New Shellharbour Hospital

Biodiversity Management Sub-Plan

Prepared for BESIX Watpac

September 2024

New Shellharbour Hospital

Biodiversity Management Sub-Plan

BESIX Watpac

E240692 RP1

September 2024

Version	Date	Prepared by	Reviewed by	Comments
1	12 September	Callan Douchkov	David Bone	Draft
1	13 September	Callan Douchkov	David Bone	Final

Approved by

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13/09/2024

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Abbreviations

Abbreviation	Description
BDAR	Biodiversity Development Assessment Report
BMSP	Biodiversity Management Sub-Plan
CEMP	Construction Environmental Management Plan
EEC	Ecologically Endangered Community
EIS	Environmental Impact Statement
LGA	Local Government Area
PCT	Plant Community Type
NSH	New Shellharbour Hospital
SSD	State Significant Development
SSDA	State Significant Development Application

TABLE OF CONTENTS

Abbreviations **2**

1 Introduction **1**

2 Site description **2**

2.1 Site location 2

2.2 Construction staging and activities 2

3 Conditions of approval **4**

4 Site assessment **5**

4.1 Biodiversity Development Assessment Report 5

4.2 Threatened flora and fauna species 5

4.3 Native plant community types 5

5 Management measures **7**

5.1 Invasive species 9

5.2 Protected areas 9

Appendices

Appendix A Weed management plan A.1

Appendix B Biodiversity certification B.1

Tables

Table 2.1 Construction activities 2

Table 3.1 Consent conditions of SSD-57064458 relevant to this plan 4

Table 5.1 Management measures 7

Figures

Figure 2.1 Site location 3

Figure 4.1 PCTs within the site 6

1 Introduction

This Biodiversity Management Sub-Plan (BMSP) has been prepared for implementation by BESIX Watpac (and its contractors) for the construction of the New Shellharbour Hospital (the Project). The Project is located at 86 Dunmore Road, Dunmore New South Wales 2529, within the Shellharbour Local Government Area (LGA).

The following documents have been reviewed and applicable information incorporated into this BMSP:

- Environmental Impact Statement (the EIS), prepared by GeoLINK Consulting Pty Ltd, dated 08 September 2024.
- SSD-57064458 conditions of consent
- Biodiversity Development Assessment Report (BDAR), prepared by EMM, dated 29 February 2024
- The Environmental Management Plan Guideline: Guideline for Infrastructure Projects (DPIE, April 2020)

This management plan was prepared by EMM Senior Ecologist Callan Douchkov and reviewed by David Bone, EMM technical lead for construction environmental management, CENVP #137.Project overview

The proposed development is for a new greenfield hospital for the Shellharbour region, known as the New Shellharbour Hospital (NSH). The NSH is the subject of State Significant Development (SSD) 57064458 and is proposed to occupy Lot 10 DP1281639.

Broadly, the NSH Project and SSD consist of:

- Construction and operation of a new hospital for the Shellharbour and Illawarra region.
- Construction of supporting infrastructure required for the NSH, including green space/ landscaping and other amenities, internal roads and access, at-grade multi-deck car parking, external road upgrades and connections, utility/ service connections, and other supporting infrastructure

The CEMP and sub plans have been prepared for the project infrastructure works which comprises the following activities:

- Clearing of vegetation
- Construction of hospital buildings and supporting ancillary infrastructure
- Roadworks and access infrastructure
- Stormwater and drainage works including stormwater basins, diversion of stormwater lines, gross pollutant traps and associated swale works
- Sewer and potable water reticulation

A Biodiversity Development Assessment Report (BDAR) was prepared by EMM (2024), as part of the EIS submission.

2 Site description

2.1 Site location

The Project site is located at 86 Dunmore Road, Dunmore NSW 2529, approximately 2.5 kilometres (km) south-west of Shellharbour in the Shellharbour Local Government Area (LGA), in the Sydney Basin region of NSW. The project is wholly located within Lot 10 DP1281639 and is approximately 10 hectares (ha) in size.

2.2 Construction staging and activities

A summary of construction staging, and associated activities is provided in Table 2.1.

Table 2.1 Construction activities

Stage	Summary of activities	Timing
Pre-construction activities	• Site establishment, including site boundary fencing, erection of signage and establishment of no-go areas • Establishment of site compound and stockpile sites • Establishment of site access points, traffic management measures. • Installation of erosion and sediment controls. • Pre-clearance surveys and marking fauna habitat trees prior to clearing works. • Clearing of all existing vegetation, including grubbing activities and removal of vegetation off-site.	Completed as part of separate scope of works
Demolition	• Demolition and clearing of all existing built form structures	Completed as part of separate scope of works
Drainage and earthworks	• Drainage and infill of existing farm dams and any ground dewatering • Bulk earthworks including 'cut and fill' to create flat development platforms for the project, and site stabilisation works (if required). • Stripping, stockpiling and management of topsoil and unsuitable materials,	Partially completed as part of separate scope of works. Prior to construction
Construction	• Construction of hospital buildings, including ancillary infrastructure and car parking spaces. • Roadworks and access infrastructure • Stormwater and drainage works including stormwater basins, diversion of stormwater lines, gross pollutant traps and associated swale works. • Sewer and potable water reticulation.	During Construction
Post-construction	• Rehabilitation • Demobilisation of plant and equipment • Site clean-up	Post Construction

Source: EMM (2023); DFSI (2020, 2021); JHA (2022); Metromap (2023); DCSSS (2023)

0 100 200 m

GDA2020 MGA Zone 56

N

KEY

- Subject land

Existing environment

- Rail line
- Waterbody
- Cadastral boundary

Project location

New Shellharbour Hospital
Biodiversity Development Assessment Report
Figure 1.2

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3 Conditions of approval

This BMSP forms part of the Construction Environmental Management Plan (CEMP) and has been prepared in accordance with condition B.14 (i) and B20 of SSD-57064458. The condition requirements and where they have been addressed in this plan are summarised in Table 3.1.

Table 3.1 Consent conditions of SSD-57064458 relevant to this plan

Number	Consent Condition	Where addressed in this plan
B13	Management plans required under this consent must be prepared having regard to the relevant guidelines, including but not limited to the *Environmental Management Plan Guideline: Guideline for Infrastructure Projects* (DPIE April 2020).	This plan Section 1
B14.(i)	The CEMP must include… (i) Biodiversity Management Sub-Plan	This plan
B20.	The Biodiversity Management Sub-Plan (BMSP) must address, but not be limited to, the following:	N/A
	(a) Be prepared by a suitably qualified and experienced person/s	Section 1
	(b) Identify areas of land where impacts on biodiversity are to be avoided as outlined in the biodiversity assessment report prepared by EMM, version 6 dated 29/02/2024 and set out how these areas will be protected from construction impacts; and	Section 5.2.1
	(c) Set out the measures identified in the Biodiversity Development Assessment Report to minimise, mitigate and manage impacts on biodiversity, including timing and responsibility for delivery of the measures	Section 5
B32.	Prior to the removal of PCT 3962 – Coastal Floodplain Phragmites Reedland, the number and classes of ecosystem credits and species credits (like-for-like) set out in the BAM Biodiversity Credit Report contained in Appendix D of the Biodiversity Development Assessment Report, prepared by EMM, version V6 dated 29/02/2024, must be retired.	Section 5
B33.	The requirement to retire like-for-like ecosystem credits and species credits in condition B32 may be satisfied by payment to the Biodiversity Conservation Fund of an amount equivalent to the number and classes of ecosystem credits and species credits.	Section 5
B34.	Evidence of the retirement of credits in satisfaction of condition B32 or payment to the Biodiversity Conservation Fund in satisfaction of condition B33 must be provided to the Planning Secretary prior to the removal of PCT 3962 – Coastal Floodplain Phragmites Reedland.	Section 5

4 Site assessment

The following section outlines the findings of desktop and field surveys conducted to support the biodiversity assessment report (BDAR), submitted as part of the Environmental Impact Statement, dated 29 February 2024.

4.1 Biodiversity Development Assessment Report

To support the State Significant Development Application (SSDA), a Biodiversity Development Assessment Report (BDAR) was prepared by EMM (V6 dated 29 February 2024) which describes the biodiversity values within the development site, the impacts and measures to be taken to avoid, minimise and mitigate impacts to the Plant Community Types (PCTs) and threatened species habitat present within the development footprint and development site.

No further impact assessment under the BC Act of threatened species, populations or ecological communities is required for the development.

4.2 Threatened flora and fauna species

Habitat assessments were undertaken during the field survey for the BDAR to determine the likelihood of threatened flora and fauna species occurring within the site. Habitat assessments for fauna species involved a search for hollow bearing trees within the site in addition to searches for evidence of fauna foraging such as chewed cones and sap trees, or roosting habitat.

No hollow-bearing trees or roosting habitat are present within the site.

4.3 Native plant community types

The BDAR identified 0.01 ha of PCT 3962 – Coastal Floodplain Phragmites Reedland present within the project site which is to be removed as part of erosion and sediment control works for the project. PCT 3962 is classified as an Ecologically Endangered Community (EEC) and requires the retirement of one ecosystem credit or equivalent payment to the Biodiversity Conservation Trust prior to clearing. The location of PCT 3962 within the project footprint is shown in Figure 4.1.

Source: EMM (2023); DFSI (2020, 2021); JHA (2022); Metromap (2023); DPIE (2021); DCSSS (2023)

0 100 200 m

GDA2020 MGA Zone 56

N

KEY

- Subject land
- BAM plot
- Native planted trees
- Exotic trees
- Exotic grassland
- Cleared (non-vegetated)

Plant community type

- 3962 | Coastal Floodplain Phragmites Reedland

Threatened Ecological Community

- Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions (endangered, BC Act)

Existing environment

- Rail line
- Major road
- Minor road

Plant community types and vegetation zones

New Shellharbour Hospital
Biodiversity Development Assessment Report
Figure 4.1

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5 Management measures

This section outlines the management measures to be implemented during construction and includes mitigation measures identified in Table 6.2 of the BDAR report by EMM (29 February 2024).

The Project has been designed to avoid and minimise impacts to flora and fauna where possible and is located within an area of predominately non-native vegetation.

Table 5.1 Management measures

Control	Timing	Responsibility	Source
Evidence of the retirement of ecosystem credits in satisfaction of condition B32 of SSD-57064458 or payment to the Biodiversity Conservation Trust in satisfaction of condition B33 will be provided to the Planning Secretary prior to the removal of PCT 3962 – Coastal Floodplain Phragmites Reedland.	Prior to clearing	Project Manager	SSD-57064458 Conditions B32, B33, B34
A pre-clearance assessment for any native fauna immediately prior to any clearing of native vegetation to ensure that native frogs and reptiles are not present within vegetation to be cleared, and are removed if present prior to clearing	Prior to clearing	Construction Manager Project Ecologist	Best Practice
Temporary fencing and signage to be installed at the edge of the development site to prevent entry into adjacent vegetation.	Construction	Construction Manager	Best Practice
Boundaries of the impact area to be clearly delineated with heavy-duty fencing, un-impacted areas of exotic grassland, and the area of PCT 3962 (until such a point where it is to be cleared) marked with “No-Go” signage	Entirety of construction phase	Construction Manager	BDAR Table 6.2
Erosion and sedimentation			
Install permanent sediment barriers and erosion control during and post construction to prevent runoff into adjacent creek lines and wetlands, maintain controls throughout construction and undertake regular inspections (weekly – or daily if raining). Refer ESCP for details.	Entirety of construction phase	Construction Manager	BDAR Table 6.2
Water usage			
All water being used onsite (e.g. dust management, cleaning, processes) is to be managed appropriately on site in accordance with a water management plan or similar.	Entirety of construction phase	Construction Manager Project Manager	BDAR Table 6.2
Hygiene protocols			

Control	Timing	Responsibility	Source
Hygiene measures will be implemented to minimise the risk of pathogen and diseases spread on site (including Chytrid fungus) in accordance with the Weed Management Plan (Appendix A)	Entirety of construction phase	Construction Manager	BDAR Table 6.2
Weed control activities will be undertaken in accordance with the Weed Management Plan (Appendix A)	Entirety of construction phase	Construction Manager	BDAR Table 6.2
Revegetation			
Revegetation of the subject land will be implemented in accordance with the landscape strategy prepared by Taylor Brammer (2023).	During construction and post-construction	Construction Manager Project Manager	BDAR Table 6.2
Revegetation will follow the planting schedule and landscape plans detailed in the Landscape SSDA Package or any subsequent approved landscape plan.	During construction and post-construction	Construction Manager Project Manager	BDAR Table 6.2
Environmental inductions			
All staff working on the project will undertake an environmental induction as part of their site induction. Site briefings should be updated based on phase of the work. This environmental induction will include items such as: • Site environmental procedures (vegetation management, sediment and erosion control, exclusion fencing) • What to do in case of environmental emergency (chemical spills, fire, injured or trapped fauna) • Key contacts in case of environmental emergency • What to do in the case of finding a threatened species • What to do in the case of finding fauna on the site.	Entirety of construction phase	Project Manager and all site personnel	BDAR Table 6.2

5.1 Invasive species

There is potential for invasive exotic flora species to be spread within and outside of the site. This could occur from the movement of construction vehicles, plant, equipment and personnel through, onto and off the site and onto adjoining land. The introduction of invasive species may result in the loss of biodiversity and habitat value, smothering of native juvenile plants, harbouring of feral animals and alteration of vegetation structure and riparian function. Mitigation measures should be implemented to reduce the spread of invasive species across the site, including the washdown of vehicles, plant and equipment, and brush-down of boots when entering and exiting the site.

Landscape maintenance works will be required through the construction and operational phases to ensure existing weed species growing on site are controlled. This includes the ongoing maintenance and weeding of re-vegetated areas.

A detailed Weed Management Plan (WMP) has been developed for the project and is included as Appendix A of this BMSP.

5.2 Protected areas

5.2.1 'No-go' areas

Areas of native vegetation within the project site are to be clearly delineated as 'no-go' areas, including the fencing and signage of these areas. This includes any areas of Freshwater Wetlands (PCT 3962) not to be cleared for the construction of the planned sediment basin in this area. Where fencing is required in close proximity to identified Aboriginal Cultural areas, consultation with the project archaeologist and adherence to the requirements of the ACHAR will be required prior to works being undertaken in these areas.

Areas of exotic grassland on the project site which are not required for construction purposes will also be designated 'no-go' areas to prevent the unintentional tracking or transport of exotic weed species seed or plant matter onto/off the project site.

Other 'no-go areas' as identified in the EIS should be avoided during the construction phase, including areas that hold archaeological potential (refer ACHMP within the CEMP).

Appendix A
Weed management plan

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Weed Management Plan

New Shellharbour Hospital

Prepared for Besix Watpac

September 2024

Weed Management Plan

New Shellharbour Hospital

Besix Watpac

E240694 RP2

September 2024

Version	Date	Prepared by	Reviewed by	Comments
1	12 September 2024	Callan Douchkov	David Bone	Draft
1	13 September 2024	Callan Douchkov	David Bone	Final

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TABLE OF CONTENTS

1 Introduction 1

1.1 Purpose 1

1.2 Scope 1

1.3 Induction/ training 1

1.4 Roles and responsibilities 1

1.5 Review 2

2 Weeds and pathogens in the project area 3

2.1 Weeds 3

2.2 Pathogens 3

3 Weed management procedure 5

3.1 Approach to weed management 5

3.2 Site weed assessment 6

3.3 Establish weed control measures 7

3.4 Weed disposal 9

4 Pathogen management procedure 10

4.1 Site pathogen assessment 10

4.2 Establish pathogen control measures 10

4.3 Material disposal 11

5 Inspection, monitoring and reporting 12

Appendices

Appendix A *South East Regional Strategic Weed Management Plan 2023 – 2027* – Priority weeds A.1

Tables

Table 2.1 Priority weeds identified within the project site 3

Table 3.1 Regional weed management categories 6

Figures

Figure 3.1 Weed invasion curve 5

1 Introduction

1.1 Purpose

Construction works have the potential to cause the spread or importation of weeds and pathogens. Activities including vegetation clearing, soil disturbance, erosion and sediment control, vehicle movements, inadequate rehabilitation/ revegetation of disturbed areas and inappropriate topsoil management have been identified as potential risks in weed and pathogen management.

This Weed Management Plan has been prepared to identify the presence of key weed species and pathogens across the project area, and to outline the processes required to control and prevent their potential spread. It has been prepared in accordance with the *Biosecurity Act 2015* and the *South East Regional Strategic Weed Management Plan 2023 – 2027.* Priority weeds and other weeds of regional concern are also attached to this plan in Appendix A.

The purpose of this Plan is to:

- Identify the pathogens and key weed species and their distribution across the project area
- Prevent the introduction and spread of weeds and pathogens throughout construction works
- Establish an inspection and reporting framework for weeds and pathogens during construction
- Set out performance criteria for the management of weeds and pathogens.

1.2 Scope

This plan details control measures to be implemented throughout the construction phases of the project. This plan focuses on weed control prior to vegetation clearance, weed management during clearing, and progressive weed control throughout construction.

Operational weed management will be incorporated into landscaping and facility maintenance plans.

1.3 Induction/ training

All site personnel (including sub-contractors) will be inducted in this plan and the existence of priority weeds in the project area. Training will also include requirements to inspect machinery and clean footwear to prevent the spread of weeds, and measures to identify and prevent the introduction or spread of *Phytophthora cinnamomi* (Root Rot).

Training will include inductions, toolbox talks, pre-starts and targeted training sessions as required.

1.4 Roles and responsibilities

The Environmental Site Representative is responsible for ensuring the effective implementation of this Plan and for the training of site personnel in the requirements of this plan.

The Environmental Site Representative will advise and co-ordinate appropriate weed removal and control techniques for each weed species and for pathogens.

All persons entering the site are responsible for preventing the spread of weeds and pathogens within the project area.

1.5 Review

This Plan will be updated throughout construction to include any new weed or pathogen findings and subsequent management measures required. This plan will be reviewed in accordance with the continuous improvement process described in the CEMP.

2 Weeds and pathogens in the project area

2.1 Weeds

The *South East Regional Strategic Weed Management Plan 2023 – 2027* identified priority weeds and other regional weeds of concern for the South East Region, including the Shellharbour Local Government Area (LGA). The WeedWise website and associated app (https://weeds.dpi.nsw.gov.au/) also provides details on weed identification, control options and biosecurity duty. This website and app will be utilised to inform the identification, status and management options required.

2.1.1 Priority weeds in the South East Region

State level determined priority weeds and regional determined priority weeds, as identified in the *South East Regional Strategic Weed Management Plan 2023 – 2027* are provided in Appendix A of this plan. Management requirements for weeds, whether that be specific regulatory measures (state level priorities) or outcomes to demonstrate compliance with the General Biosecurity Duty (regional priority weeds), are also detailed in Appendix A.

The outcomes applied to a particular weed depend on factors such as the biology and ecology of the weed, the land use(s) in which it occurs, the distribution in the region and size of the infestation, potential pathways for infestation and others. These factors were taken into account in determining the suite of outcomes to demonstrate compliance with the General Biosecurity Duty and strategic responses. These obligations apply to all private and public landholders in the region.

2.1.2 Weed identification

Several state and regional level priority weeds were identified during flora surveys undertaken on the project site during the development of the Biodiversity Development Assessment Report (BDAR) (EMM,2024). State and regional level priority weeds identified within the project site are outlined in Table 2.1.

Table 2.1 Priority weeds identified within the project site

Scientific name	Common name	Regional Priority Weed	State Priority Weed	Weed of National Significance
Araujia sericifera	Moth Vine		x	
Eragrostis curvula	African Lovegrass		x	
Lantana camara	Lantana	x	x	
Ligustrum lucidum	Large-leaved Privet		x	
Rubus fruticosus	Blackberry		x	x
Senecio madagascariensis	Fireweed		x	x

2.2 Pathogens

Pathogens that have been identified to potentially occur in the Project area include:

- Soil-borne pathogen *Phytophthora cinnamomi* (Phytophthora)
- *Austropuccinia psidii* which causes the disease Myrtle rust

- *Batrochytridium dendrobatidis* (Chytrid (Frog) fungus)
- Psittacine beak and feather disease (PBFD).

Identification and/or fact sheets on each pathogen identified as having the potential to occur within the project area or with the potential to be introduced to the area will be prepared for use in toolbox talks and pre-start meetings especially during clearing and earthworks periods.

3 Weed management procedure

3.1 Approach to weed management

In NSW all plants are regulated with a general biosecurity duty under the *Biosecurity Act 2015* to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.

Figure 3.1, from the *South East Regional Strategic Weed Management Plan 2023 – 2027* illustrated the invasion process for weeds from arrival to widespread establishment and shows that the effort and resources required to control a weed rise with time and area occupied. Managing weeds earlier rather than later is more effective. The asset protection phase shown in Figure 3.1 illustrated the shift in focus from controlling a weed species to limiting the impact it may have on important assets.

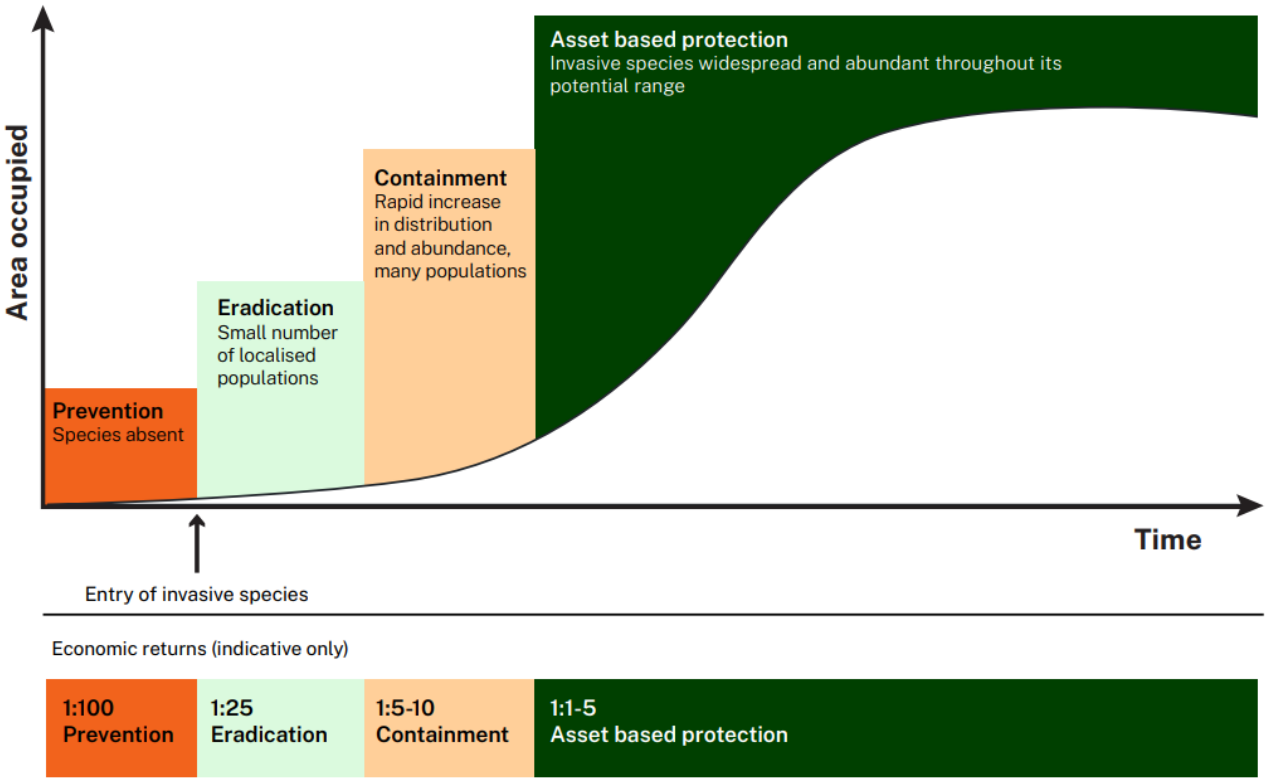

Figure 3.1 Weed invasion curve

Source: *South East Regional Strategic Weed Management Plan 2023 – 2027*

Further detail of the management categories identified in Figure 3.1 is provided in Table 3.1.

