



Eraring Battery Energy Storage System

Statement of Heritage Impact

IS365800_SoHI | 02

13 October 2021

Origin Energy Eraring Pty Limited

SSD-15950052 EIS Appendix G



Eraring Battery Energy Storage System

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02	13/10/2021	Final Statement of Heritage Impact	Alexandra Seifertova	Karen Murphy	Thomas Muddle

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Glossary of terms and abbreviations

Term	Definition
BESS	Battery Energy Storage System
CHL	Commonwealth Heritage List
DPIE	Department of Planning, Industry and Environment
EIS	Environmental Impact Statement
EP&A Act	Environmental Planning and Assessment Act 1979
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
EPS	Eraring Power Station
FCAS	Frequency Control Ancillary Services
GW	Gigawatt
HV	High voltage
kV	Kilovolt
LEP	Local Environmental Plan
LGA	Local Government Area
MV	Medium voltage
MW	Megawatt
MWh	Megawatt hours
NHL	National Heritage List
NEM	National Energy Market
PCS	Power conversion systems
RNE	Register of the National Estate
SEARs	Secretary's Environmental Assessment Requirements
SRD SEPP	State Environmental Planning Policy (State and Regional Development) 2011
SHI	State Heritage Inventory
SHR	State Heritage Register
SRAS	System Restart Ancillary Services
SSD	State significant development
WHL	World Heritage List

Executive Summary

Origin Energy Eraring Pty Limited (Origin) owns and operates the Eraring Power Station (EPS) which is one of Australia's largest power stations, having a capacity of 2,880 megawatts (MW). Origin is seeking regulatory and environmental planning approval for the construction and operation of a grid-scale Battery Energy Storage System (BESS) with a discharge capacity of 700 MW and storage capacity of 2,800 megawatt hours (MWh) within the Origin landholding associated with the EPS (the Project). The Project area is located within the Local Government Area (LGA) of Lake Macquarie.

Jacobs on behalf of Origin currently developing an Environmental Impact Statement (EIS) for the assessment of the Eraring Battery Energy Storage System in accordance with Part 4, Division 4.7 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). This Statement of Heritage Impact report has been prepared to inform the EIS.

The results of the desktop assessment and a site inspection confirmed the presence of one locally listed heritage item, EPS (LEP 93) overlapping the Project area, which is listed on the Lake Macquarie Local Environmental Plan 2014 (LEP). The scope of proposed works focuses on an area of the site where there are no key heritage elements associated with the EPS itself, and where parts of the land were previously used for stockpiling soil from various upgrades and construction work. Given the small scale nature of the historical activities prior to the EPS, and subsequent levels of ground disturbance, there is unlikely to be historical archaeological remains present in the Project area, and the archaeological potential is considered to be negligible.

No demolition of the key heritage elements of the EPS itself are proposed. The design of the Project infrastructure has a similar utilitarian / functional approach to that for which the power station is of heritage significance. The addition of Project infrastructure would not impact on the technological or historical significance of the power station, and it would contribute to the continuing operation of the site for its significant historical use. As such, the proposed works have been assessed as having negligible adverse impact on the heritage significance of the EPS (LEP 93).

As there is negligible adverse impact on historical heritage of the EPS (LEP 93) from the planned works, the management measures are for managing general project risk to heritage. These measures are as follows:

- Should any unexpected non-Aboriginal heritage, including archaeological relics, be uncovered during the course of the proposed works, works should stop, and the area cordoned off. A qualified archaeologist and, if necessary, Heritage NSW (in accordance with s146 of the *Heritage Act 1977* (the Heritage Act)) should be contacted to assess significance and advise on further requirements before work can recommence; and
- All contractors and subcontractors should be made aware of their obligations under the Heritage Act. The presence of a heritage item and associated elements in the vicinity of the proposed works should also be communicated to all staff during toolbox talks.

Important note about your report

The sole purpose of this report and the associated services performed by Jacobs Group (Australia) Pty Ltd (Jacobs) is to undertake a Statement of Heritage Impact in accordance with the scope of services set out in the contract between Jacobs and Origin. That scope of services, as described in this report, was developed with Origin.

In preparing this report, Jacobs has relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by Origin and/or from other sources. Except as otherwise stated in the report, Jacobs has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate, or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

Jacobs derived the data in this report from information sourced from Origin (if any) and/or available in the public domain at the time or times outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination of the Project and subsequent data analysis, and re-evaluation of the data, findings, observations, and conclusions expressed in this report. Jacobs has prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures, and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.

This report should be read in full and no excerpts are to be taken as representative of the findings. No responsibility is accepted by Jacobs for use of any part of this report in any other context.

This report has been prepared on behalf of, and for the exclusive use of, Origin, and is subject to, and issued in accordance with, the provisions of the contract between Jacobs and Origin. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this report by any third party.

1. Introduction

1.1 Project background

Origin Energy Eraring Pty Limited (Origin) owns and operates the Eraring Power Station (EPS) which is one of Australia's largest power stations, having a capacity of 2,880 megawatts (MW). EPS is scheduled to be among 14 gigawatts (GW) of coal-fired generation plants to be retired within the next few decades (AEMO, 2020). The retirement of the EPS will support Origin's carbon emission reduction goals. As such, Origin is currently progressing an application to provide energy storage and key network services that would facilitate long term emissions reduction in the National Electricity Market (NEM) while supporting the delivery of secure and reliable electricity for consumers and businesses.

Origin is seeking regulatory and environmental planning approval for the construction and operation of a grid-scale Battery Energy Storage System (BESS) with a discharge capacity of 700 MW and storage capacity of 2,800 megawatt hours (MWh) next to the EPS on existing Origin landholding (the Project).

The Project is a State significant development (SSD) under the *State Environmental Planning Policy (State and Regional Development) 2011* (SRD SEPP) and subject to Part 4, Division 4.7 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). As such, the Project requires the preparation of an Environmental Impact Statement (EIS) in accordance with Secretary's Environmental Assessment Requirements (SEARs) and the approval of the Independent Planning Commission under circumstances described in SRD SEPP or the NSW Minister for Planning and Public Spaces.

1.2 Purpose of this report

This Statement of Heritage Impact (SOHI) has been prepared in accordance with the SEARs issued for the Project on 19 April 2021 by the Planning Secretary of the NSW Department of Planning, Industry and Environment (DPIE). The SEARs relevant to this technical report are presented in Table 1-1.

Table 1-1: SEARs – Historic Heritage

SEARs	Section addressed
<ul style="list-style-type: none"> ▪ Heritage – including an assessment of the development: <ul style="list-style-type: none"> - on historic heritage and a Statement of Heritage Impact (SOHI), prepared in accordance with the guidelines in the NSW Heritage Manual; 	Entire report

This report also addresses mandatory considerations in applicable environmental planning instruments and guidelines as noted in Table 1-2.

Table 1-2: Environmental planning instruments and considerations

Environmental planning instrument	Mandatory considerations	Where addressed
Lake Macquarie Local Environmental Plan (LEP) 2014	<p>The Project would be located within the City of Lake Macquarie LGA and development within this LGA is regulated by the Lake Macquarie LEP. The Project area is zoned SP2 Infrastructure (Electricity generating works) with the purpose shown on the map permissible with consent, and energy storage included in the definition of Electricity generating works.</p> <p>Other applicable clauses of the LEP include:</p>	Entire report

Environmental planning instrument	Mandatory considerations	Where addressed
	<ul style="list-style-type: none"> Clause 5.10 heritage protection in relation to the listing of the EPS as a locally significant heritage item which requires that the consent authority must, before granting consent under this clause in respect of a heritage item or heritage conservation area, consider the effect of the proposed development on the heritage significance of the item or area concerned. 	

1.3 Project location

The Project will be situated on land zoned SP2 Infrastructure for electricity generating purposes and within an area previously disturbed by power station activities. No re-zonings or land acquisitions are required. The Project is located within, Lots 10 and 11 DP 1050120, Rocky Point Road Eraring, within the Lake Macquarie LGA, as illustrated in Figure 1-1.

