3 Impact assessment

The project site is not listed as containing a heritage item on any statutory heritage register or list, nor is it within a heritage conservation area. It is adjacent to the southern section of the Luddenham Road alignment, between Elizabeth Drive and the Warragamba pipeline, which was formerly listed as a heritage item with local significance on the Aerotropolis SEPP (item #18). The listing was removed from the Aerotropolis SEPP in March 2022.

The northern section of the Luddenham Road alignment, between the Warragamba pipeline and Mamre Road, Orchard Hills, remains listed as a local heritage item on the Penrith LEP (item #843), and is located approximately 1.5 km to the north-east of the site. The distance and topography are such that there are no direct sight lines to or from the heritage item, and there will be no physical or visual impacts from the development proposal.

8.3.4 Conclusions and recommendations

Heritage Now (2023) recommended that the proposed development may proceed without the need to seek any heritage approvals or further investigation, as no heritage impacts have been identified.

8.4 Biodiversity

8.4.1 Overview

An ecological assessment for the project site was prepared by Eco Logical Australia Pty Ltd (ELA 2022) to assess whether the project site may support any native vegetation, threatened species, and/or populations and communities listed under the BC Act.

A desktop assessment was completed to inform the ecological assessment, which included searches of the relevant databases and review of existing and available vegetation mapping. The ecological assessment was also informed by two field surveys, firstly undertaken in 2016 and more recently in April 2022. The more recent field survey included the validation of existing vegetation mapping, a threatened flora and fauna habitat assessment, opportunistic fauna sightings and the recording of full floristic plot data.

The study area of the ecological assessment is the entirety of lots 5, 6 and 7 of DP 255578, with a smaller disturbance area that will be subject to the removal of vegetation (refer to Figure 1 and Figure 2 of Appendix E).

8.4.2 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.

A small portion of the north-east impact area is within the Major Transport Corridor (refer Figure 3 of Appendix G). This portion of the site requires assessment under the EPBC Act, as Commonwealth Approval for the Cumberland Plain Conservation Plan 2022 (CPCP) has not yet been granted. ELA has completed the assessment as if no biodiversity certification exists to provide a conservative and thorough assessment of the entire impact area.

i Desktop searches

ELA conducted searches of the BioNet Atlas of NSW Wildlife and Protected Matters Search Tool (PMST) for BC Act and EPBC Act listed threatened flora for flora species present within 5 km of the project site.

The results indicate that there are eight threatened flora species and 25 threatened fauna species that are listed on the BioNet Atlas as previously recorded within a 5 km radius of the project.

No BioNet records for threatened flora and fauna species were identified as having been previously recorded within the project area. A further 35 species were identified through the PMST.

8.4.3 Field surveys

i Flora

The field survey identified PCT 3320 Cumberland Shale Plains Woodland within the project area, which is associated with threatened ecological community (TEC) Cumberland Plain Woodland in the Sydney Basin. The extent of this vegetation within the project area is shown in Figure 8 of Appendix G and was identified to be of poor condition. This vegetation does not meet the condition criteria of the TEC listing under the EPBC Act.

The remainder of the project area consists of cleared/exotic vegetation, which has been subjected to historical agricultural grazing. Three priority weeds under the NSW *Biosecurity Act 2015* were identified in the project area: African Boxthorn, Fireweed and Green Cestrum.

No threatened flora species or habitat were identified within the project area due to its highly degraded nature.

ii Fauna

Although no threatened fauna were identified in the project area during the most recent survey, there are ten hollow bearing trees present which may provide habitat to identified fauna species listed under the BioNet Atlas and EPBC Act. The location of hollow bearing trees relevant to the impact area are shown in Figure 8.8.



Figure 8.8 Hollow bearing trees (ELA 2022)

8.4.4 Impact assessment

i Flora

Construction of the project will have a direct disturbance of 2.44 ha, consisting of 0.51 ha of native vegetation, being PCT 3320 Cumberland Shale Plains Woodland (in poor condition), and 1.93 ha of cleared/exotic vegetation.

Indirect impacts may include:

- increased surface water runoff, sedimentation, and nutrients during construction
- disturbance to fauna due to noise and dust emissions
- spread of weed species.

ELA (2022) completed a Test of Significance (ToS) (BC Act) for Cumberland Plain Woodland (critically endangered TEC), and concluded that the project (and associated vegetation disturbance of 0.51 ha) is unlikely to result in a significant impact to the TEC.

The TEC does not meet the condition criteria for the corresponding TEC under EPBC Act, being Cumberland Plain Shale Woodlands and Shale Gravel Transition Forest. Therefore, an Assessment of Significance under the EPBC Act was not completed.

Indirect impacts to threatened flora and fauna species are unlikely to be significant provided appropriate mitigation measures are implemented during construction of the project.

The 'clearing of native vegetation' and 'the invasion of native plant communities by exotic perennial grasses' are key threatening processes (KTP). As noted above, up to 0.51 ha of native vegetation would be directly impacted because of the project, which is considered to be non-significant impact. The project area already contains exotic perennial grasses, and therefore any impact to this KTP is minimal.

ii Fauna

Cumberland Shale Plain Woodland has the potential to provide roosting and foraging habitat for several threatened fauna species identified on the BioNet Atlas and PMST, including the Regent Honeyeater, Brown Treecreeper, Varied Sittella, Eastern False Pipistrelle, Eastern Coastal Free-tailed Bat, Southern Myotis, Yellow-bellied Sheath-tail-bat, Greater Broad-nosed Bat, Grey-headed Flying-fox and Latham's Snipe. Construction of the project will result in the removal of one hollow bearing tree, which is considered to be a KTP.

ELA completed a ToS (BC Act) for species listed above (excluding the Latham's Snipe), which concluded that project is unlikely to result in a significant impact to any of the threatened fauna species. The Regent Honeyeater, Grey-headed Flying-fox and Latham's Snipe are also listed under the EPBC Act. ELA completed an Assessment of Significance under the EPBC Act for these species and concluded that the project will not have a significant impact on these species.

