



# Tallawarra B Power Station Hydrogen Fuel Mix – MOD 3

## Modification Report

22 September 2023

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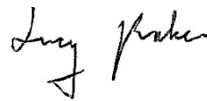
# Tallawarra B Power Station Hydrogen Fuel Mix – MOD 3

## Modification Report



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## Acronyms and Abbreviations

Name	Description
AHIMS	Aboriginal Heritage Information Management System
ASS	Acid sulphate soils
BC Act	<i>Biodiversity Conservation Act 2016</i>
CASA	Civil Aviation Safety Authority
CCGT	Combined Cycle Gas Turbine
CEMP	Construction Environment Management PL
CHDD	Cultural Heritage Due Diligence
CSSI	Critical State Significant Infrastructure
dB	Decibels
dB(A)	A-weighted decibel
DCP	Development Control Plan
DPE	NSW Department of Planning and Environment
Due Diligence Code of Practice	Due Diligence Code of Practice for the Investigation of Aboriginal Objects (DECCW 2010)
EnergyAustralia	EnergyAustralia Tallawarra Pty Ltd
EP&A Act	<i>Environmental Planning &amp; Assessment Act 1979</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPL	Environmental Protection License
ERM	Environmental Resources Management Australia Pty Ltd
GHG	Greenhouse gas
GRS	Gas Receiving Station
GWh	Gigawatt hour
HIPAP No.4	<i>Hazardous Industry Planning Advisory Paper No. 4: Risk Criteria for Land Use Safety Planning</i>
ILALC	Illawarra Local Aboriginal Land Council
ISO	International Organisation for Standardization
Kg	Kilogram
kPa	kilopascal
LAeq	Equivalent Continuous Sound Pressure Level
LEP	Local Environmental Plan
LGA	Local Government Area
LoO	Likelihood of occurrence
MOD	Modification
MW	Megawatt
NEM	National Electricity Market
NGER	National Greenhouse and Energy Reporting
NPfl	Noise Policy for Industry (NSW EPA, 2017)
NSR	Noise Sensitive Receiver
NSW	New South Wales
OCGT	Open Cycle Gas Turbine
PA	Project Approval
PCT	Plant Community Types
PHA	Preliminary Hazard Analysis
PMST	Protected Matters Search Tool
PNTL	Project Noise Trigger Levels
SEPP	State Environmental Planning Policy

Name	Description
SEPP 33	<i>State Environmental Planning Policy No. 33: Hazardous and Offensive Industries</i>
SES	Stakeholder Engagement Strategy
SS	Stainless steel
SSI	State Significant Infrastructure
SWMP	Soil and Water Management Sub-Plan
T	Tonne
Tallawarra A	Tallawarra A Power Station
Tallawarra B	Tallawarra B Power Station
TEC	Threatened Ecological Communities
TTPP	The Transport Planning Partnership



## SUMMARY

Environmental Resources Australia Pty Ltd (ERM) was engaged by EnergyAustralia Tallawarra Pty Ltd (EnergyAustralia, or the Proponent) to prepare a Modification Report and associated technical assessments to support a modification application to the Tallawarra B Power Station Project Approval (MP 07\_0124). EnergyAustralia is seeking to modify MP 07\_0124 to allow the introduction of up to 5% green hydrogen into the fuel mix and construction of associated infrastructure, hereafter referred to as the 'Modification'.

Specifically, the Modification proposes the following scope of works:

- To use green hydrogen as a supplementary fuel, with green hydrogen providing a maximum of 5% (by volume) of Tallawarra B Power Station (Tallawarra B) fuel mix;
- To include the following additional infrastructure:
  - a hydrogen injection system capable of providing an average 4-hour full load of continuous steady state operations;
  - a green hydrogen receiving and unloading facility to enable green hydrogen to be delivered by road via tube trailers, including up to two (2) unloading points (with a flange connection provided for tie-in any potential future hydrogen pipeline);
  - a hydrogen blending skid, complete with piping, instrumentation, and valves;
  - purging, draining and venting systems, where required; and
  - fire protection and flame detection systems, where required.

Key benefits of the Modification include that it will provide environmental benefits through a reduction in greenhouse gas emissions with 5% green hydrogen in the fuel mix. The combustion of hydrogen with air will only yield water vapour and potentially small amounts of nitrogen oxide, within the existing licence limits for Tallawarra B.

## Assessment Findings

This report is supported by the following technical assessments:

- Air Emissions Review (Air Quality and Plume);
- Preliminary Hazards Analysis;
- Fire Safety Study;
- Construction and Operational Noise and Vibration Assessments;
- Traffic and Transport Assessment;
- Biodiversity Assessment;
- Aboriginal Heritage Due Diligence Assessment; and
- Desktop Soil and Water Assessment.

### *Air Emissions Review (Air Quality and Plume)*

ERM (2022, Appendix E) has prepared a technical analysis of the Modification in the context of emissions to air, inclusive of Greenhouse Gas (GHG), plume rise potential and air quality related matters,

- Fuel properties: A review of fuel properties indicates that with the introduction of green hydrogen at a volume of 5%, the changes in energy content and density are within the existing ranges of variability observed in the natural gas supply. At 5% by volume, green hydrogen contributes to 1.5% of the calorific value of the blended gas and thus displaces 1.5% of the natural gas consumption;

- Greenhouse gas emissions: The reduction in Scope 1 emissions is directly proportional to the reduction in natural gas consumption of 1.5%. Scope 3 emissions vary with the assumed transport processes. When accounting for Scope 1 emissions that are released via the Tallawarra B exhaust stack, and Scope 3 emissions associated with the production and transport of green hydrogen, the following estimates are made:
  - Using 200 tonnes (t) of hydrogen annually would result in an emission reduction of approximately 1,400 tonnes of carbon dioxide equivalents (t CO<sub>2</sub>-e) per annum. This represents an overall (Scope 1 + 3) emission reduction of 1.25% and a Scope 1 emission reduction of 1.5%;
  - When operating on blended gas, the Scope 1 + 3 emission intensity is estimated to reduce from 674 kg/MWh SO to 666 kg/MWh ('sent out' basis). This equates to an emission reduction of 8 kg CO<sub>2</sub>-e for each MWh of electricity produced using the blended gas. This is equivalent to 8 tonnes (t) of CO<sub>2</sub>-e emission reduction per gigawatt hour (GWh) of electricity produced;
- Plume Rise Considerations: A review of manufacturer data indicated that the Modification represents a negligible change to the emission parameters that define buoyant plume rise;
- Air Emissions: Under operation on blended gas, the changes to the exhaust plume temperature and flow rate are negligible (<0.1% variation against natural gas operation); hence the potential impact on plume dispersion characteristics is also considered negligible; and
- With regard to pollutant emission quantities, the manufacturer has indicated that negligible changes in the emission profile will occur for the blended fuel. To this effect, there are no proposed changes to the guaranteed NO<sub>x</sub> emission guarantee, operational monitoring, or NO<sub>x</sub> limits as a result of the Modification.

Overall, manufacturer information indicates that changes to the emission profile under blended gas operation are immaterial compared to the approved operations. On this basis, the existing approval, monitoring, reporting and management framework is considered appropriate for operations under the Modification.

## Hazards

The quantitative risk assessment concluded that the Modification complies with the relevant risk criterion for all landuse types with respect to risk of fatality and risk of injury and accident propagation (Arriscar 2023, **Appendix F**). Arriscar has made a number of recommendations which will be incorporated to enhance the safety during operational activities associated with the Modification.

## Noise and Vibration

### Construction Noise

Predicted worst-case and unmitigated  $L_{eq, 15min}$  noise levels for all construction equipment and construction scenarios at the nearest sensitive receivers (within 1.5 km of the site boundary where construction noise impacts have the potential to be present) have been calculated by ERM (2023, **Appendix G**).

The results indicate that the Modification will be compliant with the relevant criteria contained in the *Interim Construction Noise Guideline 2009* at all noise sensitive receivers.

It should be noted that the predicted noise levels are variable due to the intermittent operation of construction equipment and the changing separation distances between mobile construction noise sources and noise sensitive receivers.

## Operational Noise

Operational noise modelling has been undertaken based on information provided by EnergyAustralia and is provided in **Appendix H** (ERM, 2023). The predicted noise levels were assessed for compliance against the Noise Policy for Industry (NSW EPA, 2017). The proposed operations from the Project are predicted to comply with the noise limits during all operational scenarios and assessment time periods at the identified noise sensitive receivers.

The predicted noise levels were also assessed for compliance against Environment Protection Licence 555. The noise levels from the Modification were predicted to comply with EPL 555 noise limits with or without treatment in place. It should be noted that the EPL will require an update should the modification proposal be approved.

An assessment of traffic noise was undertaken for noise sensitive receptors affected by roads with traffic volume changes due to the Modification. The proposed heavy vehicle movement change associated with the Modification is expected to comply with the criteria set in the NSW Road Noise Policy (DECCW, 2011).

## Traffic and Transport

Traffic modelling indicates that the key intersections near the site are currently operating with low delays and would continue to operate at the same level of service during the construction and operation phases of the Modification (TTPP 2022, **Appendix I**). The assessment confirmed that the Modification would not have a significant impact on the road network efficiency or road safety. It is however recommended that a road safety audit is undertaken to assess the detailed design, and prior to construction commencing, specifically to impacts to Yallah Bay Road.

## Biodiversity

A Biodiversity Assessment Report was prepared by ERM and determined that the Modification will not result in clearance of any intact native vegetation communities or significant habitat features that may be used by threatened species (ERM 2022, **Appendix J**). Only minor clearance of a highly disturbed areas of a mix of native and non-native regrowth vegetation may be required to facilitate the Modification.

Some wide-ranging, mobile species (e.g., highly mobile birds and microchiropteran bats) may occasionally forage within or over the Modification Area; however, the Modification is not anticipated to affect any habitat that is significant to the survival of these species.

The Modification Area has a history of vegetation clearance and disturbance; therefore, it is unlikely that it will result in any significant impacts on ecological values listed under the BC Act or the EPBC Act. The Modification is unlikely to impact any Matters of National Environmental Significance (MNES), and a referral to the Commonwealth Minister for the Environment is not required.

Mitigation measures and additional safeguards to manage potential indirect impacts of the Modification on biodiversity values, Threatened Ecological Communities (TECs) or any potential threatened flora and fauna species in areas of adjacent habitats include:

- Undertake a review and, if required, amend the Tallawarra B Construction / Operation Environmental Management Plan to avoid or mitigate potential impacts to biodiversity values, including implementing a weed management procedure;
- Installation of appropriate sediment control measures around development footprint to minimise the potential to impact adjacent waterways and vegetated areas; and
- Implement a traffic management plan, as interactions between wildlife and traffic can be a source of mortality for some species. As such, specific construction and operation speed limits should be established to reduce risk of fauna strikes.

## Aboriginal Heritage

The site inspection undertaken for the Cultural Heritage Due Diligence (CHDD) assessment did not identify any Aboriginal objects within the Modification Area (ERM 2022, **Appendix K**). The assessment also concluded that no harm to potential Aboriginal objects within the broader context of the site and immediate surrounds is expected. Areas of archaeological and cultural sensitivity have previously been identified within the Tallawarra Power Station (Niche, 2021); however, none were identified within the Modification Area. As such, and in accordance with the requirements of the *National Parks and Wildlife Act 1974* and the Due Diligence Code of Practice, the proposed works can proceed with caution.

## Soil and Water

The water demands of the Modification will not result in a change to previously approved water requirements. Construction activities have the potential to impact on water and soil; however, with appropriate mitigation measures, these impacts should be minimised or avoided. A Soil and Water Management Sub-Plan (SWMP) has been prepared for the construction of the Tallawarra Stage B Project, and will be used to manage potential impacts associated with the Tallawarra B MP 07\_0124 and EPL No. 555. In accordance with CoA 7.7 the SWMP will be reviewed within 3 months, unless the Department agrees otherwise, should MP 07\_0124 be modified.

## 1. INTRODUCTION

Environmental Resources Australia Pty Ltd (ERM) were engaged by EnergyAustralia Tallawarra Pty Ltd (EnergyAustralia, or the Proponent) to prepare a Modification Report and associated technical assessments to support a modification application to the Tallawarra B Power Station Project Approval (MP 07\_0124). EnergyAustralia is seeking to modify MP 07\_0124 to allow the introduction of up to 5% green hydrogen into the fuel mix and construction of associated infrastructure, hereafter referred to as the 'Modification'.

This Modification Report has been prepared to support a State Significant Infrastructure (SSI) modification pursuant to Division 5.2, Subdivision 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act), with consideration to Appendix F of DPE's *State Significant Infrastructure Guidelines* (DPIE, 2021a). The Modification Report outlines the proposed change in the fuel mix of Tallawarra B Power Station (Tallawarra B) with the addition of up to 5% green hydrogen. The environmental impacts of the proposed modification are assessed qualitatively and quantitatively, as relevant. The Modification Report does not seek to reassess environmental impacts associated with the approved Tallawarra B Project (MP 07\_0124) where no changes are proposed.

The Modification Report is supported by technical assessments, including:

- Air Emissions Review (**Section 6.1, Appendix E**);
- Preliminary Hazards Analysis (**Section 6.2, Appendix F**).
- Construction and Operational Noise and Vibration Assessment (**Section 6.3, Appendix G, Appendix H**);
- Traffic and Transport Assessment (**Section 6.4, Appendix I**);
- Biodiversity Assessment (**Section 6.5, Appendix J**);
- Aboriginal Heritage Due Diligence Assessment (**Section 6.6, Appendix K**); and
- Desktop Soil and Water Assessment (**Section 6.7**).

### 1.1 Proponent

EnergyAustralia is the proponent for the Modification and will be responsible for its implementation. EnergyAustralia's details are provided below:

**ABN:** 69 081 074 142

**Address:** Level 19, Two Melbourne Quarter, 697 Collins Street, Docklands Victoria, 3008.

### 1.2 Approved Project

The existing Tallawarra Power Station (the site) is located within Lot 500 DP 1129361, approximately 20 kilometres (km) (by road) from Wollongong and 100 km from Sydney. The site is located within the Wollongong Local Government Area (LGA) and is near the western shore of Lake Illawarra. The site is surrounded by cleared, undeveloped land. The site lies approximately equidistant between Dapto to the northwest, and Yallah to the southwest.

The site incorporates the operational Tallawarra A Power Station (Tallawarra A) and the under construction Tallawarra B Power Station. EnergyAustralia was granted approval to construct and operate Tallawarra B (MP 07\_0124) on 21 December 2010. The Tallawarra B Power Station Project was declared a Critical State Significant Infrastructure (CSSI) project by order under Clause 5 of Schedule 2 to the *Environmental Planning and Assessment (Savings, Transitional and Other Provisions) Regulation 2017* on 20 November 2018.

Tallawarra B MP 07\_0124 has been subject to two previous modifications:

- MOD 1 extended the Project Approval lapse date to 21 December 2020;
- MOD 2 further extended the Project Approval lapse date to 21 December 2022 and allowed for the construction and operation of:
  - A single-unit gas turbine power plant with a total nominal output of up to 400 MW operating in open cycle mode; or
  - A single unit gas turbine plant with a nominal output of 400 MW operating in combined cycle mode.

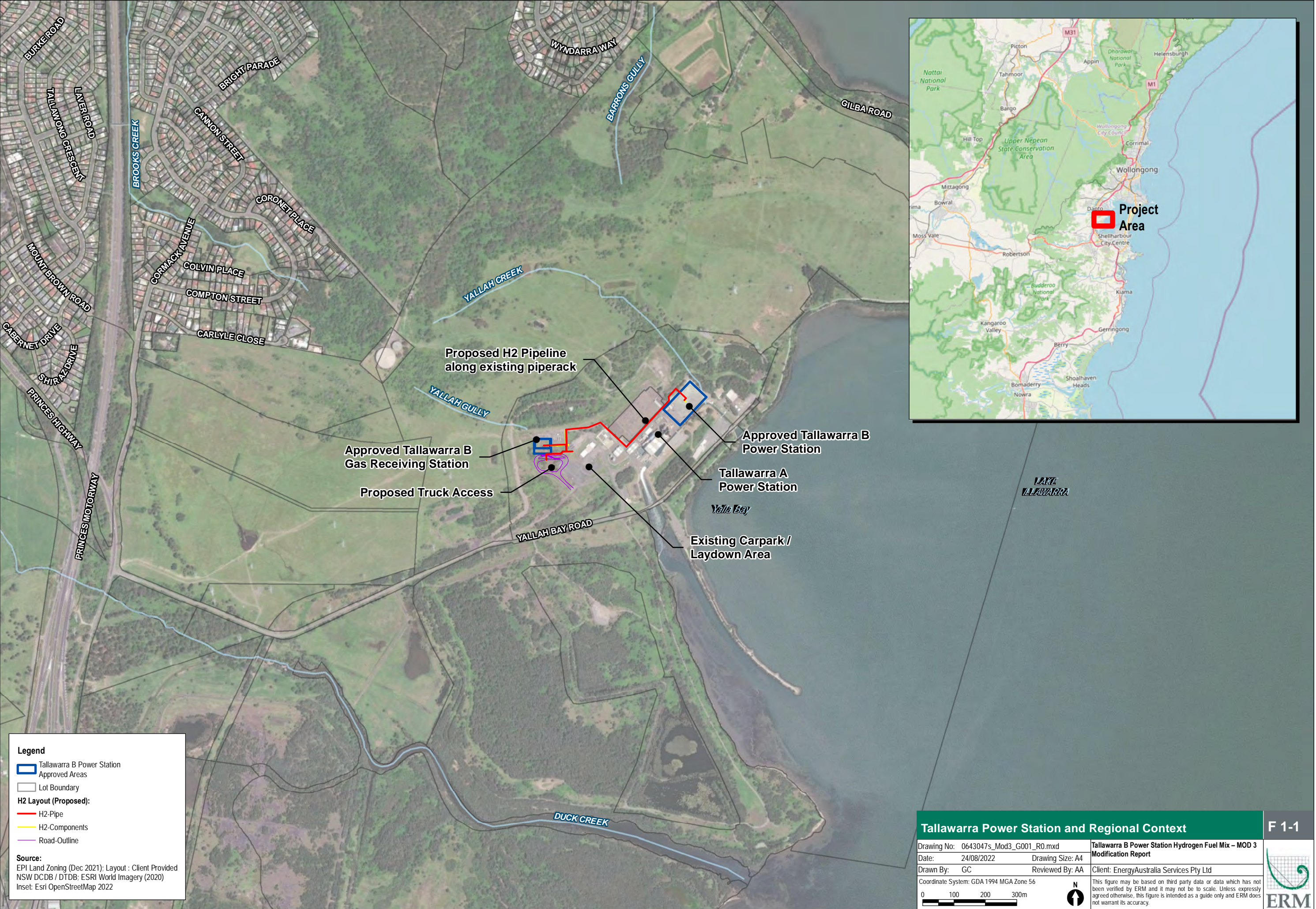
MP 07\_0124 allows EnergyAustralia to:

- Construct and operate either:
  - a single-unit gas turbine power plant with a total nominal output of up to 400 MW operating in open cycle mode; or
  - single unit gas turbine plant with a nominal output of 400 MW operating in combined cycle mode.
- Use natural gas (supplied from an extension to the gas lateral line at Tallawarra A) for operation of Open Cycle Gas Turbine (OCGT) plant; and
- Construct and operate associated infrastructure, including use of the existing Tallawarra A infrastructure located adjacent to the site.