Table 3.1 Regional weed management categories

Category	Objective	Weed Characteristics
Prevention	To prevent the weed species arriving and establishing in the region.	These species are not known to be present in the region. They have a high to very high weed risk (highly invasive and high threat) and have a high likelihood of arriving in the region due to potential distribution and/ or an existing high-risk pathway.
Eradication	To permanently remove the species and its propagules from the region OR to destroy infestations to reduce the extent of the weed in the region with the aim of local eradication.	These species are present in the region to a limited extent only and the risk of re-invasion is either minimal or can be easily managed. They have a high to very high weed risk and high feasibility of coordinated control.
Containment	To prevent the ongoing spread of the species in all or part of the region.	These species have a limited distribution in the region. Regional containment strategies aim to prevent spread of the weed from an invaded part of the region (core infestation), and/or exclude the weed from an uninvaded part of the region (exclusion zone).
Asset Protection	To prevent the spread of weeds to key sites/ assets of high economic, environmental and social value, or to reduce their impact on these sites if spread has already occurred.	These weed species are widespread and unlikely to be eradicated or contained within the wider regional context. Effort is focussed on reducing weed threats to protect priority high value assets

3.2 Site weed assessment

Weed assessments will occur:

- As part of vegetation pre-clearing surveys
- Prior to drainage works
- During regular site inspections
- When a potential weed infestation has been identified.

The weed assessment will involve the following activities:

- Identify and describe or map weed infested areas
- Include photographic guide to identifying common weed species
- Identify surrounding land uses and sensitive environmental areas

- Determine weed management priorities and objectives in accordance with the *South East Regional Strategic Weed Management Plan 2023 – 2027*

3.3 Establish weed control measures

3.3.1 Prevention of weed spread/ importation

Environmental controls will be implemented to prevent the spread or introduction of weeds within the project footprint. Controls will include:

- Map and mark areas that are infested with weeds as an exclusion zone with fencing and signage to limit access by personnel and vehicles
- Install wheel wash and rumble grids
- Provide boot wash down facilities
- Program works from least to most weed infested areas, where possible.

3.3.2 Determine weed control/ removal methods

Weed control methods include mechanical, physical and chemical techniques. The suitability of control techniques will vary depending on the target weed species and the desired outcomes. An Ecologist will advise on the most appropriate weed treatment methodology and timing.

3.3.3 Implement weed control/ removal methods

Weed control methods will be implemented under guidance from the project Ecologist. Methods will include:

- Use of mechanical weed control methods such as slashing or mowing
- Controlled use of herbicides to avoid the development of herbicide resistance
- Mowing/ slashing of areas infested with weeds before they seed to reduce the propagation of new plants
- Separate weeds from native vegetation where native vegetation is to be used for mulch
- Topsoil recovered from areas of low weed infestation will be stockpiled separately
- Remove weeds immediately onto suitable trucks and dispose of without stockpiling
- Following weed removal, any exposed areas will be stabilised and/ or rehabilitated to reduce erosion and minimise the potential for further weed invasion.

3.3.4 Pesticide use

The use of pesticides must be in accordance with the NSW *Pesticides Act 1999*, other relevant legislation, label directions, any relevant industry codes of practice.

The Environmental Site Representatives will ensure that a Pesticide Application Record is completed and public notifications made in accordance with relevant legislation where required, such as where pesticides are to be used in areas that could be accessed by members of the public.

The notification does not need to be completed if all of the following are satisfied:

- The pesticide is, or is part of a product that is widely available to the general public at retail outlets
- The pesticide is only applied by hand or by using hand-held equipment
- If applied outdoors on any single occasion, in quantities of no more than 5 L/5 kg of concentrated product or 20 L/20 kg of the ready-to-use product or, if applied indoors, in quantities of no more than 1 L/1 kg of concentrated product or 5 L/5 kg of the ready-to-use product.

Public notification of pesticide use will be in accordance with the guidelines whenever pesticides are used adjacent to, or across the road from a public place or private property. Appropriate environmental management measures will be implemented where pesticides are proposed to be used to avoid or minimise impacts on adjoining properties.

Any spraying of priority weeds must avoid damage to adjacent native vegetation and to prevent overspray entering waterways or adjoining properties. Only pesticides registered for use near water may be used near any waterways.

The following measures will be implemented whenever pesticides are to be used adjacent to, or across the road from, a “sensitive place”:

- Use of mechanical means of pest control (such as mowing or slashing) where feasible or
- Use of hand-held application of pesticides where mechanical means of pest control are not feasible.

Pesticide application will be appropriately scheduled. Pesticides will not be applied:

- On hot days when plants are stressed
- After seed has set
- Within 24 hours of rain or when rain is imminent
- When winds will cause drift of pesticides into non-target areas.

All personnel managing and using pesticides must receive appropriate training and hold an appropriate licence prior to commencing work.

3.3.5 Ongoing management of weeds

Measures for the ongoing management of weeds will be implemented, including the following:

- Minimise soil disturbance within weed infested areas
- Ensure topsoil imported onto site is free of weed propagules
- Regularly inspect and clean machinery, vehicles and footwear using installed facilities
- Wash down the wheels of all construction plant before transportation to the site
- Keep records of all screening checks and subsequent actions taken
- Securely cover loads of weed-contaminated material during transportation
- Avoid use of weeds as mulch

- Avoid re-use of vegetation or topsoil containing weed material on site unless appropriately treated
- Monitor disturbed and rehabilitated sites for presence of weeds.

3.4 Weed disposal

Weeds and topsoil potentially containing weed propagules will be removed and disposed of at a suitable landfill location in accordance with the requirements of Shellharbour Council and the *Biosecurity Act 2015*. Exotic plant species will be removed, bagged (or appropriately segregated) and disposed offsite to a licensed landfill facility.

4 Pathogen management procedure

4.1 Site pathogen assessment

A site assessment for potential risk of pathogens in the project area will be undertaken by an Ecologist during pre-clearing surveys. The site assessment will identify and describe or map potential pathogen-containing vegetation areas. DPI guidelines will be referred to for the most up-to-date hygiene protocols for each pathogen and for the most recent locations of contamination.

Testing from a National Association of Testing Authorities (NATA) approved laboratory may be required where potential risk areas are identified to confirm the presence of pathogens in the soil and/ or water.

4.2 Establish pathogen control measures

4.2.1 Prevention of introduction or spread of pathogens

Pathogens can be spread on footwear, vehicles and machinery, particularly during wet weather or in wet conditions. Controlling the introduction and spread of pathogens that have the potential to harm the environment is a high priority. Environmental controls will be implemented in consultation with the project Ecologist to prevent the spread or introduction of pathogens to the project area. Controls will include:

- Map and mark areas that are infested with pathogens as an exclusion zone with fencing and signage to limit access by personnel and vehicles
- Install rumble grids
- Provide boot wash down/ disinfection facilities
- Program works from uninfected areas to infected areas, where possible

4.2.2 Determine pathogen prevention / control methods

Management measures for pathogens can include planning or awareness measures, exclusion measures and containment measures. The suitability of control techniques will vary depending on the pathogen and will be determined on advice from the project Ecologist and best practice guidelines. Best practice protocols include:

- Minimise work during excessively wet or muddy conditions
- Provide parking and turn-around points on hard, well-drained surfaces
- Restrict vehicles to designated tracks, trails and parking areas
- Restrict personnel to designated tracks and trails
- Personnel working in an infected site should shower and launder clothes before moving to another vegetated site
- Use disinfectant or gloves when handling frogs and only handle frogs when necessary
- Ensure vehicles and footwear are free of soil before entering or exiting the site (i.e. directed to wash down area before entering or exiting the site)
- Use a certified supply of plants and soil that is disease-free

- Hygiene protocols, such as use of disposable suits, will be used where site personnel are required to work in areas identified as containing pathogens that are located in the vicinity of threatened flora or fauna
- Removed infected vegetation will be securely wrapped in bags prior to disposal.

4.3 Material disposal

Disposal of infected material will vary depending on the pathogen in the affected material.

Where materials are known or suspected to be affected by *Phytophthora*, the material will be retained within the contaminated area. Stockpiles of mulch, topsoil and fill material will be separated to avoid potential contamination and spread.

Plant material infected with Myrtle Rust will be buried on site if possible and will not be disposed of at another vegetated site. Buried material sites will be recorded on maps to prevent re-exposure. Where material is unable to be buried, advice will be sought from NSW DEECCW or other agencies.

To avoid cross contamination of frogs with *Chytrid*, project personnel and contractors will avoid, where possible, transferring water between two or more separate waterbodies.

5 Inspection, monitoring and reporting

Monitoring of weed and/or pathogen infestations will occur as part of the routine weekly environmental inspections to determine the effectiveness of management controls. The identified presence of any weeds and/or pathogens and the necessary management actions will be noted on the Environmental Inspection Checklist.

A weed and pathogen monitoring program will be implemented as follows:

- Inspection of the general condition of the project area including identification of additional weeds and pathogens or reduction in the occurrence of weeds and pathogens
- Assessment of the effectiveness of weed and pathogen treatments, where implemented
- Suggest modifications to weed and pathogen treatments where they are noted to be ineffective
- Provide a schedule to re-apply treatments if previous treatments are not fully effective
- Conduct mapping and fixed point photographs of the active project area and adjoining impacted areas.

An action plan will be prepared, where required, to manage any ongoing weed and pathogen problems identified by inspections.

Appendix A

South East Regional Strategic Weed Management Plan 2023 – 2027 – Priority weeds

EMM
creating opportunities

A1.1 State priority weeds

State priority weed category – PREVENTION:

The following weeds have not established self-sustaining populations in NSW and pose a significant biosecurity risk to the state. Prohibiting these weeds from the state to prevent the biosecurity risk posed is a reasonably practical objective.

Common name	Scientific name	Biosecurity Act requirements and strategic response in the region
All species of vascular plant Tracheophyta	*Tracheophyta*	***Mandatory Measure (Division 8, Clause 34)*** Duty to notify on importation of plants into the state: (1) A person must not import into the State a species of vascular plant (Tracheophyta) if the species is not currently present in the State unless the person has, at least 20 working days before the plant is imported into the state, notified the species of plant and its proposed location within the State. (2) The notification is to be given to the Secretary and is to be given in accordance with Part 6. (3) A species of plant is taken not to be present in the state if the National Herbarium of New South Wales does not show it as being present in the state. Note. See http://plantnet.rbgsyd.nsw.gov.au

State priority weed category – PREVENTION:

The following weeds have not established self-sustaining populations in NSW and pose a significant biosecurity risk to the state. Prohibiting these weeds from the state to prevent the biosecurity risk posed is a reasonably practical objective.

Common name	Scientific name	Biosecurity Act requirements and strategic response in the region
Anchored water hyacinth	*Eichhornia azurea*	**Prohibited Matter (Part 4, *Biosecurity Act, 2015*)** A person who deals with any biosecurity matter that is Prohibited Matter throughout the State is guilty of an offence. A person has a biosecurity duty to ensure that so far as is reasonably practicable, the biosecurity risk posed by prohibited matter is prevented, eliminated or minimised. A person who becomes aware of, or suspects, that a prohibited matter event has occurred, is occurring or is about to occur has a biosecurity duty to immediately notify the local control authority about the prohibited matter event. **Regional strategic response**: • Implement quarantine and/or hygiene protocols • Undertake high risk sites and pathways analysis to identify potential introduction areas and preventative options • Trigger rapid response protocol.
Black knapweed	*Centaurea x moncktonii*	
Bridal veil creeper	*Asparagus declinatus*	
Broomrape	Orobanche spp. (all species except the native *O. cernua var. australiana* and *O. minor)*	
Eurasian water milfoil	*Myriophyllum spicatum*	
Frogbit / Spongeplant	*Limnobium spp.* (all species)	
Gamba grass	*Andropogon gayanus*	
Hawkweed	*Pilosella spp* (all species) in addition to *Hieracium spp* (all species except *Hieracium murorum*)	
Hydrocotyl/ Water pennywort	*Hydrocotyle ranunculoides*	
Karoo acacia	*Vachellia karroo* (syn. *Acacia karroo*)	
Kochia	*Bassia scoparia* (excluding subsp. *trichophylla*)	

State priority weed category – PREVENTION:

The following weeds have not established self-sustaining populations in NSW and pose a significant biosecurity risk to the state. Prohibiting these weeds from the state to prevent the biosecurity risk posed is a reasonably practical objective.

Common name	Scientific name	Biosecurity Act requirements and strategic response in the region
Koster's curse	*Clidemia hirta*	**Prohibited Matter (Part 4, *Biosecurity Act, 2015*)** A person who deals with any biosecurity matter that is Prohibited Matter throughout the State is guilty of an offence. A person has a biosecurity duty to ensure that so far as is reasonably practicable, the biosecurity risk posed by prohibited matter is prevented, eliminated or minimised. A person who becomes aware of, or suspects, that a prohibited matter event has occurred, is occurring or is about to occur has a biosecurity duty to immediately notify the local control authority about the prohibited matter event. **Regional strategic response**: • Implement quarantine and/or hygiene protocols. • Undertake high risk sites and pathways analysis to identify potential introduction areas and preventative options. • Trigger rapid response protocol.
Lagarosiphon	*Lagarosiphon major*	
Mexican feather grass	*Nassella tenuissima* (syn. *Stipa tenuissima*)	
Miconia	*Miconia spp.* (all species)	
Mikania vine	*Mikania micrantha*	
Mimosa	*Mimosa pigra*	
Pond apple	*Annona glabra*	
Prickly acacia	*Vachellia nilotica* (syn. *Acacia nilotica)*	
Rubber vine	*Cryptostegia grandiflora*	
Siam weed	*Chromolaena odorata*	
Spotted knapweed	*Centaurea stoebe subsp. australis*	
Water caltrop	*Trapa spp.* (all species)	
Water soldier	*Stratiotes aloides*	
Witchweed	Striga spp. (*except the native S. parviflora*)	
Yellow burrhead	*Limnocharis flava*	

State priority weed category – PREVENTION:

The following weeds have not established self-sustaining populations in NSW and pose a significant biosecurity risk to the state. Prohibiting these weeds from the state to prevent the biosecurity risk posed is a reasonably practical objective.

Common name	Scientific name	Biosecurity Act requirements and strategic response in the region
Parthenium weed	*Parthenium hysterophorus*	**Prohibited Matter (Part 4, *Biosecurity Act, 2015*)** A person who deals with any biosecurity matter that is Prohibited Matter throughout the state is guilty of an offence. A person has a biosecurity duty to ensure that so far as is reasonably practicable, the biosecurity risk posed by prohibited matter is prevented, eliminated or minimised. A person who becomes aware of, or suspects, that a prohibited matter event has occurred, is occurring or is about to occur has a biosecurity duty to immediately notify the local control authority about the prohibited matter event. ***Mandatory Measure (Division 8, Clause 35, Biosecurity Regulation, 2017) - parthenium weed carriers – machinery and equipment*** (1) This clause applies to the following equipment: a. grain harvesters (including the comb or front) b. comb trailers (including the comb or front) c. bins used for holding grain during harvest operations d. augers or similar equipment used for moving grain e. vehicles used for transporting grain harvesters f. vehicles used as support vehicles with grain harvesters and that have been driven in paddocks during harvest operations g. mineral exploration drilling rigs and vehicles used for transporting those rigs (2) A person must not import into the State from Queensland any equipment to which this clause applies.

State priority weed category – ERADICATION:

The following weeds are present in limited distribution and abundance and pose a medium to high biosecurity risk to NSW. The measures established under the control orders are necessary to prevent, eliminate, minimise or manage the biosecurity risk or biosecurity impact.

Common name	Scientific name	Biosecurity Act requirements and strategic response in the region
Boneseed	*Chrysanthemoides monilifera subspecies. monilifera*	**The boneseed control zone is the whole of NSW** **The parkinsonia control zone is the whole of NSW** **The tropical soda apple control zone is the whole of NSW** **Control measure - owners and occupiers of land** (1) The owner or occupier of land in the control zone on which there is a new infestation of boneseed, parkinsonia or tropical soda apple must notify the local control authority for that land as soon as practicable of the following information: (a) the person's full name and contact details, including a telephone number (b) the address of the land, including the lot and deposited plan number and the property identification code for the land (if these are known) (c) any other information that is requested by the local control authority. (2) The owner or occupier of the land must ensure that the land is kept free of boneseed, parkinsonia or tropical soda apple by immediately destroying all boneseed, parkinsonia or tropical soda apple on the land. This requirement applies to any new infestation as well as any subsequent generations of boneseed, parkinsonia or tropical soda apple on that land. (3) The owner or occupier does not need to comply with subclause (1) if they know that notification of the new infestation on the land has already been given to the local control authority of that land. **Control measure – persons dealing with carriers** A person who deals with a carrier of boneseed, parkinsonia or tropical soda apple must take all reasonable steps to ensure that the carrier is not moved from the land with any boneseed, parkinsonia or tropical soda apple on it, attached to it, or contained in it, before the carrier is moved from the land.
Parkinsonia	*Parkinsonia aculeata*	
Tropical soda apple	*Solanum viarum*	

State priority weed category – ERADICATION:

The following weeds are present in limited distribution and abundance and pose a medium to high biosecurity risk to NSW. The measures established under the control orders are necessary to prevent, eliminate, minimise or manage the biosecurity risk or biosecurity impact.

Common name	Scientific name	Biosecurity Act requirements and strategic response in the region
Boneseed	*Chrysanthemoides monilifera subspecies. monilifera*	**Control measure – persons moving boneseed, parkinsonia or tropical soda apple and carriers of boneseed, parkinsonia or tropical soda apple** (excluding a human) (1) A person who moves boneseed, parkinsonia or tropical soda apple or a carrier of boneseed, parkinsonia or tropical soda apple (excluding a human) to another property, must notify the local control authority for that other property as soon as practicable before moving the boneseed, parkinsonia or tropical soda apple of the following information: (a) the person's full name and contact details (b) the addresses of the land the boneseed, parkinsonia or tropical soda apple is coming from and going to, including the lot and deposited plan number and the property identification code for the land (if these are known) (2) A person who moves boneseed, parkinsonia or tropical soda apple or a carrier of boneseed, parkinsonia or tropical soda apple (excluding a human) does not need to comply with subclause (1) if they know that notification of the movement has already been given to the local control authority for that other property. Note. Examples of when boneseed, parkinsonia or tropical soda apple or a carrier of boneseed, parkinsonia or tropical soda apple (excluding a human) may need to be moved include, but are not limited to, the movement of vehicles, soil, or livestock as well as movement for disposal.
Parkinsonia	*Parkinsonia aculeata*	
Tropical soda apple	*Solanum viarum*	

State priority weed category – ERADICATION:

The following weeds are present in limited distribution and abundance and pose a medium to high biosecurity risk to NSW. The measures established under the control orders are necessary to prevent, eliminate, minimise or manage the biosecurity risk or biosecurity impact.

Common name	Scientific name	Biosecurity Act requirements and strategic response in the region
Chinese violet	*Asystasia gangetica subspecies. micrantha*	**Control order – (Chinese Violet Control Zone)** **1. Control measures for owners and occupiers of land** Pursuant to section 62(1)(b) of the Act, an owner or occupier of land in the Chinese Violet Control Zone on which there is Chinese violet must: (a) notify the local control authority for the area if the Chinese violet is part of a new infestation of Chinese violet on the land: i) as soon as practicable after becoming aware of the new infestation ii) verbally or in writing iii) giving the following: (1) the person's full name and contact number (2) the location of the Chinese violet, including the property identification code for the land (if this is known) (3) any other information reasonably requested by the local control authority (b) destroy all Chinese violet on the land, including fruit (c) ensure that subsequent generations of Chinese violet are destroyed (d) that the land is kept free of Chinese violet (e) The owner or occupier does not need to comply with (a) above if they know that notification of the infestation on the land has already been given to the local control authority for the area.

State priority weed category – ERADICATION:

The following weeds are present in limited distribution and abundance and pose a medium to high biosecurity risk to NSW. The measures established under the control orders are necessary to prevent, eliminate, minimise or manage the biosecurity risk or biosecurity impact.

Common name	Scientific name	Biosecurity Act requirements and strategic response in the region
Chinese violet	*Asystasia gangetica subspecies. micrantha*	**2. Control measures for persons dealing with carriers** Pursuant to section 62(1)(b) of the Act, a person who deals with a carrier of Chinese violet in the Chinese Violet Control Zone, in circumstances where the person knows or ought reasonably to know of the presence of Chinese violet on the land or in or on the carrier, must: a) ensure that Chinese violet (including any seed and propagules) is not moved from the land b) immediately notify the local control authority for the area: i) as soon as practicable after becoming aware of the presence of Chinese violet ii) verbally or in writing iii) giving the following: (1) the person's full name and contact number (2) the location of the Chinese violet, including the property identification code for the land (if this is known) iv) any other information reasonably requested by the local control authority. c) The person who deals with a carrier of Chinese violet does not need to comply with (b) above if they know that notification of the infestation on the land has already been given to the local control authority for the area.

State priority weed category – ERADICATION AND/OR CONTAINMENT:

The following weeds pose a medium to high biosecurity risk to NSW and vary in distribution and abundance in different parts of the state. The principal object of a biosecurity zone regulation is to provide for the long term management of a biosecurity risk or biosecurity impact.

Species	Land area where requirements apply	Biosecurity Act requirements and strategic response in the region
Alligator weed *Alternanthera philoxeroides*	A biosecurity zone, to be known as the Alligator Weed Biosecurity Zone, is established for all land within the state except land in the following regions: a) Greater Sydney, b) Hunter (but only in respect of land in the local government area of City of Lake Macquarie, City of Maitland, City of Newcastle or Port Stephens).	**Alligator Weed Biosecurity Zone (Biosecurity Regulation 2017 - Part 5, Division 2)** An owner or occupier of land in the Alligator Weed Biosecurity Zone on which there is the weed *Alternanthera philoxeroides* (alligator weed) must: (a) if the weed is part of a new infestation of the weed on the land, notify the local control authority for the land as soon as practicable in accordance with Part 6 (b) eradicate the weed or if that is not practicable destroy as much of the weed as is practicable and suppress the spread of any remaining weed. **Mandatory Measure (Division 8, Clause 33, Biosecurity Regulation 2017)** A person must not import into the state or sell. **Regional strategic response:** • develop a region-wide coordinated campaign for collaborative management; • detailed surveillance and mapping to locate all infestations; • high level analysis of pathways analysis to identify potential introduction areas and preventative options; • implement quarantine and/or hygiene protocols; and • monitor progress towards eradication.