8.4.5 Management and mitigation measures

ELA provide detailed mitigation measures in Table 7 of Appendix E. A summary of these measures is provided below:

- Include relevant mitigation measures in the CEMP to ameliorate potential impacts to biodiversity values outside of the impact area.
- Drainage should be controlled in the works footprint in line with the POEO Act requirements to avoid impacts on adjacent/nearby habitats and threatened ecological communities including the adjacent extent of CPW.
- clear delineation of vegetation to be removed and establishment of 'No-Go' zones
- All hollow bearing trees outside of the impact area are to be identified and retained.
- Micro-siting of infrastructure or use of construction methods that do not impact trees must be implemented, and arborist must certify tree protection measures that can enable the protection of all hollow-bearing trees outside of the impact area.
- Construction activities within the tree protection zone (TPZ) of trees to be retained must be assessed and approved by the project arborist and must comply with AS 4970-2009 – Protection of trees on development sites.
- The CEMP must detail tree protection measures to retain all hollow-bearing trees outside the impact area.
- A pre-clearance survey should be undertaken for the hollow-bearing tree to be removed in the impact area.

- Ensure fertilisers, turf, mulch, weeds and imported soils are not unintentionally introduced into areas of ENV and NVR (i.e. through natural drainage pathways or general proximity).
- Chemicals and rubbish must be contained to the construction area.
- All chemicals should be correctly stored within bunding.
- Weed removal should be undertaken using mechanical and manual means. If herbicides are to be used, they should be used as described in the product label. Use in proximity to creek lines should be limited.
- The site-specific CEMP should include measures to reduce the spread of weeds, what weed species are present on site and how best to treat them.
- Temporary tree protection measures (such as machinery exclusion zones from tree roots and tree trunk protection) should be in place for any retained trees and to protect adjacent native vegetation during all construction works. High visibility orange bunting should be placed at a 1 m distance from the trunk of the tree with 'no-go' signage attached.

Work vehicle access should be restricted to designated work areas and existing formed access tracks/roadways.

8.5 Water

8.5.1 Overview

This section assesses the potential hydrology, flooding, water quality, soil erosion and sedimentation aspects and impacts of the project. A geotechnical investigation (Geotechnique 2022) was conducted which involved the installation of 11 boreholes to assess groundwater and soil conditions at the project site.

8.5.2 Existing environment

i Hydrology and water quality

The project site is within the Hawkesbury-Nepean catchment, and more specifically 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 more urbanised areas (Sydney Metro 2020). Likewise, the project site and the adjacent two land lots (Lot 5 DP 255578 situated to the immediate west, and Lot 7 DP 255578 situated to the immediate east) have a combined total of four dams (Dam 1 – Dam 4), which are connected by waterways (Eco Logical 2022b) (refer to the DDP in Appendix B). Dam 2 is located on the project site. The nearest receiving creek mapped as Key Fish Habitat by the Department of Primary Industries – Fisheries (DPI Fisheries) is Cosgroves Creek, approximately 100 m to the south-east of the subject site. Water quality of the four dams found on the three adjoining land lots, as well as the volume and size of the dams is provided in the Dam Dewatering Plan prepared for the project by Eco Logical (2022b).

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 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.

Boreholes installed as part of the geotechnical investigations at the site identified that there was no groundwater on the project site at the depths of the boreholes (1.95 m to 5.8 m). However, it was noted that groundwater levels generally vary due to changes in temperature, rainfall, and other factors not evident during drilling works.

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, 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 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):

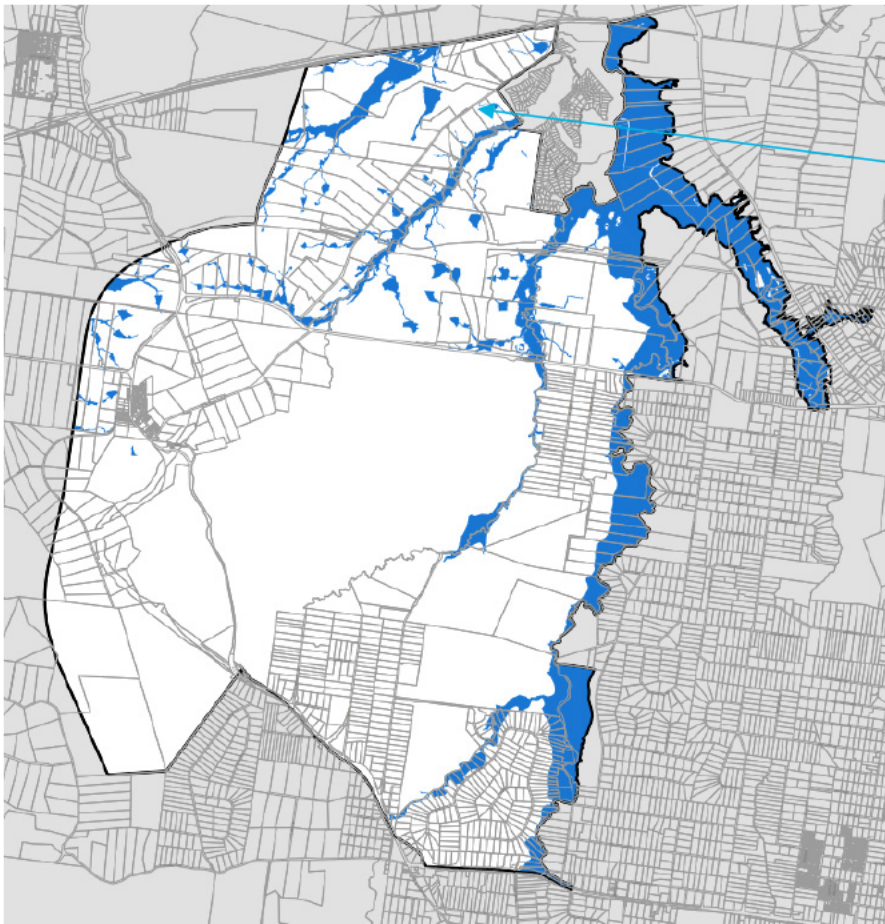
- effluent released from five sewage treatment plants in the lower parts of the catchment
- urban and agricultural runoff from market gardens, cattle and sheep grazing and intensive agriculture such as poultry farming.