EnergyAustralia obtained a variation to the Environment Protection Licence (EPL) No. 555 held in relation to Tallawarra A to authorise the construction of Tallawarra B.

A map of the site and its regional setting is provided in **Figure 1-1**.







## 1.3 Modification

### 1.3.1 Background

EnergyAustralia announced in May 2021 that it had entered into a funding agreement with the NSW Government. Under the agreement, EnergyAustralia would purchase green hydrogen at a volume equivalent to up to 5% of Tallawarra B's fuel mix by 2025, resulting in future Tallawarra B operations as a dual fuel green hydrogen / natural gas power station. The agreement also seeks to offset direct carbon emissions from Tallawarra B over its operational life.

Tallawarra B is currently approved for the use of natural gas only as the fuel supply under its planning approval (MP 07\_0124). Condition 2.1 of Schedule 2 provides that "natural gas is the only fuel approved for firing of the burner/turbine". In addition, MP 07\_0124 does not currently authorise the construction of additional infrastructure proposed as part of the approved project.

EnergyAustralia is therefore seeking to obtain the necessary planning approvals to allow the introduction of up to 5% green hydrogen into the fuel mix. This will involve the ongoing importation of green hydrogen to the site via trucks and ancillary infrastructure to allow for hydrogen transfer to Tallawarra B.

### 1.3.2 Overview

The Modification proposes the use of green hydrogen in the fuel mix of Tallawarra B and the construction of associated infrastructure.

Specifically, the Modification proposes the following scope of works:

- To use green hydrogen as a supplementary fuel, with green hydrogen providing a maximum of 5% (by volume) of Tallawarra B fuel mix;
- To include the following additional infrastructure:
  - a hydrogen injection system capable of providing an average 4-hour full load of continuous steady state operations;
  - a green hydrogen receiving and unloading facility to enable green hydrogen to be delivered by road via tube trailers, including up to two (2) unloading points (with a flange connection provided for tie-in any potential future hydrogen pipeline);
  - a hydrogen blending skid, complete with piping, instrumentation, and valves;
  - purging, draining and venting systems, where required; and
  - fire protection and flame detection systems, where required.

The Modification is described in further detail in **Section 3**.

### 1.3.3 Objectives and Justification

EnergyAustralia is seeking to achieve the following objectives:

- Produce electricity in an environmentally responsible manner by introducing up to 5% green hydrogen into the Tallawarra B fuel mix;
- Provide a secure supply of electricity to the local and regional markets;
- Match power supply requirements of the markets to their needs;
- Understand and effectively manage environmental impacts; and
- Contribute to the local, regional and State economies through capital expenditure, employment and economic supply of electricity.

Further justification for the Modification includes that the Modification:

- Will be located entirely within the project area of the approved Tallawarra B planning approval (MP 07\_0124);
- Does not include any offsite infrastructure to facilitate the delivery of green hydrogen (e.g., road upgrades or offsite hydrogen pipelines); and
- Occurs within previously disturbed areas within the Tallawarra Power Station site, thereby limiting potential biodiversity and heritage impacts.

## 2. STRATEGIC CONTEXT

### 2.1 Critical State Significance

The Tallawarra B Project was declared a Critical State Significant Infrastructure (CSSI) project by the Minister for Planning on 20 November 2018, meaning it has strategic infrastructure priority for the State of NSW. This is largely due to its critical importance to the secure supply of electricity to the National Electricity Market (NEM).

The strategic priority of Tallawarra B is further reinforced through State and Federal government funding commitments, including a funding commitment of up to \$83 million (Ministers for the Department of Industry, Science and Resources, 2021; Matt Kean MP, Member for Hornsby, 2021).

### 2.2 Securing Electricity Supply

Tallawarra B is a fast-start open cycle power station, which was developed by EnergyAustralia in response to a high demand for fast-start energy in NSW. It is expected to be completed and become operational in 2023-24, around the time of the scheduled retirement of the Liddell Power Station (EnergyAustralia, 2020).

Tallawarra B (inclusive of the 5% green hydrogen fuel mix) will be the first net zero emissions hydrogen and gas capable power plant in Australia, where direct carbon emissions from the project will be offset over its operational life. The Tallawarra B Project will provide greater energy security in NSW following the retirement of large thermal generation plants, and a reliable energy supply that will assist in the transition to renewable energy in NSW.

Preliminary technical and regulatory investigations have not found any significant implications for gas quality or safety from blending up to 10% hydrogen by volume in gas distribution networks, where the gas mixture is homogenous throughout the network (Commonwealth of Australia, 2019).

Tallawarra B will deliver electricity to the NEM at short notice including:

- During periods of high electricity demand;
- During supply outages; or
- When intermittent renewable energy supply is lower than demand.

According to EnergyAustralia (2020), Tallawarra B will also play an important role in:

- Maintaining system security;
- Complementing renewables coming into the system; and
- Providing reliable power to customers in NSW.

### 2.3 Energy Sector Transformation

Electricity generation is the largest source of greenhouse gas emissions in Australia, accounting for nearly 34% of total emissions (CSIRO, 2021). The NEM, which connects the southern and eastern states in Australia, delivers around 80 per cent of Australia's electricity consumption and is a system currently dominated by coal-fired generation.

The retirement of coal generated power in NSW is predicted to be the most rapid, compared to other Australian States and Territories. By 2035, the Mt Piper Power Station will likely become the sole remaining coal fired power generator after the expected closure of the Liddell, Eraring and Bayswater power stations. This has the potential to put pressure on the future supply of energy, with electricity consumption across NSW increasing consistently over recent years and forecast to continue to do so over the next decade.

Accordingly, Australia is in the midst of a complex energy transformation. The Australian Government's *Climate Change Bill 2022* became law on 4 August 2022 and fortifies an emissions

reduction target of 43 per cent from 2005 levels by 2030 (a 15 percentage point increase on Australia's previous 2030 target) and the target for net zero emissions by 2050. Initiatives to transition to lower carbon energy generation and supply will help Australia honour these commitments.

## 2.4 Key Benefits of the Modification

Hydrogen is a flexible, safe, transportable and storable fuel which can be used, like natural gas, to heat homes and industry, and for cooking (Commonwealth of Australia, 2019). Key benefits of the Modification include that it will provide environmental benefits through a reduction in greenhouse gas emissions with 5% green hydrogen included in the fuel mix. The combustion of hydrogen with air will yield water vapour and potentially small amounts of nitrogen oxide; however, these will be within the existing licence limits for the site.

The Air Emissions Review (**Appendix E**) has estimated that using green hydrogen for five per cent of the Tallawarra B fuel use, would result in an emission reduction of approximately 1,400 t CO<sub>2</sub>-e per annum. It is further estimated that an emission reduction of 8.4 kg CO<sub>2</sub>-e of GHG arises for each MWh of electricity produced using the blended gas, which equates to 1.25% of the total emissions. This is equivalent to 8 tonnes (t) of emission reductions per gigawatt hour (GWh) of electricity produced.

### 3. DESCRIPTION OF THE MODIFICATION

The Modification proposes the following scope of works:

- To use green hydrogen as a supplementary fuel, with green hydrogen providing a maximum of 5% (by volume) of Tallawarra B fuel mix;
- To include the following additional infrastructure:
  - a hydrogen injection system capable of providing an average 4-hour full load of continuous steady state operations;
  - a green hydrogen receiving and unloading facility to enable green hydrogen to be delivered by road via tube trailers, including up to two (2) unloading points (with a flange connection provided for tie-in to any potential future hydrogen pipeline);
  - a hydrogen blending skid, complete with piping, instrumentation, and valves;
  - purging, draining and venting systems, where required; and
  - fire protection and flame detection systems, where required.

The scope and scale of the construction work associated with the Modification is minor relative to the approved project. Majority of the proposed work is proposed to be conducted within existing pipe racks and within a new e-room near the existing gas receiving station (GRS).

The Modification is described in further detail within this section. The site layout of the Modification (i.e., Modification Area) is displayed in **Figure 3-1**.





**Legend**  
H2 Layout (Proposed):  
— H2-Pipe  
— H2-Components  
— Road-Outline  
— Energy Australia Property  
— Tallawarra B Power Station Approved Areas  
— Lot Boundary

**Source:**  
EPI Land Zoning (Dec 2021); Layout : Client Provided  
NSW DCDB / DTDB; ESRI World Imagery (2020)

Modification Layout		F 3-1
Drawing No: 0643047s_Mod3_G002_R0.mxd	Tallawarra B Power Station Hydrogen Fuel Mix – MOD 3	
Date: 25/08/2022	Drawing Size: A4	Modification Report
Drawn By: GC	Reviewed By: AA	Client: EnergyAustralia Services Pty Ltd
Coordinate System: GDA 1994 MGA Zone 56		This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.
0 25 50 75m		



## 3.1 Hydrogen Components and Processes

### 3.1.1 Transport

Green hydrogen will be transported to the Site by road via pressurised tube trailers. The semi-trailer trucks that are currently available can hold 344 kilogram (kg) of compressed hydrogen gas at 16,500 kilopascal (kPa), and have a length of 19 m and width of 2.5 m. Trailers with a 1 tonne (T) capacity are expected to be approved within the next 12 months that meet Australian road and safety standards.

An average of four to six trucks (and worst case six to eight) pressurised tube trailers will access the site each day to transport the hydrogen. While the source of the green hydrogen is subject to confirmation of commercial arrangements with an offsite supplier, the transport of hydrogen is expected to come from the north via the Princes Highway, although trips from the south would be possible via the Princes Motorway and then the Princes Highway.

Access to the facility for the hydrogen laden trucks would be via an existing driveway located off Yallah Bay Road. A turning circle is proposed to be developed to facilitate access for the hydrogen laden trucks to the unloading point at the hydrogen receiving and unloading facility.

### 3.1.2 Storage and Capacity

There will be no green hydrogen production or permanent storage on-site. Hydrogen will be delivered to site as detailed in Section 3.1.1 and used within the 4-hour operational period of Tallawarra B. Approximately 1500 kg of hydrogen will be consumed within a 4-hour period, with a maximum rate of 375 kg/hr at a volume of 5%.

The hydrogen will be temporarily stored in the tube trailers that will connect to an unloading system, and a maximum of four laden tube trailers will be on-site at any one time. A maximum of 1,376 kg of hydrogen will be temporarily stored within the tube trailers on-site at any one time, to be used within the average 4-hour operational period.

The hydrogen will be delivered on-site at a pressure of approximately 16,500 kPa. The hydrogen pressure will be reduced to approximately 3,500 kPa across two stages, which will allow for it to be combined into the turbine fuel gas stream.

### 3.1.3 Transfer

The hydrogen will be transferred from the tube trailers to the Tallawarra B. The proposed hydrogen transfer process is presented in the Process Flow Diagram in **Figure 3-2**. There are four key components in the hydrogen transfer process which are described below.

#### 3.1.3.1 Hydrogen Tube Trailers

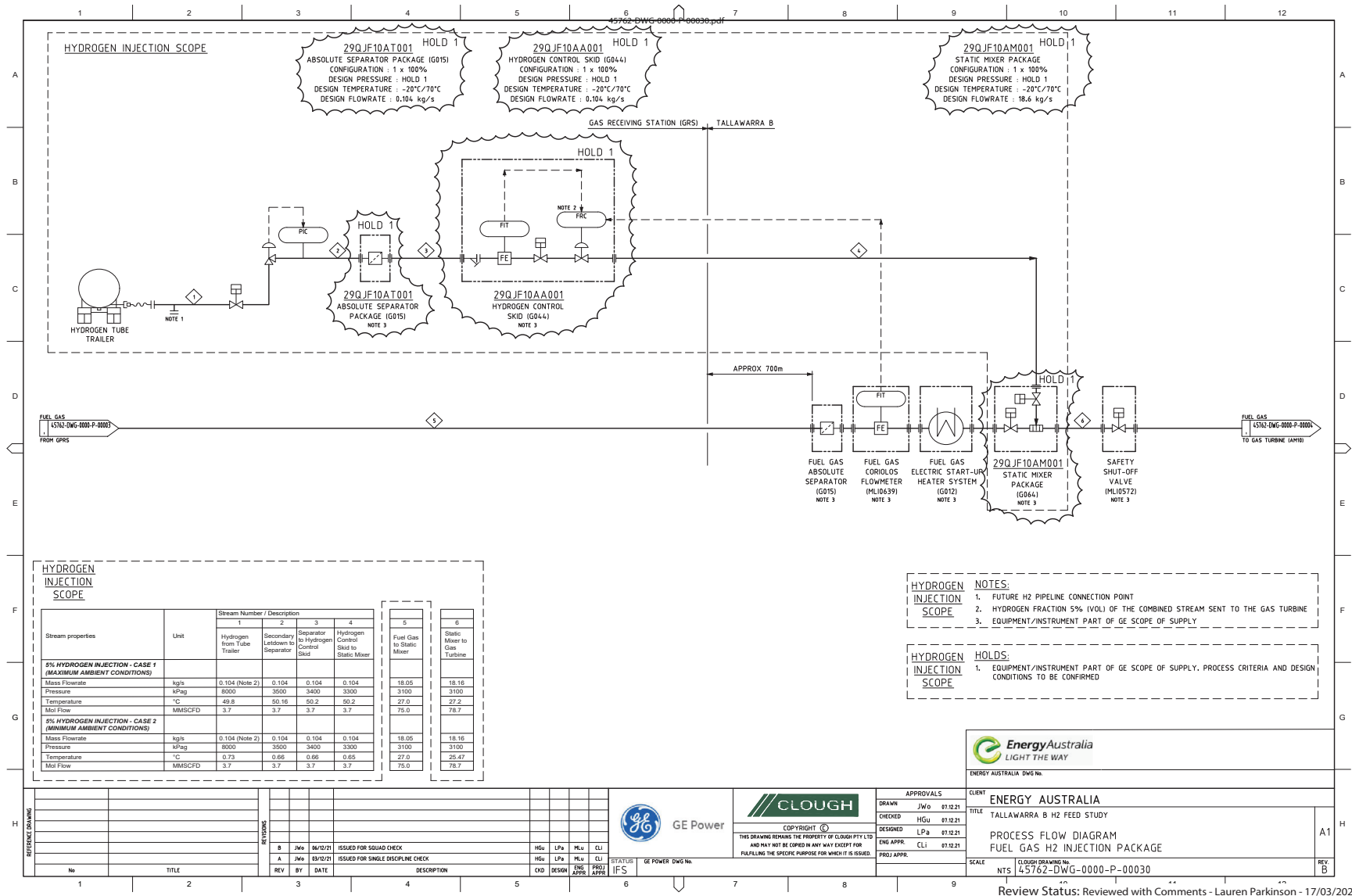
A hydrogen receiving station will be constructed near the Tallawarra B gas receiving station (GRS) area. The tube trailers will be connected to a header via rated hoses (316 stainless steel piping).

#### 3.1.3.2 Hydrogen Blending Skid

The H<sub>2</sub> tube trailers will connect to a hydrogen blending skid, which will control the flow of hydrogen and ensure that the 5% volume is maintained. It will control the flow of hydrogen based on ratio control, by using a signal from the total fuel gas supply meter at the Tallawarra B Power Island. There is approximately 650 m from the blending skid to the power island.

#### 3.1.3.3 Hydrogen Supply Line

A hydrogen supply line (DN50 / 2 inch, 316 stainless steel piping) will connect the blending skid to a hydrogen mixing tee, which will be located downstream of the fuel gas conditioning skid. The hydrogen pipeline will run along the existing pipe rack from the GRS area to Tallawarra B.



## Process Flow Diagram

Drawing No.: 0643047s_Mod3_I001_R1.ai	Tallawarra B Power Station Hydrogen Fuel Mix - MOD 3 Modification Report
Date: 07/11/2022	Drawing Size: A4
Drawn by: GC	Reviewed by: CT
Client: EnergyAustralia Services Pty Ltd	This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.
Drawing Not to Scale	

F 3-2



Source:  
EnergyAustralia, 2021

### 3.1.4 Injection

Following the completion of the steps described in **Section 3.1.4**, the hydrogen will be injected as combined steam into the Tallawarra B gas turbines.