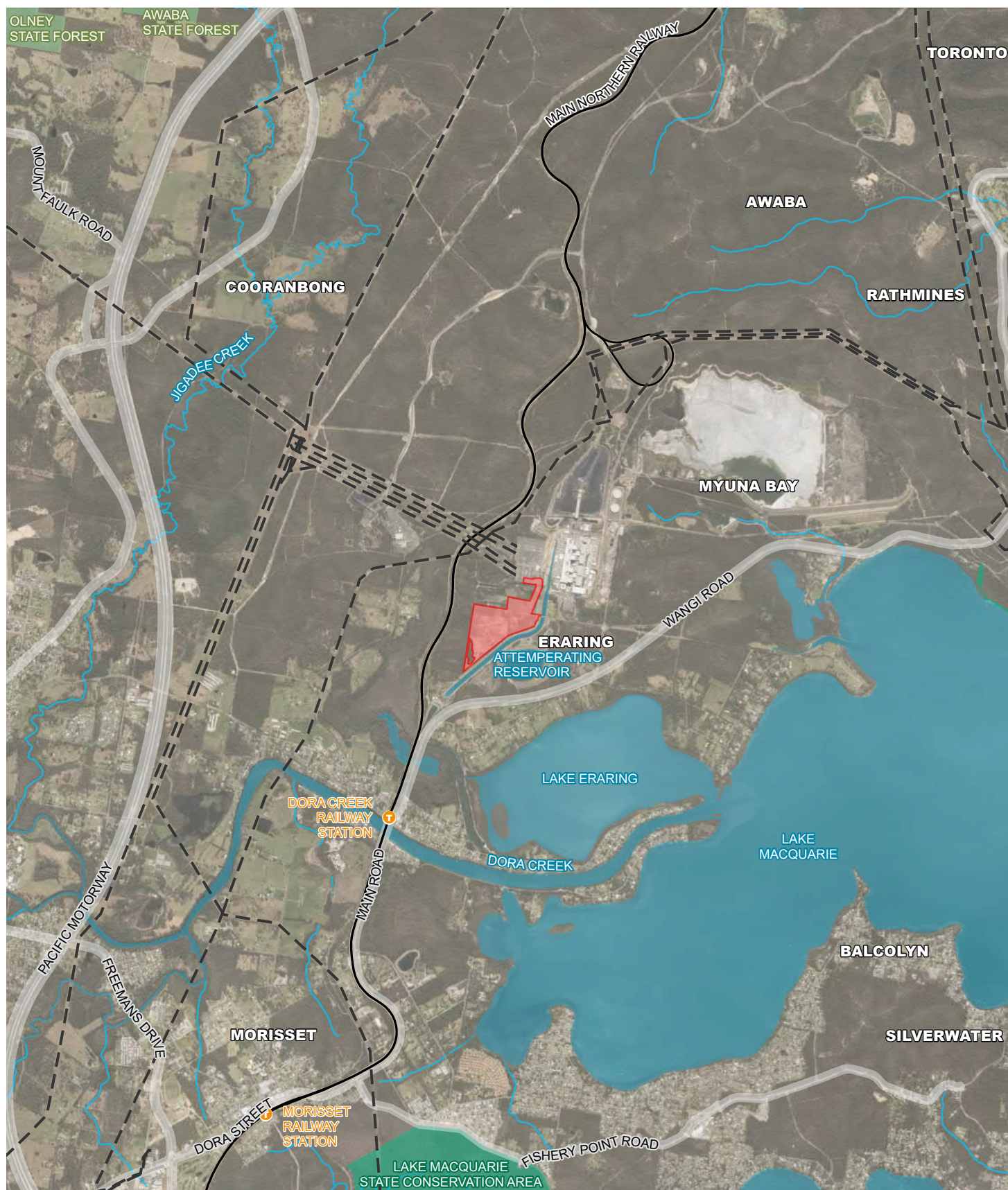
Surrounding land external to the EPS consists of broadacre rural development and low-density residential properties. The largest commercial centre and population centre nearby is Charlestown (29.1 kilometres (km) north east), and the closest residential suburb is Dora Creek (1.2 km south). The Great Northern Railway alignment runs along the border of Dora Creek and Eraring suburbs, approximately 200 m west of the Project area.

The Project area is surrounded by the following features with the Origin landholding:

- EPS operations area, elevated TransGrid switchyard, coal yards and extensive EPS buffer lands to the north;
- Elevated attenuation reservoir to the east;
- Elevated EPS inlet canal to the south and east; and
- Mature vegetation within E2 environmental protection zoned land along a ridge line to the west.

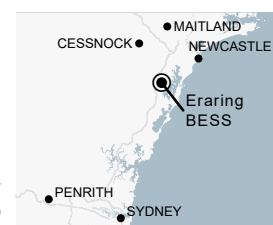
The nearest private receptors to the Project area are located as follows:

- Rural residential dwellings approximately 600 m to the west on Gradwells Road beyond the Great Northern Railway;
- Dora creek township approximately 1.2 km to the south;
- Properties on Border Street approximately 600 m to the south which are screened by the EPS inlet canal and attenuation reservoir and beyond Wangi Road; and
- Dwellings to the north of Project area located over 4 km away beyond the EPS and mining operations.



■ Project area
 - - - Electricity transmission line
— Railway

0 1 km
 1:50,000 at A4
 GDA94 MGA56



Data sources

Origin 2021
 © Department Finance, Services
 and Innovation Dec 2020,
 © Department of Customer Service 2020

Figure 1-1 Project location

1.4 Investigators and contributions

This report was authored by Alexandra Seifertova (Archaeologist, Jacobs). Alexandra holds a Bachelor of Arts with Honours from the University of Sydney and has over three years of experience as an archaeologist. This report was reviewed by Dr Karen Murphy (Technical Director, Archaeology and Cultural Heritage, Jacobs). Spatial mapping was provided by Sarah Ryan (Graduate Spatial Consultant, Jacobs).

1.5 Report structure

The report structure is as follows:

- Section 1 provides the Project background and briefly describes the Project location;
- Section 2 describes the Project;
- Section 3 describes the legislation applicable to historical heritage for the Project location;
- Section 4 describes the historical context of the Project location;
- Section 5 describes the site inspection;
- Section 6 provides a significance assessment of heritage items in and near the Project area;
- Section 7 provides an impact assessment on heritage items in or near the Project area; and
- Section 8 provides the recommended mitigation measures.

2. Project description

2.1 Overview

Origin is seeking regulatory and environmental planning approval for the construction and operation of a grid-scale BESS with a discharge capacity of 700 MW and storage capacity of 2,800 MWh at the Project area. The Eraring BESS would be among the largest battery projects in NSW and Australia in terms of peak power output and discharge duration. The Project would provide energy storage and key network services that would facilitate long term emissions reduction in the NEM while supporting the delivery of secure and reliable electricity for consumers and businesses.

The Project would be situated within the Origin landholding associated with the EPS located on the western shore of Lake Macquarie. EPS is approximately 40 km south of Newcastle and approximately 120 km north of Sydney in NSW. The total area of the Origin's landholding is approximately 1,200 hectares (ha), including EPS operational areas, Eraring Ash Dam and surrounding buffer lands consisting of bushland and grassland interspersed with roads, water management and electricity transmission infrastructure. The Project area is about 25 ha and is shown in Figure 2-1.