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

i Flooding

Western Sydney Parkland SEPP shows the extent of the 1 in 100 annual exceedance probability (AEP) flood extent over the Aerotropolis (refer to Figure 8.9). It shows that in the event of a 1 in 100 AEP flood, the Cosgroves Creek corridor would be impacted. 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 hard surfaces and water management infrastructure in the area, will most likely mitigate any flooding risk.



Source: SEPP Western Sydney Parkland maps

Figure 8.9 1 in 100 AEP flood extent

ii Geology and soils

The project is located within the Sydney Basin and traverses several geographic formations and landscapes with different soil types. Geology and soils are described in further detail in Section 6.2.

The site is not identifiable on the Acid Sulfate Soil Risk Map, with a desktop review indicating that acid sulfate soils (ASS) are unlikely to be present at the subject site (JBS&G 2022).

A review of the Western Sydney salinity potential map indicates that the project site is located in an area with a moderate salinity potential, with high salinity potential along Cosgroves Creek (JBS&G 2022). Areas of high salinity potential are typically encountered in lower slopes and drainage systems where water accumulation is high.

Soil samples were collected across the site as part of JBS&G's Detailed Site Investigation (2022) and were analysed for a range of contaminants. Samples were found to be below the adopted commercial ecological and/or human health criteria for most contaminants including:

- heavy metals
- TRH and BTEX
- PAH
- PCB
- organochloride pesticides

- asbestos
- salmonella and thermotolerant coliforms.

The only contaminant above criteria was E.coli which was found in soil samples within the dam sediment at 130 MPB/g, which is 30 MPB/g above the screening criteria of 100 MPN/g.

ii 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 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.

8.5.3 Impact assessment

i Construction

The project will be mostly contained within the subject site, with the exception of transmission line connection and stormwater drainage works along Luddenham Road.

The design of the proposed SSP ZS has taken into account the existing topography, geology, soil and groundwater and surface water features, as well as the flooding potential within the Cosgrove Creek corridor.

Earthworks to be undertaken as part of project construction are summarised in Chapter 7. Earthworks will also take into consideration the geology and soils, groundwater, and flooding risks at the subject site. Proposed earthworks have been planned out with guidance from specialised geotechnical consultants, who have undertaken extensive site investigation works at the subject site and were able to propose controlled earthworks that will avoid surface ground subsidence.

Earthworks that have the potential to impact on 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 holes and trenches.

The greatest erosion risks during construction works are expected when potentially dispersive soils are exposed during earthworks. Sediment control measures will be implemented as outlined in the following section.

Another risk is the storage and/or stockpiling of any excess spoil that may need to be disposed of following construction works. Stockpile management will be a key element for inclusion in the CEMP, particularly in relation to location, drainage and appropriate handling and removal of any excess spoil from the subject site.

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

ii Operation

The construction of an appropriate on-site water and stormwater management system proposed for the subject site is considered sufficient to manage and control water and soil-related impacts during the operation of the project.

8.5.4 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, particularly any under boring activities, are described below.

i 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-term 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 *Soils and Construction Manual* (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 the construction site, 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 (Appendix K).
- 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 required for the active stage of works.
- Detailed geotechnical investigations will be undertaken where necessary prior to any earthworks taking place.
- 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 the subject 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.

ii 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.

Spoil management and dewatering of worksites will all be managed in accordance with the following EE Standards and the Environmental Guidelines Handbook (Appendix K) 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.

iii Contaminated soil measures

As previously mentioned, all soil samples, apart from those taken from dam sediment, were below recommended limits for various contaminants:

- Dam sediment is to be re-tested after dewatering to assess current contamination status.
- 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 the unnamed tributary located within the north-west corner of the site.

iv Acid sulfate soils

Acid sulfate soils are not expected to be encountered during construction. In the event that ASS are identified during construction, the soil should be properly managed as follows:

- The excavated stockpile material may either be treated on site or removed off-site to a licenced landfill for treatment and disposal.
- The excavated ASS should be treated immediately otherwise the excavated soil should be captured as specialist advice.
- All material to be removed from the site should be carried out by a licensed contractor. The material should be sealed and contained on the truck during haulage using appropriate lining and capping material.
- The disturbance of ASS should be avoided as much as possible by minimising excavation works.

v Earthworks management

Earthworks should be carried out in a controlled manner as specified below:

- Double sediment and erosion controls are required during earthworks.
- Should groundwater be encountered during earthworks, the Site Supervisor would notify the Environmental Advisor and Project Manager who will co-ordinate any further actions, in line with the recommendations provided in the GeoEnviro Geotechnical Report.
- A functioning 'spill kit' will be kept near the construction site 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, and the incidents should be reported.

vi 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.
- 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.

8.6 Contamination

8.6.1 Overview

A preliminary site investigation (PSI) was prepared by JBS&G (2022) for a wider area beyond the SSP, which includes the project site.

8.6.2 Existing environment

At the time of the PSI preparation, the subject site was being used for grazing land for cattle and residential structures (southwest of current site) had been demolished. JBS&G (2022) reported that the history of the subject site and immediately surrounding land did not identify any obvious activities which were likely to have resulted in significant or widespread contamination of natural soil or groundwater that would prevent development within the subject site.

Desktop search of the NSW EPA database identified the following:

- No prevention, clean-up or prohibitions notices have been issued under the POEO Act for the subject site or immediate surrounding land.
- No notices have been issued under the CLM Act for the subject site and immediate surrounding land.
- The subject site or immediate surrounding are not on the list of NSW contaminated sites notified to the EPA.
- The site is not listed by EPA on the NSW Government PFAS Investigation program. The closest PFAS investigation area identified by the EPA is the Richmond RAAF Base (Middleton Avenue, Richmond). Given the RAAF Base is 6 km south of the subject site, and the Hawkesbury River separates the subject site and the RAAF Base, it is unlikely any PFAS related impacts at the Base pose a risk to the subject site.

Furthermore, previous reports indicated that no chemical or fuel storage was known to be present on the subject site, consistent with site observations and review of historical aerials as reported above.