A summary of the metrics for the 5% hydrogen injection is provided in **Table 3-1**.

The gas turbine will start-up and shut down through the use of 100% natural gas.

**Table 3-1 Injection of 5% Hydrogen**

Stream	1	2	3	4
Pressure (kPag)	8,000	3,700	3,200	3,000
Temperature (°C)	25.8	26.0	26.0	27.0
Mol Flow (MMSCFD)	3.3	3.3	3.3	67.4
Mass Flow (kg/s)	0.09	0.09	0.09	15.58

### 3.1.5 Safety Systems

A number of new safety systems are proposed to be installed for the Modification, including:

- Material selection for hydrogen service;
- Instrumented protection systems (hydrogen feed overpressure protection, H<sub>2</sub>/NG ratio deviation protection);
- Hydrogen gas direction and alarm/ ESD;
- Fire protection for hydrogen fires;
- Gas receipt station collision protection against trailer movements;
- Protection against trailer drive-away while still connected;
- Nitrogen purging facility for line clearing of flammables; and
- Atmospheric vent elevated and at safe location.

### 3.1.6 Emissions

The introduction of 5% green hydrogen into the fuel mix is not expected to have a material impact on the exhaust flume gas composition. Further discussion is provided in **Section 6.1** and **Appendix E**.

## 3.2 Traffic and Access

### 3.2.1 Construction

A range of heavy vehicles is expected to be required for the transportation of construction equipment, materials, and concrete to site. The average number of trucks required during construction of the Modification is expected to be 4 to 6 heavy vehicles per day for a total of 8 to 12 trips (inbound and outbound). At most, it is anticipated that 10 heavy vehicles per day for a total of 20 trips (inbound and outbound) will be required during construction.

This is relatively small in comparison to the approved project which for construction requires approximately 50 heavy vehicles per day for a total of 100 heavy vehicle trips (inbound and outbound) per day (EnergyAustralia, 2022). Heavy vehicle traffic for the construction of Tallawarra B peaked during the initial site establishment and set up stage of the project, and will continue to reduce throughout construction and into commissioning (EnergyAustralia, 2022). Talla B will commence operations in late 2023, prior to the commencement of construction of the Modification.

A new truck access way and unloading area are proposed to the west and north of the existing car parking area, as shown in **Figure 3-1**. Access to this area will be restricted with security gates fitted with a swipe card reader and automatic gates. Access to the facility for the hydrogen trucks would be via an existing driveway located off Yallah Bay Road, meaning no changes to existing site access is required.

Earth moving equipment will be required to allow for the construction of the truck access and turning circle area.

In total there would be 36 workers on-site during the peak construction periods. It is assumed that this workforce would arrive at site by private vehicles with an occupancy of 1 to 2 people. When assuming the worst case scenario (i.e. all workers arrive and leave the site in the same hour) this would result in 30 light vehicle trips in the morning hour (6:30 am – 7:30 am) and evening hour (5:00 pm – 6:00 pm). No changes are proposed to the existing on-site parking areas.

An assessment of construction traffic impacts is provided in **Section 6.4.2** and **Appendix I**.

### 3.2.2 Operations

During operations of the Modified Project, up to a maximum of 8 hydrogen trailers could be used in any one day, with 2 tube trailers connected at any one time. A maximum of 4 trailers could be present at the site at any one time. These vehicles are anticipated to access the site from the north via the Princes Highway.

Tallawarra B and Tallawarra A combined will require on average an operational workforce of 33 people, including shift workers. When assuming the worst case scenario (i.e. all workers arrive and leave the site in the same hour), it is assumed 40 light vehicle trips to the site, and 3 light vehicle trips from the site would be generated in the morning hour (6:30 am – 7:30 am), and reverse in the afternoon peak.

An assessment of operational traffic impacts is provided in **Section 6.4.2** and **Appendix I**.

## 3.3 Staging

### 3.3.1 Construction

Construction of the approved project commenced in January 2022 with a construction schedule of 20 months. Construction of the Modification is anticipated to last 6 months and is proposed to commence following completion of the detailed design. Talla B will commence operations in late 2023, prior to the commencement of the construction of the Modification.

#### 3.3.1.1 Construction Hours

Construction of the Modification will be undertaken within the current approved hours of construction for Tallawarra B under MP 07\_0124, which are:

- Monday to Friday – 7:00 am to 6:00 pm;
- Saturday – 8:00 am to 1:00 pm; and
- No works to take place on Sundays or Public Holidays.

#### 3.3.1.2 Construction workforce

The current construction workforce for the Tallawarra B project is proposed to be utilised to allow for the additional scope of the hydrogen works. Dedicated workforce for the construction of the hydrogen works may require the following crews:

- Civil – 10 people;
- Mechanical / Piping – 12 people;
- Instrumentation and Electrical – 8 people; and
- Supervision – 6 people.

### 3.3.1.3 Construction Scope

The scope and scale of the construction work associated with the Modification is minor relative to the approved project.

Majority of the work is proposed to be conducted within existing pipe racks and e-room near the existing GRS. A significant construction activity would be to install the fully welded stainless piping from the GRS down to the Power Island. In addition, control cabinets would be installed in the e-room and cabling installed back to the blending skid and filter unit. The foundations for the skids are approximately 3 m x 3 m. A small pipe rack extension from the main pipe rack down to the blending skid area would be required.

Earth moving equipment would be required to prepare the truck access and turning circle area.

Key equipment required for the construction of the Modification include:

- 90T Mobile Crane;
- 20T Franna;
- Water Cart;
- Roller;
- Bobcat;
- Small Excavator;
- Loader; and
- Telehandler (telescopic forklift).

### 3.3.2 Operations

#### 3.3.2.1 Operational Hours

The Modification will operate in accordance with the approved operational hours of Tallawarra B (MP 07\_0124), which is approved as a four-hour operational peaking power station, operating 24 hours a day, 7 days a week (24/7).

#### 3.3.2.2 Operational Workforce

The Modification will not result in a net change to the operational workforce for the Tallawarra B Power Station.

## 3.4 Comparison to Current Approval

A comparison of the proposed modification and the current approval (MP 07\_0124, MODS 1 & 2) is provided in **Table 3-2** below.



**Table 3-2 Modified Project Summary Table**

Project Element	Summary of Approved Project	Summary of Proposed Modification
Description	<ul style="list-style-type: none"> <li>Single-unit gas turbine power plant with a total nominal output of up to 400 MW operating in open cycle mode or a single unit gas turbine plant with a nominal output of 400 MW operating in combined cycle mode.</li> </ul>	<ul style="list-style-type: none"> <li>The use of green hydrogen as a supplementary fuel, requiring the addition of the following infrastructure: <ul style="list-style-type: none"> <li>A hydrogen injection system capable of providing an average 4-hour full load of continuous steady state operations;</li> <li>A green hydrogen receiving and unloading facility to enable green hydrogen to be delivered by road via tube trailers, including up to two (2) unloading points (with a flange connection provided for tie-in any potential future hydrogen pipeline);</li> <li>A hydrogen blending skid, complete with piping, instrumentation, and valves;</li> <li>Purging, draining and venting systems, where required; and</li> <li>Fire protection and flame detection systems, where required.</li> </ul> </li> </ul>
Development Footprint	<ul style="list-style-type: none"> <li>Approved boundary and layout as defined in Figure 3-1.</li> </ul>	<ul style="list-style-type: none"> <li>Located entirely within the project area of the approved Tallawarra B Power Station. Footprint of the proposed hydrogen elements defined in Figure 3-1.</li> </ul>
Site Disturbance	<ul style="list-style-type: none"> <li>Site disturbance area of 35 hectares.</li> </ul>	<ul style="list-style-type: none"> <li>Proposed infrastructure associated with the Modification is to be located within areas of previous ground disturbance associated with former and current power station operations.</li> </ul>
Fuel Composition	<ul style="list-style-type: none"> <li>100% natural gas as the only fuel for firing of the burner/turbine.</li> </ul>	<ul style="list-style-type: none"> <li>Minimum 95% natural gas and up to 5% green hydrogen for firing of the burner/turbine.</li> </ul>
On-site Fuel Storage	<ul style="list-style-type: none"> <li>Under the current approval MP 07_0124 (as modified):</li> <li>Natural gas fuel is supplied through a connection to the existing Tallawarra A Power Station; and</li> <li>There is no storage of fuel on-site.</li> </ul>	<ul style="list-style-type: none"> <li>No change to existing storage on-site;</li> <li>No permanent hydrogen storage tanks on-site at Tallawarra B;</li> <li>Hydrogen will be delivered on-site via tube trailers (maximum. 6-8 trucks per day), with no hydrogen production on-site;</li> <li>Hydrogen will be temporarily stored in the tube trailers connecting to an unloading system, comprising of pipelines on-site; and</li> <li>A maximum of 1,376 kg of hydrogen will be temporarily stored within the tube trailers on-site at any one time, to be used within the average 4-hour operational period.</li> </ul>
Capacity	<ul style="list-style-type: none"> <li>The current capacity approval under MP 07_0124 (as modified) permits:</li> <li>A single-unit gas turbine power plant with a total nominal output of up to 400 megawatts operating in open cycle mode; or</li> <li>A single unit gas turbine plant with a nominal output of 400 megawatts operating in combined cycle mode.</li> </ul>	<ul style="list-style-type: none"> <li>Total capacity of up to 400 MW, i.e., no change to the current approved nominal output.</li> </ul>
Site Access	<ul style="list-style-type: none"> <li>Access to the site provided along Yallah Bay Road via the Princes Highway, refer <b>Figure 3-1</b>.</li> </ul>	<ul style="list-style-type: none"> <li>No changes to site access requirements.</li> </ul>

Project Element	Summary of Approved Project	Summary of Proposed Modification
Parking	<ul style="list-style-type: none"><li>■ Utilises existing car parking facilities at Tallawarra A, <b>Figure 3-1</b>.</li></ul>	<ul style="list-style-type: none"><li>■ No changes to car parking requirements.</li></ul>
Buildings / Associated infrastructure	<p>The current approval permits the construction of:</p> <ul style="list-style-type: none"><li>■ high voltage switchyard;</li><li>■ transmission line;</li><li>■ gas pipelines;</li><li>■ gas receiving and conditioning stations; and</li><li>■ potable/fire water tank.</li></ul>	<p>No change to the previously approved buildings / infrastructure.</p> <p>The Modification will involve the construction of the following additional infrastructure:</p> <ul style="list-style-type: none"><li>■ hydrogen receiving and unloading facility;</li><li>■ hydrogen blending skid, complete with piping, instrumentation, and valves;</li><li>■ purging, draining and venting systems (where required); and</li><li>■ fire protection and flame detection systems (where required).</li></ul>
Workforce	<p>Peak employment level will be in the order of:</p> <ul style="list-style-type: none"><li>■ 200-250 personnel for an OCGT; or</li><li>■ 300-400 personnel for a CCGT.</li></ul>	<ul style="list-style-type: none"><li>■ No changes</li></ul>
Use of Tallawarra A infrastructure	<p>The current approval permits use of existing infrastructure at the Tallawarra A including:</p> <ul style="list-style-type: none"><li>■ the existing gas supply;</li><li>■ control room;</li><li>■ administration building;</li><li>■ amenities;</li><li>■ car park;</li><li>■ water treatment plant; and</li><li>■ water intake and outlet canal.</li></ul>	<ul style="list-style-type: none"><li>■ No changes</li></ul>

### 3.4.1 Alternatives

Three options were investigated during the concept phase to determine the location of the hydrogen blending skid and injection point. Consideration was given from the perspective of process safety, site layout, piping requirements, controllability, and instrumentation impacts.

- Option 1: Blending skid and injection point located at Gas Receiving Station (GRS);
- Option 2: Blending skid at Gas Receiving Station (GRS) and injection located at Tallawarra B Power Island;
- Option 3: Blending skid and injection located at Tallawarra B Power Island.

In consultation with the original equipment manufacturer (GE Power), Option 2 was selected for further definition in FEED phase.

The 'Do Nothing' Approach has been discounted as the benefits of using green hydrogen to generate electricity at Tallawarra B, as outlined in **Section 2.4** would not be realised.

## 4. STATUTORY CONTEXT

This section outlines the key statutory requirements for the Modification under the EP&A Act and other relevant NSW and Commonwealth legislation with regard to the *State Significant Development Guidelines – Preparing a Modification Report* (DPIE, 2021a).

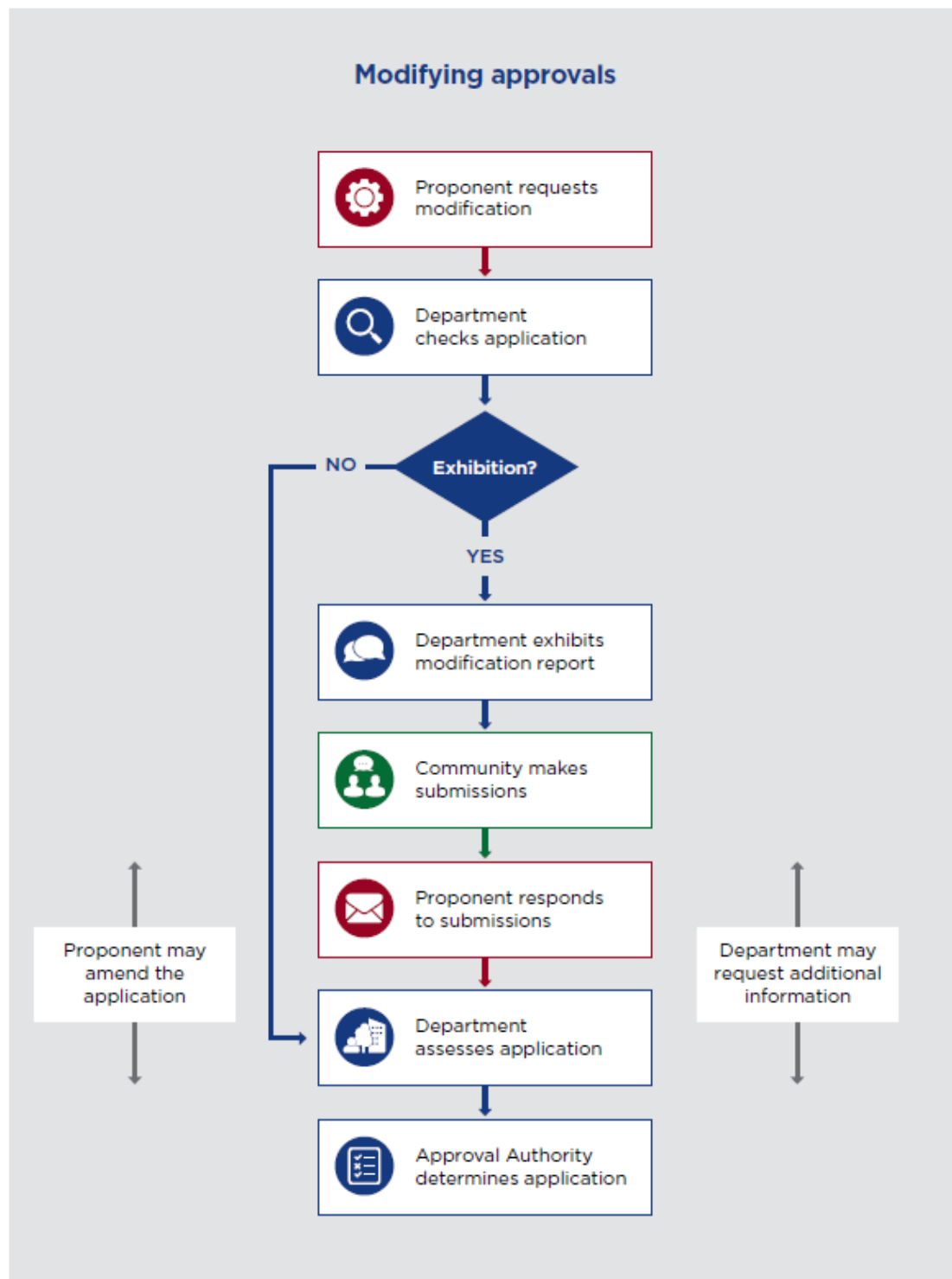
### 4.1 SSI Modification Pathway

On 20 November 2018, Tallawarra B was made a CSSI project under Clause 5, Schedule 2 of *Environmental Planning and Assessment (Savings, Transitional and Other Provisions) Regulation 2017*. As such, the modification is proposed to be sought under the provisions of Section 5.25 (2) of the EP&A Act, which states:

*5.25 Modification of Minister's approval*

*(2) The proponent may request the Minister to modify the Minister's approval for State significant infrastructure. The Minister's approval for a modification is not required if the infrastructure as modified will be consistent with the existing approval under this Division.*

As the proposed modification is not consistent with the existing approval, a modification of the SSI approval is required pursuant to Section 5.25 (2) of the EP&A Act. The SSI modification process is supported by new *State Significant Infrastructure Guidelines* ('SSI guidelines') released in November 2021 outlining the planning and approvals process. An overview of the key steps in the SSI modification process is provided in **Figure 4-1**.



**Figure 4-1 Overview of SSI Modification Process**

(Source: DPIE, 2021)

## 4.2 Permissibility

The Modification seeks to use green hydrogen as a supplementary fuel to the approved Tallawarra B Gas Fired Power Station. As such, the development is for the same purpose, being electricity power generation, with the fuel composition effectively being ancillary to the electricity generating works.

Electricity generating works are defined as “*a building or place used for the purpose of making or generating electricity; or electricity storage*” under the Principal Local Environmental Plan (LEP) Standard Instrument 2006 ([Standard Instrument—Principal Local Environmental Plan \(2006 EPI 155a\) - NSW Legislation](#)).