The Project would include the construction and operation of:

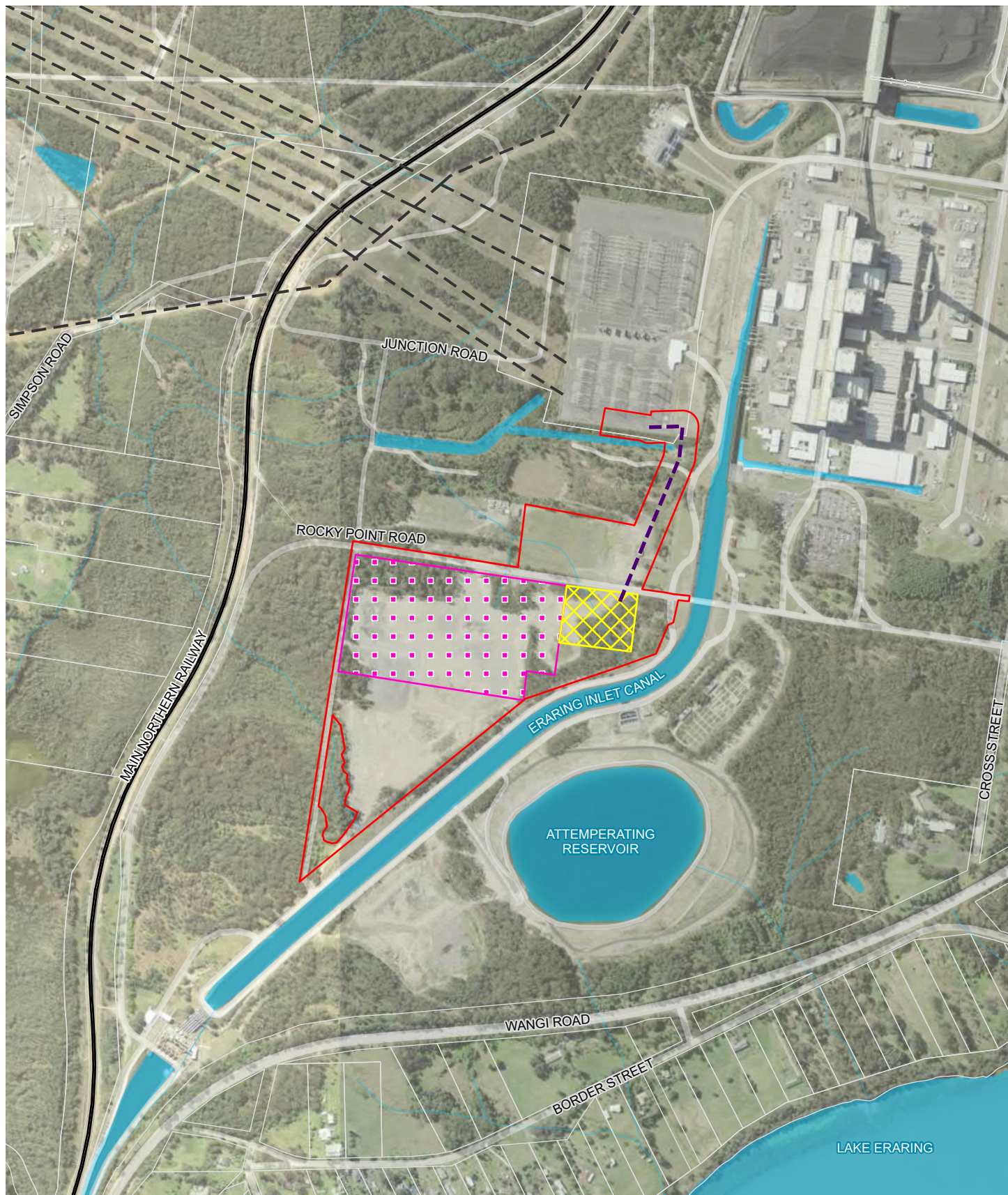
- BESS compounds comprising of rows of enclosures housing lithium-ion type batteries connected to associated power conversion systems (PCS) and high voltage (HV) electrical reticulation equipment;
- A BESS substation housing HV transformers and associated infrastructure;
- Approximately 400 m of overhead 330 kilovolt (kV) transmission line connecting the BESS substation to the existing 330 kV TransGrid switchyard; and
- Ancillary infrastructure and facilities including safety protection systems and site ancillary facilities such as laydown areas and site offices.

A full description of the Project is included in Section 3 of the EIS.

The BESS will be capable of providing Energy Frequency Control Ancillary Services (FCAS), System Restart Ancillary Services (SRAS), as well as Fast Frequency Response (FFR) and synthetic inertia - security services currently under consideration in the NEM.

The Project maximum disturbance area is approximately 25 ha in size with permeant infrastructure likely to cover half this area. Construction may require temporary compounds or laydown areas outside the permanent footprint but within the Project area and would be located in existing vacant areas of the Project area as illustrated in Figure 2-1.

Figure 2-1: Project layout



- Project area
- Proposed 330kV transmission connection
- Battery Energy Storage System
- Substation
- Electricity transmission line
- Railway
- Cadastre

0 300 m

1:10,000 at A4
GDA94 MGA56

Data sources

Origin 2021,
Aerometrex 2020,
© Department Finance, Services
and Innovation Dec 2020
© Department Customer Service



Figure 2-1 Project overview

2.2 Battery system

The BESS technology provider is not yet confirmed; however, the batteries are likely to consist of modular lithium-ion type racks, housed within battery enclosures containing protection, control and heating, ventilation and air conditioning.

Other infrastructure within the BESS compound will include:

- PCS comprising of inverters and battery transformers;
- HV reticulation including ring main unit (RMU), cables and switchboards; and
- Switch rooms and control rooms.

The PCS will be four-quadrant bidirectional type, with capability for both charge/ discharge in leading and lagging reactive power scenarios. The PCS will also have grid forming capability to allow islanded operation and SRAS where required.

2.3 Network connection

The Project would take advantage of the close proximity to the existing TransGrid owned 330 kV switchyard which has sufficient spare capacity for the size of the proposed BESS. The Project's connection will be electrically separate to that of EPS, so it can be operated independently of the EPS.

The following components are required to connect the BESS to the NEM:

- 33/330 kV transformers in a banded transformer area;
- Overhead steel structure lattice towers complete with insulators and conductor(s) spanning the distance between the Project area and the existing TransGrid 330 kV switchyard;
- Associated protection and control systems.

Connection works into the TransGrid switchyard is targeting existing vacant connection bays but allowance is made for bench extension and installation of additional infrastructure.

2.4 Construction works

The construction methodology for the Project will be developed in more detail during the preparation of the detailed design. However, it is expected to involve:

- Installation and maintenance of environmental controls including drainage and sediment controls;
- Upgraded construction access track from existing internal access road to battery location;
- Vegetation clearing;
- Cut and fill to level areas and establish a hardstand pad and construction laydown areas;
- Structural works – slabs to support battery modules, power conversion systems and transformer structures;
- Delivery, installation and electrical fit-out of battery modules, power conversion systems and transformers;
- Installation of 330 kV overhead cabling from the battery transformers to the TransGrid switchyard;
- Testing and commissioning activities; and
- Removal of construction equipment and rehabilitation of construction areas.

2.5 Construction workforce

The Project will involve the recruitment and training of a construction workforce and ongoing operations and maintenance roles. The Project will also provide localised upskilling and training in the region in relation to the deployment of batteries. Major contractors will be asked to demonstrate their commitment to using a regional workforce and creating Indigenous and equal opportunity employment.

2.6 Construction program

The Project's modular design provides significant deployment flexibility with the capacity to stage the 700 MW to meet market needs. The construction of the first stage of the BESS is expected to begin in 2022 (subject to approval) and have a duration of 18 months, with commercial operations possible by 2023. The indicative timeline for subsequent stages of the Project include:

- Stage 2 construction commencing 2023 and operations commencing 2025; and
- Stage 3 construction commencing 2026 and operations commencing 2027.

2.7 Operation

Operation will be 24 hours/365 days per week and will respond to market demand, fluctuating from discharge at full capacity for up to four hours or partial capacity for a longer duration. Maintenance activities will be ongoing (landscaping, asset protection zones, water management infrastructure, access tracks and inspection, testing and replacement of components). Operation life is expected to be between 20 to 30 years. Component replacements and/or upgraded may extend this timeframe.

2.8 Decommissioning

Following the end of economic life, above ground components would be removed and, where possible, re-purposed. Land rehabilitation will be undertaken where necessary to achieve acceptable conditions as far as reasonably practicable.