State priority weed category – ERADICATION AND/OR CONTAINMENT:

The following weeds pose a medium to high biosecurity risk to NSW and vary in distribution and abundance in different parts of the state. The principal object of a biosecurity zone regulation is to provide for the long term management of a biosecurity risk or biosecurity impact.

Species	Land area where requirements apply	Biosecurity Act requirements and strategic response in the region
Bitou bush *Chrysanthemoides monilifera subspecies. rotundata*	A biosecurity zone, to be known as the Bitou bush Biosecurity Zone, is established for all land within the state except land within 10 kilometres of the mean high water mark of the Pacific Ocean between Cape Byron in the north and Point Perpendicular in the south.	**Bitou Bush Biosecurity Zone (Biosecurity Regulation 2016 - Part 5, Division 3)** An owner or occupier of land in the Bitou Bush Biosecurity Zone on which there is the weed *Chrysanthemoides monilifera subspecies. rotundata* (bitou bush) must: (a) if the weed is part of a new infestation of the weed on the land, notify the local control authority for the land as soon as practicable in accordance with Part 6 (b) eradicate the weed or if that is not practicable destroy as much of the weed as is practicable and suppress the spread of any remaining weed. **Mandatory Measure (Division 8, Clause 33, Biosecurity Regulation 2017)** A person must not import into the state or sell. **Regional strategic response:** Implement Bitou Bush State Strategic Plan

State priority weed category – ERADICATION AND/OR CONTAINMENT:

The following weeds pose a medium to high biosecurity risk to NSW and vary in distribution and abundance in different parts of the state. The principal object of a biosecurity zone regulation is to provide for the long term management of a biosecurity risk or biosecurity impact.

Species	Land area where requirements apply	Biosecurity Act requirements and strategic response in the region
Water hyacinth *Eichhornia crassipes*	A biosecurity zone, to be known as the Water Hyacinth Biosecurity Zone, is established for all land within the State except land in the following regions: (a) Greater Sydney or North Coast (b) North West (but only land in those regions that is in the local government area of Moree plains) (c) Hunter (but only land in that region that is in the local government area of City of Cessnock, City of Lake Macquarie, Mid-Coast, City of Maitland, City of Newcastle or Port Stephens) (d) South East (but only land in that region that is in the local government area of Eurobodalla, Kiama, City of Shellharbour, City of Shoalhaven or City of Wollongong).	**Water Hyacinth Biosecurity Zone (Biosecurity Regulation 2017 - Part 5, Division 4)** An owner or occupier of land in the Water Hyacinth Biosecurity Zone on which there is the weed *Eichhornia crassipes* (water hyacinth) must: (a) if the weed is part of a new infestation of the weed on the land, notify the local control authority for the land as soon as practicable in accordance with Part 6 (b) eradicate the weed, or if that is not practicable destroy as much of the weed as is practicable and suppress the spread of any remaining weed. **Mandatory Measure (Division 8, Clause 33, Biosecurity Regulation 2017):** A person must not import into the State or sell. **Regional strategic response:** • develop a region-wide coordinated campaign for collaborative management • identification of key sites/assets in the geographic area • species managed in accordance with published weed management plans.

State priority weed category – CONTAINMENT AND/OR ASSET PROTECTION:

These weeds are widely distributed in some areas of the state. As Weeds of National Significance, their further spread through trade should be minimised to protect priority assets.

Common name	Scientific name	Biosecurity Act requirements and strategic response in the region
African boxthorn	*Lycium ferocissimum*	**Mandatory Measure (Division 8, Clause 33, Biosecurity Regulation 2017):** A person must not import into the State or sell.
Asparagus weeds	*Asparagus aethiopicus, A. africanus, A. asparagoides including the Western Cape form*, A. densiflorus, A. plumosus, and A. scandens*	
Athel pine	*Tamarix aphylla*	
Bellyache bush	*Jatropha gossypiifolia*	
Blackberry	*Rubus fruticosus spp. agg. (except the varietals Chester Thornless, Dirksen Thornless, Loch Ness, Silvan, Black Satin, Murrindindi, Smooth Stem, Thornfree and Chehalem)*	
Brooms	*Genista monspessulana, G. linifolia, Cystisus scoparius*	
Cabomba	*Cabomba caroliniana*	
Cat's claw creeper	*Dolichandra unguis-cati*	
Chilean needle grass	*Nassella neesiana*	

State priority weed category – CONTAINMENT AND/OR ASSET PROTECTION:

These weeds are widely distributed in some areas of the state. As Weeds of National Significance, their further spread through trade should be minimised to protect priority assets.

Common name	Scientific name	Biosecurity Act requirements and strategic response in the region
Fireweed	*Senecio madagascariensis*	**Mandatory Measure (Division 8, Clause 33, Biosecurity Regulation 2017):** A person must not import into the State or sell.
Gorse	*Ulex europaeus*	
Hymenachne	*Hymenachne amplexicaulis*	
Lantana	*Lantana camara*	
Madeira vine	*Anredera cordifolia*	
Mesquite	*Prosopis spp.*	
Prickly pears	*Opuntia spp. (excluding O. ficus-indica), Cylindropuntia spp. and Austrocylindropuntia spp.*	
Sagittaria	*Sagittaria platyphylla*	
Salvinia	*Salvinia molesta*	
Serrated tussock	*Nassella trichotoma*	
Silver-leaf nightshade	*Solanum elaeagnifolium*	
Willows	*Salix species except S. babylonica, S. X calodendron and S. x reichardtiji (*willows except weeping willows, pussy willow and sterile pussy willow*)*	

A1.2 Regional priority weeds

Some local control authorities have local control programs covering priority species for their area under Section 371 of the *Biosecurity Act 2015*. In addition to consulting the regional plan, it is important to check with your council if there are any local programs in place for your local government area. If a plant is not recognised in the regional plan or in a local program, then it may be dealt with under a general biosecurity duty. Species that are outside of the scope of a plan or program should be assessed in terms of risk, context and situation before general biosecurity duty is applied.

Regional priority weed category – PREVENTION (whole of region):

The following weeds are currently not found in the region, pose significant biosecurity risk and prevention of the biosecurity risk posed by these weeds is a reasonably practical objective.

Sickle thorn – *Asparagus falcatus*

Coral creeper – *Barleria repens*

Kidney leaf mud plantain – *Heteranthera reniformis*

Water star grass – *Heteranthera zosterifolia*

Holly leaved senecio – *Senecio glastifolius*

Outcomes to demonstrate compliance with general biosecurity duty	Strategic response in the South East region
Land managers should mitigate the risk of the plant being introduced to their land	Identify high risk sites and pathways and conduct ongoing surveillance for incursions of the species.
Land managers should eradicate the plant from the land and keep the land free of the plant	Prevention of entry to geographic area, and movement and sale within.
A person should not deal with the plant, where dealings include but are not limited to buying, selling, growing, moving, carrying or releasing the plant	Have a collaborative rapid response protocol in place.
Notify local control authority if found.	Implement site specific biosecurity and / or hygiene protocols.

Regional priority weed category – ERADICATION (whole of region):

The following weeds are currently not found in the region, pose significant biosecurity risk and prevention of the biosecurity risk posed by these weeds is a reasonably practical objective.

Ming asparagus fern/pompom asparagus – *Asparagus macowanii var. zuluensis*
Groundsel bush – *Baccharis halimifolia*
Cat's claw creeper – *Dolichandra unguis-cati (syn. Macfadyena unguis-cati)* *
Kei apple – *Dovyalis caffra*
Horsetails – *Equisetum spp.*
Senegal tea plant – *Gymnocoronis spilanthoides*
Water poppy – *Hydrocleys nymphoides*
Long leaf water primrose – *Ludwigia longifolia*
Ludwigia – *Ludwigia peruviana*
Water lettuce – *Pistia stratiotes*
Kudzu – *Pueraria lobata*
Salvinia – Salvinia molesta *
Giant devil's fig – Solanum chrysotrichum
Silverleaf nightshade – Solanum elaeagnifolium *
Sticky nightshade – Solanum sisymbriifolium

Outcomes to demonstrate compliance with general biosecurity duty	Strategic response in the South East region
Land managers should mitigate the risk of the plant being introduced to their land	Establish agreed quarantine and/or hygiene protocols
Land managers should eradicate the plant from the land and keep the land free of the plant	Surveillance and mapping to locate all infested properties
A person should not deal with the plant, where dealings include but are not limited to buying, selling, growing, keeping, moving, carrying or releasing the plant.	Destruction of all infestations including seed banks
Notify local control authority if found.	Prevention of entry to geographic area, and movement and sale within
*These species are subject to state requirements. Please see A1.1	Monitor progress towards eradication
	Undertake high risk sites and pathway inspections.

Regional priority weed category – CONTAINMENT:

These weeds are widely distributed in parts of the region. While elimination is not practicable in the containment zone, minimisation of the biosecurity risk posed by these weeds to the whole South East region may be reasonably practicable by attempting to prevent spread to new locations outside the containment zone.

Mysore thorn – *Caesalpinia decapetala*

Land area where requirements apply	Outcomes to demonstrate compliance with general biosecurity duty	Strategic response in the South East region
Containment zone: Wollongong Local Government Area. Exclusion zone: Whole of region except containment zone.	**Whole of region:** Land managers mitigate the risk of new weeds being introduced to their land A person should not deal with the plant, where dealings include but are not limited to buying, selling, growing, moving, carrying or releasing the plant. **Within exclusion zone:** Land managers should eradicate the plant from the land and keep the land free of the plant Notify local control authority if found. **Within containment zone:** Land managers should reduce the impact of the plant on assets of high economic, environmental and/or social value Land managers should mitigate spread of the plant from their land. * these species are subject to state requirements. Please see A1.1	**Within exclusion zone:** Establish agreed quarantine and/or hygiene protocols. Surveillance and mapping to locate all infested properties and maintain currency of exclusion zone and objectives. Monitor change in current distribution to ensure containment of spread. High level analysis of pathways to identify potential introduction areas and preventative options **Within containment zone:** Identification of key sites/ assets in the geographic area Identification of regional containment zones where required Develop region-wide coordinated campaigns for collaborative management Species managed in accordance with published weed management plan

Regional priority weed category – CONTAINMENT:

These weeds are widely distributed in parts of the region. While elimination is not practicable in the containment zone, minimisation of the biosecurity risk posed by these weeds to the whole South East region may be reasonably practicable by attempting to prevent spread to new locations outside the containment zone.

Spanish heath – *Erica lusitanica*

Land area where requirements apply	Outcomes to demonstrate compliance with general biosecurity duty	Strategic response in the South East region
Containment zone: Queanbeyan-Palerang, Snowy Monaro and Wingecarribee Local Government Areas. Exclusion zone: Whole of region except containment zone.	**Whole of region:** Land managers mitigate the risk of new weeds being introduced to their land A person should not deal with the plant, where dealings include but are not limited to buying, selling, growing, moving, carrying or releasing the plant. **Within exclusion zone:** Land managers should eradicate the plant from the land and keep the land free of the plant Notify local control authority if found. **Within containment zone:** Land managers should reduce the impact of the plant on assets of high economic, environmental and/or social value Land managers should mitigate spread of the plant from their land. * these species are subject to state requirements. Please see A1.1	**Within exclusion zone:** Establish agreed quarantine and/or hygiene protocols. Surveillance and mapping to locate all infested properties and maintain currency of exclusion zone and objectives. Monitor change in current distribution to ensure containment of spread. High level analysis of pathways to identify potential introduction areas and preventative options **Within containment zone:** Identification of key sites/ assets in the geographic area Identification of regional containment zones where required Develop region-wide coordinated campaigns for collaborative management Species managed in accordance with published weed management plan

Regional priority weed category – CONTAINMENT:

These weeds are widely distributed in parts of the region. While elimination is not practicable in the containment zone, minimisation of the biosecurity risk posed by these weeds to the whole South East region may be reasonably practicable by attempting to prevent spread to new locations outside the containment zone.

Coolatai grass – *Hyparrhenia hirta*

Land area where requirements apply	Outcomes to demonstrate compliance with general biosecurity duty	Strategic response in the South East region
Containment zone: Goulburn Mulwaree, Shoalhaven, Snowy Monaro, Wingecarribee, Upper Lachlan, Wollongong and Shellharbour Local Government Areas. Exclusion zone: Whole of region except containment zone.	**Whole of region:** Land managers mitigate the risk of new weeds being introduced to their land A person should not deal with the plant, where dealings include but are not limited to buying, selling, growing, moving, carrying or releasing the plant. **Within exclusion zone:** Land managers should eradicate the plant from the land and keep the land free of the plant Notify local control authority if found. **Within containment zone:** Land managers should reduce the impact of the plant on assets of high economic, environmental and/or social value Land managers should mitigate spread of the plant from their land.	**Within exclusion zone:** Establish agreed quarantine and/or hygiene protocols. Surveillance and mapping to locate all infested properties and maintain currency of exclusion zone and objectives. Monitor change in current distribution to ensure containment of spread. High level analysis of pathways to identify potential introduction areas and preventative options **Within containment zone:** Identification of key sites/ assets in the geographic area Identification of regional containment zones where required Develop region-wide coordinated campaigns for collaborative management Species managed in accordance with published weed management plan

Regional priority weed category – CONTAINMENT:

These weeds are widely distributed in parts of the region. While elimination is not practicable in the containment zone, minimisation of the biosecurity risk posed by these weeds to the whole South East region may be reasonably practicable by attempting to prevent spread to new locations outside the containment zone.

Lantana – *Lantana camara* *

Land area where requirements apply	Outcomes to demonstrate compliance with general biosecurity duty	Strategic response in the South East region
Containment zone: Eurobodalla, Shoalhaven, Wollongong, Shellharbour and Kiama Local Government Areas. Exclusion zone: Whole of region except containment zone.	**Whole of region:** Land managers mitigate the risk of new weeds being introduced to their land A person should not deal with the plant, where dealings include but are not limited to buying, selling, growing, moving, carrying or releasing the plant. **Within exclusion zone:** Land managers should eradicate the plant from the land and keep the land free of the plant Notify local control authority if found. **Within containment zone:** Land managers should reduce the impact of the plant on assets of high economic, environmental and/or social value Land managers should mitigate spread of the plant from their land. * these species are subject to state requirements. Please see A1.1	**Within exclusion zone:** Establish agreed quarantine and/or hygiene protocols. Surveillance and mapping to locate all infested properties and maintain currency of exclusion zone and objectives. Monitor change in current distribution to ensure containment of spread. High level analysis of pathways to identify potential introduction areas and preventative options **Within containment zone:** Identification of key sites/ assets in the geographic area Identification of regional containment zones where required Develop region-wide coordinated campaigns for collaborative management Species managed in accordance with published weed management plan

Regional priority weed category – CONTAINMENT:

These weeds are widely distributed in parts of the region. While elimination is not practicable in the containment zone, minimisation of the biosecurity risk posed by these weeds to the whole South East region may be reasonably practicable by attempting to prevent spread to new locations outside the containment zone.

Gorse – *Ulex europaeus* *

Land area where requirements apply	Outcomes to demonstrate compliance with general biosecurity duty	Strategic response in the South East region
Containment zone: Goulburn Mulwaree, Queanbeyan-Palerang, Snowy Monaro, Wingecarribee and Yass Valley Local Government Areas. Exclusion zone: Whole of region except containment zone.	**Whole of region:** Land managers mitigate the risk of new weeds being introduced to their land A person should not deal with the plant, where dealings include but are not limited to buying, selling, growing, moving, carrying or releasing the plant. **Within exclusion zone:** Land managers should eradicate the plant from the land and keep the land free of the plant Notify local control authority if found. **Within containment zone:** Land managers should reduce the impact of the plant on assets of high economic, environmental and/or social value Land managers should mitigate spread of the plant from their land. * these species are subject to state requirements. Please see A1.1	**Within exclusion zone:** Establish agreed quarantine and/or hygiene protocols. Surveillance and mapping to locate all infested properties and maintain currency of exclusion zone and objectives. Monitor change in current distribution to ensure containment of spread. High level analysis of pathways to identify potential introduction areas and preventative options **Within containment zone:** Identification of key sites/ assets in the geographic area Identification of regional containment zones where required Develop region-wide coordinated campaigns for collaborative management Species managed in accordance with published weed management plan

Appendix B
Biodiversity certification

EMM
creating opportunities

New Shellharbour Hospital

Biodiversity development assessment report

Prepared for New South Wales Health Infrastructure

February 2024

New Shellharbour Hospital

Biodiversity development assessment report

New South Wales Health Infrastructure

E211110 RP7

February 2024

Version	Date	Prepared by	Reviewed by	Comments
V1	02/02/2023	Cecilia Phu, Madeleine Hunt	Erin Lowe	First draft
V2	24/02/2023	Cecilia Phu	Erin Lowe	Second draft
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V5	11/09/2023	Cecilia Phu	Erin Lowe	FINAL
V6	29/02/2024	Cecilia Phu	Erin Lowe	FINAL – amendments for RTS

Certified by

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29 February 2024

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TABLE OF CONTENTS

1 Introduction 1

1.1 Background 1

1.2 Key terminology 2

1.3 Assessment requirements 2

1.4 Consultation 3

1.5 Purpose of report 4

1.6 Information sources 4

1.7 Contributors 6

1.8 Declaration 7

2 Legislative context 11

2.1 Commonwealth legislation 11

2.2 State legislation 11

3 Landscape features 15

3.1 Assessment of site context 16

4 Native vegetation 22

4.1 Background review 22

4.2 Methods 22

4.3 Results 24

5 Threatened species 33

5.1 Threatened species assessment process 33

5.2 Species habitat values 33

5.3 Ecosystem credit species 35

5.4 Species credit species 38

6 Impact assessment 41

6.1 Potential direct and indirect impacts 41

6.2 Prescribed impacts 41

6.3 Avoidance, minimisation and mitigation 44

6.4 Serious and Irreversible Impacts 47

6.5 Impact summary 47

7 Assessment of other relevant biodiversity legislation 49

7.1 Commonwealth 49

7.2 State 49

8 Conclusion **52**

References **53**

Appendices

Appendix A BDAR requirements compliance A.1

Appendix B BAM plot data sheets B.1

Appendix C BAM import data C.1

Appendix D Biodiversity credit report D.1

Appendix E Likelihood of occurrence assessment E.1

Appendix F EPBC assessments of significance F.1

Tables

Table 1.1 Key terms used in this BDAR 2

Table 1.2 Secretary's Environmental Assessment Requirements - Biodiversity 2

Table 1.3 Project contributors 6

Table 3.1 Landscape features 15

Table 3.2 Percentage of native vegetation cover 16

Table 4.1 Vegetation surveys 22

Table 4.2 PCT 3962 - Coastal Floodplain Phragmites Reedland 25

Table 4.3 Vegetation zones 31

Table 5.1 Ecosystem credit species assessment 36

Table 5.2 Candidate species credit assessment 39

Table 6.1 Prescribed impacts 42

Table 6.2 Avoidance and mitigation measures 45

Table 6.3 Impact requiring offset 47

Table 7.1 Assessment of the project against the EPBC Act 49

Table 7.2 Biodiversity duties for priority weeds 50

Table F.1 Significant impact assessment – Green and Golden Bell Frog (Vulnerable) F.2

Figures

Figure 1.1 Regional context 8

Figure 1.2 Project location 9

Figure 1.3 Concept plan 10

Figure 3.1 Location map (IBRA subregion and NSW Landscapes) 17

Figure 3.2 Location map (watercourses and wetlands) 18

Figure 3.3 Location map (native vegetation extent) 19

Figure 3.4 Location map (soil hazards) 20

Figure 3.5 Site map 21

Figure 4.1 Plant community types and vegetation zones 32
Figure 6.1 Impacts requiring offset 48

Photographs

Photograph 4.1 PCT 3962 - Coastal Floodplain Phragmites Reedland 27
Photograph 4.2 Improved pasture within the subject land 29

1 Introduction

New South Wales (NSW) Health Infrastructure (HI) proposes to develop a new greenfield hospital for the Shellharbour region, known as the New Shellharbour Hospital (NSH) (herein referred to as 'the project').

The project is classified as State significant development (SSD) and requires the approval of the NSW Minister for Planning. An application for development consent under Part 4, Division 4.7 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) will be supported by an Environmental Impact Statement (EIS).

EMM Consulting Pty Limited (EMM) was commissioned by Savills Australia on behalf of HI to prepare this Biodiversity Development Assessment Report (BDAR) to inform the EIS for the project.

1.1 Background

1.1.1 Project location

The project is located at 86 Dunmore Road, Dunmore NSW 2529, approximately 2.5 kilometres (km) south-west of Shellharbour in the Shellharbour local government area (LGA), and in the Sydney Basin region of NSW (Figure 1.1).

The project will be located wholly within Lot 10 DP1281639, which was acquired by Health Administration Corporation (HAC). The lot is zoned as R2 (Low Density Residential) under the *Shellharbour Local Environmental Plan 2013* (Shellharbour LEP) and is approximately 10 hectares (ha) in size. The lot contains a homestead and several outbuildings surrounded by exotic grassland and is currently un-tenanted (Figure 1.2).

To the south of the lot, the land is zoned as RU2 (Rural Landscape). To the north the lands adjoining the lot are zoned as R2 (Low Density Residential) and SP1 (Infrastructure- Educational Establishment, Place of Public Worship). To the west is the rail corridor and M1 Princes Highway. The land to the west is zoned SP2 (Infrastructure- Rail Infrastructure Facility) and is owned by Transport for NSW for the operation of the South Coast Line railway. Adjoining the eastern border of the lot are lands zoned as R2 (Low Density Residential), RU1 (Primary Production) and RE2 (Private Recreation), the latter of which is utilised for the operation of a golf course.

1.1.2 Project description

In September 2020, the NSW Government committed to more than $700 million to deliver new and improved health facilities for the Illawarra Shoalhaven Health District to meet the needs of the growing community. The NSH project will be a larger and more capable major regional hospital to provide the health services required to meet the needs of the Shellharbour and wider Illawarra region (in conjunction with the districts, other hospitals and community health facilities).

Broadly, the project will consist of:

- construction and operation of a new hospital for Shellharbour
- construction of supporting infrastructure required for the NSH, including:
    - construction of access and internal roads
    - construction of at-grade and multi-deck car parking
    - external road upgrades and connections
    - utility/service connections
    - green space landscaping.

The project will be accessed on its eastern border via Dunmore Road, a collector road providing access to Shellharbour Road and Princes Highway to the north and west, and Shellharbour central business district to the east.

The demolition of existing buildings and removal of surrounding trees is captured under a separate scope of work and development consent issued by Shellharbour City Council for proposed bulk earthwork activities (DA0606/2022) and does not form a part of the project SSD application.

A detailed description of the project is provided in the EIS. A concept plan is provided in Figure 1.3.