An investigation program was undertaken as part of the PSI, which included soil and sediment sampling by a backhoe to excavate test pits to a maximum depth of 1.8 m. Selected soil samples were screened for potential volatile organic compounds (VOCs) using a portable photo-ionisation detector (PID). Surface water grab samples were also collected directly into sample containers from the edge of the dam water, where safe to do so. Representative samples were collected across the subject site and were analysed for a range of analytes, with the laboratory results summarised in Tables A to C of Appendix I.

8.6.3 Impact assessment

Site investigation and desktop assessment findings are summarised below:

- No odours, staining or asbestos containing material (ACM) were observed across the site. No asbestos was detected within analysed soil samples.
- Concentrations of heavy metals were reported below the adopted commercial ecological and/or human health criteria in all soil samples selected for analysis.
- Total recovery hydrocarbons (TRH) and benzene, toluene, ethylbenzene and xylenes (BTEX) concentrations were reported below the limit of reporting (LOR) and/or the adopted commercial assessment criteria.
- Polycyclic aromatic hydrocarbons (PAH) concentrations were reported below the LOR and the adopted commercial assessment criteria.
- Polychlorinated biphenyls (PCB) concentrations were reported below the LOR and the adopted commercial assessment criteria.
- OCP concentrations were reported below the LOR and the adopted commercial assessment criteria.
- E. coli, salmonella and thermotolerant coliforms were reported in some of the dams.

8.6.4 Conclusions and recommendations

Based on the results of the PSI, the following key findings have been made:

- No significant filling was observed across the site, with dam walls appearing to be constructed or reworked natural clay likely source from the site.
- No ACM was observed in soils, on the ground surface or was detected within laboratory analysed soil samples.
- All individual chemical contaminants in soil were below the LOR and/or the adopted site criteria.
- The concentration of E. coli detected in the dam sediment exceeded the adopted screening criterion and will require management after dam is decommissioned. Concentrations of remaining biological contaminants in dam sediments were reported below the screening criteria.
- The area assessed for salinity was classified as non-saline.
- The concentration of copper in dam surface water exceeded the adopted freshwater criterion and as such, water cannot be released directly to nearby ecological receptors. The water is considered appropriate to be irrigated across the site or used in dust suppression during development.

Based on the information provided in the PSI, the history of the site and immediately surrounding land did not identify any obvious activities which are likely to have resulted in significant or widespread contamination of natural soil or water that would prevent development within the subject site. It is concluded that the site is suitable for the proposed commercial/ industrial land use scenario as a zone substation. Appropriate management of dam sediment and surface water via a dam dewatering plan is recommended.

8.7 Noise

8.7.1 Overview

A noise impact assessment (NIA) was prepared by Day Design Pty Ltd (Day Design) (2022) to assess any noise impact of the project on the surrounding area. It has been provided in Appendix I.

The NIA involved a desktop assessment and a site inspection, which are summarised further below.

8.7.2 Existing environment

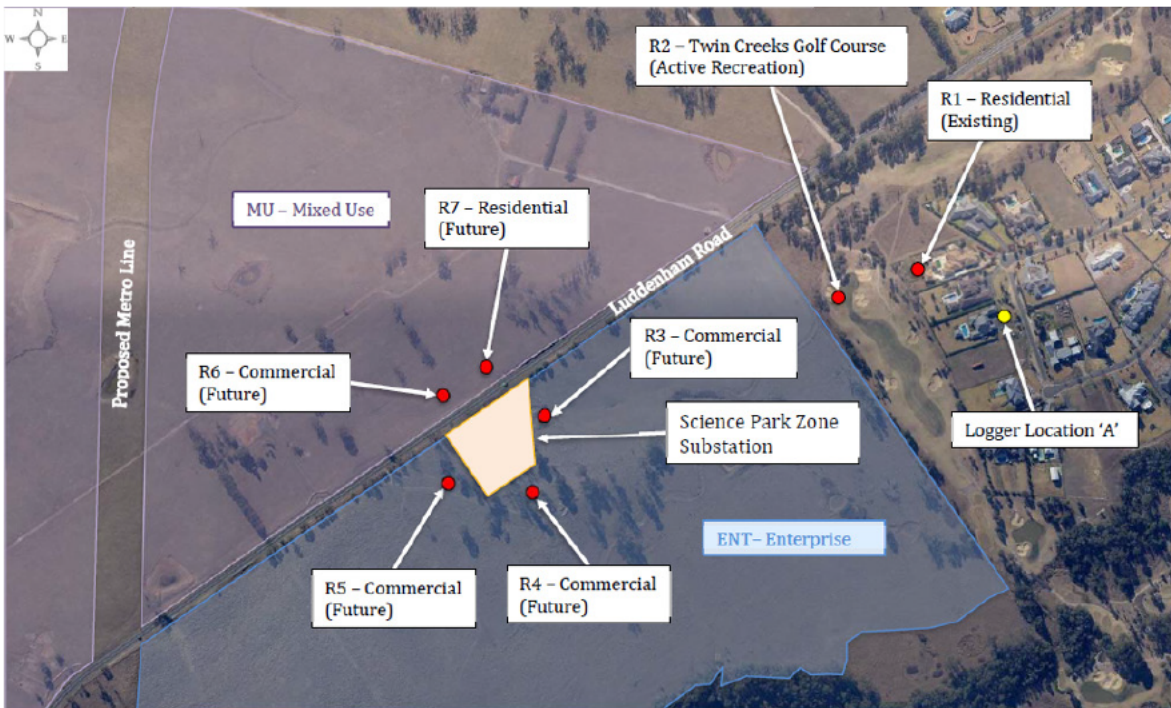
i Sensitive receivers

Currently, the nearest potentially affected residential premises is located east of the subject site, at 48 Portrush Crescent, Luddenham. The nearest potentially affected future commercial premises will be located on east, west and south of the ZS in the Enterprise zone; and to the north of the opposite side of Luddenham in the mixed land use zone.

The nearest noise sensitive receivers to the property, in various directions, are provided in Table 8.2 and shown in Figure 8.10.