3. Legislative context

3.1 Commonwealth legislation

3.1.1 *Environment Protection and Biodiversity Conservation Act 1999*

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Australian Government's key piece of legal framework for the protection and management of matters of national environmental significance (that is flora, fauna, ecological communities and heritage places). Heritage places are protected through their inclusion on the World Heritage List (WHL), the National Heritage List (NHL) or Commonwealth Heritage List (CHL).

The EPBC Act stipulates that a person or entity who has proposed an action that will, or is likely to, have a significant impact on a World, National or Commonwealth Heritage site must refer the action to the Minister for the Environment. The Minister then determines if the action requires approval (referral) under the EPBC Act. If this is the case, an environmental assessment is required, and the Minister then approves (or declines) the action based on that assessment.

A significant impact is defined as 'an impact which is important, notable, or of consequence, having regard to its context or intensity'. The level of significance of the action is based on the sensitivity, value and quality of the environment that is to be impacted, and the duration, scale and geographic extent of the impact. If the action is to be undertaken in accordance with an approved management plan, approval is not required, and the matter does not need to be referred to the Minister.

3.1.2 Commonwealth Heritage List

The CHL has been established to include heritage places that are either entirely within a Commonwealth area, or outside the Australian jurisdiction and owned or leased by the Commonwealth or a Commonwealth Authority. It includes natural, Indigenous and historic heritage places which meet one or more Commonwealth heritage value criteria.

3.1.3 National Heritage List

The NHL includes those places of outstanding heritage significance to the Australian nation (including places overseas) and includes natural, Indigenous and historic places.

3.1.4 Register of the National Estate

The Register of the National Estate (RNE) was formerly compiled as a record of Australia's natural, cultural and Indigenous heritage places worth keeping for the future. The RNE was frozen on 19 February 2007, which means that no new places have been added or removed since that time. From February 2012 all references to the RNE were removed from the EPBC Act and the RNE is maintained on a non-statutory basis as a publicly available archive.

3.2 State legislation

3.2.1 Environmental Planning and Assessment Act 1979

The Project is SSD under Part 4, Division 4.7 of the EP&A Act and the SRD SEPP. Under Section 4.41 of the EP&A Act, the requirement for specified authorisations, and the specified provisions of any legislation that may prohibit an SSD project, including the requirement in the *Heritage Act 1977* for a heritage approval or an excavation permit, do not apply if planning approval has been given for the project.

Land use planning, including zoning and development control, is governed primarily by LEPs made under the EP&A Act. LEPs include lists of local heritage items and local heritage precincts, and provide controls on

development which may affect those items or be located in those precincts. Although LEP controls do not apply to SSD, relevant LEP lists were reviewed for the purpose of preparing this report.

3.2.2 Heritage Act 1977

The the Heritage Act provides several mechanisms by which items and places of heritage significance may be protected. The Heritage Act is designed to protect both listed heritage items, such as standing structures, and potential archaeological remains or relics. Different parts of the Heritage Act deal with these different situations. Approvals under Part 4 or an excavation permit under Section 139 of the Heritage Act are not required for an approved project under Part 4, Division 4.7 of the EP&A Act, however, this assessment follows the intent of the Heritage Act and has addressed the SEARs.

3.2.2.1 State Heritage Register

The Heritage Council of NSW maintains the State Heritage Register (SHR). Only those items which are of State heritage significance in NSW are listed on the SHR. Listing on the SHR controls activities such as alteration, damage, demolition and development. Approved projects to which Part 4, Division 4.7 of the EP&A Act applies do not require approval under Part 4 of the Heritage Act (e.g. a Section 60 approval) for items on the SHR. The requirement to assess the potential impacts of SSD on heritage is provided by the SEARs.

3.2.2.2 Archaeological relics

Part 6 Division 9 of the Heritage Act protects archaeological 'relics' from being 'exposed, moved, damaged or destroyed' by the disturbance or excavation of land. This protection extends to the situation where a person has 'reasonable cause to suspect' that archaeological remains may be affected by the disturbance or excavation of the land. It applies to all land in NSW that is not included in the SHR. Under Section 4(1) of the Heritage Act, a relic is defined as:

'any deposit, artefact, object or material evidence that relates to the settlement of the area that comprises NSW, not being Aboriginal settlement, and is of State or local heritage significance'.

Approved projects to which Part 4, Division 4.7 of the EP&A Act applies do not require approval under Section 139 of the Heritage Act (e.g. excavation permit). The requirement to assess the potential impacts of SSD on heritage is provided by the SEARs.

3.2.2.3 State Heritage and Conservation (s170) registers

Under Section 170 of the Heritage Act, NSW government agencies are required to maintain a register of heritage assets under their control or ownership. Each government agency is responsible for ensuring that the items entered on its register under Section 170 are maintained with due diligence in accordance with the State Agency Heritage Guide (Heritage Council of NSW 2005). Items on s170 registers are listed on the NSW government's online database – the State Heritage Inventory (SHI).

4. Desktop assessment

4.1 Historical context

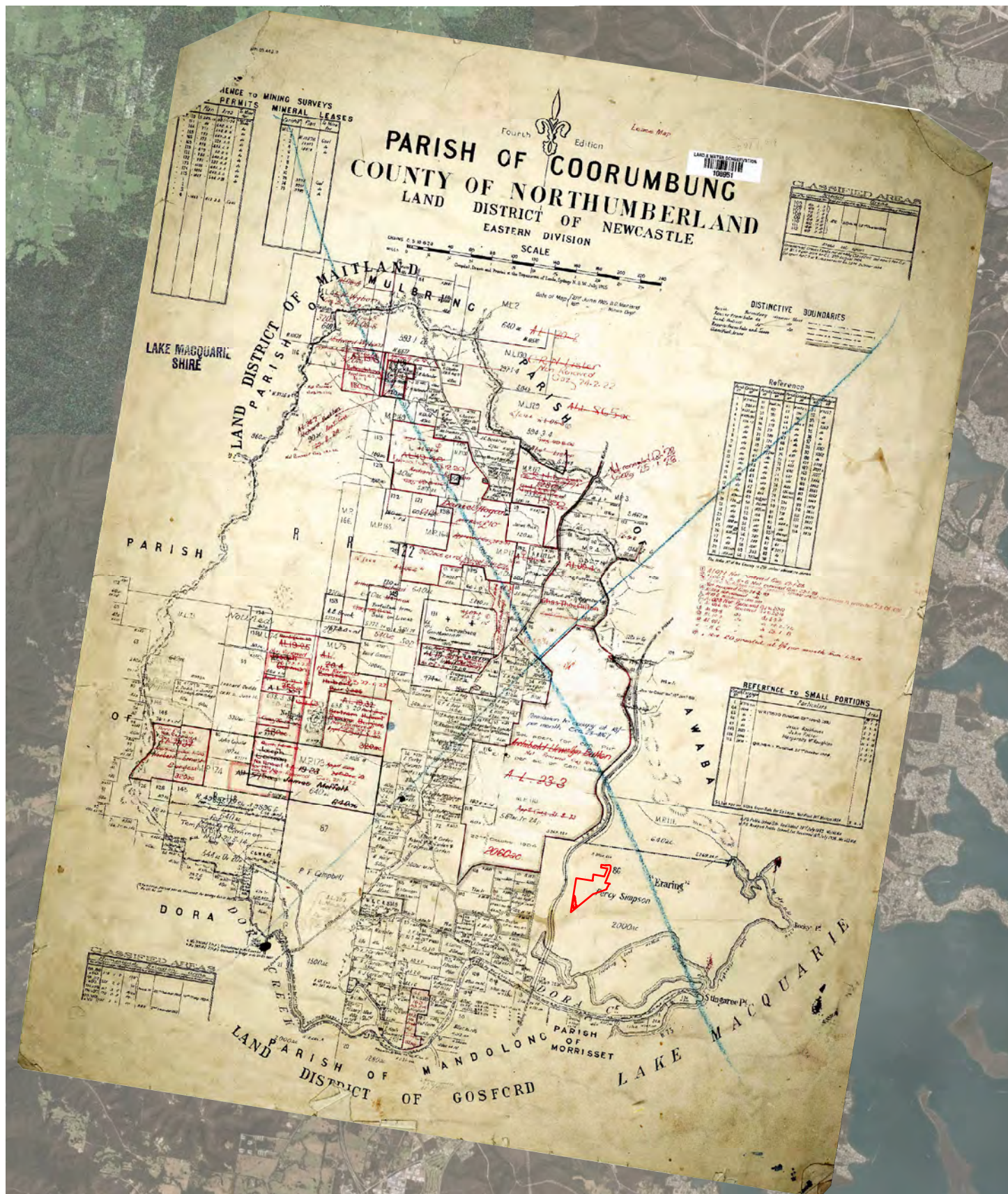
4.1.1 Early land use

The first land grant given in present day Eraring was to Percy Simpson on 7 April 1838. Simpson already owned a land grant of 2,000 acres at Cooranbong (see