1.2 Key terminology

The following key terminology has been adopted throughout the BDAR (Table 1.1).

Table 1.1 Key terms used in this BDAR

Term	Definition
The project	The New Shellharbour Hospital (NSH). This refers to all elements that comprise the project for which approval is sought.
Study area	The area of land that was surveyed for ecological values. This includes the subject land and additional adjacent areas to provide context for impacts.
Buffer area	The area of land within 1,500 m buffer zone for the subject land. Buffer areas are selected in accordance with the Biodiversity Assessment Method (BAM) (DPIE 2020)
Locality	Includes the subject land and the area of land within a 10 km buffer surrounding the subject land. This area was used during the database search.
Subject land	Refers to Lot 10 DP1281639 within which the project will be wholly located, plus the road reserve along the Dunmore Road frontage, within which upgrade and connections works will be undertaken (see Figure 1.2). This includes the final footprint but also the construction footprint and temporary laydown areas.

1.3 Assessment requirements

1.3.1 Secretary's Environmental Assessment Requirements (SEARS) – Industry Specific

This BDAR considers and addresses the relevant Planning Secretary's Environmental Assessment Requirements (SEARs) for the project (6 April 2023), as well as relevant government assessment requirements, guidelines and policies. The requirements of the SEARs relevant to this BDAR are outlined in Table 1.2.

Table 1.2 Secretary's Environmental Assessment Requirements - Biodiversity

Issue and Assessment Requirements	Documentation
11. Biodiversity	
• Assess any biodiversity impacts associated with the development in accordance with the *Biodiversity Conservation Act 2016* and the *Biodiversity Assessment Method 2020*, including the preparation of a Biodiversity Development Assessment Report (BDAR), unless a waiver is granted, or the development is on biodiversity certified land.	This BDAR
• If the development is on biodiversity certified land, provide information to identify the site (using associated mapping) and demonstrate the proposed development is consistent with the relevant biodiversity measure conferred by the biodiversity certification.	Not applicable.

Table 1.2 Secretary's Environmental Assessment Requirements - Biodiversity

Issue and Assessment Requirements	Documentation
Additional assessment requirements	
Riparian Zone Management • Where applicable, provide a Riparian Zone Management Assessment prepared by a suitably qualified professional, to determine the presence of mapped and potential unmapped waterways across the site and where relevant to map the top of bank of waterways to determine appropriate Vegetated Riparian Zone (VRZ) and riparian zone management as required by *NSW Water Management Act 2000.*	Not applicable. Refer to Section 2.2.5 and Section 7.2.3 for discussion.

1.3.2 Streamlined assessment module – small area

A streamlined assessment module may be applied to the BDAR for small area developments in accordance with area clearing limits specified in Appendix C of the BAM (DPIE 2020). For land with a minimum lot size of less than or equal to 1 ha, the streamlined assessment module for small area clearing can be applied where the clearing of native vegetation (including planted native vegetation) does not exceed 1 ha.

The project meets the area clearing limits to be assessed under the streamlined assessment module for small area development in the Biodiversity Assessment Method Calculator (BAM-C):

- the subject land is zoned R2 (Low Density Residential) and the minimum lot size for R2 zoned land is 450 m^2
- the total area of native vegetation clearing of the project is less than 1 ha (see Chapter 4 of this BDAR).

The small area streamlined assessment module does not require targeted threatened species surveys other than for species listed as at risk of Serious and Irreversible Impact (SAII) under the BAM (DPIE 2020). Targeted surveys must be undertaken for SAII species identified to have potential to occur within the site. If any SAII species are recorded within the site a determination of whether the proposed development will result in a SAII is required. If a SAII will result from the development, the Minister for Planning must take the impacts into consideration and determine whether there are additional measures that will minimise those impacts if consent is to be granted as required by Section 7.16(3) of the *NSW Biodiversity Conservation Act 2016* (BC Act).

1.4 Consultation

Consultation was undertaken with the Biodiversity and Conservation Division (BCD) of the Department of Planning and Environment (DPE), South East (Illawarra) Branch on 27 February 2023. Consultation items/points of advice include application of the small area assessment in the BAM-C to SSD applications, threatened species to be considered in the BDAR, survey design/sampling locations and interactions with development applications being submitted concurrently.

1.5 Purpose of report

This BDAR assesses the project in accordance with the BAM (DPIE 2020) and addresses matters relating to terrestrial biodiversity.

The specific objectives of this assessment are to:

- describe biodiversity values of the subject land
- assess the likelihood that threatened species and communities (threatened biodiversity) listed under the BC Act and *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) could occur in the subject land
- document the strategies implemented to avoid and/or minimise impacts of the project on threatened biodiversity
- provide environmental safeguards to mitigate threatened biodiversity impacts during construction and operation
- assess residual threatened biodiversity impacts, after avoidance and minimisation strategies have been implemented
- identify credit requirements of the project.

This report meets the minimum information requirements for BDARs as set out in Appendix K of the BAM (DPIE 2020) (see Appendix A).

1.6 Information sources

1.6.1 Publications and databases

In order to provide context for the project, information about flora and fauna species, populations, communities and habitats from the locality (generally within 10 km) was obtained from the following publications and databases:

- NSW BioNet (DPE 2022b) for:
  - Atlas of NSW Wildlife for threatened species records
  - threatened species profiles
  - threatened biodiversity data collection (TBDC)
  - Vegetation Classification database for information on plant community types (PCTs)
- Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) Protected Matters Search Tool (PMST) (DCCEEW 2023b)for Matters of National Environmental Significance (MNES) likely to occur within the study area
- Commonwealth DCCEEW Species Profile and Threats Database (DCCEEW 2022)
- Interactive Flying-fox web viewer (DCCEEW 2021)
- New South Wales Flora Online (PlantNET) (Royal Botanic Gardens and Domain Trust 2022)

- Register of Areas of Outstanding Biodiversity Value (AOBV) (DPE 2022a)
- NSW WeedWise (DPI 2022b)
- Fisheries Spatial Data Portal (DPI 2022a), for information on:
  - key fish habitat mapping
  - freshwater fish community status
  - freshwater threatened species distributions.

1.6.2 Other relevant studies

This BDAR considers the findings of the following studies:

- *New Shellharbour Hospital Threatened Species Survey* (Eco Logical Australia 2022)
- *New Shellharbour Hospital Preferred Site - Biodiversity Constraints Assessment* (EMM 2021)
- *New Shellharbour Hospital Arboricultural Development Assessment Report* (Vezgoff 2022)
- *New Shellharbour Hospital Civil Engineering Design Report* (Enstruct 2023b)
- *New Shellharbour Hospital Landscape Design Report* (Taylor Brammer 2023a).

1.6.3 Spatial data

Base map data was obtained from Department of Finance, Services and Innovation (DFSI) NSW databases, with cadastral data obtained from DFSI digital cadastral database. Mapping for stream orders was obtained from the Department of Primary Industries (DPI).

The following spatial datasets were utilised during the development of this report:

- Michell Landscapes Version V3.1 (OEH 2017)[1]
- Interim Biogeographic Regionalisation of Australia (IBRA) Version 7 (DoEE 2018)
- NSW State Vegetation Type Map vC1.1.M1.1 (DPE 2022d)
- Illawarra - Shoalhaven Regional Plan Corridors (DPE 2021b)
- Directory of important wetlands in Australia (DIWA) (DAWE 2022b)
- Australian Ramsar Wetlands (DAWE 2022a).

Other relevant datasets were accessed via the following viewers:

- eSPADE (DPIE 2022)
- NSW SEED (NSW Government 2023).

[1] It is noted that identifying NSW (Mitchell) Landscapes is not required for assessment of small areas under the streamlined assessment module (Section 3.1.3(10)(b) of DPIE 2020).

Mapping undertaken during the site assessment was conducted using a hand-held GPS unit, mobile tablet computers running ArcGIS Field Maps™ and Survey123 for ArcGIS™ and aerial photo interpretation. Accuracy is subject to accuracy of GPS devices, generally ± 5 m. Mapping has been produced using a Geographic Information System (GIS; ArcGIS 10.8.1).

Spatial data relevant to this BDAR is provided to Department of Planning and Environment (DPE) following lodgement of the BDAR.

1.6.4 Imagery

Imagery relied upon in this assessment include those sourced from:

- SIX Maps Viewer (Department of Customer Service – Spatial Services)
- ESRI – map service layer (Esri, Maxar, Earthstar Geographics, and the GIS User Community)
- MetroMap (Aerometrex 2021).

1.7 Contributors

This BDAR was prepared by Cecilia Phu (BAAS17058) and Madeleine Hunt in accordance with BAM 2020 (DPIE 2020). The BAM credit calculations were performed by Cecilia Phu (BAM-C application version 1.4.0.00; BAM data version 61).

A technical review of the report and credit calculations was undertaken by Erin Lowe (accredited assessor number BAAS 18135).

Contributors and staff qualifications are presented in Table 1.3.

Table 1.3 Project contributors

Name	Qualifications	Experience	Role
Cecilia Phu	BSc (Hons) BAM accredited assessor (BAAS17058)	15 years	Project lead Field surveys (BAM plots) BDAR lead author
Madeleine Hunt	BESM (Marine Science)	1 year	BDAR contributing author
Paul Rossington	BSc (Biology), Master of Wildlife Management BAM accredited assessor (BAAS18065)	18 years	Field surveys (targeted flora searches)
Luke O'Brien	BESM BSc (Hons) Bam accredited assessor (BAAS22017)	7 years	Field surveys (targeted flora searches)
Ross Davey	BSc (EnvMgt)	3 years	Field surveys (targeted flora searches)
Erin Lowe	BSc (Sustainable Resource Mgt) BNatHistIllus (BAAS18135)	12 years	Technical review

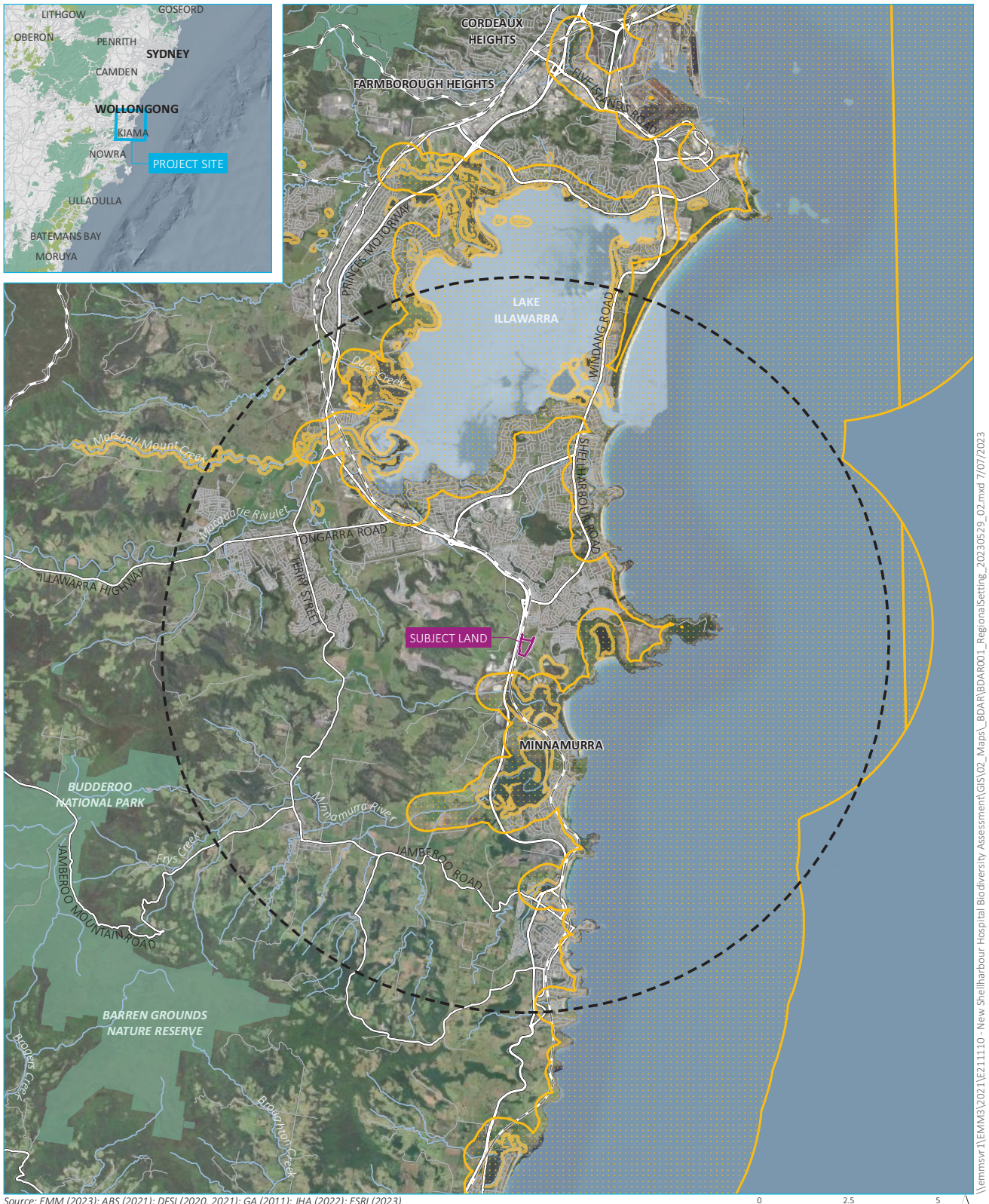
1.8 Declaration

Certification under clause 6.15 Biodiversity Conservation Act 2016

I, Cecilia Phu, certify that this report has been prepared based on the requirements of, and information provided under, the Biodiversity Assessment Method (DPIE 2020) and Clause 6.15 of the BC Act.

Conflict of interest

As per the Accredited BAM Assessor Code of Conduct, BAM Accredited Assessors must not act in circumstances where there is actual, perceived, or potential conflict of interest. I declare that I have considered the circumstances and there is no actual, perceived, or potential conflict of interest. This declaration has been made in the interests of full disclosure to the decision-maker. Full disclosure has also been provided to the client.



Source: EMM (2023); ABS (2021); DFSI (2020, 2021); GA (2011); JHA (2022); ESRI (2023)

KEY

- Subject land
- 10 km radius for database searches
- Rail line
- Major road
- Minor road
- Named watercourse
- Named waterbody
- NPWS reserve
- SEPP Coastal Environmental Area
- SEPP Coastal Wetland Proximity Area

INSET KEY

- Major road
- NPWS reserve
- State forest

Regional context

New Shellharbour Hospital
Biodiversity Development Assessment Report
Figure 1.1

EMM creating opportunities

Source: EMM (2023); DFSI (2020, 2021); JHA (2022); Metromap (2023); DCSSS (2023)

0 100 200 m
GDA2020 MGA Zone 56

N

KEY

- Subject land

Existing environment

- Rail line
- Waterbody
- Cadastral boundary

Project location

New Shellharbour Hospital
Biodiversity Development Assessment Report
Figure 1.2

EMM
creating opportunities

\\emmsvr1\EMM3\2021\E211110 - New Shellharbour Hospital Biodiversity Assessment\GIS\02_Maps_BDAR\BDAR02_ProjectLocation_20230529_03.mxd 7/07/2023

Source: EMM (2023); DFSI (2020, 2021); JHA (2022); Metromap (2023)

0 100 200 m

GDA2020 MGA Zone 56

N

\\emmsvr1\EMM3\2021\E211110 - New Shellharbour Hospital Biodiversity Assessment\GIS\02_Maps_BDAR\BDAR003_ConceptPlan_20230529_02.mxd 7/07/2023

KEY

- Subject land
- Concept plan

Existing environment

- Rail line
- Waterbody

Concept plan

New Shellharbour Hospital
Biodiversity Development Assessment Report
Figure 1.3

EMM
creating opportunities

2 Legislative context

This chapter provides a brief outline of the key biodiversity legislation and government policy considered in this assessment.

2.1 Commonwealth legislation

2.1.1 *Environmental Protection and Biodiversity Conservation Act 1999*

The EPBC Act provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities, heritage places and water resources which are defined as MNES under the EPBC Act. These are:

- world heritage properties
- places listed on the National Heritage Register
- Ramsar wetlands of international significance
- threatened flora and fauna species and ecological communities
- migratory species
- Commonwealth marine areas
- the Great Barrier Reef Marine Park
- nuclear actions (including uranium mining)
- water resources, in relation to coal seam gas or large coal mining development.

Under the EPBC Act, an action that may have a significant impact on a MNES is deemed to be a 'controlled action' and can only proceed with the approval of the Commonwealth Minister for the Environment and Water.

An action that may potentially have a significant impact on a MNES is to be referred to DCCEEW for determination as to whether or not it is a controlled action. If deemed a controlled action the project is assessed under the EPBC Act, and a decision made as to whether or not to grant approval.

The project is unlikely to have a significant impact on MNES and as such has not been referred to DCCEEW. Assessment of relevant MNES is included in Section 7.1.

2.2 State legislation

2.2.1 *Environmental Planning and Assessment Act 1979*

The NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) was enacted to encourage the consideration and management of impacts of proposed development or land-use changes on the environment and the community. The EP&A Act is administered by the NSW Department of Planning and Environment (DPE).

The EP&A Act provides the overarching structure for planning in NSW; however, is supported by other statutory environmental planning instruments (EPIs) including State Environmental Planning Policies (SEPPs). EPIs relevant to the natural environment are outlined further below.

i State Environmental Planning Policy (Planning Systems) 2021

Under Section 4.36 of the EP&A Act, a development is State significant if it is declared to be SSD by any SEPP.

The project is declared to be SSD by *State Environmental Planning Policy (Planning Systems) 2021* (Planning Systems SEPP). Section 2.6(1) of the Planning Systems SEPP states:

> (1) Development is declared to be State significant development for the purposes of the Act if –
>
> (a) the development on the land concerned is, by the operation of an environmental planning instrument, not permissible without development consent under Part 4 of the Act, and
>
> (b) the development is specified in Schedule 1 or 2.

The project meets clause 2.6(1)(a) as it is not permissible without development consent. The project also meets clause 2.6(1)(b) as it is a 'hospital' that has a capital investment of more than $30 million as specified in Schedule 1 of the Planning Systems SEPP. Therefore, the project meets the requirements of Clause 2.6(1) and is SSD that requires development consent, in accordance with Part 4, Division 4.7 of the EP&A Act.

ii State Environmental Planning Policy (Biodiversity and Conservation) 2021

Chapter 3 (Koala Habitat Protection 2020) and Chapter 4 (Koala Habitat Protection 2021) of the *State Environmental Planning Policy (Biodiversity and Conservation) 2021* (Biodiversity and Conservation SEPP) together aim to encourage the proper conservation and management of areas of natural vegetation that provide habitat for Koalas to ensure a permanent free-living population over their present range and reverse the current trend of Koala population decline.

In nine metropolitan Sydney LGA (Blue Mountains, Campbelltown, Hawkesbury, Ku-Ring-Gai, Liverpool, Northern Beaches, Hornsby, Wollondilly) and the Central Coast LGA, Koala Habitat Protection 2021 applies to all land use zones. Outside of these areas, Koala Habitat Protection 2020 continues to apply to all land zoned RU1, RU2, and RU3.

The Koala Habitat Protection 2020 provisions of the Biodiversity and Conservation SEPP is not triggered for the project as it is located within the Shellharbour LGA and is zoned R2 (Low Density Residential), and the policy only applies to local developments where a development application is made and does not apply to major projects. Nonetheless, consideration has been given to the potential occurrence and impacts upon the koala within this BDAR (Section 5).

2.2.2 *Biodiversity Conservation Act 2016*

The BC Act is the legislation responsible for the conservation of biodiversity in NSW through the protection of threatened flora and fauna species, populations and ecological communities. The BC Act, together with the *Biodiversity Conservation Regulation 2017* (BC Regulation), established the Biodiversity Offsets Scheme (BOS).

The BOS includes establishment of the BAM (DPIE 2020) for use by accredited persons in biodiversity assessment under the scheme. The purpose of the BAM (DPIE 2020) is to assess the impact of actions on threatened species and threatened ecological communities, and their habitats and determine offset requirements. For major projects, use of the BAM (DPIE 2020) is mandatory, unless a BDAR waiver is granted.

The BAM (DPIE 2020) sets out the requirements for a repeatable and transparent assessment of terrestrial biodiversity values on land in order to:

- identify the biodiversity values on land subject to proposed development
- determine the impacts of a proposed development, following all measures to avoid, minimise and mitigate impacts
- quantify and describe the biodiversity credits required to offset the residual impacts of proposed development on biodiversity values.

This biodiversity assessment has been undertaken in accordance with the requirements of the BAM (DPIE 2020).

2.2.3 *Fisheries Management Act 1994*

The *Fisheries Management Act 1994* (FM Act) contains provisions for the conservation of fish stocks, key fish habitat, biodiversity, threatened species, populations and ecological communities. It regulates the conservation of fish, vegetation and some aquatic macroinvertebrates and the development and sharing of the fishery resources of NSW for present and future generations. The FM Act lists threatened species, populations and ecological communities, key threatening processes (KTPs) and declared critical habitat. Assessment guidelines to determine whether a significant impact is expected are detailed in Section 220ZZ and 220ZZA of the FM Act.

Another objective of the FM Act is to conserve key fish habitat (KFH). These are defined as aquatic habitats that are important to the sustainability of recreational and commercial fishing industries, the maintenance of fish populations generally and the survival and recovery of threatened aquatic species. KFH is defined in Section 3.2.1 and 3.2.2 of the *Policy and Guidelines for Fish Conservation and Management* (DPI 2013).

The subject land does not contain KFH and is unlikely to have a significant impact on threatened aquatic species, populations, communities, habitats and KFH. Indirect impacts on downstream receivers are addressed in Section 6.1.2 and mitigation measures proposed to manage off-site impacts (Section 6.3).

2.2.4 *Biosecurity Act 2015*

The primary objective of the *Biosecurity Act 2015* (Biosecurity Act) is to provide a framework for the prevention, elimination, and minimisation of biosecurity risks posed by biosecurity matter, dealing with biosecurity matter, carriers and potential carriers, and other activities that involve biosecurity matter, carriers, or potential carriers.

All plants in NSW are regulated by a general biosecurity duty to prevent, eliminate, or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated, or minimised, so far as is reasonably practicable.

The Biosecurity Act places restrictions on the trade and movement of plants that harm the NSW environment, economy, and community. Those plants are called 'priority weeds' and the restrictions on trade and movement apply to all parts of the plant including cuts, cultivars, and hybrids. Priority weeds are any weeds identified in a local strategic plan that has been approved by the Minister under Division 2 of Part 4 of *the Local Land Services Act 2013*.

'State priority weeds' must not be sold anywhere in NSW. People that buy or sell state priority weeds in NSW are committing an offence under the Biosecurity Act that carries large penalties. The following legal instruments apply:

- Prohibited Matter – A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. The definition of 'dealing' is broad and includes having, buying, selling, moving, growing and disposal.
- Control Order – Requires all parts of the plant to be destroyed until eradicated.
- Mandatory Measure (Prohibition on Dealings) – Must not be imported into the State or sold.

'Regional priority weeds' should not be sold or moved in certain Local Land Services regions of NSW.