Table 8.2 Nearest noise sensitive receivers

Receptor and type	Address	Direction from site	Distance (m)
R1 – Residential (Existing)	48 Portrush Crescent	East	500 m
R2 – Twin Creek Golf & Country Club (Active Recreation)	2-8 Twin Creeks Road	East	410 m
R3 – Commercial (Future)	Lot 6, DP 255578, 480-544 Luddenham Road	East	Adjacent
R4 – Commercial (Future)	Lot 6, DP255578, 480-544 Luddenham Road	West	Adjacent
R5 – Commercial (Future)	Lot 5, Dp255578, 480-544 Luddenham Road	West	Adjacent
R6 – Commercial (Future)	Luddenham Road	North	35 m
R7 – Residential (Future)	Luddenham Road	North	60 m



Source: NIA

Figure 8.10 Nearest sensitive receivers

8.7.3 Background noise level

Ambient noise level can be defined as the background sound pressure level at any given location, normally used as a reference level to study a new intrusive sound source. The ambient L_{90} background noise level is a statistical measure of the sound pressure level that is exceeded for 90% of the measuring period, normally for a duration of 15 minutes. The Rating Background Level (RBL) is defined by the NSW Environment Protection Authority (EPA) as the median value of the (lower) tenth percentile of L_{90} ambient background noise levels for the day, evening or nighttime periods, measured over a number of days during the proposed days and times of operation.

The NIA notes that the sensitive receivers that may be most impacted by the project would be the residences located to the north of the project. They may experience the most impact during the night-time hours when the zone substation is operating. A noise logger was placed at 44 Portrush Crescent, Luddenham, which is to the north-east of the project. Noise levels were measured from 6 June 2022 – 13 June 2022 during a period with clear skies and temperatures of -1 to 17°C , with the results presented in Table 8.3.

Table 8.3 Noise levels at location 'A' (Source: NIA)

Location	Time period	L_{90} Rating Background Level	Proposed L_{eq} Noise Level
Location 'A'	Day (7:00 am to 6:00 pm)	38 dBA	56 dBA
	Evening (6:00 pm to 10:00 pm)	34 dBA	44 dBA
	Night (10:00 pm to 7:00 am)	31 dBA	44 dBA

8.7.4 Assessment criteria

The NIA assessed the project for background noise levels outlined above, as well as against NSW Noise Policy for Industry (NPfI) standards and modifying factors, to derive at Project Specific Noise criteria. The most stringent Project Specific Noise criterion identified included the following:

Residential receptors in C4L Environmental Living & MU: Mixed-Use:

- 43 dBA during the day
- 39 dBA in the evening
- 36 dBA at night.

Active Recreation Area Receptors:

- 53 dBA $L_{eq, period}$ when in use.

Commercial Receptors:

- 63 dBA $L_{eq, period}$ when in use.

8.7.5 Impact assessment

i Construction

Construction works associated with the project will result in some noise generation. Typical noise generation for the construction of the project will include excavation machinery, large backhoe and trench digging equipment, and directional digging. 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.

Given that the area is sparsely populated, it is anticipated that construction noise should not greatly disturb many residential, commercial, and industrial premises. However, as noted, there are some receivers that are located approximately 200 m from the subject site. 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 18 months and will thus be short-lived. Nevertheless, the entire area is in the process of being transformed and cumulative noise impacts may occur during the construction of the SSP and the surrounding Aerotropolis.

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

ii Operation

Once commissioned, the ZS will operate continuously, 24 hours a day, 7 days a week. The main source of noise from the project will be the transformers that operate continually throughout the day and night. The noise level will not change appreciably from the day to the night and therefore the predicted noise level at night will be the worst-case scenario.

EE has provided three potential transformer options to be assessed for the project. Their specifications including sound power levels are provided in Table 8.4. The project will initially include two transformers with another transformer added at a later date, and one auxiliary transformer. The NIA assumed three transformers will be in operation at 105% no-load with cooling and 2/3 rated load, and that fire walls will be installed on the north, east and western side of the transformers.

Table 8.4 Transformer type options

Transformer options	Transformer	dB(A)
Option 1	At 105% Regulated Voltage (Ur) No-Load with cooling for maximum rating	71 dB(A)
Option 2	At 105% Ur No-Load with cooling for maximum rating	63 dB(A)
Option 3	At 105% Ur No-Load and 2/3 rated load with cooling configuration for 2/3 rated load	63 dB(A)

The results of the assessment using the three optional transformers are presented in Table 8.5.

Table 8.5 Transformer type options – predicted L_{eq} noise levels

Transformer options	R1	R2	R3	R4	R5	R6	R7
Acceptable Noise Limit	36	53	63	63	63	63	36
Premises	Residential	Active Recreation	Commercial	Commercial (future)	Commercial (future)	Commercial (future)	
Option 1	23	22	33	29	43	19	34
Complies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Option 2	15	14	25	43	35	11	26
Complies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Option 3	8	7	18	36	28	4	19
Complies	Yes	Yes	Yes	Yes	Yes	Yes	Yes

As can be seen from the tabled results, Option 1 which has the worst-case scenario, meets the most stringent noise criteria by a margin of 13 dB. Provided the sound power level of the new transformers are limited to a maximum level of 91 dBA at 66% load (approximately 84 dBA at no load), the noise emission at all nearby sensitive receivers will meet the acceptable noise limits.

Measurements and calculations show that the level of noise emitted by all three transformer options proposed for the project will meet the acceptable noise level requirements of the EPA's Noise Policy for Industry and will therefore be acceptable.

8.7.6 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 PCC 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 contact 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 Environmental Services Team. If generators are required to operate at night, acoustic consultants may be required to undertake noise assessment prior to their use.

8.8 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.

8.8.1 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.

8.9 Roads, traffic and access

8.9.1 Overview

As previously noted, the construction works will predominantly occur within the project site, with minimal works along the north-western border of the project site along Luddenham Road. Additionally, drainage works will be undertaken within the road reserve of Luddenham Road.

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

8.9.2 Existing environment

i 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 is adjacent to Luddenham Road. Transmission feeder lines will be placed underneath the road reserve as part of the broader transmission and distribution strategy. ZS works include stormwater drainage works along the road reserve of Luddenham Road.