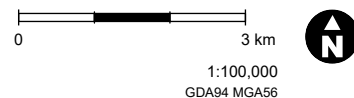
Figure 4-1) (Lake Macquarie and District Historical Society 2008). A second land grant was originally in place for Simpson, however it was accidentally cancelled by Surveyor-General John Oxley (Lake Macquarie City Library 2021a). As a result, Simpson acquired the land grant at Eraring. Following financial difficulties, and the inadequate use of the land, Simpson sold the grant in the same year.

The land grant for Eraring passed through multiple hands before ending with Mr Smart who bought it in 1840 and proceeded to subdivide the land. The first subdivision is believed to have been along the northern shore of Lake Eraring and later it was extended as far as Dora Creek. In 1910 the Excelsior Land Co sold farming blocks at Eraring. These farm blocks would be used for agricultural farming and orchards until the 1980s. This subdivision also resulted in the formation of streets and street names still in use today (see Figure 4-2) (Lake Macquarie City Library 2021a).

The town of Eraring was slow to develop due to its limited access. Early transportation was either by boat/ water, or horse and dray. More accessible and regular forms of transport began following the opening of Dora Creek station in 1889.



Project area



1:100,000
GDA94 MGA56



Data sources
Origin 2021
Aerometrex 2020,
© Department Finance, Services
and Innovation Dec 2020
© Department of Customer Service 2020

Figure 4-1 Parish map 1905

4.1.2 Eraring Power Station

The EPS and its construction was announced in 1973 (see Figure 4-3). Although previously used for farming and orchard practices, Eraring was perfectly suited for a power station due to the availability of land, the proximity of Eraring Lake for cooling water, and its proximity to coalfields. Confirmation of the power station was granted in 1973 and construction began in 1975 (Lake Macquarie and District Historical Society 2008; Lake Macquarie City Library 2021b). The power station was the fifth power station designed and built by Elcom, after Wallerawang, Vales Point, Munmorah, and Liddell Power Stations.



Figure 4-3: Location of the EPS (Lake Macquarie City Library 2021b)

Unit 1 and 2 of the power station entered commercial operation in 1982, Unit 3 operating in 1983, and lastly Unit 4 operating in 1984. The total cost of the power station was \$1653 million, and it had a capacity of 2640 MW. During construction a workforce of over 2300 were employed, the permanent staff approximately 600 (Lake Macquarie and District Historical Society 2008). At the time of opening it was the largest power generating station in Australia with a capacity of 2640 MW and was one of the first stations to be linked into the state's electricity supergrid. Operating at full capacity, the station would consume 6.5 million tonnes of coal annually. It is supplied with coal by four collieries: Cooranbong, Myuna, Awaba and Newstan (Lake Macquarie City Library 2021a). In 1981 the power station was sold to a consortium of 13 companies and it operated as Eraring Power Company.

The power station consists of (west to east) a switchyard, cooling water canal (taking water from the Lake at Bonnell's Bay, south of the power station), turbine hall, auxiliary bay, boilers, ash filters, stacks and cooling water outlet tunnel and canal ending in Myuna Bay (NSW Government 2008). There are four turbo-generators which are 50 m long and produce 660 MW of electricity. The four boilers are 80 m high and burn 6.5 million tonnes of coal per year. The two stacks are 200 m high and visible from far across the Lake (NSW Government 2008).

4.2 Previous heritage assessments

A heritage assessment by HLA-Envirosciences Pty Limited (2007) for the expansion of the capacity of the EPS generators from 660 MW to 750 MW including the construction of the attemperation dam and associated borrow pits identified nine areas with high archaeological potential south of the Project area. These items included a collapsed structure, fence lines and dams (HLA-Envirosciences Pty Limited 2007). The majority of the site is described as having been heavily disturbed previously by pastoralism, land clearance and fire trails and as such was assessed as containing low to nil historical archaeological potential. The location of the nine high archaeological potential areas is located outside of the current Project area. Aerial imagery indicates that these areas were also impacted by the construction of the attemperation dam after 2010.

4.3 Historical aerial imagery

A review of historical aerial imagery shows that prior to the construction of the power station, the land was used for a mixture of small farms and native vegetation (see Figure 4-4 and Figure 4-5). Following the construction of the power station, the Project area remained largely vegetated with some operational impacts. Based on recent Google Earth images, from 2005 and 2010, the area was significantly disturbed by 2010 where it is shown cleared and used for stockpiling during the construction of the dam to the south of the canal. It now remains as a stockpile with revegetation occurring.

4.4 Heritage database search results

4.4.1 World, National and/or Commonwealth heritage listed items

A search of the Australian Heritage Database was completed on 11 June 2021 by Alexandra Seifertova (Graduate Archaeologist, Jacobs). This included a search of the WHL, the NHL and CHL. No heritage items were identified within the Project area.

4.4.2 State heritage listed items

A search of the SHR was completed on 11 June 2021 by Alexandra Seifertova (Graduate Archaeologist, Jacobs). No heritage items were identified within the Project area.

4.4.3 Local heritage listed items

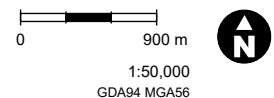
A search of the Lake Macquarie LEP 2014 was completed on 11 June 2021 by Alexandra Seifertova (Graduate Archaeologist, Jacobs). One locally listed heritage item – EPS (LEP 93) is located within the Project area, and one item – Great Northern Railway (LEP 189) within a 1 km radius from the Project area (refer to Section 4.4.3 and Figure 4.6). The proposed Project will not be impacting on the Great Northern Railway (LEP 189) and as such this item will not be further considered in this report.

Table 4-1: Local heritage listed items within the vicinity of the Project area

Register	Item name	Address	ID	Distance from Project area
LEP	EPS	268 and 294 Rocky Point Road, Eraring	93	Within Project area
LEP	Great Northern Railway	Line passes through Lake Macquarie City from Garden Suburb to Wyee	189	200 m west



Project area — Railway



Data sources

Origin 2021
Aerometrex 2020,
© Department Finance, Services
and Innovation Dec 2020
© Department of Customer Service 2020