Section 2.36 (1)(b) of *State Environmental Planning Policy (Transport and Infrastructure) 2021* (Transport and Infrastructure SEPP) provides for electricity generating works to be carried out on any land in a prescribed rural, industrial or special use zone with development consent. A prescribed rural, industrial or special use zone is defined in Section 2.35 of the Transport and Infrastructure SEPP and includes the following land use zones:

- RU1 Primary Production
- RU2 Rural Landscape
- RU3 Forestry
- RU4 Primary Production Small Lots
- IN1 General Industrial
- IN2 Light Industrial
- IN3 Heavy Industrial
- IN4 Working Waterfront
- SP1 Special Activities
- SP2 Infrastructure

The Modification Area is located within land zoned SP2 Infrastructure under the Wollongong Local Environmental Plan 2009 (Wollongong LEP), as shown in **Figure 4-2**. Electricity generating works are therefore permissible with consent. As the Modification seeks to introduce a supplementary fuel to the approved gas fired power station for the purpose of generating electricity, the Modification would be permissible with consent.





**Legend**

Tallawarra B Power Station Approved Areas

**H2 Layout (Proposed)**

H2-Pipe

H2-Components

Road-Outline

**Land Zoning**

B1 Neighbourhood Centre

B6 Enterprise Corridor

B7 Business Park

C2 Environmental Conservation

C3 Environmental Management

C4 Environmental Living

IN1 General Industrial

IN2 Light Industrial

R2 Low Density Residential

R5 Large Lot Residential

RE1 Public Recreation

RU2 Rural Landscape

SP2 Infrastructure

SP3 Tourist

W1 Natural Waterways

W2 Recreational Waterways

**Source:**  
EPI Land Zoning (Dec 2021); Layout : Client Provided  
NSW DCDB / DTDB; ESRI World Imagery (2020)

**Land Zoning**

Drawing No: 0643047s\_Mod3\_G003\_R0.mxd

Date: 25/08/2022

Drawn By: GC

Coordinate System: GDA 1994 MGA Zone 56

Drawing Size: A4

Reviewed By: AA

0100200300m

Tallawarra B Power Station Hydrogen Fuel Mix – MOD 3  
Modification Report

Client: EnergyAustralia Services Pty Ltd

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ERM

F 4-2



### 4.3 Other Approvals

Other approvals required under relevant NSW and Commonwealth legislation are detailed in **Table 4-1**.

**Table 4-1 Other Approvals Required Under NSW and Commonwealth Legislation**

Approval Category	Legislation	Requirement
<b>Consistent Approvals</b> Section 5.24 of the EP&A Act outlines that these approvals cannot be refused if necessary for carrying out an approved SSI and are to be consistent with the terms of the SSI approval.	<i>Protection of the Environment Operations Act 1997</i> (POEO Act)	EnergyAustralia hold an Environment Protection Licence (EPL) no. 555 under Section 58(5) of the POEO Act for the Tallawarra Power Station. EnergyAustralia obtained a variation to EPL No. 555 held in relation to the Tallawarra A Power Station to authorise the construction of Tallawarra B. An additional variation to EPL No. 555 is expected to be required for the Modification. EnergyAustralia will consult with the NSW Environment Protection Authority (EPA) regarding this licence modification.
	<i>Pipelines Act 1967</i>	An application to DPE for a pipeline licence is being sought under section 12 of the <i>Pipelines Act 1967</i> for the Tallawarra Stage B project.
<b>Commonwealth Approvals</b>	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act)	Approval from the Minister for the Commonwealth Department of Agriculture, Water and the Environment (DAWE) is required for any action that will, or is likely to have a significant impact on one or more MNES. The findings of the Biodiversity Assessment ( <b>Section 6.5</b> and/or <b>Appendix J</b> ) confirmed that a referral under the EPBC Act is not required.
	<i>National Greenhouse and Energy Reporting Act 2007</i> (NGER Act)	The NGER Act establishes the national legislative framework for the NGER Scheme, which comprises a framework for reporting greenhouse gas emissions, greenhouse gas projects and energy consumption and production by corporations in Australia. The Air Emissions Review ( <b>Section 6.1, Appendix E</b> ) concluded that the Modification will be immaterial when compared to the approved operations. On this basis, the existing approval, monitoring, reporting and management framework is considered appropriate for operations under the Modification.
<b>Other Approvals</b>	<i>Biodiversity Conservation Act 2016</i>	In accordance with Section 7.17 (2)(c) of the BC Act, a Biodiversity Development Assessment Report in accordance with the Biodiversity Assessment Methodology (BAM) is not required as the Modification would not have any additional direct or indirect impacts on biodiversity values (refer <b>Section 6.5</b> and/or <b>Appendix J</b> ). Condition 3.41 of MP 07_0124 requires the Proponent to develop and submit to the Secretary for approval, a plan for offsetting the biodiversity impacts resulting from the removal of any native vegetation. The condition does not mandate that the Offset Plan include the provision of any formal offsets, such as the retirement of credits under the former <i>Threatened Species Conservation Act 1995</i> or the BC Act.

### 4.4 Mandatory Matters for Consideration

The consent authority is required to consider a range of matters when deciding whether to grant consent for the Modification. These are referred to as mandatory considerations, which are detailed in **Table 4-2** below.

**Table 4-2 Mandatory Considerations**

Statutory Reference	Mandatory Consideration
<i>Considerations under the EP&amp;A Act and Regulation</i>	
Section 1.3 - Objects of the Act	<p>Pursuant to Section 1.3 of the EP&amp;A Act, the Modification aligns with the following Objects of the Act:</p> <ul style="list-style-type: none"> <li>(a) <i>to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources,</i></li> <li>(b) <i>to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,</i></li> <li>(c) <i>to promote the orderly and economic use and development of land,</i></li> <li>(f) <i>to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),</i></li> <li>(j) <i>to provide increased opportunity for community participation in environmental planning and assessment.</i></li> </ul>
Section 4.15 - Evaluation	<p>Pursuant to Section 4.15 of the EP&amp;A Act, the Modification Report has considered:</p> <ul style="list-style-type: none"> <li>■ Relevant environmental planning instruments including: <ul style="list-style-type: none"> <li>– State Environmental Planning Policy (Planning Systems) 2021;</li> <li>– State Environmental Planning Policy (Resilience and Hazards) 2021;</li> <li>– State Environmental Planning Policy (Transport and Infrastructure) 2021; and</li> <li>– Wollongong Local Environmental Plan 2009.</li> </ul> </li> <li>■ Relevant development control plans including: <ul style="list-style-type: none"> <li>– Wollongong Development Control Plan 2009</li> </ul> </li> <li>■ The likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality;</li> <li>■ The suitability of the site for the development;</li> <li>■ Any submissions made in accordance with this Act or the regulations; and</li> <li>■ The public interest.</li> </ul>
<i>Considerations under other NSW legislation</i>	
Biodiversity Conservation Act 2016 – Section 7.14	<p>Section 7.27 of the BC Act addresses the requirements of biodiversity assessment for modifications. In accordance with Section 7.17 (2)(c) of the BC Act, a biodiversity development assessment report in accordance with the Biodiversity Assessment Methodology (BAM) is not required as the Modification would not have any additional direct or indirect impacts on biodiversity values.</p>
<i>Protection of the Environment Operations Act 1997</i>	<p>The <i>Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales</i> (Approved Methods) (EPA, 2016), lists the statutory requirements for modelling and assessing emissions of air pollutants from stationary sources in NSW. The Approved Methods are given legal effect under Part 5: Air Impurities Emitted from Activities and Plant in the <i>Protection of the Environment Operations (Clean Air) Regulation 2010</i>. The Air Emissions Review (<b>Section 6.1, Appendix E</b>) applies the criteria provided in the Approved Methods</p>
<b>Considerations under relevant EPIs</b>	
State Environmental Planning Policy (Resilience and Hazards) 2021 – Chapter 3	<p>Chapter 3 of the Resilience and Hazards SEPP assesses the potential hazards associated with the proposed development by providing definitions and guidelines for hazardous industry, offensive industry, hazardous storage establishments, and offensive storage establishments.</p> <p>In accordance with Clause 3.7 of the Resilience and Hazards SEPP, consideration will be given to current circulars or guidelines published by the Department of Planning relating to hazardous or offensive development, including:</p> <ul style="list-style-type: none"> <li>■ Hazardous Industry Planning Advisory Paper No 3 – Risk Assessment; and</li> <li>■ Hazardous Industry Planning Advisory Paper No 12 – Hazards</li> </ul> <p>In addition, a Preliminary Hazard Analysis (PHA) has been undertaken for the Modification in accordance with Chapter 3 of the Resilience and Hazards SEPP (refer <b>Section 6.2 and Appendix F</b>).</p>
State Environmental Planning Policy (Resilience and Hazards) 2021 – Chapter 4	<p>Chapter 4 of the Resilience and Hazards SEPP provides a state wide planning approach to the remediation of contaminated land. Under Clause 4.6 (1) of the Resilience and Hazards SEPP, a consent authority is required to consider whether a proposed development site is affected by soil or other contaminants before granting consent. The Modification is sited within the existing assessed footprint of Tallawarra B</p>

Statutory Reference	Mandatory Consideration
	(MP 07_0124). Prior to the commencement of construction, the existing Construction Environmental Management Plan (CEMP) and Soil and Water Management Sub-plan for Tallawarra B will be reviewed and updated as necessary for the Modification.
Wollongong Local Environmental Plan 2009	The Modification Area is situated within the Wollongong LGA, where the relevant Local Environmental Plan (LEP) is the Wollongong Local Environmental Plan 2009 (Wollongong LEP). The Modification is located within land zoned SP2 Infrastructure under the Wollongong LEP.
<b>Considerations under Development Control Plans</b>	
Wollongong Development Control Plan 2009	The Modification Area is situated within the Wollongong LGA, where the relevant Development Control Plan (DCP) is the Wollongong Development Control Plan 2009 (Wollongong DCP). Under Section 4.15 of the EP&A Act, in determining a development application, a consent authority is to take into consideration the provisions of DCPs.

## 5. ENGAGEMENT

EnergyAustralia has undertaken consultation with relevant government agencies and the community as summarised herein. Further information is detailed in the Engagement Outcomes Report included as **Appendix M**.

The following guiding principles apply to EnergyAustralia's approach to stakeholder and community engagement across all its operations and projects.

- **What is promised is delivered:** EnergyAustralia is accountable for the delivery of all commitments made to the community.
- **Spend time talking with people:** EnergyAustralia initiates engagement with key stakeholders early in its projects and gives priority to meaningful face to face engagement.
- **Reduce the 'don't know':** EnergyAustralia works to actively build community awareness and trust in its operations, its approach, and its people.

Engagement about the modification was designed in line with these guiding principles, as well as industry best practice, to ensure that stakeholders felt appropriately consulted and had confidence in EnergyAustralia's management of Tallawarra B.

A Stakeholder Engagement Strategy (SES) was developed in July 2022 to support the proposed modification. This SES is included as **Appendix D**. EnergyAustralia is committed to ongoing engagement with regulators and the community regarding its activities at Tallawarra B.

Stakeholders are defined by EnergyAustralia as people, groups or communities that have an interest in, may be impacted by, or could potentially impact their projects.

Stakeholders for Tallawarra B were identified across three main groups including government stakeholders (refer 5.1), local community, and peak bodies and interest groups (refer 5.2).

### 5.1 Agency Engagement

Engagement with DPE and other regulators and agencies has been undertaken to identify specific requirements to be included in the Modification Report. A summary of the engagement undertaken with government agencies in relation to the Modification is provided in **Table 5-1**.

**Table 5-1 Summary of Government Consultation**

Government Agency	Consultation Undertaken
NSW Department of Planning and Environment (DPE)	Briefing on 22 April 2022 to introduce the Modification Application, seek confirmation of planning pathway and feedback on assessment requirements to support an application.
Office of Energy and Climate Change	Stakeholder briefing undertaken by EnergyAustralia on 24 October 2022 covering the following topics: <ul style="list-style-type: none"><li>■ Aviation plume modelling</li><li>■ Hydrogen storage and source</li><li>■ Schedule and commissioning date</li><li>■ Major hazard trigger</li></ul>
Department of Regional NSW	Stakeholder briefing comprised a presentation to a Danish trade delegation at the request of the Department of Regional NSW on 25 October 2022 covering the following topics: <ul style="list-style-type: none"><li>■ Introduction of Modification</li><li>■ Existing and proposed project approvals</li><li>■ Background and rationale for the proposed modification to introduce green hydrogen (including proposed additional infrastructure)</li><li>■ Assessment of impacts</li><li>■ Community engagement overview</li></ul>
Shellharbour City Council	Stakeholder briefing on 21 July 2022 covering the following topics:

Government Agency	Consultation Undertaken
	<ul style="list-style-type: none"><li>■ Planning pathway for Modification Application.</li><li>■ Assessments approach (air quality, plume and greenhouse gas assessments, noise, and traffic assessments).</li><li>■ Council advise that their key issues were:<ul style="list-style-type: none"><li>- Plume rise and aviation safety impacts for Shellharbour airport (concerns raised related to the existing Tallawarra B approval and were not specific to the hydrogen Modification Application).</li></ul></li></ul>
Wollongong City Council	<p>Stakeholder briefing on 18 July 2022 covering the following topics:</p> <ul style="list-style-type: none"><li>■ Planning pathway for Modification Application.</li><li>■ Assessments approach (air quality, plume and greenhouse gas assessments, noise, and traffic assessments).</li><li>■ Council advised that their key issues were:<ul style="list-style-type: none"><li>- Noise (operational trucks and reversing alarms).</li><li>- Traffic movements and condition of Yallah Bay Road (volume of trucks relative to the Modification Application was discussed, noting that Tallawarra B was already approved).</li><li>- Consideration of Tallawarra Lands and future residential development.</li></ul></li></ul>

## 5.2 Community Engagement

The Engagement Outcomes Report included as **Appendix M** details outcomes of the implementation of the SES developed to support the proposed modification.

The engagement approach in relation to the Modification included proactive re-engagement with all known Tallawarra B stakeholders previously consulted, continued engagement with the Tallawarra Power Station Community Liaison Group (CLG) and opportunities to engage with new stakeholders.

A variety of communication and engagement activities were developed and undertaken to promote local community and stakeholder awareness of the Modification Application and to foster participation. New communication collateral was created with various engagement opportunities co-ordinated including a mix of face-to-face and online activities. Multiple feedback channels were incorporated into communication collateral for ease of stakeholder feedback.

A summary of the key outcomes from the communication and engagement activities undertaken with local community, and peak bodies and interest groups is provided in **Table 5-2**.

Evidence of the communications collateral utilised for engagement can be found in Appendices A-G of the Engagement Outcomes Report included as **Appendix M** including:

- Letter sent to key stakeholders offering briefings;
- Update letter sent to Illawarra stakeholders;
- Unaddressed mailout letter sent to suburbs surrounding Tallawarra Power Station;
- Tallawarra Power Station CLG newsletter;
- Advertising in the Illawarra Mercury to promote the community drop-in session held on 28 September 2022;
- Social media advertising to promote the community drop-in session; and,
- Participant survey undertaken at this community drop-in session.

**Table 5-2 Summary of Key Outcomes from Communications and Engagement Activities**

Activity	Description	Outcome
<i>Dedicated project channels</i>	A dedicated project web page for Tallawarra B, project email address, 1800 toll-free information line and mailing address were communicated consistently throughout the engagement process.	Stakeholders had a range of different ways to seek further information.
<i>Tallawarra B landing page on EnergyAustralia website</i>	The existing web page for the project was updated, a short link was created (for ease of access) and a range of new collateral added about the Modification Application to support the engagement process.	Unique visits to the Tallawarra B landing page doubled from August to September 2022.
<i>Tallawarra B fact sheets</i>	The existing Tallawarra B fact sheet was updated to reflect the Modification Application and a new green hydrogen fact sheet created to support the engagement process.	Stakeholders were able to easily access user-friendly, meaningful information about the proposal.
<i>Frequently Asked Questions (FAQ) document</i>	A new FAQ document was developed to support the Modification Application and will continue to be updated as project feedback is received.	Stakeholders were able to easily access commonly asked questions and answers about the proposal.
<i>Key stakeholder briefings</i>	A briefing pack was developed to provide key information about the Modification Application and outlined mechanisms for stakeholder feedback.	In addition to regulatory engagement, nine briefings were undertaken with key stakeholders (Dept. of Regional NSW; EPA; FRNSW; Member for Wollongong; Member for Cunningham; Office of Energy and Climate Change; Regional Development Australia Illawarra; Shellharbour Council; Wollongong Council).
<i>Tallawarra Power Station CLG update</i>	A newsletter update about the Modification Application was provided to the CLG, including ways to provide feedback or seek further information.	CLG members were kept informed about the Modification Application and asked for their feedback.
<i>Tallawarra B community drop-in session (Dapto Ribbonwood Centre)</i>	<p>A drop-in session to seek community feedback on the Modification Application was held on 28 September 2022 and promoted by:</p> <ul style="list-style-type: none"> <li>■ Multiple advertisements in the Illawarra Mercury with a circulation of 17,293 and a digital audience of 569,887</li> <li>■ Social media advertising on Facebook which achieved 143,029 impressions</li> <li>■ Delivery of 6413 unaddressed letters to suburbs immediately surrounding the power station.</li> </ul>	14 community members attended the drop-in session held, with 92 per cent of participants finding the information provided at this session either helpful or very helpful.

### 5.3 Key Issues Raised

Section 6 of the Engagement Outcomes Report (refer **Appendix M**) presents stakeholder feedback captured during engagement activities. Key themes raised relate to air quality and emissions, consultation, environment, aviation, heritage, biodiversity, traffic and transport, social, noise, construction, operations, and health and safety.