The provisions of the Biosecurity Act are discussed further in Section 7.2.2.

2.2.5 *Water Management Act 2000*

Division 6 of the *Water Management Act 2000* (WM Act) requires consideration of controlled activities (activities within 40 m of riparian land) and aquifer interference activities. The NSW Aquifer Interference Policy (NOW 2012) requires an assessment of potential impacts on groundwater users, including groundwater dependent ecosystems (GDEs). Impacts on riparian land and GDEs are considered in Section 7.2.3 of this report.

3 Landscape features

The identification of landscape features was undertaken in accordance with Section 3 of the BAM (DPIE 2020) and results are summarised within this chapter.

The landscape features identified within the 1,500 m buffer area are summarised in Table 3.1 and shown in Figure 3.1 and Figure 3.5.

Table 3.1 Landscape features

Landscape feature	Details	Figure
Method applied for site context components	1,500 m buffered assessment area	-
Interim Biogeographic regionalisation of Australia (IBRA) bioregion	Sydney Basin.	Figure 3.1
IBRA subregion	Illawarra	Figure 3.1
BioNet NSW landscapes (formerly Mitchell landscapes)	Two BioNet NSW Landscapes occur within the subject land: • Kiama Coastal Slopes • Lake Illawarra Alluvial Plains. Most of the subject land is located within the Lake Illawarra Alluvial Plains BioNet NSW Landscape, with the highest elevations of the disturbance footprint (north-east portion) occurring in the Kiama Coastal Slopes BioNet NSW Landscape. A very small area of Lake Illawarra Barrier BioNet NSW Landscape occurs within the buffer area but not within the subject site, near Killalea Lagoon.	Figure 3.1
Rivers, streams and estuaries	The buffer area contains a number of 1st to 3rd order watercourses that drain into Rocklow Creek (4th and 5th order) to the south. Outside of the buffer area Rocklow Creek flows into Minnamurra River (6th order), which drains into the South Pacific Ocean at Minnamurra Point. The northern portion of the buffer area drains to Elliot Lake to the north, which flows out to the South Pacific Ocean at Barrack Point. To the east, a number of 1st to 3rd order watercourses drain into the South Pacific Ocean at the southern end of Shellharbour Beach. The subject land contains a 1st order watercourse belonging to the Rocklow Creek catchment.	Figure 3.2
Wetlands	There are no Ramsar wetlands within the buffer area. There is one important wetland listed on the Directory of Important Wetlands in Australia (DIWA) – Minnamurra River Estuary (NSW084), which occurs to the south of the subject land. Minnamurra River Estuary is broadly aligned with Coastal Wetland zone mapping identified under Chapter 2 (Coastal management) of the State Environmental Planning Policy (Resilience and Hazards) 2021. A second Coastal Wetland zone is identified to the south-east of the subject land. There are no Coastal Wetlands or proximity buffers to Coastal Wetlands as identified under Chapter 2 (Coastal management) of the State Environmental Planning Policy (Resilience and Hazards) 2021 within the subject land.	Figure 3.2

Table 3.1 Landscape features

Landscape feature	Details	Figure
Connectivity of different areas of habitat	The buffer area of the project consists of highly fragmented native vegetation, often occurring in isolated patches surrounded by a matrix of agricultural and exotic grasslands. The Princes Highway and the South Coast Line railway provide a barrier to habitat connectivity in the east and west directions. The Illawarra Shoalhaven Regional Biodiversity Corridor Mapping (DPE 2023) is a regional biodiversity corridor comprising a sub-component of the "High Environmental Value (HEV)" land mapped (DPE 2021a) and referred to in the Illawarra Shoalhaven Regional Plan 2041 (DPIE 2021). The buffer area captures a small proportion of this corridor, which connects Minnamurra River Estuary to the vegetated footslopes west of Princes Highway along Rocklow Creek. The project captures small patches of this corridor classified as "Stepping-stone" habitat; this part of the corridor is represented by individual trees established around the homestead.	Figure 3.3
Areas of geological significance and soil hazard	There are unlikely to be areas of geological significance within the buffer area, although the low ridges to the west of the Princes Highway could potentially contain some rock outcropping that might include crevices. The acid sulfate soil risk mapping (DPIE 2022) indicates that the acid sulfate soil probability is: • H2: high probability 1-3 m below ground surface along the western boundary of the subject land • H1: high probability <1 m below ground surface along Rocklow Creek to the south of the subject land • H0: high probability at/near ground surface around the Minnamurra River Estuary.	Figure 3.4
Areas of outstanding biodiversity value	There are no areas of outstanding biodiversity value within the subject land	-

3.1 Assessment of site context

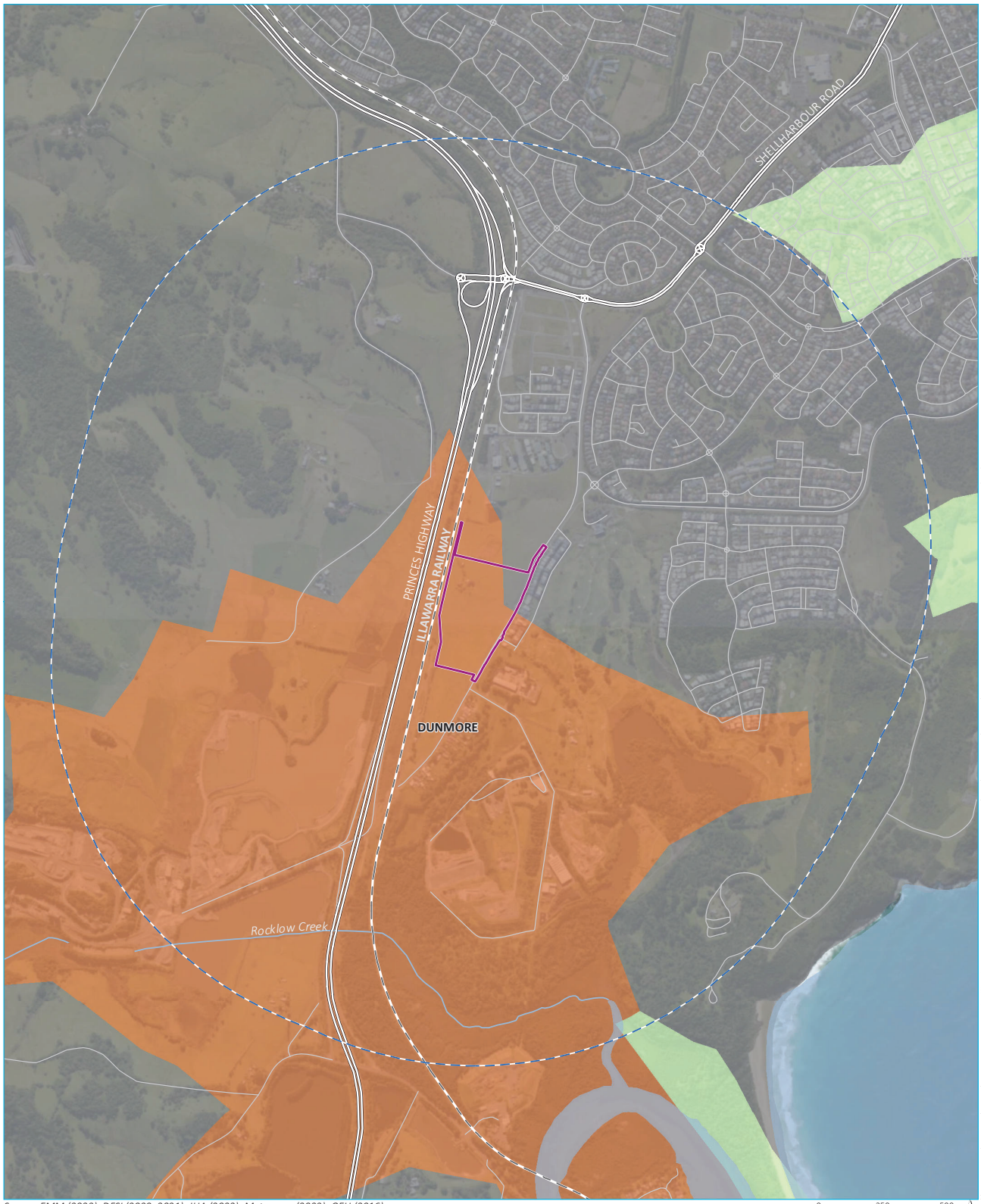
The site context has been assessed in accordance with Section 3.2 of the BAM (DPIE 2020) for site-based developments.

Regional mapping data was used as a starting basis for estimating native vegetation extent (DPE 2022d). Regional mapping was reviewed against aerial imagery and updated in areas of inconsistency. In areas where vegetation mapping was validated by field studies, this information was used to determine native vegetation extent instead of the regional mapping data. Native vegetation extent is shown on Figure 3.3 and Figure 3.5.

Percentage native cover was assessed as 29.4% (Table 3.2). Patch size was assumed to be >100 ha for every vegetation zone as a conservative approach to threatened species assessment. This enabled the BAM-C to filter in the maximum number of candidate species for consideration.

Table 3.2 Percentage of native vegetation cover

Component	Native vegetation in buffer area (ha)	Buffer area (ha)	Approximate percentage of native vegetation in buffer area
Site-based component 1,500 m buffer	290.42	973.93	29.8%



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Source: EMM (2023); DFSI (2020, 2021); JHA (2022); Metromap (2023); OEH (2016)

0 250 500 m
GDA2020 MGA Zone 56
N

KEY

- Subject land
- Subject land buffer (1500 m)

NSW landsapes

- Kiama Coastal Slopes
- Lake Illawarra Alluvial Plains
- Lake Illawarra Barrier

Existing environment

- Rail line
- Major road
- Minor road
- Named watercourse
- Named waterbody

The entire map extent is within the Sydney Basin IBRA bioregion and the Illawarra IBRA subregion.

Location map
(IBRA subregion and NSW landscapes)

New Shellharbour Hospital
Biodiversity Development Assessment Report
Figure 3.1

EMM
creating opportunities

Source: EMM (2023); DFSI (2020, 2021); JHA (2022); Metromap (2023); OEH (2009, 2016); DPIE (2018)

0 250 500 m
GDA2020 MGA Zone 56
N

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KEY

- Subject land
- Subject land buffer (1500 m)

Riparian buffer
- 10 m
- 20 m
- 30 m
- 40 m

Strahler stream order
- 1st order
- 2nd order
- 3rd order
- 4th order
- 5th order
- 6th order

Existing environment
- Rail line
- Major road
- Minor road
- Named waterbody
- Minnamurra River Estuary
- Coastal SEPP

Location map (watercourses and wetlands)

New Shellharbour Hospital
Biodiversity Development Assessment Report
Figure 3.2

EMM
creating opportunities

Source: EMM (2023); DFSI (2020, 2021); JHA (2022); Metromap (2023); DPE (2023)

0 250 500 m
GDA2020 MGA Zone 56
N

KEY

- Subject land
- Subject land buffer (1500 m)
- Dunmore Hills Minnamurra biodiversity corridor

Vegetation extent

- Native
- Non-native

Existing environment

- Rail line
- Major road
- Minor road
- Named waterbody

Location map
(native vegetation extent)

New Shellharbour Hospital
Biodiversity Development Assessment Report
Figure 3.3

EMM
creating opportunities

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Source: EMM (2023); DFSI (2020, 2021); JHA (2022); Metromap (2023); DPIE (2021)

0 250 500 m
GDA2020 MGA Zone 56
N

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KEY

- Subject land
- Subject land buffer (1500 m)

Acid sulfate soil risk

- High probability of occurrence (HAp2)
- High probability of occurrence (HEi0)
- High probability of occurrence (HEm)
- High probability of occurrence (HEp1)

Existing environment

- Rail line
- Major road
- Minor road
- Named waterbody

Location map (soil hazards)

New Shellharbour Hospital
Biodiversity Development Assessment Report
Figure 3.4

EMM
creating opportunities

Source: EMM (2023); DFSI (2020, 2021); JHA (2022); Metromap (2023); DPIE (2021); DCSSS (2023)

0 100 200 m

GDA2020 MGA Zone 56

N

KEY

- Subject land
- Native vegetation

Strahler stream order
- 1st order
- 2nd order
- 3rd order

Riparian buffer
- 10 m
- 20 m
- 30 m
- 40 m

Existing environment
- Rail line
- Major road
- Minor road
- Cadastral boundary

Site map

New Shellharbour Hospital
Biodiversity Development Assessment Report
Figure 3.5

EMM
creating opportunities

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4 Native vegetation

An assessment of native vegetation within the subject land was undertaken in accordance with Section 4 of the BAM (DPIE 2020) and is summarised within this chapter.

4.1 Background review

A review of desktop information was undertaken to obtain a broad understanding of the regional vegetation types within the locality of the study area. This included a review of the following data sources and reference literature:

- NSW State Vegetation Type Map vC1.1.M1.1 (DPE 2022d)
- Illawarra Plant Community Type Vegetation Map, 2016. VIS_ID 4678 (DPE 2016).

The regional map datasets do not identify any native vegetation types within the study area.

Vegetation within the buffer area surrounding the subject land is characterised by a range of vegetation types associated with the coastal floodplain and hinterlands, including freshwater and estuarine wetlands, swamp forests, lowland and littoral subtropical rainforests, heathy shrublands and low forests, with only small areas of wet sclerophyll forest and grassy woodland.

4.2 Methods

4.2.1 Field survey dates and tasks

Vegetation surveys were conducted on the dates outlined in Table 4.1.

Table 4.1 Vegetation surveys

Dates	Surveys completed
18 June 2021	Vegetation mapping, habitat assessment, BAM plots
3 January 2022	Vegetation mapping, BAM plots
27 January 2023	Habitat assessment, BAM plots

4.2.2 Vegetation mapping and habitat assessment

As no mapping datasets identified native vegetation within the study area, the basis for vegetation mapping (i.e. classification and linework) was vegetation validation and ground-truthing surveys, and informed where required by aerial photograph interpretation.

Systematic visual inspection of 2-dimensional digital aerial imagery was undertaken using GIS; ArcGIS™ 10.8.1. Aerial imagery, along with existing mapping layers, were examined at scales of between 1:2,000 and 1:4,000.

Vegetation validation and mapping surveys were undertaken across the study area over repeat visits (refer to Table 4.1). Vegetation was mapped in the field and involved the following survey techniques:

- random meander surveys on foot to ground-truth PCT boundaries and collect rapid data (or vegetation validation) points
- systematic plot-based floristic vegetation survey (i.e. 'BAM plots') consistent with Section 4.2.1 of the BAM (DPIE 2020) to facilitate identification of the most likely PCTs as described in the BioNet Vegetation Classification database (DPE 2022c).

Vegetation mapping undertaken during the field studies was conducted using hand-held GPS units, and mobile tablet computers running ArcGIS Field Maps™ and Survey123 for ArcGIS™. Accuracy is subject to accuracy of GPS devices, generally ± 5 m. The vegetation mapping dataset has been produced using ArcGIS™ 10.8.1.

4.2.3 Vegetation integrity assessment

Following the stratification of vegetation zones within the study area, native vegetation integrity was assessed using data obtained via a series of plots, as per the methodology outlined in Section 4.2.1, 4.3.3 and 4.3.4 of the BAM (DPIE 2020). Plot data was collected from the study area across three separate survey events (Table 4.1).

At each plot location the following was undertaken:

- one 400 m^2 plot, for assessment of composition and structure
- one 1,000 m^2 plot for assessment of function, including a series of five 1 x 1 m plots to assess average litter cover.

The assessment of composition and structure, based on a 400 m^2 plot, recorded species name, stratum, growth form, cover and abundance rating for each species present within the plot. Cover (foliage cover) was estimated for all species rooted in or overhanging the plot, and recorded using decimals (if less than 1%, rounded to whole number (1–5%) or estimated to the nearest 5% (5–100%). Abundance was counted (up to 20) and estimated above 20, and recorded using the following intervals: 1, 2, 3, 4, 5, 10, 20, 50, 100, 500, 1,000, 1,500, 2,000 et cetera.

The assessment of function recorded the number of large trees, the presence of tree stem size class, tree regeneration, number of trees with hollows and length of fallen logs, as well as leaf litter cover within the 1,000 m^2 plot and five 1 x 1 m subplots.

Datasheets are provided in Appendix B.

Surveys for flora and vegetation communities were completed under the authority of Scientific License (SL100409). A list of flora species was compiled for each plot and PCT. Records of all flora species will be submitted for incorporation into the Atlas of NSW Wildlife.

4.2.4 Limitations and assumptions

i Revised Plant Community Types in eastern NSW (revised PCTs)

It is noted that revised PCTs in eastern NSW will be introduced to the BOS and BAM in 2023 and that some existing PCTs have already been decommissioned. The revised PCTs were publicly released on 24 June 2022 and was made available to the BAM-C on 14 April 2023. This BDAR uses the revised PCT reference data.

ii Location of BAM plot

One plot was undertaken along the western boundary to sample a patch of reedland that extends into the rail corridor. Only a small area of the patch occurs within the subject land. Access to the rail corridor was not available at the time of survey. Due to the highly linear and limited extent of the vegetation patch within the subject land itself, the plot was undertaken with the following amendment to the plot dimensions: 80 x 5 m.

4.3 Results

4.3.1 Overview

The subject land occurs on a gently undulating landform that slopes from the north-east to the south-west, with the highest elevation in the north-east corner, approximately 32 m above sea level (asl), declining to approximately 4 m asl in the south-west.

The low-lying areas in the south-west of the subject land is part of a narrow, gently inclined alluvial plain that drains to the tidal flats and Minnamurra River to the south. The north-eastern portion of the subject land rises to low latite/basalt hills and benched slopes to the east as seen in Killalea Regional Park and Killalea Reserve.

Historically, the subject land has been utilised for grazing of cattle and agistment and is characterised by improved pasture. Most of the subject land is, therefore, cleared of remnant native vegetation and only retains a few native trees around the homestead and outbuildings (for which separate consent from the Council for their removal has already been received). Reedland dominated by Common Reed (*Phragmites australis*) and Broadleaf Cumbungi (*Typha orientalis*) occur in the road reserve and rail corridor to the west of the subject land, which collect surface run-off from the subject land and adjoining properties before draining to third order tributaries of Rocklow Creek. Stands of Swamp Oak (*Casuarina cunninghamiana*) also occur in the road reserve to the west of the subject land but are not present within the subject land itself.

4.3.2 Flora species

The flora assemblage within the subject land is most represented by introduced grass species, with 71% of the assemblage comprising exotic pasture grasses and grassland and urban weeds. Of these, two plants are recognised as a weed of national significance (WONS): Fireweed (*Senecio madagascariensis*) and Lantana (*Lantana camara*). They are also priority weeds for the Shellharbour LGA and are regulated by a 'prohibition on certain dealings' duty.

Twelve species are classed as High Threat Weeds for the purposes of application of the BAM (DPIE 2020). This includes Moth Vine (*Araujia sericifera*), Fireweed, Lantana, Large-leaved Privet (*Ligustrum lucidum*), Blackberry (*Rubus fruticosus* sp. aggregate), and the following grass species:

- Whiskey Grass (*Andropogon virginicus*)
- Narrow-leafed Carpet Grass (*Axonopus fissifolius*)
- *Briza subaristata*
- Kikuyu (*Cenchrus clandestinus*)
- Panic Veldtgrass (*Ehrharta erecta*)
- African Lovegrass (*Eragrostis curvula*)
- Paspalum (*Paspalum dilatatum*).

Of these species, Lantana and Moth Vine are classified as a manageable High Threat Weed, with the remaining classified as a non-manageable High Threat Weed.

4.3.3 Plant community types

One PCT was identified in the subject land corresponding to a patch of reedland and is the dominant PCT on the subject land (Figure 4.1). The eastern limit of a patch of reedland occurs within the subject land along a small section of the western boundary fence line. Most of the patch occurs off-site within the rail corridor outside of the subject land.

The reedland patch best fits *PCT 3962 – Coastal Floodplain Phragmites Reedland* and is described in Table 4.2. PCT 3962 is a tall freshwater reedland associated with alluvial backswamps on coastal floodplains and is dominated by Common Reed (*Phragmites australis*) and Broadleaf Cumbungi (*Typha orientalis*) in urban areas. PCT 3962 was previously identified as PCT 781 under the Illawarra Plant Community Type Vegetation Map, 2016. VIS_ID 4678 (DPE 2016).

Table 4.2 PCT 3962 - Coastal Floodplain Phragmites Reedland

Attribute	Description
PCT ID	3962
Common name	Coastal Floodplain Phragmites Reedland
Vegetation formation, class	Freshwater Wetlands, Coastal Freshwater Lagoons
Description and condition	The area of reedland that occurs within the subject land represents the eastern fringe of a patch of reedland occurring off-site to the west of the subject land. Occurring largely within the rail corridor, the reedland occupies a low-lying depression between the fence line and the ballast slope along the rail tracks. It is dominated by a tall and dense layer of Common Reed (*Phragmites australis*) with occasional occurrences of Broadleaf Cumbungi (*Typha orientalis*). The occurrence of PCT 3962 within the subject land is characteristically species-poor. There is no tree or shrub layer at this location and the ground layer is very sparse, supporting only a few native species in low abundance such as *Juncus usitatus* and Lesser Joyweed (*Alternanthera denticulata*), and a small number of exotic forbs such as Curled Dock (*Rumex crispus), Cyperus brevifolius*, and Common Sowthistle (*Sonchus oleraceus*). As it interfaces with the surrounding pasture grassland, it also contains pasture grasses and weeds including Lamb's Tongue (*Plantago lanceolata*), Purpletop (*Verbena bonariensis*), Burr Medic (*Medicago polymorpha*), *Aster* spp., Paspalum (*Paspalum dilatatum*) and Kikuyu *(Cenchrus clandestinus*). The reedland also contains infestations of Blackberry (*Rubus fruticosus* sp. aggregate) in localised patches with runners, or suckers trailing through the reedland.
Extent within disturbance footprint	0.01 ha
Survey effort	Plot P07

Table 4.2 PCT 3962 - Coastal Floodplain Phragmites Reedland

Attribute	Description
Justification of evidence and species used to identify the PCT	PCT 3962 is considered to be best fit for the occurrence of reedland within the subject land. It is consistent on the following points: • occurs within the Illawarra subregion • occurs at low elevations (i.e. at or below 5 m asl) • Common Reed (*Phragmites australis*) forms a mid-dense to dense upper layer • individual species in lower layer are rare • lacks a woody shrub layer. Other PCTs considered and excluded include: • PCT 3963, which is similar floristically to PCT 3962 but is associated with estuarine, tidal environments • PCT 3967, which can occur in similar environments to PCT 3962 but is distinguished floristically as it lacks a strong dominance of Common Reed (*Phragmites australis*) • PCT 3975, which describes non-woody freshwater wetlands on Quaternary alluvium south from the Hunter Valley that **are not** dominated by Common Reed (*Phragmites australis*). PCT 3962 is also characteristically species-poor (median species richness of 14 species) especially compared to PCT 3967 and 3975.
Status	BC Act - Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions.
Estimate of percent cleared value of PCT	73.11%

Photograph 4.1 **PCT 3962 - Coastal Floodplain Phragmites Reedland**

i Exotic grassland

The dominant vegetation type within the subject land is exotic grassland comprising improved pasture that is used for grazing of cattle and agistment. The dominant grass species recorded within improved pastures are Kikuyu (*Cenchrus clandestinus*), Paspalum (*Paspalum dilatatum*) and Yorkshire Fog (*Holcus lanatus*).