No local intersections will be impacted by the construction works.

ii Traffic movements

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

iii 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 the following statistics for the Penrith LGAs:

- The statistics results show that the number of crashes and casualties has gradually decreased within the Penrith LGA between 2016–2020 (from 109 crashes and 149 casualties in 2016 to 65 crashes and 103 casualties in 2020).
- There were nine accidents on Luddenham Road between 2016–2020, most of which occurred close to the residential development off Creek Twins Drive and involves four two minor injuries, five moderate injuries, and two serious injuries.

The main hotspots for accidents along the stretch of Luddenham Road are on either side of Luddenham Road/Twin Creeks Road intersection (roundabout).

8.9.3 Impact assessment

i Construction

A driveway to provide access to the ZS and cabling associated with the ZS will be located off New Road 1. Stormwater drainage works will be undertaken within the road reserve of Luddenham Road, adjacent to Lot 6 DP255578. This will require temporary and short-term closures or partial closures to Luddenham Road, which may impact other road users.

Road occupancy permits will be obtained from TfNSW and PCC as required, and a Section 138 Roads Act approval will also be required.

Use of electronic signage in advance of construction commencing may be appropriate in a strategic location outside of the site to advise residents and road users of the upcoming works.

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

ii 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 project site for maintenance purposes.

8.9.4 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 PCC requirements.
- All other appropriate permits will be obtained from the relevant road authorities prior to any construction works taking place along the road reserve; and works will be conducted with these permits.
- Traffic management measures will be included as part of the overarching CEMP.
- 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 (if required) 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 any impacted residents before construction commences, should this be required.
- 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.

8.10 Visual assessment

The landscape character surrounding the project is one of predominantly rural and agricultural land, which is fast transforming with the construction of the Aerotropolis, the SSP and other surrounding precincts.

The construction will be visible from Luddenham Road, as well as the surrounding land; however, it will be small in comparison to the bulk earthworks that will take place due to the surrounding development.

The subject site will experience permanent changes; however, the changes will be in line with the surrounding transformation and development, which will be industrial, commercial, and residential. The outside of the subject site will be landscaped with vegetation planted between the two outside fences. Nevertheless, the control room and amenities building will most likely be visible from Luddenham Road and the surrounding lots but will not cause a significant visual impact.

8.11 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, particularly SSP 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.

8.12 Air quality and dust suppression

8.12.1 Construction

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

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.

8.12.2 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 be made to EE's Environmental Guideline Handbook for dust mitigation and management techniques.

8.13 Safety and hazards

8.13.1 Construction

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 and open trenching, machinery and vehicle movements and changes to road and traffic conditions will be managed appropriately.

8.13.2 Operation

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

8.13.3 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.

8.14 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 1 August 2022 shows that the subject site falls within bush prone land of some category, mostly Vegetation category 2.

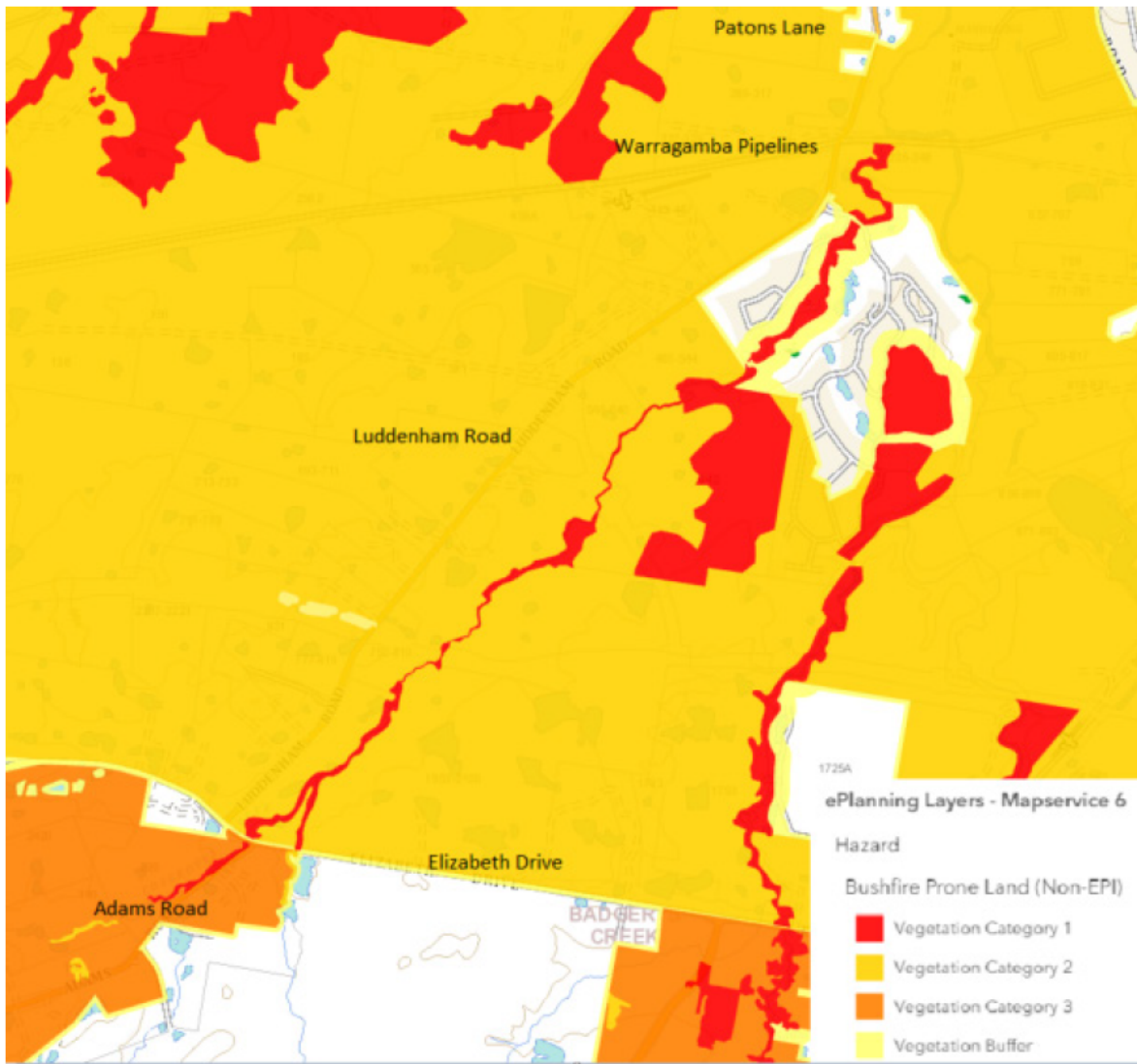


Figure 8.11 NSW Rural Fire Service search results for 'bush fire prone land' including the subject site

8.14.1 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 by the contractor, 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.
- The project will be constructed and maintained in accordance with EE Company Procedure GAM 0011.