Overall, stakeholder feedback was positive or neutral, with the proposal perceived as a negligible change to what has already been approved for the construction and operation of Tallawarra B.

Table 5 of **Appendix M** includes feedback and the response provided to elected officials, government departments /agencies and local government, including Shellharbour City Council and Wollongong City Council. Table 6 of **Appendix M** includes feedback, where received, from Tallawarra Power Station CLG members, community groups, conservation/environmental groups, not for profits and other community organisations. Table 7 of **Appendix M** includes feedback, where received, from the aviation industry, educational institutions, economic and industry groups, as well as Aboriginal stakeholders in the Illawarra.

## 5.4 Next Steps

EnergyAustralia understands that after lodgement, DPE will require this Modification Report to be on Public Exhibition for a period of at least 14 days. In accordance with the *Undertaking Engagement Guidelines for State Significant Projects* (November 2021), to enable the community to read the Modification Application and make a submission on the proposal, EnergyAustralia intends to undertake further engagement to support this process as outlined below in **Table 5-3**.

**Table 5-3 Further Engagement**

Activity	Objective/details	Stakeholders	Timing
<i>Update supporting collateral (if needed) and undertake additional engagement planning</i>	Determine engagement approach. Collateral to be updated to support Public Exhibition of the Modification Application may include: <ul style="list-style-type: none"><li>■ Project webpage, fact sheets, frequently asked questions</li><li>■ Letters</li><li>■ Media release</li><li>■ Advertising.</li></ul>	All	Prior to lodgement of Modification Application
<i>Advertising in the Illawarra Mercury</i>	Publicly advertise EnergyAustralia's intention for the Modification Application to be on Public Exhibition as required by DPE (and in accordance with specified time frames).	All	After lodgement of Modification Application and prior to Public Exhibition
<i>Update to stakeholders</i>	Provide update to stakeholders previously engaged with by EnergyAustralia and extend invitation for these stakeholders to participate in the Public Exhibition process by sharing information and details to enable them provide feedback.	Government, CLG, key stakeholders	At the commencement of Public Exhibition period
<i>Advertising in the Illawarra Mercury</i>	Publish a Public Notice about the Public Exhibition period to coincide with this occurring, including the process to provide feedback.	All	At the commencement of Public Exhibition period
<i>Public Exhibition</i>	Modification Application on Public Exhibition	All	To be determined by DPE
<i>Response to submissions (if required)</i>	Develop engagement inputs to help respond to any public submissions on the Modification Application that are referred to EnergyAustralia by DPE (as needed).	As identified	Concurrent to Response to Submissions



## 6. ASSESSMENT OF IMPACTS

This section provides a description of the existing environment, and an assessment of the environmental impacts associated with the Modification, along with recommended management measures to minimise impacts to the environment. This assessment considered the following environmental aspects:

- Air quality and plume;
- Hazards;
- Operational and construction noise and vibration;
- Traffic and access;
- Biodiversity;
- Aboriginal heritage; and
- Soil and water.

### 6.1 Air Quality and Plume

An Air Emissions Review has been prepared to support this Modification Report, and is provided in **Appendix E** (ERM (2022)). The review provides a technical analysis of the Modification in relation to greenhouse gas (GHG), plume rise potential, and other air quality related matters.

The review involved a comparative analysis of the operation of Tallawarra B on the approved natural gas fuel and a natural gas blended with 5% hydrogen (by volume) (hereafter referred to as 'blended gas'), using several references, including gas distribution network information, manufacturer process estimates for the gas turbine generator, and greenhouse gas emission factor references.

#### 6.1.1 Existing Environment

##### 6.1.1.1 Existing Sources of Emissions

Tallawarra A is located adjacent to Tallawarra B and is required to report air emissions to the National Pollutant Inventory. CoA 3.25 of MP 07\_0124 requires that the combined discharges from Tallawarra A and Tallawarra B should not exceed 900 tonnes per annum.

Existing sources in the locality that generate air emissions include car exhaust, manufacturing, storage, wastewater treatment, mining, energy generation, and construction.

##### 6.1.1.2 Background to Accounting Methodology

Quantification of GHG emissions has followed the GHG Protocol (WRI & WBCSD, 2004), the Intergovernmental Panel on Climate Change (IPCC, 2006), as well as Australian Government GHG accounting and classification systems.

The review has been guided by the emission estimation methodologies endorsed under the *National Greenhouse and Energy Reporting Regulations 2008*. These describe the detailed requirements for reporting under the National Greenhouse and Energy Reporting (NGER) framework and provide a basis for estimating emissions from proposed activities.

### The GHG Protocol

The GHG Protocol establishes an international standard for accounting and reporting of GHG emissions. The GHG Protocol has been adopted by the International Organization for Standardisation, endorsed by GHG initiatives (such as the Carbon Disclosure Proposal) and is compatible with existing GHG trading schemes.

Under this protocol, three “Scopes” of emissions (Scope 1, Scope 2 and Scope 3) are defined for GHG accounting and reporting purposes. This terminology has been adopted in Australian GHG reporting and measurement methods and has been employed in this assessment. The definitions for Scope 1, Scope 2 and Scope 3 emissions are summarised as below, but are detailed in Section 3.1 of **Appendix E**:

- Scope 1: Direct Greenhouse Gas Emissions: Direct greenhouse gas emissions are defined as those emissions that occur from sources that are owned or controlled by the reporting entity;
- Scope 2: Energy Product Use Indirect Greenhouse Gas Emissions: Indirect emissions that accounts for greenhouse gas emissions from the generation of purchased energy products (principally, electricity, steam / heat and reduction materials used for smelting) by the entity; and
- Scope 3: Other Indirect Greenhouse Gas Emissions: Emissions that are a consequence of the activities of an entity but which arise from sources not owned or controlled by that entity. Some examples of Scope 3 activities provided in the GHG Protocol are extraction and production of purchased materials, transportation of purchased fuels, and use of sold products and services.

The GHG Protocol provides that reporting Scope 3 emissions is optional. The *National Greenhouse Energy Reporting Act 2007* provides that facilities triggering greenhouse emissions and energy usage thresholds are required to report Scope 1 and Scope 2, but not Scope 3.

## 6.1.2 Assessment of Impacts

### 6.1.2.1 Fuel Properties

A review of fuel properties indicates that with the introduction of hydrogen at a volume of 5%, the changes in energy content and density are within the existing ranges of variability observed in the natural gas supply. At 5% by volume, hydrogen contributes to 1.5% of the calorific value of the blended gas, and thus displaces 1.5% of the site’s natural gas consumption for a given volume of blended gas.

### 6.1.2.2 Greenhouse Gas Emissions

The assessment included a number of Scope 3 emissions, which are considered important when considering the activity’s broader greenhouse performance relative to the baseline operations. While EnergyAustralia would not be required to report these emissions under the NGER framework; their inclusion allows a comprehensive assessment of the GHG implications across the fuel supply chain.

Emission estimates have been based on National Greenhouse Accounts emission factors addressing the following emission sources:

- Scope 1 emissions associated with the combustion of natural gas.
- Scope 3 emissions associated:
  - the extraction and distribution of natural gas;
  - the production of green hydrogen; and
  - the transport of green hydrogen to the site.

Scope 2 emissions have been assumed to be negligible in the context of operational emissions (refer Section 3.3.1 ‘Inventory Approach’ of **Appendix E**).

Based on the review and estimates undertaken, the following findings are made:

- The reduction in Scope 1 emissions are directly proportional to the reduction in natural gas consumption of 1.5%. Scope 3 emissions vary with the assumed transport processes. Given that the source of green hydrogen has not yet been identified, it has been assumed that wind-based green hydrogen is transported from a distance of 100 km, with a payload of 320 kg. Changes in assumptions to include trucking of larger quantities at shorter distances would result in proportional reductions in these estimates;

- When accounting for Scope 1 emissions that are released via the exhaust stack, and Scope 3 emissions associated with the production and transport of green hydrogen, the following estimates are made:
  - Using 200 t of hydrogen annually, would result in an emission reduction of approximately 1,400 t CO<sub>2</sub>-e per annum. This represents an overall (Scope 1 + 3) emission reduction of 1.25%, and a Scope 1 emission reduction of 1.5%; and
  - When operating on blended gas, the Scope 1 + 3 emission intensity is estimated to reduce from 674 kg/MWh SO to 666 kg/MWh ('sent out' basis). This equates to an emission reduction of 8 kg CO<sub>2</sub>-e for each MWh of electricity that is produced using the blended gas. This is also equivalent to 8 tonnes (t) of emission reduction per gigawatt hour (GWh) of electricity produced.

### 6.1.2.3 Plume Rise Considerations

The Tallawarra B Power Station Project Approval (MP 07\_0124) included a detailed assessment of potential plume rise impacts on aviation safety. A review of the potential influence of the blended fuel on exhaust emission parameters has been undertaken as relevant to the consideration of potential variation in impacts under the Modification.

A review of manufacturer data indicated that the Modification represents a negligible change to the emission parameters that define buoyant plume rise.

### 6.1.2.4 Air Emission Review

The review examined the potential changes to emission parameters, noting that the influence of an emission source on ambient air quality is a function of both the rate at which emissions are released and the effectiveness with which these emissions disperse in the atmosphere.

Based on a review of manufacturer information, the corresponding findings have been made:

- Under operation on blended gas, the changes to the exhaust plume temperature and flow rate are negligible (<0.1% variation against natural gas operation); hence the potential impact on plume dispersion characteristics is also considered negligible; and
- With regard to pollutant emission quantities, the manufacturer has indicated that negligible changes in the emission profile will occur for the blended fuel. To this effect, there are no proposed changes to the guaranteed NO<sub>x</sub> emission guarantee, operational monitoring, or NO<sub>x</sub> limits as a result of the Modification.

### 6.1.2.5 Construction Impacts

Based on the scale of the proposed infrastructure and nature of construction activities, the potential for adverse air quality impacts during the construction phase is considered minor, and manageable using conventional methods for management of construction impacts. The Air Emissions Review (**Appendix E**) has included a detailed review of the potential influence of blended fuel on operational air emissions, as relative to those associated with the approved project. Overall, manufacturer information indicates that changes to the emission profile under blended gas operation are immaterial compared to those from approved operations on natural gas fuel. On this basis, predicted operational air quality impacts are consistent with the most recent detailed assessment of air emissions, as detailed in the MOD2 air quality impact assessment (Katestone, 2020). Therefore, the existing approval, monitoring, reporting and management framework have been nominated as appropriate for operations under the blended fuel.

## 6.1.3 Mitigation and Management Measures

It is considered that operations under the Modification would be consistent with the operations assessed under the existing approval (MP 07\_0124). In this respect, the existing monitoring, reporting and management framework requirements are considered appropriate for operations under the Modification.

## 6.2 Hazards

A Preliminary Hazard Analysis (PHA) and a Fire Safety Study has been prepared by Arriscar (2023) to support this Modification Report, and is provided in **Appendix F** and **Appendix L** respectively. The below section provides a summary of the key findings from the PHA only.

### 6.2.1 Existing Environment

Hazardous materials handled by Tallawarra B include hydrogen, natural gas, nitrogen, lube oil, diesel, transformer oil, and chemicals.

The PHA completed for MP 07\_0124 (SKM, 2009) identified a number of hazards associated with Tallawarra B with the potential to impact upon adjacent off-site areas. The risks associated with Tallawarra B were deemed to be below the criteria published in the *Hazardous Industry Planning Advisory Paper No. 4: Risk Criteria for Land Use Safety Planning* (HIPAP No. 4), as Tallawarra B would be situated within land zoned for industrial (electricity generation) uses. As such, Tallawarra B was classified as potentially hazardous and not hazardous under the former *State Environmental Planning Policy No. 33: Hazardous and Offensive Industries* (SEPP 33).

#### 6.2.1.1 Sensitive Receptors

The nearest receptors from the western boundary fence of the site relevant to the PHA are:

- Residential zoned land in Central Precinct (400 m);
- Industrial zoned land immediately to the south-west.

The closest existing residence is at Carlyle Close in Dapto, to the west of Yallah Gully, 680 m from the western boundary fence of Tallawarra B.

The closest existing school is Munt Brown Public School, located 1.8 km northwest. Future schools may be built in Tallawarra Lands, but there are no plans for a school at the time of this study.

### 6.2.2 Assessment of Impacts

There are potential hazards associated with the transport, transfer, and storage of green hydrogen for the Modification, as summarised below:

- Hydrogen release from trailer manifold and loss of full trailer inventory;
- Single tube rupture in hydrogen trailer manifold;
- Hydrogen release at receival station (valves, flanges, fittings);
- Hydrogen release from pipeline within site;
- Natural gas release at receival station (valves, flanges, fittings);
- Natural gas release from pipeline within site;
- Transformer fire; and
- Minor fires in office, workshop.

A number of existing safety systems are provided on-site to manage these risks. Further, a number of additional safety systems are proposed for the Modification, as identified in **Section 3.1.5**.

The quantitative risk assessment for the Modification was conducted with conservative assumptions, and using the following risk parameters:

- Location of specific individual risk of fatality;
- Risk of injury from thermal radiation exceeding 4.7 kW/m<sup>2</sup>;
- Risk of injury from blast overpressure exceeding 7 kPa;
- Risk of property damage and accident propagation exceeding 23 kW/m<sup>2</sup>; and
- Risk of property damage and accident propagation exceeding 14 kPa.



The conclusions on satisfying risk criteria of HIPAP No.4 are summarised in **Table 6-1** below and demonstrates that the Modification complies with all risk criteria.

**Table 6-1 Modification Compliance with HIPAP No.4**

Land Use / Impairment	Risk Criterion (per million per year)	Complies?
<b>Criteria Summary for Risk of Fatality</b>		
Hospitals, schools, childcare facilities and old age housing developments	0.5	Yes
Residential developments and places of continuous occupancy, such as hotels and tourist resorts	1	Yes
Commercial developments, including offices, retail centres, warehouses with showrooms, restaurants and entertainment centres	5	Yes
Sporting complexes and active open space areas	10	Yes
Industrial sites	50	Yes
<b>Criteria Summary for Risk of Injury and Accident Propagation</b>		
Blast overpressure of 7 kPa at residential and sensitive areas (injury)	50	Yes
Thermal radiation of 4.7 kW/m <sup>2</sup> at residential and sensitive areas (injury)	50	Yes
Blast overpressure of 14 kPa at neighbouring potentially hazardous facilities (damage and accident propagation)	50	Yes
Thermal radiation of 23 kW/m <sup>2</sup> at neighbouring potentially hazardous facilities (damage and accident propagation)	50	Yes

### 6.2.3 Mitigation and Management Measures

Arriscar (2023, **Appendix F**) has made the following recommendations in the PHA which has been incorporated into the design of the Modification to provide further risk reduction:

- Provide sign posting on speed limits near the hydrogen tube trailer receival station;
- Develop a regular function testing regime for H<sub>2</sub> related safety instrumented systems as part of the Safety Management System;
- Update the hazardous area specification around the gas receival station, to include the hydrogen receival and pressure control infrastructure; and
- Consider installing fire rated valves for Emergency Shutdown function for gas isolation in the plant, if they are not already designed to be fire rated.

## 6.3 Noise

A Construction Noise and Vibration Assessment and an Operational Noise Assessment has been prepared by ERM to support this Modification Report, and is provided in **Appendix G** and **Appendix H**, respectively.

## 6.3.1 Existing Environment

### 6.3.1.1 Surrounding Environment

The majority of the land surrounding the site is vacant and has been cleared of vegetation to facilitate cattle grazing and other rural activities; however, the now surplus environmental buffer zone that existed around the former coal fired power station has been rezoned as an urban release and employment area (referred to as the ‘Tallawarra Lands’) to aid in the fulfilment of housing and employment needs in the Illawarra region (Cardno, 2018).

The Noise Sensitive Receptors considered for the noise modelling are summarised in Table 2-1 of the Operational Noise Assessment (**Appendix H**), or shown below in Figure 6-2. The potential dwellings defined in Tallawarra Lands Concept Plan Approval Modification (Cardno, 2018) have not been considered in the construction assessment as they are unlikely to be occupied during the construction.

A monitoring campaign had been conducted at nearby surroundings by Benbow from 7 May – 28 May 2019 (Benbow, 2022). The results are summarised in **Table 6-2** and the monitoring locations excerpt is shown in **Figure 6-1**.

**Table 6-2 Background Noise Monitoring Result**

Logger Location	Address	RBL (LA90)			LAeq		
		Day	Evening	Night	Day	Evening	Night
Logger A	Yallah Bay Road, Yallah	38	38 <sup>1</sup>	31	54	48	50
Logger B	54 Carlyle Close, Dapto	36	36 <sup>1</sup>	34	53	48	47
Logger C	13 Malonga Place, Koonawarra	36	34	30	54	48	47
Logger D	Yallah Bay Road, Yallah	35 <sup>2</sup>	34	31	49	45	43
Logger E	108 Haywards Bay Drive, Haywards Bay	35	35 <sup>1</sup>	34	55	51	49

1. As per the Noise Policy for Industry section 2.3 the project intrusiveness noise level for evening be set at no greater than the project intrusiveness noise level for daytime.