Other species recorded include Lamb's Tongue (*Plantago lanceolata*), White Clover (*Trifolium repens*), Purpletop (*Verbena bonariensis*), Blackberry (*Rubus fruticosus* sp. aggregate), Smooth Catsear (*Hypochaeris glabra*), Narrow-leaved Carpet Grass (*Axonopus fissifolius*), *Phalaris* spp., Paddy's Lucerne (*Sida rhombifolia*), Spear Thistle (*Cirsium vulgare*), Fireweed (*Senecio madagascariensis*), Creeping Oxalis (*Oxalis corniculata*), Dandelion (*Taraxacum officinale*), Prairie Grass (*Bromus catharticus*), Rat's-tail Fescue (*Vulpia* spp.), *Briza subaristata*, and Pale Pigeon Grass (*Setaria pumila*).

The presence of native species is very low and includes scattered, rare occurrences of forbs like Knob Sedge (*Carex inversa*), Variable Glycine (*Glycine tabacina*), and Lesser Joyweed (*Alternanthera denticulata*).

ii Planted trees

Woody vegetation is largely confined to the house paddock around the homestead and outbuildings.

Woody vegetation that has been recorded comprises mostly introduced trees and shrubs including Pepper Tree (*Schinus molle* var. *areira*), Large-leaved Privet (*Ligustrum lucidum*), Coral Tree (*Erythrina x sykesii*) and African Olive (*Olea europaea* ssp. *cuspidata*).

Native trees recorded include one Forest Red Gum (*Eucalyptus tereticornis*) and one Weeping Bottle Brush (*Callistemon viminalis*) at the front of the homestead, one Sandpaper Fig (*Ficus coronata*) next to a shed, and one Silky Oak (*Grevillea robusta*) at the fence line boundary of the house paddock. Silky Oak occurs naturally north from Coffs Harbour and is not indigenous to the Shellharbour area.

The proposed removal of the trees around the homestead and outbuildings is assessed under a separate DA determined by Shellharbour City Council for proposed demolition and bulk earthwork activities (DA0606/2022) and is not addressed further in this BDAR.

Photograph 4.2 Improved pasture within the subject land

4.3.4 Freshwater Wetlands on Coastal Floodplains

PCT 3962 conforms to the BC Act Final Determination for the Endangered Ecological Community (EEC) *Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions* (Freshwater Wetlands on Coastal Floodplain EEC) on the following points:

- occurs in the Sydney Basin Bioregion in the Shellharbour LGA
- is likely to be periodically inundated by fresh or brackish water
- occurs on alluvial soils on a coastal floodplain
- occurs below 20 m asl
- is a reedland structure and lacks woody species
- includes characteristic species Common Reed (*Phragmites australis*) and Broadleaf Cumbungi (*Typha orientalis*).

PCT 3962 does not conform to any listing advice for a threatened ecological community protected under the EPBC Act.

There are no other threatened ecological communities present within the subject land that are not associated with PCT 3962.

4.3.5 Vegetation zones

There is one vegetation zone identified and assessed in the BAM-C (Table 4.3). This vegetation zone is shown in Figure 4.1.

The BAM-C import data is provided in Appendix C.

Table 4.3 Vegetation zones

Vegetation zone ID	PCT ID	Condition	Area (ha)	Patch size class	No. plots required	No. plots completed	Plot IDs	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score
1	3962	moderate	0.01	>100 ha	1	1	P07	30.1	94.7	...	53.4

Source: EMM (2023); DFSI (2020, 2021); JHA (2022); Metromap (2023); DPIE (2021); DCSSS (2023)

0 100 200 m
GDA2020 MGA Zone 56
N

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KEY

- Subject land
- BAM plot
- Native planted trees
- Exotic trees
- Exotic grassland
- Cleared (non-vegetated)

Plant community type

- 3962 | Coastal Floodplain Phragmites Reedland

Threatened Ecological Community

- Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions (endangered, BC Act)

Existing environment

- Rail line
- Major road
- Minor road

Plant community types and vegetation zones

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Biodiversity Development Assessment Report
Figure 4.1

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5 Threatened species

5.1 Threatened species assessment process

To assess threatened species, the following steps were undertaken:

- Step 1: Identify the threatened species considered for assessment. This includes predicted species assessed for ecosystem credits and candidate species assessed for species credits. This step was completed based on review of the following data sources:
  - species predicted by the BAM-C (these are species that are associated with the PCTs recorded; the species distribution is within the IBRA subregion of the subject land; the subject land is within any specific geographic limitations for a species; and the study area meets the species' requirements for vegetation class and patch size)
  - threatened species that have been previously recorded in the locality
  - species predicted to occur by the EPBC Act PMST.
- Step 2: Assess habitat constraints listed for each species in the Threatened Biodiversity Data Collection (TBDC) based on field assessment of habitat constraints present and eliminate species that are vagrant in the IBRA subregion. This step results in a list of confirmed predicted species to be assessed for ecosystem credits and a list of confirmed candidate species credit species.

  It is noted that, in accordance with Appendix C (streamlined assessment module – small area) of the BAM (DPIE 2020), candidate species identified in Steps 1 and 2 that are at risk of Serious and Irreversible Impacts (SAII) are to be further assessed in accordance with Steps 3-5 of the BAM (DPIE 2020). Unless incidentally recorded on the subject land, candidate species not at risk of an SAII do not require further assessment.
- Step 3: Further assess habitat for candidate species credit species. After a field assessment of the habitat present in the study area, the likelihood of each threatened species occurring on the study area is assessed, based on the quality of habitat and the presence of microhabitats required by each species. Species without suitable habitat do not require further assessment.

5.2 Species habitat values

The dominant habitat type within with subject land is represented by improved pasture, or exotic grassland.

Although a first-order watercourse occurs within the subject land and drains off-site to the south-west, the watercourse is ephemeral and did not contain water during visit undertaken in wet years. The watercourse is not differentiated from the surrounding exotic grassland by a clear bank, stream bed and aquatic or wetland vegetation, except at the western boundary where a small extent of reedland vegetation is present.

Several buildings and structures are present within the subject land, including a homestead and associated outbuildings such as sheds. These will be demolished as part of a separate scope of works approved under DA0606/2022 by Shellharbour City Council.

The subject land lacks forested habitats and, therefore, lacks forest/woodland values like a well-developed canopy layer, hollow-bearing trees, abundant nectar- and blossom- resources, well-developed leaf litter components and abundant ground timber debris.

These habitat types are discussed in more detail below.

5.2.1 Exotic grassland

Exotic grassland vegetation occurs throughout the subject land and comprises the dominant vegetation. Exotic grassland was introduced by pasture improvement activities for grazing and agistment.

Exotic grassland within the subject land provides low habitat value for threatened flora and fauna because:

- the soil profile has been moderately disturbed for pasture improvement works
- the widespread occurrence of exotic perennial grasses like Paspalum (*Paspalum dilatatum*) and Kikuyu (*Cenchrus clandestinus*) is well-established and has outcompeted much of the native groundcover species
- woody debris and leaf litter are scarce to absent.

Considering the topography of the subject land, surface water appears to drain relatively quickly off the site into the watercourses to the west, limiting the degree of pooling on-site and, hence, the availability of flooded grassland for migratory and wetland birds.

Given the general proximity to larger patches of vegetation and habitat resources present in the wider study area, a range of threatened species could occur on occasion whilst moving through the subject land. This may include microbats, migratory wetland birds, and raptors. Native frog species may traverse exotic grassland to move between watery sites, particularly after rain. However, it is noted that the subject land is located at the watershed of the Rocklow Creek catchment and watery sites are largely downstream. Given the limited extent and quality of habitat in exotic grassland, threatened species are unlikely to rely on any resources contained within it.

5.2.2 Artificial structures

Several buildings and structures are present within the subject land, including a homestead and associated outbuildings such as sheds. The value of these structures as breeding roosts for specialist cave-breeding bat species is low. There is no evidence of guano, urine stains or insect casings recorded to indicate that these structures are currently being used as roosting habitat for microbats (Eco Logical Australia 2022).

It is noted that the demolition of the structures is assessed under a separate DA determined by Shellharbour City Council for proposed demolition and bulk earthwork activities (DA0606/2022). Potential impacts on threatened bats are assessed under that application and not assessed further in this BDAR. However, for completeness, the following comments are made regarding the value of the buildings structures as maternity roosts for cave-breeding bats, at risk of SAII, that are known from the surrounding locality, such as Large-eared Pied Bat (*Chalinolobus dwyeri*), Large Bent-winged Bat (*Miniopterus orianae oceanensis*) and Little Bent-winged Bat (*Miniopterus australis*).

The specialist cave-roosting Large-eared Pied Bat(*Chalinolobus dwyeri*) has highly specific requirements for maternity roosts (Pennay 2008). The building structures are unlikely to support a maternity colony of Large-eared Pied Bat (*Chalinolobus dwyeri*) because their size and overall structural character are not consistent with the features required for this species, such as sandstone caves and overhangs with domed roofs with indentations, et cetera. (DERM 2011).

Likewise, specialist cave-roosting bats such as Large Bent-winged Bat (*Miniopterus orianae oceanensis*) and Little Bent-winged Bat(*Miniopterus australis*) also have specific maternity roost requirements. These species require roost structures that allow high temperatures and humidity to build up; these conditions facilitate the development of young (DERM 2011; DELWP 2020; OEH 2022a; b). Bent-winged Bat species are also known to facilitate heat production by forming large breeding colonies where the heat produced by the bats themselves contribute to temperatures exceeding 30°C (DELWP 2020; OEH 2022a). Little Bent-winged Bat (*Miniopterus australis*) is known to share maternity sites with the Large Bent-winged Bat (*Miniopterus orianae oceanensis*) to take advantage of the high temperatures generated by the larger colony (Churchill 2008; OEH 2022b).

The building structures within the subject land are unlikely to provide suitable breeding habitat for cave-obligate species as they do not support stable microclimes (humidity and temperatures) required for breeding.

5.2.3 Aquatic and wetland habitat

There are limited aquatic values within the subject land. Wetland habitats comprising reedland vegetation is limited to a small section of the western boundary of the subject land. The small extent of freshwater wetland that extends into the subject land lacks open water. However, the area could provide foraging habitat for common frog species and some reptiles.

There are two dams located to the north of the subject land in adjacent lots. To the south of the subject land, there is a small water body within an extent of freshwater wetland as well as an ephemeral depression that were identified by Eco Logical Australia during a survey effort in January 2022 (Eco Logical Australia 2022). These southern waterbodies are contained within the additional lot acquired by HAC and are outside of the subject land.

Terrestrial species associated generally with dam and wetland habitats on the coast include Green and Golden Bell Frog (*Litoria aurea*) and Southern Myotis (*Myotis macropus*).

Green and Golden Bell Frog is associated with a wide range of ephemeral and permanent water bodies that are still and shallow, unshaded but with vegetation diversity on the banks of the waterbody and is adjacent to terrestrial grassy habitats and diurnal shelter sites (DCCEEW 2023a). The dams present near the subject land represent suboptimal habitat as there is limited fringing vegetation; furthermore, there has not been a record of Green and Golden Bell Frog within the subject land and records within the study area surrounding the subject land are over 40 years old (DPE 2022b). Whilst there is a low potential for Green and Golden Bell Frog to occur, surveys for Green and Golden Bell Frog (*Litoria aurea*) were undertaken at the southern waterbodies in 2022 by Eco Logical Australia (Eco Logical Australia 2022). The surveys consisted of call playback, tadpole dip netting and spotlighting over four nights in accordance with published survey guidelines (DECC 2009; DEWHA 2010). No Green and Golden Bell frog individuals or tadpoles were detected during the surveys.

Eco Logical Australia (2022) also undertook echolocation detection surveys for microbats, which detected potential calls for Southern Myotis. Southern Myotis has a strong association with streams and permanent waterways which are used for foraging, with roosting habitat within proximity of foraging habitat (Churchill 2008). The species is known from the locality of the subject land (DPE 2022b) as there is suitable habitat in the locality and would be expected to fly over from time to time. However, there is no suitable foraging habitat within the subject land in the form of permanent streams and waterbodies, and no animals were detected during roost cavity searches undertaken of the building structures (Eco Logical Australia 2022).

A first order stream is mapped within the subject land; however, habitat assessments during field surveys confirmed that this drainage system is undifferentiated from the surrounding exotic grassland as it is not defined by a clear stream bank, stream bed or aquatic vegetation. At the time of each survey event, the stream did not contain water. Site visits conducted by EMM for this assessment and by Eco Logical Australia (2022) occurred in wet years.

There is no KFH identified within the subject land and threatened fish species are unlikely to be present; however KFH has been identified downstream from the subject land.

5.3 Ecosystem credit species

Ecosystem credit species are threatened species that can be reliably predicted to use an area of land based on habitat surrogates. For the purposes of the BAM (DPIE 2020), ecosystem credit species are deemed to be offset through the habitat surrogates (PCTs) in which they occur.

A list of ecosystem credit species predicted to occur within the study area is provided in Table 5.1. The potential for these species to occur within the subject land was assessed in accordance with Section 5.2.2 of the BAM (DPIE 2020).

Table 5.1 Ecosystem credit species assessment

Scientific name	Common name	Sensitivity to gain	Habitat/geographic constraint from the TBDC	Justification for exclusion
Artamus cyanopterus cyanopterus	Dusky Woodswallow	Moderate	-	Not excluded
Botaurus poiciloptilus	Australasian Bittern	Moderate	• Water bodies • Brackish or freshwater wetlands	Not excluded
Calidris alba	Sanderling (Foraging)	High	-	Not excluded
Calidris canutus	Red Knot (Foraging)	High	-	Not excluded
Calidris ferruginea	Curlew Sandpiper (Foraging)	High	-	Not excluded
Calidris tenuirostris	Great Knot (Foraging)	High	-	Not excluded
Charadrius leschenaultii	Greater Sand-plover (Foraging)	High	-	Not excluded
Charadrius mongolus	Lesser Sand-plover (Foraging)	High	-	Not excluded
Circus assimilis	Spotted Harrier	Moderate	-	Not excluded
Daphoenositta chrysoptera	Varied Sitella	Moderate	-	Not excluded
Dasyurus maculatus	Spotted-tailed Quoll	High	-	Not excluded
Ephippiorhynchus asiaticus	Black-necked Stork	Moderate	• Swamps • Shallow, open freshwater or saline wetlands or shallow edges of deeper wetlands within 300 m of these swamps/ waterbodies • Shallow lakes, lake margins and estuaries within 300 m of these waterbodies	Not excluded
Epthianura albifrons	White-fronted Chat	Moderate	-	Not excluded
Haliaeetus leucogaster	White-bellied Sea-Eagle (Foraging)	High	• Waterbodies • Within 1 km of a rivers, lakes, large dams or creeks, wetlands and coastlines	Not excluded
Hieraaetus morphnoides	Little Eagle (Foraging)	Moderate	-	Not excluded
Hirundapus caudacutus	White-throated Needletail	High	-	Not excluded
Irediparra gallinacea	Comb-crested Jacana	Moderate	• Waterbodies • Freshwater wetlands with a good surface cover of floating aquatic vegetation	Not excluded

Table 5.1 Ecosystem credit species assessment

Scientific name	Common name	Sensitivity to gain	Habitat/geographic constraint from the TBDC	Justification for exclusion
Ixobrychus flavicollis	Black Bittern	Moderate	• Waterbodies • Land within 40 m of freshwater and estuarine wetlands, in areas of permanent water and dense vegetation	Not excluded
Lathamus discolor	Swift Parrot (Foraging)	Moderate	-	Not excluded
Limosa lapponica baueri	Bar-tailed Godwit (Foraging)	High	-	Not excluded
Limosa limosa	Black-tailed Godwit (Foraging)	High	-	Not excluded
Lophoictinia isura	Square-tailed Kite (Foraging)	Moderate	-	Not excluded
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	High	-	Not excluded
Miniopterus australis	Little Bent-winged Bat (Foraging)	High	-	Not excluded
Miniopterus orianae oceanensis	Large Bent-winged Bat (Foraging)	High	-	Not excluded
Neophema pulchella	Turquoise Parrot	High	-	Not excluded
Numenius madagascariensis	Eastern Curlew (Foraging)	High	-	Not excluded
Oxyura australis	Blue-billed Duck	Moderate	-	Not excluded
Pandion cristatus	Eastern Osprey (Foraging)	Moderate	-	Not excluded
Petroica boodang	Scarlet Robin	Moderate	-	Not excluded
Pteropus poliocephalus	Grey-headed Flying-fox (Foraging)	High	-	Not excluded
Rostratula australis	Australian Painted Snipe	Moderate	-	Not excluded
Stictonetta naevosa	Freckled Duck	Moderate	-	Not excluded
Thinornis cucullatus cucullatus	Eastern Hooded Dotterel (Foraging)	High	-	Not excluded
Tyto novaehollandiae	Masked Owl (Foraging)	High	-	Not excluded
Xenus cinereus	Terek Sandpiper (Foraging)	High	-	Not excluded

5.4 Species credit species

5.4.1 Candidate species assessment

As this BDAR is being prepared in accordance with Appendix C (streamlined assessment module – small area) of the BAM (DPIE 2020), only candidate species at risk of SAII have been predicted by the BAM-C. These species are shown in Table 5.2.

An assessment of the geographic and landscape constraints has been provided for each species, with a justification provided where each species has been excluded, in accordance with Steps 1 to 3 (Section 5.2.1 to Section 5.2.3) of the BAM (DPIE 2020).

The Curlew Sandpiper (*Calidris ferruginea*), Great Knot (*Calidris tenuirostris*), Swift Parrot (*Lathamus discolor*) and Eastern Curlew (*Numenius madagascariensis*) have been excluded from further assessment as the subject land does not contain Important Habitat as per the Important Habitat Map.

Similarly, the Little Bent-winged Bat (*Miniopterus australis*) and Large Bent-winged Bat (*Miniopterus orianae oceanensis*) have also been excluded due to lack of habitat constraints for breeding. Furthermore, as the demolition of the artificial structures present within the subject land are captured under a separate DA and approval pathway (DA0606/2022), all suitable habitat for these species has been considered and no further assessment is required within this BDAR.

There is no Important Habitat mapped for the Eastern Hooded Dotterel (*Thinornis cucullatus cucullatus*) and no habitat or geographic constraints for breeding defined for the species. This species is a shorebird associated with sandy ocean beaches; nests are located on flat beaches above the high tide mark or on the side of sparsely vegetated dunes and are generally built into depressions in the sand (TSSC 2014; OEH 2021). Breeding habitat in the zone between the fore-dune and beach strandline does not occur within the subject land and no microhabitats comprising soft, loose sand scrapes are present within the subject land. The Eastern Hooded Dotterel (*Thinornis cucullatus cucullatus*) is highly unlikely to breed within the subject land and has been excluded on the basis of lack of suitable breeding microhabitats.

Table 5.2 Candidate species credit assessment

Scientific name	Common name	Habitat constraint from the TBDC	Habitat/geographic constraint present in the disturbance footprint? (Step 2)	Suitable microhabitats present and habitat not degraded? (Step 3)	Candidate species?	Justification	Sensitivity to gain class	BC Act status	EPBC Act status
Calidris ferruginea	Curlew Sandpiper (Breeding)	As per Important Habitat Map	No	No	No	Habitat constraint not present	High	E	CE
Calidris tenuirostris	Great Knot (Breeding)	As per Important Habitat Map	No	No	No	Habitat constraint not present	High	V	CE
Lathamus discolor	Swift Parrot (Breeding)	As per Important Habitat Map	No	No	No	Habitat constraint not present	Moderate	E	CE
Miniopterus australis	Little Bent-winged Bat (Breeding)	• Caves • Cave, tunnel, mine, culvert or other known structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave • Observation type code 'E nest-roost' • With numbers of individuals >500 • Or from the scientific literature	No	No	No	Habitat constraint not present	Very High	V	-
Miniopterus orianae oceanensis	Large Bent-winged Bat (Breeding)	• Caves • Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records with microhabitat code "IC - in cave • Oservation type code 'E nest-roost' • With numbers of individuals >500	No	No	No	Habitat constraint not present	Very High	V	-

Table 5.2 Candidate species credit assessment

Scientific name	Common name	Habitat constraint from the TBDC	Habitat/geographic constraint present in the disturbance footprint? (Step 2)	Suitable microhabitats present and habitat not degraded? (Step 3)	Candidate species?	Justification	Sensitivity to gain class	BC Act status	EPBC Act status
Numenius madagascariensis	Eastern Curlew	As per Important Habitat Map	No	No	No	Habitat constraint not present	High	-	CE
Thinornis cucullatus cucullatus	Eastern Hooded Dotterel (Breeding)	-	-	No	No	Breeding microhabitats (comprising soft, loose sand scrapes situated between the base of fore-dunes and the beach strandline zone)(TSSC 2014; OEH 2021) are not present within the subject land. The species is highly unlikely to breed within the subject land.	High	CE	V

6 Impact assessment

This chapter identifies the potential impacts of the project on biodiversity values and the measures taken to avoid and minimise the impacts. Recommendations are also outlined to further avoid any residual impacts.

6.1 Potential direct and indirect impacts

6.1.1 Direct impacts

The direct impact of the project is limited to the clearing of approximately 0.01 ha of PCT 3962, which represents 0.01 ha of the EEC Freshwater Wetlands on Coastal Floodplain.

The project will also clear approximately 9.95 ha of exotic grassland.

6.1.2 Indirect impacts

The indirect impact of the project on biodiversity is expected to involve:

- sedimentation and runoff impacts to downstream watercourses and vegetation during construction and operation of the project
- weed and pathogen introduction and spread during construction and operation of the project.

i Sedimentation and runoff

Construction and operation of the project may lead to sedimentation and runoff, which may affect water quality in downstream receiving waterbodies and habitats. Rocklow Creek is a catchment area to the west of the project that feeds into the Minnamurra River, a wave dominated barrier estuary.

During the project, sediment may be mobilised and transported by surface water during rainfall events, and potentially discharging into watercourses and drainage lines potentially reducing water quality in downstream and offsite aquatic habitats. Increased suspended sediments can reduce light penetration into the water column, reducing photosynthesis of aquatic macrophytes, and decreasing dissolved oxygen levels.

Erosion and sediment control measures will be implemented during the project. Strict controls will be put in place to ensure sediment does not run off into watercourses.

ii Weeds and pathogens

The project has the potential to facilitate dispersal of weed species. Uncontrolled movement of vehicles, equipment and personnel is the key vector of transmission, in particular vehicles and equipment sourced from regions beyond the disturbance footprint, which may introduce new species to the locality. Many weed species thrive on ground disturbance and will rapidly colonise disturbed areas in advance of native species recolonisation.

Increased pest flora abundance has adverse impacts on native vegetation and biodiversity, as well as potential negative economic effects on local land uses.