8.15 Waste

i General Construction Waste

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.

Other wastes might include:

- Construction worker generated general waste.
- Unused raw material.
- 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.

ii Operation

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

8.15.2 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 will be removed from the work site at the end of each working day. Where items are able to be recycled, the materials will be sorted and stored at an appropriate site (e.g. the nearest Field Service Centre) for collection and recycling.

8.16 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.

9 Environmental management

9.1 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.

9.2 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 substation 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, 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.

9.3 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 Environmental Services 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.

Table 9.1 Summary of management and mitigation measures

Impact	Environmental safeguards	Responsibility
Biodiversity	Measures to further avoid and minimise the construction footprint and native vegetation or habitat removal will be investigated during detailed design and implemented where practicable and feasible.	Contractor
Biodiversity	Include mitigation measures outlined in REF into CEMP	Contractor
Biodiversity	A pre-clearance survey should be undertaken for the hollow-bearing trees outside the impact area.	Contractor
Biodiversity	All hollow bearing trees outside the impact area will be identified and retained.	Contractor
Biodiversity	Ensure fertilisers, turf, mulch, weeds and imported soils are not unintentionally introduced into areas of ENV and NVR (i.e. through natural drainage pathways or general proximity).	Contractor
Biodiversity	Micro-siting of infrastructure or use of construction methods that do not impact trees must be implemented, and arborist must certify tree protection measures that can enable the protection of all hollow-bearing trees outside of the impact area.	Contractor
Biodiversity	A clear delineation of vegetation to be removed and no-go zones will be established.	Contractor
Biodiversity	Drainage will be controlled within the works footprint in line with POEO Act requirements to avoid impacts on adjacent/nearby habitats and threatened ecological communities.	Contractor
Biodiversity	Construction activities within the tree protection zone (TPZ) of trees to be retained must be assessed and approved by the project arborist and must comply with AS 4970-2009 – Protection of trees on development sites.	Contractor
Biodiversity	Weed removal should be undertaken using mechanical and manual means. If herbicides are to be used, they should be used as described in the product label. Use in proximity to creek lines should be limited.	Contractor
Biodiversity	Temporary tree protection measures (such as machinery exclusion zones from tree roots and tree trunk protection) should be in place for any retained trees and to protect adjacent native vegetation during all construction works. High visibility orange bunting should be placed at a 1 m distance from the trunk of the tree with 'no-go' signage attached.	Contractor
General ecological mitigation	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.	Contractor
Invasive and noxious weed management	Weed control measures (e.g. 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.	Contractor

Table 9.1 Summary of management and mitigation measures

Impact	Environmental safeguards	Responsibility
Risk of pathogen and pest species	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.	Contractor
Contaminated land	No specific management strategy is considered to be necessary due to the lack of indication that gross contamination is present on site. However, an Unexpected Finds Protocol should be prepared and implemented during construction, particularly when earthworks are undertaken, as a precautionary measure.	
Contaminated land	If contaminated areas are encountered during construction, appropriate control measures will be implemented to manage the immediate risks of contamination. All other works that may impact on the contaminated area will cease until the nature and extent of the contamination has been confirmed and any necessary site-specific controls or further actions identified in consultation with the Transport for NSW's Environment Manager and/or EPA.	Contractor
Accidental spills	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.	Contractor
Pollution control measures, erosion, and sediment control	Soil and water management will be conducted in accordance with EE's standards and Environmental Guidelines Handbook.	Contractor
Pollution control measures, erosion, and sediment control	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.	Contractor
Pollution control measures, erosion, and sediment control	Disturbance will be restricted to those areas of the project route required for the active stage of works.	Contractor
Pollution control measures, erosion, and sediment control	Any soil tracked on the roadways will be swept up on a regular basis.	Contractor
Pollution control measures, erosion, and sediment control	No fuels, oils or other chemicals are to be stored at worksites unless small amounts are required for that specific days' work.	Contractor

Table 9.1 Summary of management and mitigation measures

Impact	Environmental safeguards	Responsibility
Pollution control measures, erosion, and sediment control	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.	Contractor
Pollution control measures, erosion, and sediment control	Where necessary, additional erosion and sediment controls will be installed during periods of highest rainfall risk (April to October).	Contractor
Pollution control measures, erosion, and sediment control	All drainage, erosion and sediment control measures will be maintained in proper working order until their function is no longer required.	Contractor
Pollution control measures, erosion, and sediment control	Flagging tape or bunting will be used during construction to minimise the potential or any disturbance outside of the designated work areas.	Contractor
Pollution control measures, erosion, and sediment control	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.	Contractor
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.	Contractor
Excavated material measures	Dam sediment is to be re-tested after dewatering to assess current contamination status.	Contractor
Excavated material measures	Permission of the landowner is to be sought prior to establishing site compounds or stock piling on their land.	Contractor
Excavated material measures	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: <ul style="list-style-type: none"> • EMS 0007 – Waste Management • EMS 0008 – Environmental Incidence Response and Management • EMS 0013 – Spoil management • EMS 0014 – Dewatering worksites. 	Contractor

Table 9.1 Summary of management and mitigation measures

Impact	Environmental safeguards	Responsibility
Excavated material measures – inspection and maintenance	The construction, inspection and maintenance requirements for all drainage, erosion and sediment control measures will be specified in the CEMP.	Contractor
Excavated material measures – inspection and maintenance	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.	Contractor
Excavated material measures – inspection and maintenance	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.	Contractor