2. The determined RBL cannot be below the minimum RBL that has been used as per Table 2.1 Noise Policy for Industry



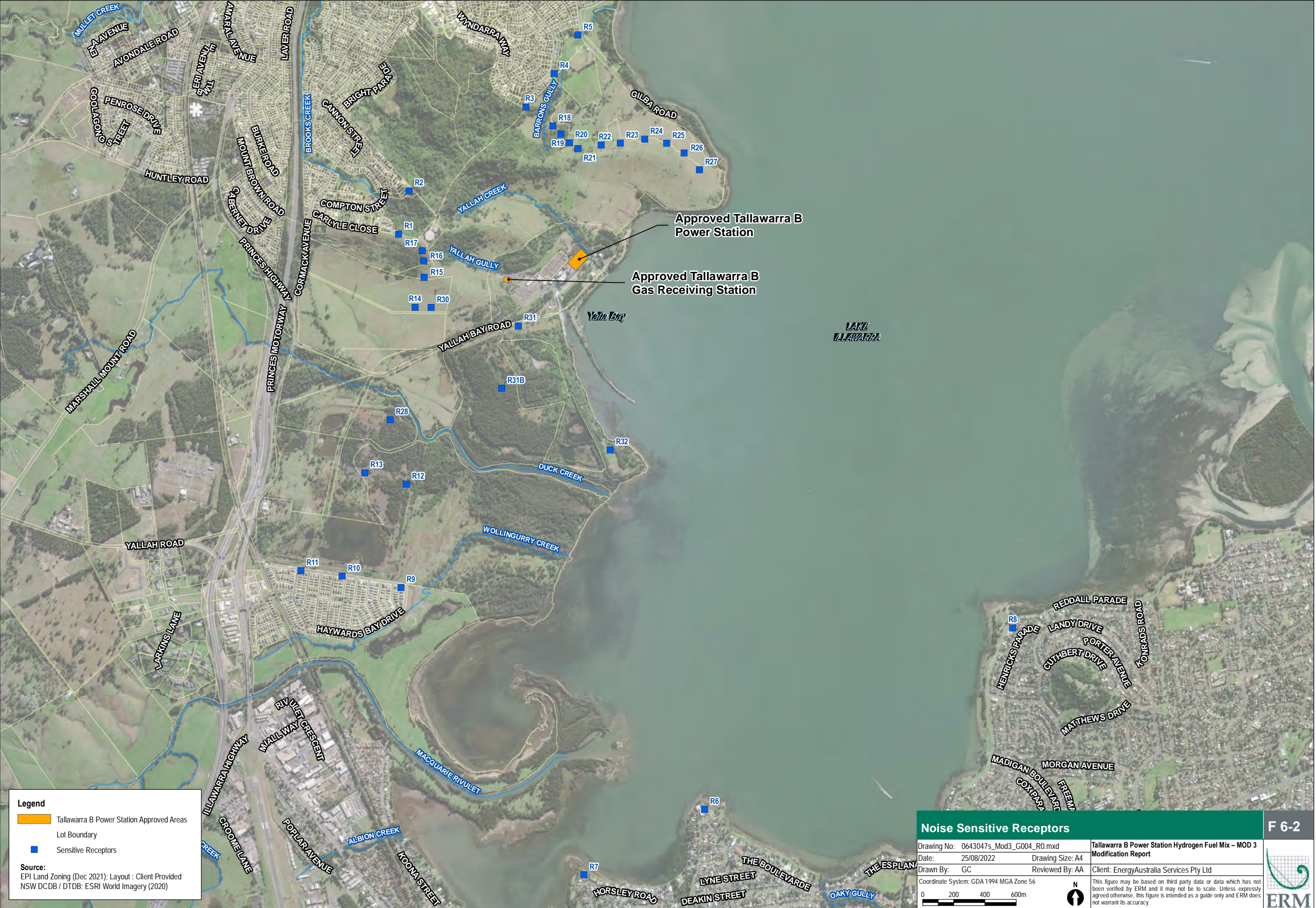
**Figure 6-1 Background Noise Monitoring Locations**

### 6.3.1.2 Noise and Vibration Criteria

The Noise Assessments include a detailed description of the noise and vibration criteria of relevance to the Modification, as summarised below:

- Existing Project Approval: the relevant conditions in MP 07\_0124 for assessing operational noise are provided in Appendix C of **Appendix H**;
- Existing Environment Protection License: the site is required by NSW EPA to comply with the Environmental Protection Licence (EPL) (no. 555) (NSW EPA, 2021) dated 1 December 2021. Condition L6 from the EPL provides noise limits and they are reproduced in Appendix B of **Appendix H**;
- NSW Interim Construction Noise Guideline (ICNG): provides construction noise management levels based on measured/adopted background noise to minimise the annoyance from construction, and is presented in Table 3-1 of **Appendix G**;
- The Noise Policy for Industry (NPFI) (NSW EPA, 2017): sets out the procedure to assess operational noise from industrial developments. This includes an assessment against relevant Project Noise Trigger Levels (PNTLs), amenity noise, sleep disturbance, and traffic noise criteria. Refer to Section 3 of **Appendix H** for a full description the application of NPFI to the Modification;
- Assessing Vibration: A Technical Guideline: the Assessing Vibration guideline (DEC, 2006) provides guidance for assessing human exposure to vibration. This guidance is based on the *British Standard (BS 6472–1992) – Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz) dated 1992*, and is reproduced in Table 3-4 of **Appendix G**;
- NSW Road Noise Policy: the NSW Government has approved the NSW Road Noise Policy (RNP) (DECCW, 2011) to minimise road traffic noise and its impacts. Table 3 of the RNP sets out the assessment criteria for residences to be applied to particular types of project, road category and land use, and is summarised in Section 3.2 of **Appendix G**.







## 6.3.2 Assessment of Impacts

### 6.3.2.1 Construction Noise and Vibration

#### Construction Noise Impact

The potential for construction noise and vibration impact from machinery and equipment at the closest receivers needs to be considered. In accordance with the NSW Interim Construction Noise Guidelines (ICNG), the risk of construction noise impact exists when construction occurs outside the recommended standard hours or when construction noise management levels are exceeded.

Predicted worst-case and unmitigated Leq, 15min noise levels for all construction equipment and construction scenarios at the nearest sensitive receivers (within 1.5 km of the site boundary where construction noise impacts have the potential to be present) indicates that the ICNG Noise Affected and Highly Affected Management Levels are expected to be complied with at all noise sensitive receivers (NSRs).

#### Construction Traffic Noise Impact

Construction vehicles associated with the Modification are likely to travel along Princes Highway and Princes Motorway then enter via Yallah Bay Road to get to site and vice versa. At most, it is anticipated that 30 light vehicle and 10 heavy vehicles per day for a total of 80 trips (inbound and outbound) will be required during construction of the Modification. The predicted  $L_{Aeq,period}$  road traffic noise level increase at the most impacted receiver, 35 Cabernet Drive, is 0.1 dB with the construction generated traffic associated with Modification. Therefore, this increase of less than 2 dB complies with the RNP criteria.

#### Construction Vibration Impact

The potential for construction vibration impacts needs to be considered both in terms of effects on building occupants (human comfort) and the effects on the building structure (building damage). As vibration inducing equipment (including rollers) is generally located at significant offsets from the nearest receivers, it is not anticipated that vibration would be a significant issue. Table 6-1 of **Appendix G** outlines safe working distances for vibration intensive plant, should vibration equipment be used closer to receivers (e.g., for minor works such as pavement roadworks or utilities works).

### 6.3.2.2 Operational Noise and Vibration

The noise modelling takes into consideration the sound power level of the proposed site operations, and applies adjustments for attenuation from geometric spreading, acoustic shielding from intervening ground topography, ground effects, meteorological effects and atmospheric absorption.

As referenced in this assessment, the 'blowdown event' from the hydrogen mixing vent is a significant noise source that will be added to the approved project as a result of the Modification. A detailed description of the methodology of the noise assessment, including the modelling parameters of the blowdown event is provided in **Appendix H**.

The predicted noise level of each scenario has been compared to the most stringent criteria summarised in **Section 6.3.1.2**. For residential and tourist receivers, this is the night-time PNTL. For educational receivers, the criterion does not vary with time of day, and is only applied during the operational hours of the school.

Predicted external noise levels for each scenario are shown in **Table 6-3** and shows that predicted noise levels from the Project are expected to comply with the PNTLs at all NSRs. No treatment (in the form of silencers or other noise attenuation methods) are required for the hydrogen mixing vent.

**Table 6-3 Predicted Operational Noise Levels**

Noise Sensitive Receiver ID	Description	Receiver Type	Predicted Noise from Proposed Modification L <sub>Aeq,15min</sub> dB(A)	Night-time PNTL L <sub>Aeq,15min</sub> dB(A)
R1	54 Carlyle Close Dapto	Residential	16	38
R2	44 Coronet Place Dapto	Residential	13	38
R3	17 Malonga Place Koonawarra	Residential	13	35
R4	83 Wyndarra Way Koonawarra	Residential	14	35
R5	68 Gilba Road Koonawarra	Residential	16	35
R6	57 The Boulevarde Oak Flats	Residential	14	38
R7	23 Park Crescent Oak Flats	Residential	13	38
R8	295 Reddall Parade Mount Warrigal	Residential	13	38
R9	82 Haywards Bay Drive Haywards Bay	Residential	21	38
R10	116 Haywards Bay Drive Haywards Bay	Residential	21	38
R11	142a Haywards Bay Drive Haywards Bay	Residential	20	38
R12	Southern Precinct	Residential (Potential)	26	38
R13	Southern Precinct	Residential (Potential)	25	38
R14	Central Precinct	Residential (Potential)	33	36
R15	Central Precinct	Residential (Potential)	30	36
R16	Central Precinct	Residential (Potential)	27	36
R17	Central Precinct	Residential (Potential)	30	36
R18	Northern Precinct	Residential (Potential)	13	36
R19	Northern Precinct	Residential (Potential)	13	36
R20	Northern Precinct	Residential (Potential)	17	36
R21	Northern Precinct	Residential (Potential)	19	36
R22	Northern Precinct	Residential (Potential)	21	36
R23	Northern Precinct	Residential (Potential)	26	36
R24	Northern Precinct	Residential (Potential)	23	36
R25	Northern Precinct	Residential (Potential)	26	36
R26	Northern Precinct	Residential (Potential)	26	36
R27	Northern Precinct	Residential (Potential)	27	36
R28	Southern Precinct	Residential (Potential)	28	38

Noise Sensitive Receiver ID	Description	Receiver Type	Predicted Noise from Proposed Modification $L_{Aeq,15min}$ dB(A)	Night-time PNTL $L_{Aeq,15min}$ dB(A)
R29 <sup>1</sup>	Central Precinct	Residential (Not occupied)	43	-
R30	Central Precinct (Commercial)	Commercial (Potential)	33	60
R31	Future Development Area (Potential Primary School)	Educational (Potential)	42	50 <sup>1</sup>
R31B	Future Development Area (Potential Primary School)	Educational (Potential)	33	50 <sup>1</sup>
R32	Future Tourism Facility	Accommodation	27	43

Notes:

1. External noise level criteria

### Sleep Disturbance Assessment

The potential for sleep disturbance from maximum noise level events from the development during the night-time period has been considered. Sleep disturbance is considered to be both awakenings and disturbance to sleep stages.

With or without treatment, the predicted noise from the modification is compliant with the PNTLs at all receivers surrounding the site for  $L_{Amax}$  PNTLs.

Based on noise modelling practice, the noise emissions will be unlikely to cause any sleep disturbance. Further, the predicted noise levels are predicted to comply with the EPL 555 night limits (the most stringent limit in EPL 555) with and without treatments.

### Operational Traffic

The Traffic Assessment (TTPP, 2023) notes that during the operation of Tallawarra B, there will be up to 8 trucks per day or up to 16 heavy vehicle movements (inbound and outbound) in addition to existing traffic. It is also anticipated that 43 light vehicle trips are present in both the morning peak hour and afternoon peak hour. It is conservative to assume that all of morning peak hour traffic will occur during early morning periods which are effectively night time periods as per the RNP.

On Yallah Bay Road, there are no existing receivers to be assessed. However, the Tallawarra Lands Concept Plan Approval Modification (Cardno, 2018) has future receivers demarcated along Yallah Bay Road. There is also a potential educational receiver (R31) along Yallah Bay Road. Road traffic noise levels at the expected façade of R31 were predicted using ISO 9613-2 as a moving point source of heavy vehicle movements with a sound power level of 107 dB(A) and light vehicle movements with a sound power level of 89 dB(A) at an average speed of 80 km/h. These receivers were assumed to be 30 m away from the centre line of Yallah Bay Road. The predicted noise levels are shown in **Table 6-4**.

**Table 6-4 Road Traffic Noise Predictions at R31**

Period	Existing Traffic			Existing + Project Traffic		
	Traffic Volume (veh/hr)		Predicted Traffic Noise Level $L_{Aeq, 1hr}$ , dB(A)	Traffic Volume (veh/hr)		Predicted Traffic Noise Level $L_{Aeq, 1hr}$ , dB(A)
	Light Vehicle	Heavy Vehicle		Light Vehicle	Heavy Vehicle	
Day (7 a.m.–10 p.m.)	38	1	32.5	81	3	36.8
Night (10 p.m.–7 a.m.)	13	1	31.3	56	2	35.1

*Note 1: A façade refraction of 2.5 dB has been applied to all calculated results*

The predicted  $L_{Aeq, 1hr}$  road traffic noise levels at R31 are below the RNP criteria of 55 dB(A) (Day) and 50 dB(A) (Night). Based on RNP criteria compliance at R31, traffic noise levels at future receivers (any proposed land use) along Yallah Bay Road and all other receivers are expected to comply with the RNP criteria.

Future Central Precinct residential receivers defined in the Tallawarra Lands Concept Plan Approval Modification are further from Yallah Bay Road than R31, and therefore, road traffic noise levels are also expected to comply with the RNP criteria.

As Yallah Bay Road is a local road, RNP traffic noise criteria is not applicable for receivers on this road.

### 6.3.2.3 Cumulative Noise Impact

The potential for cumulative noise impact from the proposed hydrogen electrolyser and existing noise sources at Tallawarra Power Station may exist. In accordance with the NPFI, the risk for cumulative impact exists when the project amenity noise criteria are exceeded. The project amenity noise criteria applies a 5dB penalty to account for cumulative noise impact.

Furthermore, it is noted that although some degree of intrusiveness may be expected in some cases where ambient noise levels in the area are very low, by meeting the project amenity noise level, the risk of cumulative industrial noise impact is considered to be insignificant.

## 6.3.3 Mitigation and Management Measures

### 6.3.3.1 Construction Noise

ICNG Noise Management Levels are expected to be complied with at all construction scenarios for the Modification. Standard mitigation measures in **Table 6-5** below should be implemented during construction to reduce noise impacts if feasible and reasonable.

A Noise and Air Quality Management Plan (NAQMP) (EnergyAustralia, 2022b) has been prepared as a sub-plan of the Tallawarra-B Power Station Construction Environment Management Plan (CEMP). The CEMP is currently guiding the construction and commissioning of Talla B. Prior to construction of the Modification, the NAQMP will be reviewed and updated where relevant to include consideration of the Modification and the standard mitigation measures in **Table 6-5**.



**Table 6-5 Construction Noise Mitigation Measures**

Subject	Measures Summary
Scheduling	<p>Works should be undertaken during standard working hours only, as specified in the ICNG (NSW DECC, 2009):</p> <ul style="list-style-type: none"><li>■ Monday to Friday: 7 am to 6 pm;</li><li>■ Saturday: 8 am to 1 pm; and</li><li>■ No work on Sundays or public holidays.</li></ul> <p>Construction outside these hours might be undertaken as follows:</p> <ul style="list-style-type: none"><li>■ In accordance with the ICNG;</li><li>■ With agreement by DPE.</li></ul> <ul style="list-style-type: none"><li>■ Where an equipment item operates close to the boundary of the site, or where noise level exceedances cannot be avoided (generate high levels of noise e.g., &gt; 45 dB(A) at a Sensitive Receiver), then consideration may be given to implementing time restrictions and/or providing periods of respite for affected receivers, where feasible and reasonable.</li><li>■ In some circumstances respite may extend the duration of works and inadvertently increase noise impacts; hence due care should be taken when considering this management measure.</li></ul>
Equipment	<ul style="list-style-type: none"><li>■ Selection of the quietest plant, equipment and/or machinery for each construction activity, where practicable</li><li>■ Efficient work practices to minimise the total construction period and the number of noise sources onsite should be adopted;</li><li>■ Unnecessary noise due to idling engines should be avoided;</li><li>■ High engine speeds should be avoided when equipment can be powered down and lower engine speeds are feasible;</li><li>■ All plant, equipment and/or machinery used onsite should be in suitable condition, with particular emphasis on exhaust silencers, covers on engines and inspection of squeaking or rattling components. Excessive noise-generating machines should be repaired or removed from the site;</li><li>■ Reversal alarms shall be replaced with broadband “squash duck” motion alarms, where feasible;</li><li>■ Any equipment not in use for extended periods during construction should be turned off;</li><li>■ Vehicles and equipment should be regularly serviced according to manufacturers’ instructions and maintained in proper working order;</li><li>■ Simultaneous operation of noisy equipment should be avoided where practical; and</li><li>■ Where practical, noisy equipment should be positioned behind structures that act as barriers to Sensitive Receptors, or at the greatest distance from Sensitive Receptors, or oriented to directed noise emissions away from Sensitive Receptors.</li></ul>
Training	<p>All construction workforce should receive inductions prior to commencing on site. Inductions may occur via toolbox meetings, training and/or education, and should inform staff of:</p> <ul style="list-style-type: none"><li>■ Procedures to operate plant and equipment in a quiet and efficient manner;</li><li>■ Location of nearest Sensitive Receptors;</li><li>■ Standard construction hours;</li><li>■ Relevant approval conditions; and</li><li>■ Incidents and complaints handling procedures.</li></ul>
Sensitive Receivers Consultation	<p>Affected Sensitive Receivers should be consulted with prior to the commencement of works that are expected to exceed noise criteria. Consultation activities should discuss:</p> <ul style="list-style-type: none"><li>■ The details of proposed works;</li><li>■ The anticipated noise impacts;</li><li>■ The time periods over which these works would occur; and</li><li>■ To identify any management measures required to minimise impact at affected sensitive receivers.</li></ul>

### 6.3.3.2 Construction Vibration

Where activities using significant sources of vibration (e.g. rollers) occur within close proximity to structures and identified receivers, potential impacts are likely to be increased. In this case, the following mitigation measures are recommended for consideration:

- Substitution of methods of high vibration/impact emission to lower vibration impact methods;

- Identification of detailed assessment methods for high risk works, identify affected receivers, complaints handling and consultation protocols in Section 11 of the Talla B CEMP (EnergyAustralia, 2022a);
- Undertaking trial measurements to establish the site specific vibration propagation from higher risk activities to establish site specific offset distances required; and
- Where vibration monitoring is undertaken and any criteria exceedances identified, implementation of management measures to ensure vibration limit compliance is achieved.