Weed impacts will be mitigated during the construction and operational phases of the project and will include measures such as weed containment and disposal protocols.

6.2 Prescribed impacts

An assessment of prescribed impacts is provided in Table 6.1. No prescribed impacts have been identified for the project.

Table 6.1 Prescribed impacts

Feature	Present on site	Description of feature characteristics and location	Potential impacts	Threatened species or community using or dependent on feature	Section of report where prescribed impact is addressed
Karst, caves, crevices, cliffs, rocks and other geological features of significance	No	n/a	None identified. The subject land does not contain geologically significant features, rocky areas that represent habitat for threatened species or ecological communities.	n/a	n/a
Human-made structures	Yes	Buildings and ancillary structures.	None identified. Furthermore, buildings and ancillary structures are assessed as part of a separate DA for proposed bulk earthwork activities (DA0606/2022) and not covered in this BDAR.	None identified	n/a
Non-native vegetation	Yes	Exotic grassland	None identified. The removal of this vegetation is likely to have a low impact due to the highly degraded nature of the vegetation from historical cattle grazing and clearing.	None identified	n/a
Connectivity of habitat for threatened species	No	n/a	The vegetation on the subject land is highly fragmented, with a rail corridor and the Princes Highway preventing connectivity in the east to west direction. The subject land does not contain vegetation that forms part of a habitat corridor.	n/a	n/a
Waterbodies, water quality and hydrological processes that sustain threatened species and threatened ecological communities	No	n/a	None identified. There are no waterbodies present on the subject land. Surface water run-off is currently directed towards the railway line as sheet flow and is conveyed under the railway line via culverts (Enstruct 2023b). Surface water run-off is likely to contribute to the recharge of water in reedland vegetation comprising Freshwater Wetland TEC offsite. Management of surface water will involve the collection of surface run-off (which is likely to increase due to increase in impervious surfaces) and controlling peak discharge rates (to pre-existing discharge rates) via onsite stormwater detention (OSD) basins, which will located on the south-western boundary of the subject land (Enstruct 2023b; Taylor Brammer 2023b). As such, the quality and rate of discharge are unlikely to change such that Freshwater Wetland TEC offsite would be adversely affected.	n/a	n/a

Table 6.1 Prescribed impacts

Feature	Present on site	Description of feature characteristics and location	Potential impacts	Threatened species or community using or dependent on feature	Section of report where prescribed impact is addressed
Wind turbine strikes on protected animals	No	n/a	None identified. There is no wind farm proposed in the subject land.	n/a	n/a
Vehicle strikes on threatened fauna that are part of a threatened ecological community	No	n/a	None identified. 0.01 ha of Freshwater Wetland EEC occurs within the subject land, with larger connecting area occurring offsite along the western boundary of the subject. However, there is unlikely to be threatened fauna present that would rely on this small area of Freshwater Wetland EEC that would be at risk from vehicle strike.	n/a	n/a

6.3 Avoidance, minimisation and mitigation

6.3.1 Avoidance and minimisation

The impacts of the project are limited to removal of 0.01 ha of reedland wetland consistent with the Freshwater Wetland EEC. This area of reedland occurs as part of a larger, offsite area of wetland along the western boundary of the subject land at a natural low point where surface water discharges into the rail corridor.

The wetland will be impacted by construction works including the construction of a sediment basin and batters, installation of sediment control fencing along the western boundary and establishment of a maintenance pathway around the basin (refer to erosion and sediment control plan, sheet 1, drawing no. 5988-ENS-CV-5101 rev 02; Enstruct 2023a). The sediment basin will be converted to a wetland/onsite stormwater detention (OSD) basin. The location of the OSD basin needs to be located as close as possible to the lowest point of the subject land (Enstruct 2023b) and so it is not possible to avoid impacts on the reedland.

6.3.2 Mitigation

The project has potential to result in adverse indirect impacts on Freshwater Wetland EEC if construction were to proceed without mitigation measures. This includes transportation of construction waste, pollutants dust and/or weed propagules via surface run-off into offsite waterways to the west of the subject land, where the majority of the local occurrence of Freshwater Wetland EEC occurs.

Standard measures will be put in place to minimise and mitigate the indirect impacts of weeds and pathogens and sedimentation and runoff on offsite occurrence of Freshwater Wetland EEC. The avoidance and mitigation measures are identified in Table 6.2.

As described in Section 4.3.1, the subject land is largely an open area of exotic pasture with very little tree cover. There is a clear opportunity to enhance connectivity within the locality through the implementation of the landscape strategy (Taylor Brammer 2023a) to augment the stepping-stone values of the Dunmore Hills Minnamurra regional biodiversity corridor (DPE 2023). The landscape strategy is a well-considered green-space strategy that will increase the cover of canopy trees to 22% of the subject land and will reintroduce native indigenous trees species to the subject land (Taylor Brammer 2023a). The landscape strategy also includes extensive plantings of native indigenous shrub and groundcovers in assemblages characteristic of native plant communities indigenous to the locality. The reintroduction of vegetated habitat through planting will:

- provide stepping-stone habitat connections between the coastal reserve system in the east (e.g. Killalea Regional Park, Killalea Reserve) and habitats on the hinterland escarpment and slopes to the west
- increase the area of local habitat for native fauna such as bats, birds and other pollinators, as well as wetland species around the OSD basin
- provide visual amenity for the project.

Improvement objectives are included in Table 6.2.

Table 6.2 Avoidance and mitigation measures

Impact	Action	Intended outcome	Timing	Responsibility
General	A construction environmental management plan (CEMP) should be prepared to incorporate the design, construction and post-construction environmental management measures proposed. This should include (but not be limited to) issues relating to vegetation management, weed control, and erosion and sediment control and should include plans clearly showing areas to be cleared, trees to be retained and any other 'no go zones'. The CEMP is to be placed in an accessible location to be viewed by all site personnel (site office for example).	-	Prior to construction	Contractor
Increased sedimentation due to construction, including potential indirect impacts to Freshwater Wetland TEC	Sediment controls, including fencing and sediments traps, should be installed in any areas where works will occur in proximity to low lying vegetation or streams, or on slopes. Refer to erosion and sediment control plan, sheet 1, drawing no. 5988-ENS-CV-5101 rev 02 (Enstruct 2023a).	Minimise indirect impacts on retained vegetation, particularly on PCT 3962 and downstream habitats.	Prior to and during construction	Contractor
Increased weed encroachment into adjacent vegetation	• All weeds should be appropriately removed offsite and where possible, without stockpiling. • If stockpiling of weeds is required before removal from site, weeds are to be stockpiled and appropriately covered and located in areas away from vegetation to be retained to minimise the spread of seed and other propagules. • Where feasible, it is recommended weeds are cut and roots are kept minimising erosion. • Hygiene protocols should be implemented including hygiene procedures for equipment, footwear, and clothing. Ensure works vehicles are washed down prior to entering the works area.	Minimise indirect impacts on retained vegetation, particularly on nearby streams	Prior to and during construction	Contractor
Pathogen and disease introduction	Hygiene measures should be implemented as part of the CEMP to minimise the risk of pathogen and diseases spread on site (including Chytrid fungus), and should include procedures for equipment, footwear, and clothing. Ensure works vehicles are washed down prior to entering the works area.	Minimise indirect impacts on adjacent wetland vegetation and any native amphibians occurring in wetland vegetation offsite.	Prior to and during construction	Contractor
Weed establishment	Complete post construction weed control activities should be undertaken in accordance with the weed control protocol.	No exotic species becoming established in the area.	Prior to and during construction	Contractor

Table 6.2 Avoidance and mitigation measures

Impact	Action	Intended outcome	Timing	Responsibility
Improve local biodiversity values	• Revegetation of the subject land should be implemented in accordance with the landscape strategy (Taylor Brammer 2023a). • The revegetation should follow the planting schedule and landscape plans detailed in the Landscape SSDA Package (Taylor Brammer 2023c) or any subsequent approved landscape plan.	Improve and enhance stepping-stone values for local habitat connectivity. Increase area of habitat for native wildlife.	During construction and post-construction.	Contractor

6.4 Serious and Irreversible Impacts

An impact is to be regarded as a SAII if it is likely to contribute significantly to the risk of a threatened species (including endangered populations) or an ecological community becoming extinct based on the following four principles:

- Principle 1: The impact will cause a further decline of a species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline.
- Principle 2: The impact will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size.
- Principle 3: The impact is made on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution.
- Principle 4: The impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity, and therefore its members are not replaceable.

As this BDAR is being prepared in accordance with Appendix C (streamlined assessment module – small area) of the BAM (DPIE 2020), only species at risk of SAII are predicted as candidate species for the project.

The habitat constraints for the predicted SAII candidate species are not present within the subject land, therefore no further assessment of SAII candidate species is required.

6.5 Impact summary

6.5.1 Impacts not requiring assessment

In accordance with Section 9.3 of the BAM (DPIE 2020), areas not requiring assessment are exotic grassland within the subject land.

There are no areas of native vegetation impacts that do not require offset.

6.5.2 Impacts requiring offset

The vegetation integrity score for the impacted native freshwater wetland vegetation within the subject land is greater than 15, surpassing the threshold for offset in accordance with the BAM (DPIE 2020). As a result, one ecosystem credit is required. No species credits are required (Appendix D).

A summary of the impacts requiring offset is outlined in Table 6.3 and the area requiring offset is identified in Figure 6.1.

Table 6.3 Impact requiring offset

Vegetation zone	PCT ID	Condition	Area	Future vegetation integrity score	Change in vegetation integrity score	BRW	TEC	Potential SAII	Credits required
3962_moderate	3962	Moderate	0.01 ha	0	-53.4	2.0	Freshwater wetland EEC	No	1

Source: EMM (2023); DFSI (2020, 2021); JHA (2022); Metromap (2023); DPIE (2021); DCSSS (2023)

0 100 200 m
GDA2020 MGA Zone 56
N

KEY

- Subject land
- Impacts requiring offset

Existing environment

- Rail line
- Major road
- Minor road

Impacts requiring offset

New Shellharbour Hospital
Biodiversity Development Assessment Report
Figure 6.1

EMM
creating opportunities

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7 Assessment of other relevant biodiversity legislation

An assessment of other relevant biodiversity legislation is provided below as it relates to the project.

7.1 Commonwealth

7.1.1 *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act)

An assessment of the impacts of the project on MNES was undertaken to determine whether referral of the project to the Commonwealth Minister for the Environment is required. MNES relevant to the project were predicted by the PMST (DCCEEW 2023b) and their likelihood of occurrence assessed (Appendix E).

The MNES that were considered to have some potential to occur are summarised in Table 7.1. In determining the significance of impacts associated with the project on these MNES, the relevant criteria listed in the Matters of National Environmental Significance – Significance Impact Guidelines 1.1 (DotE 2013) were applied. EPBC Act assessments of significance are provided in Appendix F for one threatened species that has a low potential to occur.

Table 7.1 Assessment of the project against the EPBC Act

MNES	PMST predictions	Potential for significant impact
Threatened species	Two threatened fauna species were predicted to occur. These species are assessed as having low potential to occur within the subject land: • Large-eared Pied Bat (*Chalinolobus dwyeri*) • Green and Golden Bell Frog (*Litoria aurea*). Targeted survey for Green and Golden Bell Frog (*Litoria aurea*), and echolocation detection surveys as well as roost cavity searches for Large-eared Pied Bat (*Chalinolobus dwyeri*) did not detect presence of either species in the subject land (Eco Logical Australia 2022).	The potential occurrence of Large-eared Pied Bat (*Chalinolobus dwyeri*) is associated with the demolition of the building and ancillary structures, which is assessed under a separate DA determined by Shellharbour City Council for proposed demolition and bulk earthwork activities (DA0606/2022). A significant impact assessment was conservatively undertaken for Green and Golden Bell Frog (*Litoria aurea*) to assess the potential significance of any project impacts on this species. The assessment concluded that the project is unlikely have a significant impact on Green and Golden Bell Frog (Appendix F).
Threatened ecological communities	No EPBC Act listed TECs were recorded within the subject land.	Unlikely
Migratory species	No migratory species were considered to have the potential to occur within the subject land.	Unlikely
Wetlands of international importance	The subject land does not include any wetlands of international importance and is not upstream of, and proximate to any Ramsar sites.	Unlikely.

7.2 State

7.2.1 *Biosecurity Act 2015*

All plants in NSW are regulated with a general biosecurity duty under the Biosecurity Act. There is an obligation for the project to ensure that the biosecurity risks of all weed species recorded on site are prevented, eliminated, or minimised, so far as is reasonably practicable.

Two weed species, Fireweed and Lantana, have specific biosecurity duties under the Biosecurity Act as listed in Table 7.2. These species, and the biosecurity security duties described, should be a key focus of weed management activities associated with the proposed development.

Table 7.2 Biodiversity duties for priority weeds

Priority weed	Biosecurity duty for the Southeast weed management area
Fireweed *Senecio madagascariensis*	**Prohibition on certain dealings** • Must not be imported into the state, sold, bartered, exchanged or offered for sale. **Regional Recommended Measure** • Exclusion zone: whole of region except the core infestation area of Wollongong, Kiama, Shellharbour, Eurobodalla, Shoalhaven, Bega Valley and Wingecaribee councils – Whole region: Land managers should mitigate the risk of new weeds being introduced to their land. The plant should not be bought, sold, grown, carried or released into the environment. • Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. – Core area: Land managers reduce impacts from the plant on priority assets.
Lantana *Lantana camara*	**Prohibition on certain dealings** • Must not be imported into the state, sold, bartered, exchanged or offered for sale. **Regional Recommended Measure** • Exclusion zone: whole region excluding the core infestation area of Eurobodalla, Kiama, Shellharbour, Wollongong and the Shoalhaven local government area north of the Lantana Containment Line at 35’11”42 S – Whole region: Land managers should mitigate the risk of new weeds being introduced to their land. The plant should not be bought, sold, grown, carried or released into the environment. • Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. – Core area: Land managers reduce impacts from the plant on priority assets.

7.2.2 *Fisheries Management Act 1994* (FM Act)

The subject land does not contain any KFH. A first order stream is mapped within the subject land; however, habitat assessments during field surveys confirmed that this drainage system is undifferentiated from the surrounding exotic grassland as it is not defined by a clear stream bank, stream bed or aquatic vegetation. It is unlikely to provide habitat for threatened freshwater fish species listed under the FM Act

The project is unlikely to indirectly impact fish stocks, destroy or directly impact fish habitat or obstruct fish passage.

There is KFH mapped downstream of the subject land. The project will manage the rate and quality of stormwater discharge from the subject land via the design and construction of onsite stormwater detention (OSD) basins as well as implementation of erosion and sediment controls (Enstruct 2023b; Taylor Brammer 2023b).

For this reason, no further assessment of the potential impacts on KFH or threatened aquatic species is required.

7.2.3 *Water Management Act 2000*

i Groundwater dependent ecosystems

A groundwater assessment prepared for the project indicates that earthwork excavations may intercept groundwater, which would require dewatering during construction (JK Environments 2023). Dewatering activities during construction are permitted but is regulated through licencing provisions administered by WaterNSW or the Natural Resource Access Regulator (NRAR). Prior to obtaining the necessary licences, groundwater modelling would be undertaken to predict the groundwater take, groundwater drawdown behind the retention system (JK Environments 2023).

There are no aquatic, subterranean or terrestrial GDEs identified within the subject land (BOM 2023). There are three areas of terrestrial GDEs mapped downstream of the subject land that are located within 50 metres of the subject land. Mainly occurring within the corridor between the subject land and the Princes Highway, the terrestrial GDE corresponds to freshwater wetland vegetation represented by reedlands (BOM 2023).

The reedland is likely to receive surface and subsurface water from a large catchment area (see Figure 5 and 6, Enstruct 2023b); the western fall of the subject land forms part of this catchment. The project is unlikely to significantly change the amount of water received by the reedland as the catchment area is larger than the subject land.

Notwithstanding, the project is unlikely to reduce the overall availability and quality of water that is discharged to the reedland during and post-construction. The volume of surface run-off from the subject land is expected to increase due to the increase in impervious surfaces; the management of stormwater will involve the collection of surface run-off and controlling peak discharge rates (to pre-existing discharge rates) via onsite stormwater detention (OSD) basins that will act as a natural filtration system (Enstruct 2023b; Taylor Brammer 2023b). To mitigate the expected reduction in the amount of water infiltrating to the groundwater system, the OSD basins will be designed as an unlined pond to allow some recharge of the groundwater system following rainfall events to mimic the existing conditions downstream of the site, which will contribute to aquifer recharge and baseflow in Rocklow Creek (Enstruct 2023b).

ii Riparian land

As described in Section 5.2.3, a first order stream is mapped within the subject land. The stream is undifferentiated from the surrounding exotic grassland as it is not defined by a clear stream bank, stream bed or aquatic vegetation. Surface water run-off is directed towards the railway line as sheet flow and does not necessarily collect in this first order drain (Enstruct 2023b). The first order stream did not contain water at the time of survey and is unlikely to hold water for any substantial period of time.

The project will result in the removal of the mapped first order watercourse but will maintain hydrological function of the site via civil design and stormwater management of surface water and overland flow. Since the mapped first order watercourse has limited function as aquatic habitat for native fauna and does not provide wetland vegetation that would manage quality of surface water discharging from the site, it is considered to have limited biodiversity value. A Riparian Zone Management Assessment is not considered relevant or applicable to the project.

8 Conclusion

This BDAR has been prepared based on the requirements of, and information provided under, the BAM (DPIE 2020) and clause 6.15 of the BC Act. Due to the proposed small area of impact of the project, this BDAR has been prepared in accordance with Appendix C (streamlined assessment module – small area*)* of the BAM (DPIE 2020).

The impacts of the project are limited to removal of 0.01 ha of reedland wetland conforming to the EEC Freshwater Wetlands on Coastal Floodplain. The indirect impacts of the project are expected to be associated primarily with potential local downstream impacts on reedland occurring offsite in the rail corridor. The mitigation actions recommended within this BDAR have been prepared to address management of potential run-off into adjacent wetland habitats.

The following offset requirements have been determined for the project:

- 1 ecosystem credit, to compensate for impacts on 0.01 ha of PCT 3962.

This BDAR has concluded that there are no candidate entities for SAII within the subject land and, therefore, the project is unlikely to cause any SAII to any threatened species or TECs.

This BDAR has also considered impacts on threatened species and TECs listed under the EPBC Act. It has concluded that the project is unlikely to result in a significant impact to the MNES occurring or considered to have potential to occur within the subject land or surrounds.

The proponent, NSW HI proposes to purchase credits from the market, or pay into the Biodiversity Conservation Fund (BCF) to fulfill their offset obligations for the project.

References

BOM 2023, *Groundwater Dependent Ecosystems Atlas*, Australian Government, Bureau of Meterology, accessed 22 May 2023, from http://www.bom.gov.au/water/groundwater/gde/

Churchill, S. 2008, *Australian Bats*, 2nd edition. Allen & Unwin, Crows Nest.

DAWE 2022a, *Australian Ramsar Wetlands*, **Internationally important wetlands**, Australian Government, Department of Agriculture, Water and the Environment, accessed 20/01/2022, from https://www.awe.gov.au/water/wetlands/australian-wetlands-database/australian-ramsar-wetlands

----- 2022b, *Directory of Important Wetlands in Australia*, Australian Government, Department of Agriculture, Water and the Environment, accessed 20/01/2022, from https://www.awe.gov.au/water/wetlands/australian-wetlands-database/directory-important-wetlands

DCCEEW 2021, *Interactive Flying-fox Web Viewer, from*, **Monitoring Flying-Fox Populations**, Australian Government, Department of Climate Change, Energy, the Environment and Water, accessed from https://www.dcceew.gov.au/environment/biodiversity/threatened/species/flying-fox-monitoring

----- 2022, *Species Profile and Threats Database*, Australian Government, Department of Climate Change, Energy, the Environment and Water, accessed from http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

----- 2023a, *Litoria aurea - Green and Golden Bell Frog*, **in Species Profile and Threats Database**, Australian Government, Department of Climate Change, Energy, the Environment and Water, accessed from http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=1870

----- 2023b, *Protected Matters Search Tool*, Australian Government, Department of Climate Change, Energy, the Environment and Water, accessed from https://www.dcceew.gov.au/environment/epbc/protected-matters-search-tool

DEC 2005, *Draft Recovery Plan for the Green and Golden Bell Frog (Litoria aurea)*, Department of Environment and Conservation NSW, Hurstville, NSW.

DECC 2009, *Amphibians*, Threatened species survey and assessment guidelines: field survey methods for fauna. NSW Department of Environment and Climate Change, Sydney.

DELWP 2020, *National Recovery Plan for the Southern Bent-wing Bat Miniopterus orianae bassanii*, Victorian Government Department of Environment, Land, Water and Planning, Melbourne.

DERM 2011, *National recovery plan for the Large-eared Pied Bat Chalinolobus dwyeri*, Department of Environment and Resource Management, Brisbane.

DEWHA 2009a, *Significant impact guidelines for the vulnerable green and golden bell frog (Litoria aurea)*, Nationally threatened species and ecological communities Background paper to the EPBC Act policy statement 3.19. Australian Government Department of the Environment, Water, Heritage and the Arts, Canberra.

----- 2009b, *Significant impact guidelines for the vulnerable green and golden bell frog (Litoria aurea)*, Nationally threatened species and ecological communities EPBC Act policy statement 3.19. Aystralian Government Department of the Environment, Water, Heritage and the Arts, Canberra.

----- 2010, *Survey guidelines for Australia's threatened frogs*, Guidelines for detecting frogs listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999*. Australian Government, Department of the Environment, Water, Heritage and the Arts, Canberra.

DoEE 2018, *Interim Biogeographic Regionalisation of Australia (IBRA)* Version 7. Australian Government, Department of Energy and Environment, Canberra.

DotE 2013, *Matters of National Environmental Significance - Significant impact guidelines 1.1*, Australian Government, Department of the Environment, Canberra.

DPE 2016, *Illawarra Plant Community Type Vegetation Map, 2016. VIS_ID 4678*, Vector dataset. State Government of NSW and Department of Planning and Environment, Sydney.

----- 2021a, *High Environmental Values for the Illawarra-Shoalhaven Regional Plan Area*, Vector dataset. State Government of NSW and Department of Planning and Environment.

----- 2021b, *Illawarra - Shoalhaven Regional Plan Corridors*, Vector dataset. State Government of NSW and Department of Planning and Environment.

----- 2022a, *Areas of Outstanding Biodiversity Value register*, NSW Department of Planning and Environment, accessed from https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/areas-of-outstanding-biodiversity-value/area-of-outstanding-biodiversity-value-register

----- 2022b, *NSW BioNet*, NSW Department of Planning and Environment, accessed from https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/nsw-bionet

----- 2022c, *NSW BioNet Vegetation Classification application*, NSW Department of Planning and Environment, accessed from https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/nsw-bionet/about-bionet-vegetation-classification

----- 2022d, *NSW State Vegetation Type Map*, Raster dataset. State Government of NSW and Department of Planning and Environment, Sydney.

----- 2023, *Illawarra Shoalhaven Regional Biodiversity Corridors 2023*, Vector dataset. State Government of NSW and Department of Planning and Environment.