Figure 4-4 Aerial 1954



Project area — Railway

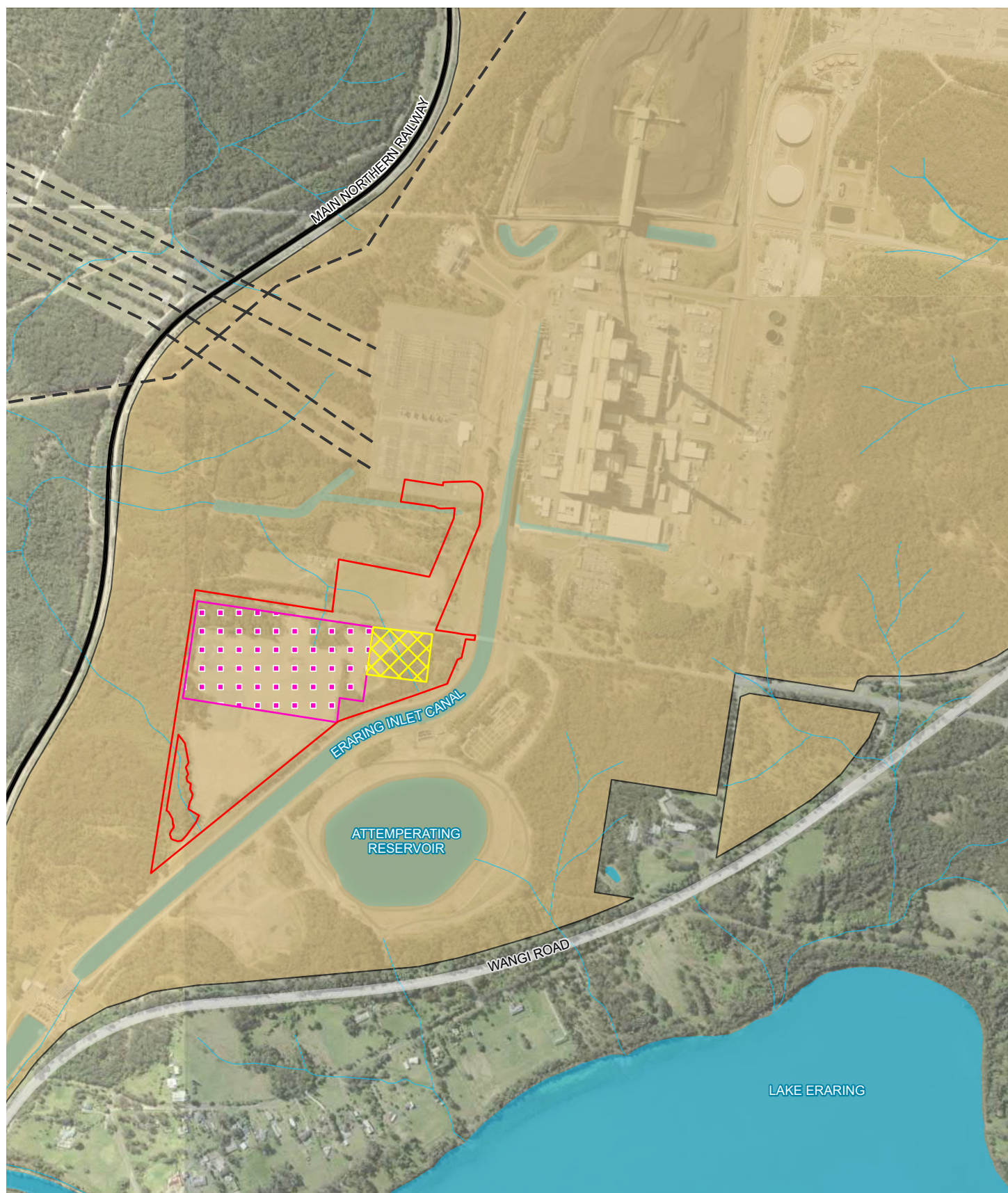
0 600 m
1:25,000
GDA94 MGA56



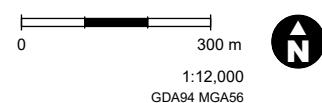
Data sources

Origin 2021
Aerometrex 2020,
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and Innovation Dec 2020
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Figure 4-5 Aerial 1979



- | | | |
|--|--|---|
| Project area | EPI Heritage Item - General | Electricity transmission line |
| Battery Energy Storage System | | Railway |
| Substation | | Major hydroline |
| | | Major water body |



Data sources

Origin 2021
Aerometrex 2020,
© Department Finance, Services
and Innovation Dec 2020
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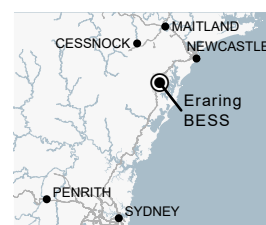


Figure 4-6 Heritage items in and near the Project area

4.4.4 Lake Macquarie City Council and Lake Macquarie Libraries

Lake Macquarie City Council was contacted on 17 June 2021 at 10:26 am by Alexandra Seifertova (Graduate Archaeologist, Jacobs) in regard to EPS (LEP #93). Consultation with the local council was recommended by Heritage NSW. Additional information about the site and its history was requested. A council representative passed on the request to Lake Macquarie Libraries who recommended accessing the following sources:

- State Heritage Register; and
- Lake Macquarie Libraries History Page – search terms included EPS and Eraring.

4.4.5 Non-statutory heritage listed items

A search of the RNE via the Australian Heritage Database was completed on 11 June 2021 by Alexandra Seifertova (Graduate Archaeologist, Jacobs). No RNE items were identified within the Project area.

5. Field survey

A field survey of the Project area was undertaken on 3 May 2021 by Alison Lamond (Senior Archaeologist, Jacobs). The site inspection aimed to understand the nature of the LEP-listed EPS within the Project area, and to identify whether any other historical heritage was present within the project area and record physical details of such heritage in order to assess its significance. The Project area was accessed via Rocky Point Road, from Wangi Road in Eraring. Due to the size of the Project area, description of the site inspection has been spilt into four units. The four units are shown in Figure 5-5.

5.1.1 Unit 1: Grid Connection 330 kV works area

Unit 1 is located on the western side of the Eraring Inlet canal between the existing TransGrid switchyard and the proposed BESS substation. The proposed works in this area would involve surface disturbance and limited subsurface disturbance for the installation of electricity transmission structures. The area consists of a modified slope and crest. The northern gently sloped section consists of a sealed access track, overhead power line, areas of introduced gravel and dense revegetation. Subsurface utilities also cross the area. The southern section is located on the moderate slope and crest is grassed and includes a helipad and subsurface utilities. Unit 1 has been subject to clear disturbance at the surface and subsurface in multiple areas which is supported by historical aerial imagery (refer to Section 4.3).



Figure 5-1: Unit 1 subsurface utilities in revegetated area (Source: Jacobs 2021)



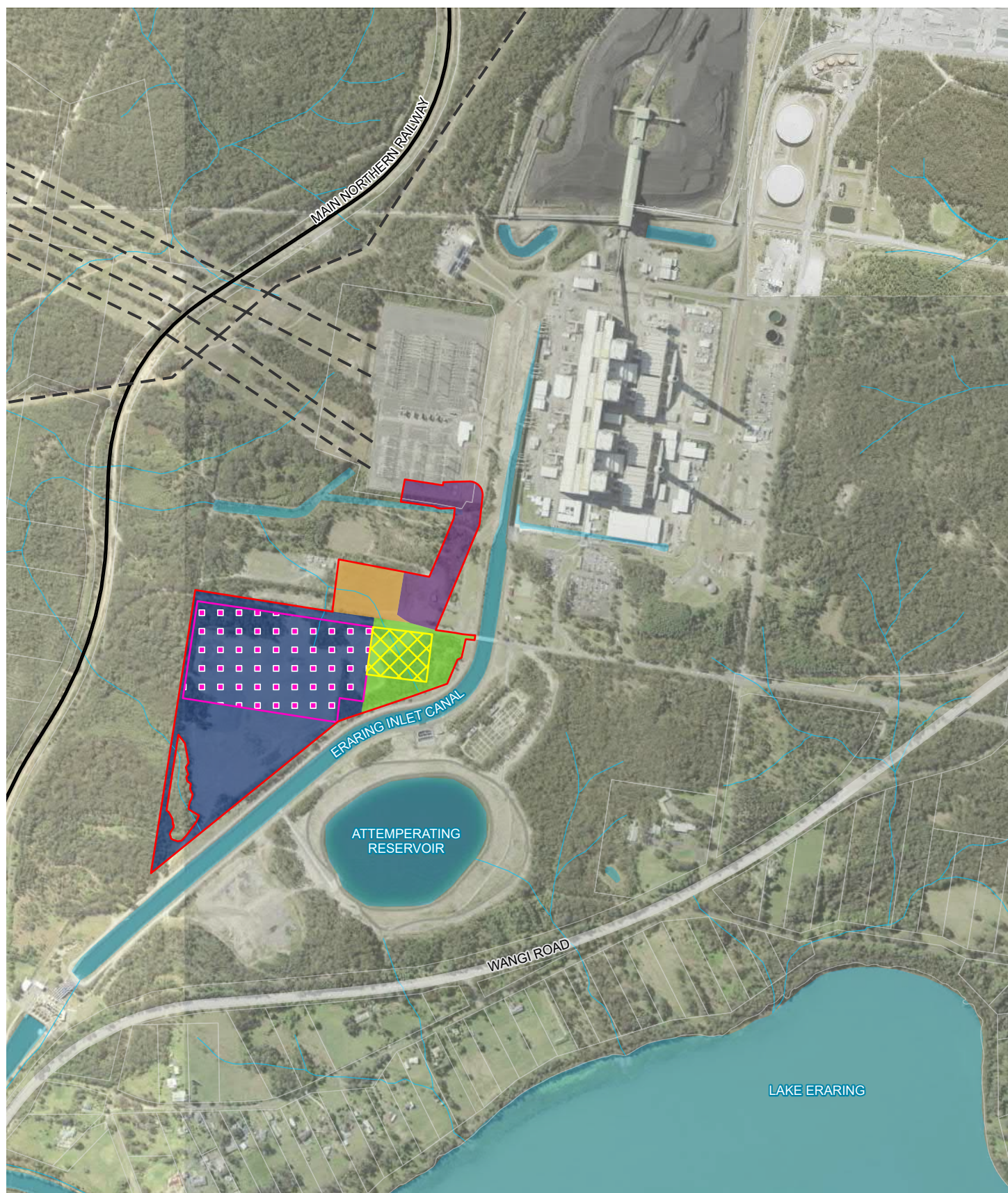
Figure 5-2: Unit 1 utilities in revegetated area (Source: Jacobs 2021)