### 6.3.3.3 Road Traffic

Regardless of compliance with RNP criteria, construction traffic noise management should also be considered during the construction of the Modification. It is anticipated this may include site awareness training and environmental inductions for construction staff and transport contractors. Mitigation measures such as the non-usage of air brakes and lower traffic speeds when travelling to and from the site will be implemented to minimise traffic noise impacts on the surrounding community.

### 6.3.3.4 Operational Treatment

The proposed operations from the Modification are predicted to comply with the PTNLs during all operational scenarios and assessment time periods at the identified noise sensitive receivers.

The following general measures are recommended as 'best practice' for minimising noise impacts:

- Ensure plant and equipment is well maintained and not generating excessive noise;
- No beeper reversing alarms within the site; and
- Site awareness training / environmental inductions that include a section on noise mitigation techniques / measures to be implemented when on site; and
- Use lower powered or reduced size equipment where noise benefits are available, where practical.

It should be noted that given that the hydrogen mixing tee vent is the most significant noise source of the Modification, verification noise measurements of the hydrogen mixing tee vent during the commissioning stage are recommended to verify the assumed noise power levels presented in the Operational Noise Assessment (**Appendix H**).

## 6.4 Traffic and Access

A Traffic and Transport Assessment has been prepared by The Transport Planning Partnership (TTPP) (2022) to support this Modification Report, and is provided in **Appendix I**.

### 6.4.1 Existing Environment

The key roads within the locality include Princes Motorway, Princes Highway, Cormack Avenue, and Yallah Bay Road, as shown in **Figure 6-3**.

Vehicular access to the site is via the Princes Highway and Yallah Bay Road. The Tallawarra Power Station is the main user of Yallah Bay Road which terminates at the power station but also provides access to a boat ramp. The site is near a shared use path along the lake foreshore connecting Koonawarra to the boat ramp and car park at Yallah Bay.

The site currently has an oversupply of 150 car spaces on-site from its previous coal fired power station. Car parking is therefore expected to be adequate for future users based on the number of staff forecast for the site and the existing use of the site.

#### *6.4.1.1 Light vehicle traffic volume and profile*

##### **Operational Traffic**

Tallawarra A will be fully operational throughout construction of the approved project. Typical light vehicle traffic associated with Tallawarra A includes approximately 25 light vehicles per day, for a total of 50 light vehicle trips (inbound and outbound) per day. The existing traffic profile for the Tallawarra A operational traffic is generally evenly spread over day and night movements, seven days per week. (Aurecon, 2021).

##### **Construction Traffic**

Construction of the approved project will generate (approximately) 200 light vehicles per day, for a total of 400 light vehicle trips (inbound and outbound) per day. Actual traffic volumes and traffic profile will vary on a day to day basis depending on the site activities and stage of construction underway. Most of these construction traffic movements will occur during standard construction working hours, and most of the construction personnel will commute from the local region to the site (Aurecon, 2021).

#### *6.4.1.2 Heavy vehicle traffic volume and profile*

Typical heavy vehicle traffic associated with Tallawarra A includes approximately 6 heavy vehicles per day, for a total of 12 heavy vehicle trips (inbound and outbound) per day, generally evenly spread over day and night movements, seven days per week. Construction of the approved project will generate approximately 50 heavy vehicle per day for a total of 100 heavy vehicle trips (inbound and outbound) per day (Aurecon, 2021).





**Legend**  

Tallawarra B Power Station Approved Areas

**H2 Layout (Proposed)**  

H2-Pipe

H2-Components

Road-Outline

**Road Network:**  

Highway/Motorway

Road/Minor Road

**Source:**  
Layout : Client Provided; NSW DCDB / DTDB;  
ESRI World Imagery (2020)

**Road Network and Site Access**

Drawing No: 0643047s\_Mod3\_G005\_R0.mxd

Date: 25/08/2022

Drawn By: GC

Coordinate System: GDA 1994 MGA Zone 56

Drawing Size: A4

Reviewed By: AA

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Tallawarra B Power Station Hydrogen Fuel Mix – MOD 3

Modification Report

Client: EnergyAustralia Services Pty Ltd

0100200300m

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ERM

F 6-3



## 6.4.2 Assessment of Impacts

### 6.4.2.1 Construction Traffic Generation

**Section 3.2.1** described the estimated traffic generated during construction of the works associated with the Modification, which is summarised in **Table 6-6** below.

**Table 6-6 Construction Traffic Generation**

Peak	To Site		From Site	
	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles
Morning Peak	30	4	-	4
Evening Peak	-	4	30	4

In total there would be 36 workers on-site during the peak construction period. It is assumed that these people would arrive at the site by private vehicles with an assumed occupancy of 1.2 people based on previous experience of similar projects. Assuming the worst case all workers arrive and leave the site in the same hour resulting in 30 light vehicle trips in the morning hour 6:30 am – 7:30 am and evening hour 5:00 pm – 6:00 pm.

The maximum number of trucks is estimated to be 10 trucks per day (or 20 trips). However, this level is not expected every day of construction and is more likely an average of 4-6 trucks per day. In the peak traffic periods, this could be some up to some 4 heavy vehicle trips per hour.

Impacts on the road network performance have been assessed using Sidra Intersection Modelling tested for the key intersections of:

- Princes Motorway Exit Ramp and Princes Highway;
- Princes Highway and Cormack Avenue; and
- Princes Highway and Yallah Bay Road.

The modelling results indicate that during construction, these intersections would continue to operate with low delays and a good level of service.

### 6.4.2.2 Operational Traffic Generation

The modification to allow hydrogen fuel to the site is not expected to require additional staff for operational activities at Tallawarra B Power Station.

Once the hydrogen facility is operational, hydrogen will be transported to the site by road transport using pressurised tube trailers during a four-hour period each day for up to 30% of the year.

The Modification is forecast to only increase the number of heavy vehicle trips by a modest 4 trucks in and 4 trucks out as a worst case during the peak hours. It is assumed that the hydrogen would be coming from the north via the Princes Highway through trips from the south would be possible via the Princes Motorway and then the Princes Highway.

Modelling by TTPP indicates that during operation, key intersections (as listed in **Section 6.4.2.1** above) would continue to operate with low delays and a good level of service during morning and afternoon peak periods.

### 6.4.2.3 Traffic Distribution

Traffic distribution during the operational phase was assumed to be:

- Light vehicles would travel with 33% to or from the south and 66% to or from the north; and
- Heavy vehicles 100% to and from the north via the Princes Highway.

#### 6.4.2.4 Cumulative Impacts

There has been a concept plan (Application No. MP09\_0131) approved for the development of land surrounding the site (Tallawarra Lands Project). The concept plan was approved in 2013 and the proposed road layout is shown in Figure 4.1 of **Appendix I**.

If this land should be developed, then it is likely that Yallah Road and the new intersections would be upgraded to reflect the move toward an urban environment. Yallah Bay Road would transition from being a local access road to a collector road, with a forecast traffic volume of 750 vehicles per hour (inbound and outbound).

The Modification is not likely to cause significant impacts on the road network compared to the general uplift in traffic volumes from the Tallawarra Lands Project.

#### 6.4.3 Mitigation and Management Measures

The Modification will require additional traffic movements during operations to allow for the transport of the proposed green hydrogen to the site. It has been identified that this will not cause significant impacts; however, to minimise potential impacts on road safety, it is recommended that a Road Safety Audit be undertaken on the detailed design of the site and post construction. The audit should focus on the access arrangement to Yallah Bay Road.

### 6.5 Biodiversity

A Biodiversity Assessment Report has been prepared by ERM (2023) to support this Modification Report, and is provided in **Appendix J**.

For the purpose of the assessment, a detailed desktop review was conducted and a one-day survey on 9 June 2022 was undertaken to identify potential biodiversity values within the Modification Area. The findings were taken into consideration for the likelihood of occurrence (LoO) assessment for the species and habitats potential to occur.

#### 6.5.1 Existing Environment

The Modification Area is situated entirely within the Sydney Basin Bioregion and the Illawarra sub-region. The bioregion is dominated by warm summers and no dry season and approximately 35% of the bioregion is made up of National parks and nature reserves.

The Modification Area is nearby the Mount Brown Reserve to the west, wetlands to the south-east, and Lake Illawarra to the east. Lake Illawarra provides habitat for coastal saltmarsh, swamp oak floodplain forest, littoral rainforest and extensive areas of seagrass (BMT Eastern Australia, 2019).

##### 6.5.1.1 Vegetation Communities

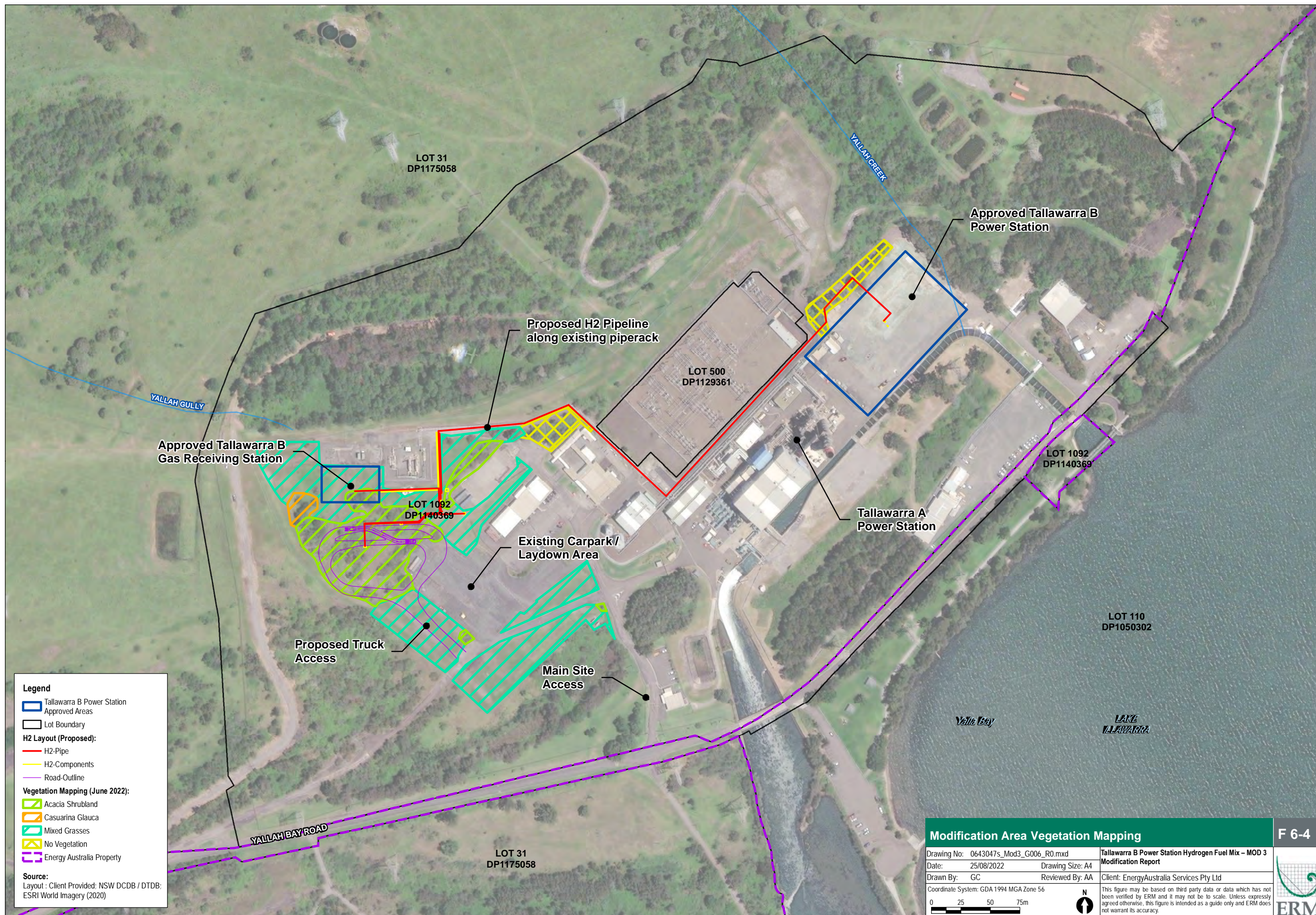
A review of the regional vegetation mapping (Illawarra Plant Community Type Vegetation Map\_VIS\_ID 4678) does not show any native vegetation within the Modification Area. This was supported by Aurecon (2020) which mapped the Modification Area as weeds and exotics.

ERM completed additional vegetation surveys in June 2022 and confirmed that the vegetation within, and immediately surrounding the Modification Area to be heavily disturbed by previous land clearing activities and its existing use of a power station.

The vegetation is not consistent with any native Plant Community Types (PCT) as listed within the BioNet Vegetation Classification database and is characterised by three non-remnant, predominantly non-native species:

- Acacia shrubland: This vegetation is dominated by non-native species, *Acacia saligna* and *Lantana camara*, and contains a low abundance of native *Acacia mearnsii* regrowth;
- Mixed grasses and weeds: These areas are heavily disturbed, with vegetation made up of a mix of native and non-native grasses and forbs including Whisky Grass (*Andropogon virginicus*), Windmill Grass (*Chloris sp.*), Mouse-ear Chickweed (*Cerastium vulgatum*), White Clover (*Trifolium repens*), Bindi Weed (*Soliva sessilis*), and Ribwort Plantain (*Plantago lanceolata*); and
- Swamp Sheoak (*Casuarina glauca*): Two (2) *Casuarina glauca* trees were identified nearby the Modification Area.







### 6.5.1.2 Threatened Ecological Communities

The Department of Climate Change, Energy, Environment and Water (DCCEEW) Protected Matters Search Tool (PMST) was interrogated to identify species or habitats protected under the EPBC Act that may potentially occur within or adjacent to the Modification Area. The results identified the potential for six (6) Threatened Ecological Communities (TECs) to occur within a 5 km buffer around the Modification Area, being:

- Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and Southeast Queensland ecological community;
- Coastal Swamp Sclerophyll Forest of New South Wales and Southeast Queensland;
- Illawarra and south coast lowland forest and woodland ecological community;
- Illawarra-Shoalhaven Subtropical Rainforest of the Sydney Basin Bioregion;
- River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria; and
- Subtropical and Temperate Coastal Saltmarsh.

No TECs have been identified or are considered likely to occur within the Modification Area. Immediately adjacent to the Modification Area are two individual *Casuarina glauca* within a highly disturbed landscape, these do not constitute a TEC.

### 6.5.1.3 Threatened Flora and Fauna

A review of the online NSW BioNet Atlas identified 79 threatened species records (from within the last 50 years) within a 5 km buffer area centred on the Modification Area; none of which are located within the Modification Area. The LoO Assessment presented in Appendix B of the Biodiversity Assessment Report (ERM, 2023) (**Appendix J**) indicated that no threatened species are considered known or likely to occur within the Modification Area. Only four (4) threatened fauna species have the potential to utilise the very limited resources within the Modification Area on a seasonal basis, or as part of a much larger home range.

### 6.5.1.4 Migratory species

The PMST results indicated the potential habitat for a total of 59 migratory bird species within a 5 km radius of the Modification Area. No significant habitat features are available within the Modification Area for the migratory species assessed. Migratory species may fly over the Modification Area as part of their generalist habitat requirements; however, they would not be dependent on the limited resources available.

## 6.5.2 Assessment of Impacts

The potential impact of the Modification on selected threatened species and communities listed under the BC Act and the EPBC Act have been considered. The Modification will not result in clearance of any intact native vegetation communities or significant habitat features for assessed threatened species. It is anticipated that only minimal clearance of a highly disturbed mix of native and non-native regrowth vegetation may be required.

While some wide-ranging, mobile species (e.g., some highly mobile birds and microchiropteran bats) may occasionally forage within or over the Modification Area, it is not expected that the proposed works will affect any habitat that is considered significant to the survival of these species.

### 6.5.2.1 Direct Impacts

The Modification will result in the clearance of Acacia Shrubland and mixed grassland community. While the Acacia Shrubland community is dominated by non-native species and exotic weeds, the mixed grassland community persists in disturbed areas and is made up of native and non-native grasses and forbes. No threatened species are anticipated to rely on any of the habitats currently present and no sensitive receptors have been identified.



The site is currently highly disturbed, and siting of the Modification has been designed to ensure no impact to any mapped biodiversity values. There will be no direct impacts to any natural streams or aquatic habitats.

### 6.5.2.2 Indirect Impacts

No threatened species are anticipated to rely on any of the habitats currently present and no sensitive receptors have been identified. Potential indirect impacts may result from any proposed development and include:

- Changes to hydrology through run off, sedimentation and erosion from installation works; and
- Increased edge effects (specifically spread of weeds) and any inadvertent impacts on adjacent habitat or vegetation.

Movement of vehicles has the potential to transport weeds and pathogens into the Modification Area and adjacent vegetation although it is noted that there will be minimal increase in traffic associated with the Modification.

### 6.5.3 Mitigation and Management Measures

The Modification has been designed to ensure no impact to any mapped biodiversity values.