Table 9.1 Summary of management and mitigation measures

Impact	Environmental safeguards	Responsibility
Waste	<p>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 <i>Waste Classification Guidelines</i> (EPA 2014) and the POEO Act.</p> <p>Measures to prevent adverse impacts in relation to generated waste will include:</p> <ul style="list-style-type: none"> • Waste mitigation and management strategies will be documented in the CEMP and in accordance with EE's Environmental Management Standard EMS 0007 Waste Management. • Stockpiles and excess fill material will be managed in accordance with managed in accordance with the EE Standards and the Environmental Guidelines Handbook and EMS 0013 – Spoil management. • Waste material generated on site will not be left on site once the works have been completed. • Every effort will be made to minimise tree trimming and removal, where possible. • Trees will be removed by a licensed arborist. <p>Earthworks should be closely monitored by a geotechnical consultant and must include field density testing at an appropriate frequency and level of supervision as detailed in AS 3798-2007.</p> <p>Any excess waste or spoil including, fill material and VENM, will be disposed of at a licensed waste or recycling facility as appropriate</p> <p>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.</p> <p>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.</p> <p>All other waste materials will be removed from the work site at the end of each working day. Where items are able to be recycled, the materials will be sorted and stored at an appropriate site (e.g. the nearest Field Service Centre) for collection and recycling.</p> <p>Once works are completed in any given location, all disturbed ground surfaces will be reinstated as soon as possible.</p>	Contractor
Waste - vegetation	<p>Vegetation such as garden and wood waste are classified as general solid waste (non-putrescible) as per the Waste Classification Guidelines. Should trees need to be removed, they will be removed by licensed arborists in accordance with the management and mitigation measures specified by the arborist, or by a suitably qualified professional as part of a 5-part test. However, vegetation removal will only be undertaken where absolutely required.</p>	Contractor
Fill material	<p>If fill material is brought to site, fill material will be stockpiled in dedicated areas and managed in accordance with the EE Standards and the Environmental Guidelines Handbook and EMS 0013 – Spoil management.</p>	Contractor
Dial Before You Dig	<p>The Project Manager will conduct DBYD searches prior to works commencing on site.</p>	Contractor

Table 9.1 Summary of management and mitigation measures

Impact	Environmental safeguards	Responsibility
Impacts on neighbouring properties – electricity supply	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.	Contractor
Noise	Appropriate approvals are to be obtained from the affected Councils as required prior to commencing construction.	Contractor
Noise	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.	Contractor
Noise	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.	Contractor
Noise	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.	Contractor
Air quality	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.	Contractor
Air quality	Traffic movement and speed will be restricted over disturbed areas of ground and unsealed access tracks.	Contractor
Air quality	Ensure any soil/spoil tracked onto roadways is swept up on a regular basis.	Contractor
Air quality	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.	Contractor
Air quality	Vehicles and machinery are not to be left idling when not in use to reduce exhaust emissions.	Contractor
Air quality	Dust suppression techniques, including wetting down surfaces will be used as necessary.	Contractor
Air quality	Reference is made to EE’s Environmental Guideline Handbook for dust mitigation and management techniques.	Contractor
Aboriginal heritage	Apply for AHIP permits for Aboriginal heritage impacted areas prior to works commencing in impacted areas.	Celestino
Aboriginal heritage	No-go areas to be marked on maps in CEMP and fenced off	Contractor

Table 9.1 Summary of management and mitigation measures

Impact	Environmental safeguards	Responsibility
Aboriginal heritage	An unexpected finds procedure will be followed in the event that an unknown or potential Aboriginal object/s, including skeletal remains, is found during construction. Work will only re-commence once the requirements of that Procedure have been satisfied.	Contractor
Non-Aboriginal heritage	An unexpected finds procedure will be followed in the event that any unexpected heritage items, archaeological remains or potential relics of Non-Aboriginal origin are encountered. Work will only re-commence once the requirements of that Procedure have been satisfied.	Contractor
Safety and hazards	<p>The following mitigation measures will be implemented to ensure management of safety and hazards:</p> <ul style="list-style-type: none"> • 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. <p>Any recommendations in the TMP will be implemented during the construction works.</p> <p>Any open holes that are left unattended at any time will be covered and fenced as necessary to prevent access.</p> <p>All works will be undertaken in accordance with SafeWork NSW requirements, EE standards and procedures and any other applicable requirements.</p>	Contractor
Bushfire	<p>The CEMP prepared for the project will make provision for the following bushfire protection measures:</p> <ul style="list-style-type: none"> • 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. • 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. • The project will be constructed and maintained in accordance with EE Company Procedure GAM 0011. 	Contractor

10 Conclusion

The investigations undertaken as part of this REF have shown that the construction of the project 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.

The environmental assessment has concluded that the project will not have a significant effect on the environment, considering the mitigation and management measures listed in Chapter 9 are implemented. This includes the retrieval of two AHIPs for disturbance to SSP 7 / AHIMS [REDACTED] prior to commencing works in Aboriginal heritage impacted areas.

It is therefore concluded that:

- An EIS is not required for the project assuming mitigation and management measures in Chapter 9 are implemented.
- EE makes a formal determination in relation to the project.
- A separate REF will be prepared for other construction stages of the project.
- 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

A.1 Appendix Heading

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Appendix B

EE SSP ZS Aboriginal Cultural Heritage Report (Kelleher
Nightingale)

B.1 Appendix Heading

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Appendix C

Celestino enabling works Aboriginal Cultural Heritage
Assessment Report (Kelleher Nightingale)

C.1 Appendix Heading

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Appendix D

Heritage Impact Assessment (Biosis Pty Ltd)

D.1 Appendix Heading

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Appendix E

Flora and Fauna Assessment (Eco Logical Australia Pty Ltd)

E.1 Appendix Heading

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Appendix F

Detailed Site Investigation (Celestino Developments Pty Ltd)

F.1 Appendix Heading

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Appendix G

Ecological Assessment (Gingra Ecological Surveys)

G.1 Appendix Heading

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Appendix H

Noise Impact Assessment (Day Design Pty Ltd)

H.1 Appendix Heading

Text here

Appendix I

Preliminary Site Investigation (JBS&G)

I.1 Appendix Heading

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Appendix J

Dam dewatering plan

J.1 Appendix Heading

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Appendix K

EE Environmental guidelines handbook

K.1 Appendix Heading

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Contact Endeavour Energy for appendices, if required.