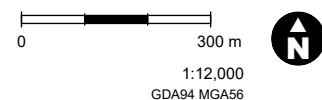
Figure 5-3: Unit 1 view south west of electrical substation from electricity easement (Source: Jacobs 2021)



Figure 5-4: Unit 1 view south to Helipad (Source: Jacobs 2021)



- | | | |
|---|---|--|
| Project area | Survey Unit 1 | Cadastre |
| Battery Energy Storage System | Survey Unit 2 | Electricity transmission line |
| Substation | Survey Unit 3 | Railway |
| | Survey Unit 4 | |



Data sources

Origin 2021
 Aerometrex 2020,
 © Department Finance, Services
 and Innovation Dec 2020
 © Department of Customer Service 2020

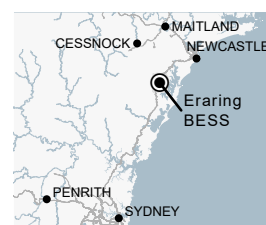


Figure 5-1 Survey units

5.1.2 Unit 2: Laydown Area

Unit 2 is located within a currently disused cricket oval on the northern side of Rocky Point Road. The proposed activities consist of introduction of fill to the surface to create a hard stand area, with no disturbance at depth. The area has been subject to earthworks to create the current level surface and is covered in dense grass. The area has been subject to clear disturbance at the surface and within the upper soil profile for the construction of the oval.

Unit 2 has been subject to clear disturbance at the surface and subsurface in multiple areas which is supported by historical aerial imagery (refer to Section 4.3).



Figure 5-6: Unit 2 disused cricket oval (Source: Jacobs 2021)



Figure 5-7: Unit 2 view to the west of Rocky Point Road alongside oval (Source: Jacobs 2021)

5.1.3 Unit 3: Substation

Unit 3 consists of a heavily vegetated area to the south of Rocky Point Road. The proposed activities in the area consist of construction of a level surface (cut and fill) and installation of services (trenching). The area slopes up from a low-lying area crossed by the road constructed on fill. The survey unit includes both moderate and gently sloping areas. No historical heritage features or evidence of archaeological potential were identified.



Figure 5-8: Unit 3 vegetated area (Source: Jacobs 2021)



Figure 5-9: Unit 3 gently sloped vegetated area (Source: Jacobs 2021)

5.1.4 Unit 4: Battery Footprint

Unit 4 is located on a highly modified area used for stockpiling during the construction of the dam to the south. Veolia representatives reported, during the survey, that they had been working on the revegetation of the area for a couple of years and when they started the area was clay fill with no topsoil (pers. comm., 3 May 2021). The area includes introduced gravel access tracks and has been highly disturbed as a result of earthworks. The proposed activities in the area consist of construction of a level surface (cut and fill) and installation foundations and battery components.

Unit 4 has been subject to clear disturbance at the surface and subsurface in multiple areas which is supported by historical aerial imagery (refer to Section 4.3).



Figure 5-10: Revegetated former stockpile (Source: Jacobs 2021)



Figure 5-11: Piles of fill within stockpile area (Source: Jacobs 2021)

6. Significance assessment

The concept of cultural heritage significance helps in estimating the heritage value of places. Those places which are likely to be significant are those which 'help an understanding of the past or enrich the present, and which will be of value to future generations' (Australia International Council on Monuments and Sites (ICOMOS) 2013). In Australia, the significance of a place is generally assessed according to the following values:

- Historic value;
- Associative value;
- Aesthetic value;
- Social value; and
- Scientific value.

The significance of a place and its associated values is guided by a system of assessment centred on the Burra Charter (Australia ICOMOS 2013). The assessment of heritage significance is defined through legislation in the Heritage Act, with its implementation guided by components of the NSW Heritage Manual (NSW Heritage Office 1996b) and the Archaeological Assessment Guidelines (NSW Heritage Office 1996a). These documents incorporate the aspects of heritage value identified in the Burra Charter into a framework currently accepted by the NSW Heritage Council and provide a detailed process for conducting assessments of heritage significance. The documents have been used in undertaking this significance assessment.

6.1 Heritage significance criteria

The NSW Heritage Council has adopted specific criteria for heritage assessments, which have been gazetted pursuant to the Heritage Act. The seven criteria upon which the following assessment of significance are outlined in Table 6-1.

Table 6-1: NSW heritage significance assessment criteria

Criteria	Description
(a) – Historical significance	An item is important in the course, or pattern, of NSW cultural or natural history
(b) – Associative significance	An item has strong or special association with the life or works of a person, or group of persons, of importance in NSW cultural or natural history
(c) – Aesthetic/ creative / technical significance	An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW
(d) – Social significance	An item has strong or special association with a particular community or cultural group in NSW for social, cultural or spiritual reasons
(e) – Research potential	An item has potential to yield information that will contribute to an understanding of NSW cultural or natural history
(f) – Rarity	An item possesses uncommon, rare or endangered aspects of NSW cultural or natural history
(g) – Representativeness	An item is important in demonstrating the principal characteristics of a class of NSW cultural or natural places or cultural or natural environments.

6.2 Eraring Power Station (LEP 93)

The following details are taken directly from the NSW State Heritage Inventory, unless otherwise noted.

6.2.1 LEP History

Eraring was the 5th power station designed and built by Elcom, after Wallerawang, Vales Point, Munmorah & Liddell. Construction began 1976, the 1st unit was commissioned in March 1982, the last in 1984. It employs about 600 people. The only power station equalling Eraring in size is Bayswater in the Upper Hunter.

6.2.2 LEP Description

Architectural style: Industrial utilitarian (form follows function exactly)

Material:

- *Frames - Turbines - steel portals*
- *Boilers - steel skeleton frame*
- *Roof - Colorbond steel*
- *Walls/Cladding - Colorbond steel sheet on turbine house, concrete chimneys*
- *Windows - industrial glazing*
- *Floors - concrete*
- *Interior - ?*

The power station has open steel frame around boilers, portal frame building covering turbo-generators. Eraring Power Station consists of (west to east) switchyard, cooling water canal (taking water from the Lake at Bonnell's Bay, south of the power station), turbine hall, auxiliary bay, boilers, ash filters, stacks and cooling water outlet tunnel and canal ending in Myuna Bay. Housing for these structures is basic, only used to protect vulnerable machinery from weather. Each of the 4 turbo-generators is 50 metres long and produces 660 Megawatts of electricity. The 4 boilers are 80 metres high and burn 6.5 million tons of coal per year. Bag filters are used to collect ash. The 2 stacks are 200 metres high and visible from far across the lake.