Mitigation measures and additional safeguards to manage the indirect impacts of the Modification on areas of adjacent native vegetation, TECs or any potential threatened flora and fauna species in areas of adjacent habitats include:

- Review and amend the Tallawarra B Construction / Operation Environmental Management Plan to ameliorate and mitigate against potential impacts to biodiversity values outside of the impact footprint, including reviewing and updating the weed management procedure;
- Installation of appropriate sediment control measures around the impact area to limit the spread of sediment into adjacent waterways and vegetation; and
- Traffic management, as traffic is a source of mortality for some species, speed limits should be established to reduce risk of fauna strikes.

The Modification Area does not support any threatened species or ecological communities and no significant habitat features have been identified. Based on the long history of vegetation clearance and disturbance, it is unlikely that the Modification would result in any significant impacts on ecological values listed under the BC Act or the EPBC Act. The Modification is unlikely to impact any MNES, and a referral to the Commonwealth Minister for the Environment is not required.

Based on these findings, further assessment under the BC Act is also not required.

## 6.6 Aboriginal Heritage

A Cultural Heritage Due Diligence (CHDD) assessment (ERM, 2023) has been prepared to support this Modification Report and is provided in **Appendix K**.

The CHDD assessment was prepared in accordance with the requirements of the *Due Diligence Code of Practice for the Investigation of Aboriginal Objects* (Due Diligence Code of Practice) (DECCW 2010).

### 6.6.1 Existing Environment

#### 6.6.1.1 Archaeological Context

The Modification Area lies within the boundaries of the Wodi Wodi tribe of the Tharawal (also Dharawal, Darawal, Carawal, Turawal, Thurawal) linguistic group (Tindale (1940:194-195, 1974:199-201). Aboriginal occupation of the Illawarra and surrounds can be traced back to approximately 20,000 years ago (Flood, 1983; Lampert 1971 and Bowdler 1976 in Attenbrow 2012: B49,53).

European presence in the Illawarra region began in 1770 which was cleared to make room for the growing cattle and forestry industries. Eventually as European colonisation advanced, Aboriginal populations were displaced. The site transitioned from pastoral land to a power station in the mid-20th century and by 1970, the footprint of the Tallawarra Power Station as it stands today was established.

### 6.6.1.2 Previous reports

Review of the CHDD compiled by Niche (2021) for the wider Tallawarra B Power Station Project noted a midden (Tallawarra Canal Midden 1 (AHIMS ID #52-5-0516)) on the Site's south-eastern boundary adjacent to the Lake Illawarra shoreline. The item was preserved, and lies approximately 120 m from the Modification Area. Other archaeological features were recorded north of the Modification Area. Exclusion zones were recommended to be established to protect these sites from the ongoing development. Furthermore, an area of archaeological sensitivity was established around Yallah Creek in the north-eastern corner of Tallawarra B, and an exclusion zone of the creek and a buffer established. No Aboriginal heritage values were identified within the Modification Area.

### 6.6.1.3 Previously Recorded Sites

A search of the AHIMS database on 18 August 2023 revealed 21 Aboriginal sites recorded within a 1 km buffer (search area) of the Modification Area, as shown in

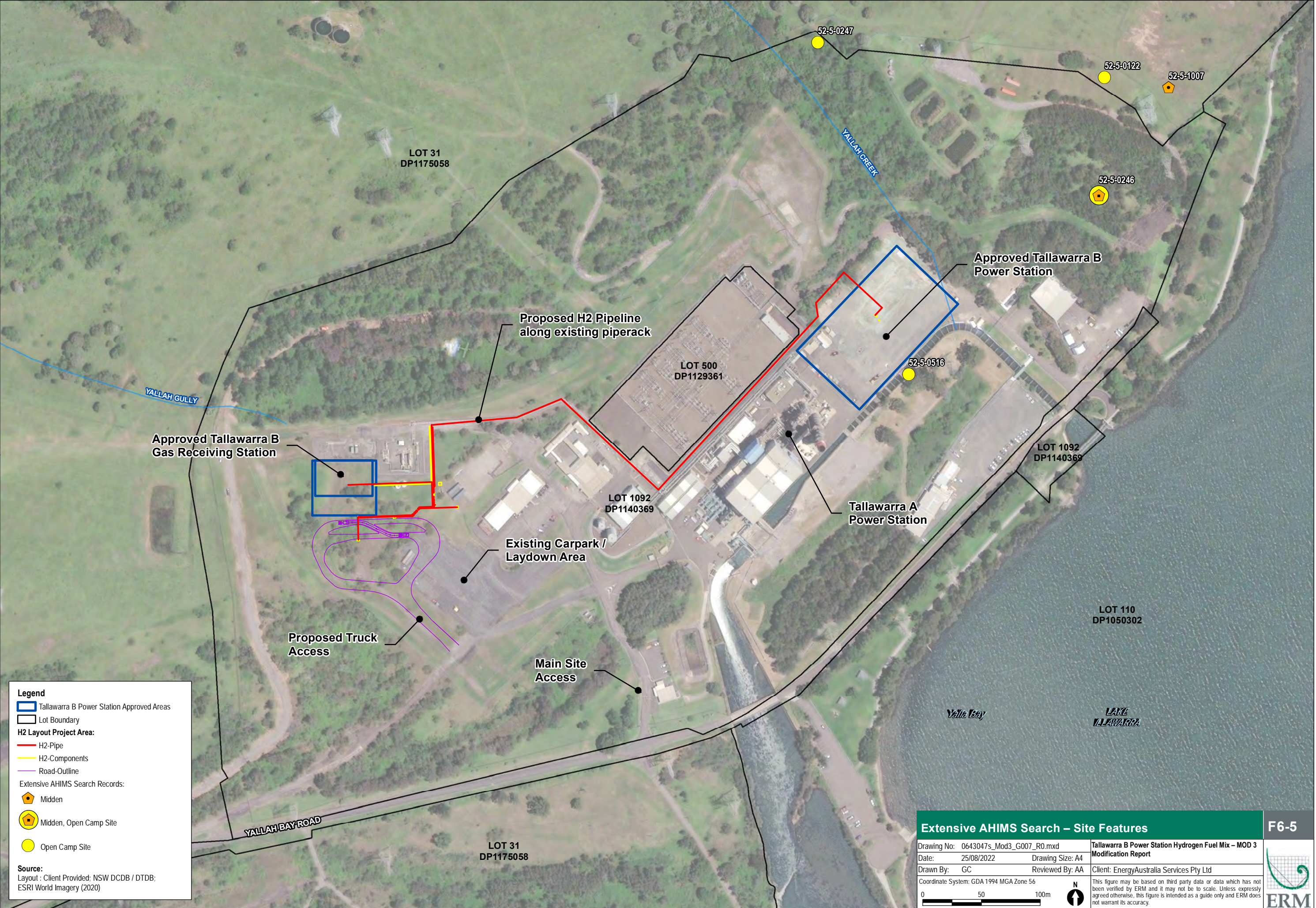
**Table 6-7 and Figure 6-5.**

The Aboriginal site features within the search area predominantly include artefacts, open camp sites and middens. There were no archaeological features or sites recorded within the Modification Area.

**Table 6-7 AHIMS Site Types**

Site Features	Number of Site Features
Artefact	15
Shell/Artefact	4
Artefact/Potential Archaeological Deposit (PAD)	1
PAD	1
<b>Total</b>	<b>21</b>







#### 6.6.1.4 Site Inspection

A detailed site inspection was undertaken on 9 June 2022 by ERM with an Illawarra Local Aboriginal Land Council (ILALC) representative in attendance. The site inspection was focused on zones (divided into three Inspection areas) scheduled for development across the Modification Area. No new Aboriginal objects were identified. Detailed inspection results are provided in Section 5 of the CHDD (Appendix K).

### 6.6.2 Assessment of Impacts

#### 6.6.2.1 Registered Aboriginal Sites

No registered AHIMS sites exist within the Modification Area. The closest AHIMS site – the Tallawarra Canal Midden 1 (AHIMS ID #52-5-0516) – located on the south-eastern boundary of the site, is being managed through an exclusion zone surrounding the site as part of the existing Cultural Heritage Management Plan for the Tallawarra Power Station (Aurecon, 2021).

#### 6.6.2.2 Areas of Archaeological Sensitivity

The land associated with the Modification is disturbed and demonstrate little to no archaeological sensitivity. Exclusion zones have been established to manage areas of archaeological sensitivity across areas such as Yallah Creek and Gully.

#### 6.6.2.3 Cultural values

Site inspection and subsequent discussions with ILALC representative identified key cultural values within and surrounding the Modification Area and noted no concerns regarding the effect of the Modification on the identified cultural values of Lake Illawarra and its surrounds.

#### 6.6.2.4 Summary

The Modification Area consists of disturbed and developed land with little to no archaeological sensitivity. Harm to potential Aboriginal objects within the Modification Area is not expected. In accordance with the requirements of the *National Parks and Wildlife Act 1974* and the Due Diligence Code of Practice, the proposed works can proceed with care.

### 6.6.3 Mitigation Measures

#### 6.6.3.1 Existing Management of Aboriginal Heritage

Previous investigations suggested that 10 m exclusion zones surrounding known archaeological sites and areas of high archaeological sensitivity should be established (Niche, 2021). These exclusion zones have been erected and it is recommended that these are to be maintained for the duration of proposed works, noting that they do not occur within the Modification Area.

#### 6.6.3.2 Unexpected Finds Procedure

The Cultural Heritage Management Plan describes an unexpected finds procedure in the event of previously unrecorded heritage items being found during works associated with MP07\_0124 (Aurecon, 2021: 23). This procedure is to be applied for works associated with the Modification.

## 6.7 Soil and Water

### 6.7.1 Existing Environment

The site is located along the eastern edge of Lake Illawarra which is fed saltwater by the adjoining Pacific Ocean during incoming tides, and drains freshwater into the ocean during outgoing tides. Freshwater is fed into Lake Illawarra by the Illawarra escarpment to the west of the Modification Area.



The gentle gradient of the landscape and topography results in a number of small creeks and gullies flowing downhill unrestricted by steeper topographic profiles in other regions. To the north of the Modification Area is Yallah Creek which is immediately adjacent to the site. Yallah Creek has been deliberately diverted from its original course. Currently, Yallah Creek enters at the north-western corner of the Site, drains into a sub-surface pipeline, and discharges in the site's north-eastern corner before it flows into Lake Illawarra. Lake Illawarra is also intersected by Duck Creek and Wollongurri Creek.

Evidence from the Tallawarra A Power Station construction indicates that the power station island is not subject to any groundwater infiltration.

Actual or potential acid sulphate soils (ASS) have been identified during previous investigations predominantly in the southern part of the Site around the current / former lower lying alluvial / estuarine environments. The majority of these areas coincide with the former ash ponds and / or low lying areas (Coffey, 2010 cited in Aurecon, 2022).

Due to the previous site land uses the site is likely to contain contaminated soils, including asbestos containing materials (Aurecon, 2022).

### 6.7.2 Assessment of Impacts

Key construction activities that have the potential to impact on water and soil include:

- General site establishment including clearing of vegetation, and general construction works may disturb groundcover and expose soils which would increase the risks of erosion and sediment and potentially risk encountering ASS;
- General construction works would present the risk of spills (such as during refuelling of equipment) that could run off and impact waterways; and
- Flooding of the construction worksite, if it occurred, would have the potential to carry sediment and pollutants from the worksite to nearby waterways.

The Modification will require no changes to water demand or water outputs.

### 6.7.3 Mitigation Measures

A number of assessments dated between 1990 and 2021 provide insight into the soil and water aspects of the site, and are summarised in Appendix B of the *Tallawarra Stage B Gas Turbine Power Station Soil and Water Management Sub-Plan* (SWMP) (Aurecon, 2022). The findings of these assessments contribute to the following provisions of the SWMP:

- Contaminated land management;
- Water quality management;
- Erosion and sediment control; and
- Flooding constraints management.

The SWMP aligns with the corresponding environmental management requirements of Tallawarra B MP 07\_0124 and EPL No. 555. In accordance with CoA 7.7 the SWMP will be reviewed within 3 months, unless the Secretary agrees otherwise, should MP 07\_0124 be modified.

## 7. JUSTIFICATION

The Modification proposes the use of green hydrogen in the fuel mix of Tallawarra B and the construction of associated infrastructure.

Key benefits of the Modification include that it will provide environmental benefits through a reduction in greenhouse gas emissions with 5% green hydrogen in the fuel mix. The combustion of hydrogen with air will only yield water vapour and potentially small amounts of nitrogen oxide, within the existing licence limits for the site.

## 7.1 Assessment Summary

### *Air Quality and Plume*

The Air Emissions Review (**Appendix E**) has estimated that using green hydrogen for five per cent of the plants fuel use, would result in an emission reduction of approximately 1,400 t CO<sub>2</sub>-e per annum. It is further estimated that an emission reduction of 8.4 kg CO<sub>2</sub>-e of GHG arises for each MWh of electricity produced using the blended gas, which equates to 1.25% of the total emissions. This is equivalent to 8 tonnes (t) of emission reductions per gigawatt hour (GWh) of electricity produced.

Manufacturer information indicates that changes to the emission profile under blended gas operation are immaterial compared to the approved operations.

### *Hazards*

The quantitative risk assessment prepared by Arriscar (2023, **Appendix F**) concluded that the Modification complies with the relevant risk criterion for all landuse types with respect to risk of fatality and risk of injury and accident propagation. Arriscar has made a number of recommendations which will be incorporated to enhance the safety during operational activities associated with the Modification.

### *Noise*

ERM has assessed that the predicted operational noise levels from the Modification are expected to comply with the PNTLs at all receivers.

The predicted cumulative noise levels were also assessed for compliance against Environment Protection Licence 555 (EPL 555). The cumulative noise levels are predicted to comply with EPL 555 noise limits with treatment in place.

An assessment of construction and operational traffic noise has been undertaken for noise sensitive receptors affected by roads with traffic volume changes due to the Modification. The proposed heavy vehicle movement change associated with the Modification is expected to comply with the criteria set in the NSW Road Noise Policy (DECCW, 2011).

Predicted worst-case and unmitigated Leq, 15min noise levels for all construction equipment and construction scenarios at the nearest sensitive receivers (within 1.5 km of the site boundary where construction noise impacts have the potential to be present) indicates that the ICNG Noise Affected and Highly Affected Management Levels are expected to be complied with at all noise sensitive receivers.

### *Traffic and Transport*

Traffic modelling by TTPP (2022, **Appendix I**) indicates that the key intersections near the site are currently operating with low delays and would continue to operate at the same level of service during the operational and construction period of the Modification. It has been found that the proposed modification to the Tallawarra B power station approval to allow hydrogen fuel to be transported to the site would not have a significant impact on the road network efficiency or road safety. It is however recommended that a road safety audit is undertaken of the detailed design and pre-opening and to focus on the access arrangement to Yallah Bay Road.

### *Biodiversity*

A Biodiversity Assessment Report prepared by ERM (2022, **Appendix J**) has demonstrated that the Modification will not result in clearance of any intact native vegetation communities or significant habitat features for assessed threatened species. It is anticipated that only minimal clearance of a highly disturbed mix of native and non-native regrowth vegetation may be required.

While some wide-ranging, mobile species (e.g., some highly mobile birds and microchiropteran bats) may occasionally forage within or over the Modification Area, it is not expected that the proposed works will affect any habitat that is considered significant to the survival of these species.

Based on the long history of vegetation clearance and disturbance, it is unlikely that the Modification would result in any significant impacts on ecological values listed under the BC Act or the EPBC Act. The Modification is unlikely to impact any Matters of National Environmental Significance (MNES), and a referral to the Commonwealth Minister for the Environment is not required.

### *Aboriginal Heritage*

During the site inspection for the Cultural Heritage Due Diligence (CHDD) prepared by ERM (2022, **Appendix K**), no Aboriginal objects were identified. No harm to potential Aboriginal objects within the broader context of the site and immediate surrounds is expected. Several areas of archaeological and cultural sensitivity have previously been identified within the Tallawarra Power Station (Niche, 2021); however, none are identified within the Modification Area. In accordance with the requirements of the *National Parks and Wildlife Act 1974* and the Due Diligence Code of Practice, the proposed works can proceed with care.

### *Soil and Water*

The Modification will require no changes to water demand or water outputs. A number of key construction activities have the potential to impact on water and soil include in the absence of appropriate mitigation measures. A Soil and Water Management Sub-Plan (SWMP) has been prepared for the construction of the Tallawarra Stage B Project which corresponds to the environmental management requirements of Tallawarra B MP 07\_0124 and EPL No. 555. In accordance with CoA 7.7 the SWMP will be reviewed within 3 months, unless the Secretary agrees otherwise, should MP 07\_0124 be modified.

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## **APPENDIX A      UPDATED PROJECT DESCRIPTION**

## **APPENDIX B        STATUTORY COMPLIANCE TABLE**

## **APPENDIX C      ADDITIONAL MITIGATION MEASURES**



## **APPENDIX D      STAKEHOLDER ENGAGEMENT STRATEGY**

## **APPENDIX E      AIR EMISSIONS REVIEW**

## **APPENDIX F      PRELIMINARY HAZARDS ASSESSMENT**



## **APPENDIX G      CONSTRUCTION AND VIBRATION NOISE ASSESSMENT**

## **APPENDIX H      OPERATIONAL NOISE ASSESSMENT**

## **APPENDIX I      TRAFFIC ASSESSMENT**



## **APPENDIX J      BIODIVERSITY ASSESSMENT**

## **APPENDIX K            ABORIGINAL HERITAGE DUE DILIGENCE ASSESSMENT**

## **APPENDIX L      FIRE SAFETY STUDY**

## **APPENDIX M      ENGAGEMENT OUTCOMES REPORT**



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