6.2.3 Significance assessment

The Statement of Significance is taken directly from the SHI. No assessment against the NSW significance criteria was prepared as part of the LEP listing. Based on the limited information available, a preliminary significance assessment against the criteria has been prepared as part of the current assessment in Table 6-2. Despite the current LEP listing indicating that it may not qualify as a heritage item, this statement is likely based on the former provision in the Heritage Act limiting heritage items to a specific age, which was the case when the 1993 heritage study identifying the heritage item was written. This provision no longer exists in the Heritage Act, and therefore the EPS is considered as a heritage item.

Table 6-2: Significance assessment for EPS

Criteria	Description
(a) – Historical significance	Demonstrates the development and continuation of power station technology in the late 20 th century
(b) – Associative significance	This item does not meet this criterion.

Criteria	Description
(c) – Aesthetic significance	Demonstrates a different design philosophy to other nearby power stations in that it focuses on utilitarian requirements. Represents ‘state of the art’ technology for the time of its development.
(d) – Social significance	Contains social significance to Lake Macquarie, and its position as the natural successor to Wangi Power Station, using the same coal sources, and employing the same people and families.
(e) – Research potential	This item does not meet this criterion.
(f) – Rarity	This item does not meet this criterion.
(g) – Representativeness	This item does not meet this criterion.

6.2.4 Statement of significance

Eraring Power Station is the biggest industrial undertaking around the Lake, and one of the biggest in the Hunter region. Eraring contrasts strongly with nearby Wangi P.S. in size of units (660 MW x 4 to Wangi's 50 MW x 3 & 60 MW x 3) and in design philosophy Eraring was designed as a utilitarian structure, with minimal concessions to appearance, while Wangi was designed to express its function without sacrificing a pleasing appearance. Eraring represents the "State of the Art" in its technology, and is one of the biggest power stations in the State. It is undoubtedly highly significant, although considering its youth, it is arguable whether Eraring yet qualifies as a heritage item.

6.2.5 Archaeological potential

The previous land use of the Project area included agriculture and orcharding. The types of heritage items or archaeology related to these historical activities would include small structures or outbuildings, fencing and other ancillary features related to farming activities. Outside of the current project area to the south, fence lines and a collapsed residential structure of some kind were observed in 2007 (HLA-Envirosciences Pty Limited 2007). Since the establishment of the EPS in the 1970s, there has been substantial disturbance and development to the Project area. Given the small-scale nature of the historical activities prior to the power station, and subsequent levels of ground disturbance, there is unlikely to be historical archaeological remains present in the Project area, and the archaeological potential is considered to be negligible.

7. Impact assessment

7.1 Proposed works

The proposed works are within the LEP listed item EPS (LEP 93) and will have a direct physical impact on the heritage item. The proposed works would include:

- Constructing a grid connected BESS with discharge capacity of up to 700 MW and storage capacity of 2,800 MWh able to dispatch over variable durations from four hours to beyond eight hours;
- Establishing HV and MV transformers and associated infrastructure;
- Connecting the BESS to 330 kV TransGrid switchyard by an approximate 400 m overhead 330 kV transmission line; and
- Installing safety protection systems and site ancillary facilities such as laydown areas and site offices.

7.2 Consideration of impacts

A summary of the impacts against the proposed works are provided in Table 7-1. The NSW Heritage Manual guidelines for preparing Statements of Heritage Impact (NSW Heritage Office 2002) pose a range of questions to be considered when assessing heritage impacts for works to or in proximity to a heritage item. Relevant considerations in relation to impacts to the EPS (LEP 93) are addressed in Table 7-2.

Overall, the key elements of the power station described in the LEP listing, will not be disturbed, removed or altered by the proposed works. The proposed works are situated to the south of the key power station elements. As there are no areas of historical archaeological potential within the Project area, there would be no impact on the archaeological potential.

Table 7-1: Summary of impacts against proposed works

Proposed work	Type of impact	Degree of impact	Consequence of impact to heritage item	Recommended management
Installation and maintenance of environmental controls	Direct (physical)	Negligible	No loss of significance	Heritage to be included in the site induction for all workers.
Upgraded construction access track	Direct (physical)			
Vegetation clearing	Direct (physical)			
Cutting and filling in areas	Indirect (visual)			
Structural works	Direct (physical)			
Installation of battery modules, power conversion systems and transformers	Indirect (visual)			
Installation of 330 kV overhead cabling	Direct (physical) Indirect (visual)			
Minor works	Direct (physical)			

Table 7-2: Consideration of impact on heritage item

Consideration	Response
Is the demolition essential for the heritage item to function?	No demolition of the key heritage elements of the power station are proposed. Impact will be limited to land previously undeveloped for the power station.
Are important features of the item affected by the demolition?	No important features of the item are proposed to be demolished.
Is the resolution to partially demolish sympathetic to the heritage significance of the item?	No demolition of the key heritage elements of the power station are proposed.
If the partial demolition is a result of the condition of the fabric, is it certain that the fabric cannot be repaired?	Not applicable.
How is the impact of the addition on the heritage significance of the item to be minimised?	The design of the proposed BESS infrastructure has a similar utilitarian / functional approach to that for which the power station is of heritage significance. The addition of BESS infrastructure would not impact on the technological or historical significance of the power station, and it would contribute to the continuing operation of the site for its significant historical use.
Will the additions visually dominate the heritage item?	The design of the proposed BESS infrastructure has a similar utilitarian / functional approach to that for which the power station is of heritage significance. Further, given the smaller scale and footprint of the BESS, it is not likely to visually dominate the power station.
Is the addition sited on any known, or potentially significant archaeological deposits? If so, have alternative positions for the additions been considered?	No significant archaeological deposits (i.e. relics) are expected within the proposed works area given the previous disturbance related to the power station.
Are the additions sympathetic to the heritage item? In what way?	The design of the proposed BESS infrastructure has a similar utilitarian / functional approach to that for which the power station is of heritage significance. The addition of BESS infrastructure would not impact on the technological or historical significance of the power station, and it would contribute to the continuing operation of the site for its significant historical use. In this way it would be sympathetic to the heritage item.
Do the trees being removed contribute to the heritage significance of the item or landscape?	The trees and vegetation proposed for removal do not contribute to the heritage significance of the power station.
Why are the tree/s being removed?	The trees are being removed to allow for construction of the proposed works.
Has the advice of a tree surgeon or horticultural specialist been obtained?	Advice from a tree surgeon or horticultural specialist is not considered necessary in this instance – the trees are small examples of common local species; they are not considered to be significant or their removal in any way challenging.
Is the tree being replaced?	The trees are not being replaced. The surrounding bushland setting of the heritage item contains many examples of similar trees and their replacement is not considered to be necessary either for the proposed works or the heritage significance of the power station.

7.3 Summary of statement of heritage impact

No demolition of the key heritage elements of the power station itself are proposed. The design of the Project has a similar utilitarian / functional approach to that for which the power station is of heritage significance. The addition of BESS infrastructure would not impact on the technological or historical significance of the power station, and it would contribute to the continuing operation of the site for its significant historical use. As such, the proposed works have been assessed as having negligible adverse impact on the heritage significance of the EPS (LEP 93).

8. Management measures

As there is negligible adverse impact on historical heritage of the EPS (LEP 93) from the planned works, the management measures are for managing general project risk to heritage. These measures are as follows:

- Should any unexpected historical heritage, including archaeological relics, be uncovered during the course of the proposed works, works should stop, and the area cordoned off. A qualified archaeologist and, if necessary, Heritage NSW (in accordance with s146 of the Heritage Act) should be contacted to assess significance and advise on further requirements before work can recommence.
- All contractors and subcontractors should be made aware of their obligations under the Heritage Act. The presence of a heritage item and associated elements in the vicinity of the proposed works should be communicated to all staff during toolbox talks.

9. Reference list

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