DPI 2013, *Policy and Guidelines for Fish Conservation and Management*, 2013 update. NSW Department of Primary Industries.

----- 2022a, *Fisheries Spatial Data Portal*, NSW Department of Primary Industries, accessed from https://www.dpi.nsw.gov.au/about-us/research-development/spatial-data-portal

----- 2022b, *NSW WeedWise v3.2.3*, NSW Department of Primary Industries, accessed 19 December, from https://weeds.dpi.nsw.gov.au/

DPIE 2020, *Biodiversity Assessment Method*, NSW Department of Planning, Industry and Environment, Parramatta.

----- 2021, *Illawarra Shoalhaven Regional Plan 2041*, NSW Department of Planning, Industry and Environment, Parramatta.

----- 2022, *eSPADE v2.2*, **NSW Soil and Land Information**, accessed from https://www.environment.nsw.gov.au/eSpade2Webapp/

Eco Logical Australia 2022, *New Shellharbour Hospital Threatened Species Surveys*, Prepared for NSW Health Infrastructure.

EMM 2021, *New Shellharbour Hospital Preferred Site - Biodiversity Constraints Assessment*, Prepared for Savills Australia on behalf of NSW Health Infrastructure.

Enstruct 2023a, *New Shellharbour Hospital - Erosion and sediment control plan sheet 1, drawing no. 5988-ENS-CV-5101 rev02*, 25/5/2023 issue for SSDA.

Enstruct 2023b, *New Shellharbour Hospital SSDA Report - Civil (Rev F)*, Prepared for Health Infrastructure. Enstruct Group Pty.

JK Environments 2023, *Assessment of groundwater conditions (SEARS 13) for proposed New Shellharbour Hospital development at 89 Dunmore Road, Dunmore NSW. E34300B2rpt-GW-rev3*, Prepared for Health Infrastructure. JK Environments Pty Ltd.

NOW 2012, *NSW Aquifer Interference Policy: NSW Government policy for the licensing and assessment of aquifer interference activities*, NSW Department of Primary Industries, Office of Water.

NSW Government 2023, *SEED*, **The Central Resource for Sharing and Enabling Environmental Data in NSW**, accessed from https://www.seed.nsw.gov.au/

OEH 2017, *Mitchell Landscapes*, Version V3.1. NSW Office of Environment and Heritage, Sydney.

----- 2021, *Eastern Hooded Dotterel - profile*, website last updated 13 October 2021. NSW Government Office of Environment and Heritage, accessed 23 May 2023, from https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10803

----- 2022a, *Large Bent-winged Bat - profile*, website last updated 09 September 2019. NSW Office of Environment and Heritage, accessed from https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10534

----- 2022b, *Little Bent-winged Bat - profile*, website last updated 24 March 2020. NSW Office of Environment and Heritage, accessed from https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10533

Pennay, M. 2008, "A maternity roost of the Large-eared Pied Bat *Chalinolobus dwyeri* (Ryan) (Microchiroptera: Vespertilionidae) in central New South Wales Australia", *Australian Zoologist* **34**: pp. 564 - 569.

Royal Botanic Gardens and Domain Trust 2022, *PlantNET (The NSW Plant Information Network System)*, accessed from https://plantnet.rbgsyd.nsw.gov.au/

Taylor Brammer 2023a, *New Shellharbour Hospital - Landscape Design Report (Rev M)*, Taylor Brammer Landscape Architects Pty Ltd, Woollahra.

Taylor Brammer 2023b, *New Shellharbour Hospital - Landscape Master Plan & Landscape Design Notes*, Drawing no. 130562-SH-CAS-LA-DWG-11-99-001. Taylor Brammer Landscape Architects Pty Ltd, Woollahra.

Taylor Brammer 2023c, *New Shellharbour Hospital - Landscape SSDA Package*, Drawing no. 130562-SH-CAS-LA-DWG-01-99-000 rev K. Taylor Brammer Landscape Architects Pty Ltd, Woollahra.

TSSC 2014, *Conservation Advice Thinornis rubricollis rubricollis hooded plover (eastern)*, **In Species Profile and Threats Database**, Threatened Species Scientific Committee, accessed 23 May 2023, from https://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=66726

Vezgoff, P. 2022, *Arboricultural Development Assessment Report*, New Shellharbour Hospital, Dunmore Road, Dunmore NSW 2529. Moore Trees Arboricultural Services, Austinmer.

Appendix A
BDAR requirements compliance

EMM
creating opportunities

Assessment of compliance with BDAR minimum information requirements: Streamlined assessment module – small area

BDAR section	BAM ref.	BAM requirement	Section reference(s) in the BDAR
Introduction	Chapters 2 and 3	**Information**	
		Introduction to the biodiversity assessment including:	–
		☒ brief description of the proposal	1.1.2
		☒ identification of subject land boundary, including: ☒ operational footprint ☒ construction footprint indicating clearing associated with temporary/ancillary construction facilities and infrastructure	1.1.2, Table 1.1
		☒ general description of the subject land	1.1.1, 4.3.1
		☒ sources of information used in the assessment, including reports and spatial data	1.6
		☒ identification of assessment method applied (i.e. linear or site-based)	3.1
		Maps and tables	
		☒ Map of the subject land boundary showing the final proposal footprint, including the construction footprint for any clearing associated with temporary/ancillary construction facilities and infrastructure	Figure 1.2 Figure 1.3

BDAR section	BAM ref.	BAM requirement	Section reference(s) in the BDAR
Landscape	Sections 3.1 and 3.2, Appendix E	**Information**	
		Identification of site context components and landscape features, including:	–
		☒ general description of subject land topographic and hydrological setting, geology and soils	Section 3
		☒ per cent native vegetation cover in the assessment area (as described in BAM Section 3.2(4.)	Section 3
		☒ IBRA bioregions and subregions (as described in BAM Subsection 3.1.3(2.))	Section 3
		Other relevant landscape features which may include:	Section 3
		☒ rivers and streams classified according to stream order (as described in BAM Subsection 3.1.3(3-4.) and Appendix E)	Section 3
		☒ wetlands within, adjacent to and downstream of the site (as described in BAM Subsection 3.1.3(4.))	Section 3
		☒ connectivity of different areas of habitat (as described in BAM Subsection 3.1.3(5–6.))	Section 3
		☒ areas of geological features of significance and soil hazard features (as described in BAM Subsections 3.1.3(7.) and 3.1.3(10.))	Section 3
		☒ areas of outstanding biodiversity value occurring on the subject land and assessment area (as described in BAM Subsection 3.1.3(8–9.))	Section 3
		Maps and tables	
		☒ Site Map ☒ Boundary of subject land ☒ Cadastre of subject land (including labelling of Lot and DP or section plan if relevant) ☒ Landscape features identified in BAM Subsection 3.1.3 ☒ Areas of outstanding biodiversity value within the subject land	Figure 1.2 Figure 3.5
		☒ Location Map ☒ Digital aerial photography at 1:1,000 scale or finer ☒ Boundary of subject land ☒ Assessment area (i.e. the subject land and either 1500 m buffer area or 500 m buffer for linear development) ☒ Landscape features identified in BAM Subsection 3.1.3	Figure 1.2 Figure 3.1-3.4

BDAR section	BAM ref.	BAM requirement	Section reference(s) in the BDAR
		☒ Additional detail (e.g. local government area boundaries) relevant at this scale ☒ Areas of outstanding biodiversity value within the subject land	
		Landscape features identified in BAM Subsection 3.1.3 and to be shown on the Site Map and/or Location Map include:	–
		☒ IBRA bioregions and subregions ☒ rivers, streams and estuaries ☒ wetlands and important wetlands ☒ connectivity of different areas of habitat ☒ areas of geological features of significance and if required, soil hazard features	Figure 3.1-3.4
		Data	
		☒ All report maps as separate jpeg files	–
		Individual digital shape files of:	–
		☒ subject land boundary	–
		☒ assessment area (i.e. subject land and 1500 m buffer area) boundary	–
		☒ cadastral boundary of subject land	–
		☒ areas of native vegetation cover	–
		☒ landscape features	–

BDAR section	BAM ref.	BAM requirement	Section reference(s) in the BDAR
Native vegetation	Chapter 4	**Information**	
		☒ Patch size (in accordance with BAM Subsection 4.3.2)	4.3.5
		☒ Identification of the dominant PCT on the subject land and extent (ha) with justification of method used (existing information or plot-based survey data)	4.3.3
		☒ Identification of any TEC associated with the PCT (BAM Subsection 4.2.2)	4.3.4
		☒ Estimate of percent cleared value of dominant PCT (BAM Subsection 4.2.1(5.)	4.3.3
		☒ Identification of any TEC on site that is not associated with the dominant PCT (Note: This TEC is required to be assessed and offset.)	4.3.4
		☒ Equivalence with mapping units of previous vegetation maps reviewed as part of the assessment (i.e. equivalent mapping units)	4.3.3
		☒ Vegetation integrity of the PCT(s) on the subject land as individual vegetation zones	4.3.5
		☒ Justification for how this was determined (i.e. qualitatively by observing values for the condition attributes set out in Table 2 of the BAM or quantitatively by collecting field data for the condition attributes at a plot in accordance with BAM Subsection 4.3.4)	–
		☒ Use of relevant benchmark data from BioNet Vegetation Classification (as described in BAM Subsections 4.3.3(5.))	–
		Where use of more appropriate local benchmark data is proposed (as described in BAM Subsection 1.4.2, BAM Subsection 4.3.3(5.) and BAM Appendix A):	–
		☒ identify the PCT or vegetation class for which local benchmark data will be applied	not applied
		☒ identify published sources of local benchmark data (if benchmarks obtained from published sources)	
		☒ describe methods of local benchmark data collection (if reference plots used to determine local benchmark data)	
		☒ provide justification for use of local data rather than BioNet Vegetation Classification benchmark values	not applied
		☒ provide written confirmation from the decision-maker that they support the use of local benchmark data	N/A
		Maps and tables	
		☒ Map of native vegetation extent within the subject land (as described in BAM Section 3.1)	Figure 3.5

BDAR section	BAM ref.	BAM requirement	Section reference(s) in the BDAR
		☒ Map of PCTs and vegetation zones within the subject land (as described in BAM Section 4.2(1.))	Figure 4.1
		☒ Map the location of floristic vegetation survey plots and vegetation integrity survey plots relative to PCT boundaries	Figure 4.1
		☒ Map of TEC distribution on the subject land	Figure 4.1
		☒ Patch size of native vegetation (as described in BAM Subsection 4.3.2)	not shown, assumed >100ha
		Table of current vegetation integrity scores for each vegetation zone within the site and including:	–
		☒ composition condition score	4.3.5
		☒ structure condition score	
		☒ function condition score	
		☒ Report from BAM-C (Small area module) including vegetation integrity scores (BAM Section 4.4)	Appendix D
		Data	
		☒ All report maps as separate jpeg files	–
		☒ Plot field data (MS Excel format)	–
		☒ Plot field datasheets	Appendix B
		Digital shape files of:	–
		☒ PCT boundaries within subject land	–
		☒ TEC boundaries within subject land	–
		☒ vegetation zone boundaries within subject land	–
		☒ floristic vegetation survey and vegetation integrity plot locations	–
Habitat suitability for threatened species	Chapter 5 and Section 9.1	**Information**	
		☒ Describe the review of existing information and any field survey undertaken to assess habitat constraints and microhabitats for threatened species within the subject land	5.1, 5.2
		☒ Determination of the suite of threatened species likely to occur on or use the proposed site according to Steps 1 and 2 in BAM Section 5.2 including species to be assessed for ecosystem credits and the list of species to be assessed for species credits	5.3, 5.4.1

BDAR section	BAM ref.	BAM requirement	Section reference(s) in the BDAR
		☒ List of ecosystem credit species derived from the TBDC (as described in BAM Subsections 5.2.1 and 5.2.2) with justification for the exclusion of any ecosystem credit species based on habitat constraints (as described in BAM Subsection 5.2.2)	Table 5.1
		☒ Identification of candidate species credit species that are at risk of an SAII and therefore, must be further assessed (BAM Section 9.1)	5.4.1
		Note: Candidate species credit species that are not at risk of an SAII and not incidentally recorded on the subject land do not require further assessment. For candidate species credit species that are at risk of an SAII, a description of the species, any habitat constraints or microhabitats associated with the species on the subject land and information used to create the species polygon/s in accordance with Steps 3 to 5 of BAM Section 5.2 including:	–
		☒ justification for determining that a candidate species credit species at risk of an SAII is unlikely to have suitable habitat on the subject land or specific vegetation zone (based on a field assessment of the subject land and published literature or an expert report prepared in accordance with Box 3 of the BAM)	Table 5.2
		☒ determination of the presence of remaining candidate species credit species at risk of an SAII (by assuming presence, conducting a threatened species survey or an expert report).	none identified
		Note: If the subject land is mapped on an important habitat map for a species, or for a component of its habitat, the subject land is considered to have suitable habitat for the species to be present.	–
		☒ species polygons identifying the location and area of suitable habitat for each candidate threatened species at risk of an SAII that is recorded on the subject land and is measured by area, OR ☒ species polygons identifying the area of suitable habitat and targeted surveys identifying the count and location of individuals on the subject land for each candidate threatened flora species at risk of an SAII that is recorded on the subject land and is measured by count ☒ species polygons for each threatened species identified on the subject land that is not at risk of an SAII (i.e. incidentally observed during site visit)	N/A
		☒ Determination of habitat condition within species polygon/s for each threatened species (measured by area) at risk of an SAII or incidentally observed during the site visit (Step 6 of BAM Section 5.2)	N/A
		☒ For flora species credit species at risk of an SAII or incidentally observed during site visit, provide a count, or an estimation, of the number of individual plants present on the subject land (as described in BAM Subsection 5.2.5(4.))	N/A
		Maps and tables	

BDAR section	BAM ref.	BAM requirement	Section reference(s) in the BDAR
		☒ Table showing ecosystem credit species in accordance with BAM Subsection 5.1.1, and identifying:	Table 5.1
		☒ the ecosystem credit species removed from the list	–
		☒ the sensitivity to gain class of each species	–
		☒ Table detailing species credit species within the subject land at risk of an SAII (BAM Section 9.1) or incidentally observed during the site visit including any associated habitat feature/components and its abundance (flora)/extent of habitat (flora and fauna) and biodiversity risk weighting (BAM Sections 5.2–5.4)	Table 5.2
		☒ Map of species credit species records within the subject land and species polygons for flora and fauna species at risk of an SAII or incidentally observed during the site visit (as described in BAM Subsection 5.2.5(1–7.))	N/A
		Data	
		☒ Digital shape files of suitable habitat identified for survey for each candidate species credit species	–
		☒ Species polygon map in jpeg format	–
		☒ Expert reports and any supporting data used to support conclusions of the expert report	–
		☒ Field datasheets detailing survey information including prevailing conditions, date, time, equipment used, etc.	–

BDAR section	BAM ref.	BAM requirement	Section reference(s) in the BDAR
Prescribed impacts	Chapter 6	**Information**	
		☒ Any prescribed impacts from the small area proposal must be set out in the BDAR consistent with Appendix K	6.2
		Maps and tables	
		☒ If relevant, maps showing location of any prescribed impact features (i.e. karst, caves, crevices, cliffs, rocks, humanmade structures, etc.)	N/A
		Data	
		☒ If relevant, digital shape files of prescribed impact feature locations	–
		☒ Prescribed impact features map in jpeg format	–
Avoid and minimise impacts	Chapter 7	**Information**	
		Demonstration of efforts to avoid and minimise impacts on biodiversity values (including prescribed impacts) associated with the proposal location in accordance with Chapter 7, including an analysis of alternative:	6.3
		☒ modes or technologies that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed mode or technology	–
		☒ alternative locations that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed location	–
		☒ alternative sites within a property on which the proposal is located that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed site	–
		☒ Describe efforts to avoid and minimise impacts (including prescribed impacts) to biodiversity values through proposal design (as described in BAM Sections 7.1 and 7.2)	6.3
		☒ Identification of any other site constraints that the proponent has considered in determining the location and design of the proposal (as described in BAM Subsection 7.2.1(3.))	N/A
		Maps and tables	
		☒ Table of measures to be implemented to avoid and minimise the impacts of the proposal, including action, outcome, timing and responsibility	Table 6.2
		☒ Map of final proposal footprint, including construction and operation	Figure 6.1
		☒ Maps demonstrating indirect impact zones where applicable	N/A

BDAR section	BAM ref.	BAM requirement	Section reference(s) in the BDAR
		Data	
		Digital shape files of:	–
		☒ final proposal footprint	–
		☒ direct and indirect impact zones	–
		☒ Maps in jpeg format	–
Assessment of impacts	Chapter 8, Sections 8.1 and 8.2	**Information**	
		Determine the impacts on native vegetation and threatened species habitat, including	–
		☒ a description of direct impacts of clearing of native vegetation, threatened ecological communities and threatened species habitat (as described in BAM Section 8.1)	6.1
		☒ description of the nature, extent, frequency, duration and timing of indirect impacts of the proposal (as described in BAM Subsection 8.2	6.1
		☒ Any prescribed impacts from the small area proposal must be set out in the BDAR consistent with Appendix K	6.2
		Maps and tables	
		☒ Table showing change in vegetation integrity score for each vegetation zone as a result of identified impacts	Table 6.3
		Data	
		N/A	–
Mitigation and management of impacts	Chapter 8, Sections 8.4 and 8.5	**Information**	
		Identification of measures to mitigate or manage impacts in accordance with the recommendations in BAM Sections 8.4.1 and 8.4.2 including:	–
		☒ techniques, timing, frequency and responsibility	Table 6.2
		☒ identify measures for which there is risk of failure	
		☒ evaluate the risk and consequence of any residual impacts	
		☒ document any adaptive management strategy proposed	N/A

BDAR section	BAM ref.	BAM requirement	Section reference(s) in the BDAR
		Identification of measures for mitigating impacts related to:	–
		☒ displacement of resident fauna (as described in BAM Subsection 8.4.1(2.))	Table 6.2
		☒ indirect impacts on native vegetation and habitat (as described in BAM Subsection 8.4.1(3.))	
		☒ mitigating prescribed biodiversity impacts (as described in BAM Subsection 8.4.2)	
		☒ Details of the adaptive management strategy proposed to monitor and respond to impacts on biodiversity values that are uncertain (BAM Section 8.5)	N/A
		Maps and tables	
		☒ Table of measures to be implemented before, during and after construction to mitigate and manage impacts of the proposal, including action, outcome, timing and responsibility	Table 6.2
		Data	
		N/A	–
Thresholds for assessing and offsetting the impacts of the proposal	Chapter 9	**Information**	
		☒ Information from the TBDC and/or other sources to report on the current status of threatened species, threatened populations at risk of an SAII and TEC/s for the proposal, and report on impacts of the proposal on TEC/s in accordance with BAM Subsection 9.2.1	6.5
		☒ Report on impacts of the proposal on threatened species and/or threatened populations at risk of an SAII in accordance with BAM Section 9.1	N/A
		☐ Identification of areas requiring offset in accordance with BAM Section 9.2	6.5.2
		☐ Identification of areas not requiring offset in accordance with BAM Section 9.2.1(3.)	6.5.1
		☐ Identification of areas not requiring assessment in accordance with BAM Section 9.3	6.5.1
		Maps and tables	
		☒ Map showing the extent of TECs at risk of an SAII within the subject land	N/A
		☒ Map showing location of threatened species at risk of an SAII within the subject land	N/A
		Map showing location of:	–
		☒ impacts requiring offset	Figure 6.1

BDAR section	BAM ref.	BAM requirement	Section reference(s) in the BDAR
		☒ impacts not requiring offset	Figure 6.1
		☒ areas not requiring assessment	Figure 6.1
		Data	
		Digital shape files of:	–
		☒ extent of TECs at risk of an SAII within the subject land	–
		☒ location of threatened species at risk of an SAII within the subject land	–
		☒ boundary of impacts requiring offset	–
		☒ boundary of impacts not requiring offset	–
		☒ boundary of areas not requiring assessment	–
		☒ Maps in jpeg format	–
Applying the no net loss standard	Chapter 10	**Information**	
		☒ Description of the impact on PCTs/TECs	6.1
		☒ Description of the impact on threatened species at risk of an SAII or incidentally observed via site visit	N/A
		☒ Number of ecosystem credits required for impacts on biodiversity values according to BAM Subsection 9	6.5.2
		☒ Number of species credits required for impacts on biodiversity values according to BAM Subsection 10.1.3, including any species credit species that has been incidentally observed on the subject land	N/A
		Note: Species credits for any species at risk of an SAII are calculated in the event that the decision-maker forms the opinion that the proposed impact is unlikely to be serious and irreversible and therefore can be offset.	–
		☒ Identification of credit class for ecosystem credits and species credits according to BAM Section 10.2 (this can be generated from BAM-C)	Appendix D
		Maps and tables	
		☒ Table showing biodiversity risk weightings	Table 6.3
		☒ Table of BC Act listing status for PCTs and threatened species requiring offset	Table 6.3
		☒ Table of PCTs requiring offset and number of ecosystem credits required (Subsection 10.2.1)	Table 6.3

BDAR section	BAM ref.	BAM requirement	Section reference(s) in the BDAR
		☒ Table of species at risk of an SAII or incidentally observed on site assessed for species credits and the number of credits required	N/A
		☒ BAM-C credit report	Appendix D
		Data	
		N/A	–

Appendix B
BAM plot data sheets

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BAM Site – Field Survey Form

Plot ID:	P07	**Date:**	27/01/23	**Project number:**	E211110	**Plot dimensions:**	80 x 5 m
Datum:	GDA94	**Easting:**	302,117	**Recorders:**	CP		
Zone:	56	**Northing:**	6,169,097	**IBRA region:**	Sydney Basin - Illawarra	**Midline bearing:**	157
Plant Community Type:		781: Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner Bioregion		**Condition class:**	Wetland	**PCT confidence:**	
Vegetation Class:		Coastal Freshwater Lagoons		**EEC:**	yes	**EEC confidence:**	

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m2 plot)		Sum values
Count of Native Richness	Trees:	0
	Shrubs:	0
	Grasses etc.:	3
	Forbs:	1
	Ferns:	0
	Other:	0
Sum of Cover of native vascular plants by growth form group	Trees:	0
	Shrubs:	0
	Grasses etc.:	85.3
	Forbs:	0.1
	Ferns:	0
	Other:	0
High Threat Weed cover:		15.3

BAM Attribute (1000 m2 plot) DBH			
DBH	Tree stem count	Length of logs (m) (≥10 cm diameter, >50 cm in length)	0
80 + cm:	0		
50 – 79 cm:	0		
30 – 49 cm:	0		
20 – 29 cm:	0	Tree hollow count	0
10 – 19 cm:	0		
5 – 9 cm:	0		
< 5 cm:	0		

Counts apply when no. of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For multi-stemmed tree, only largest living stem is included in the count. Tree stems must be living.
For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)				
Subplot:	1	2	3	4	5
Subplot score (%):	1	0	0	2	4
Average litter cover (%):	1.4				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography and site features

Along western boundary at fenceline, draining to rail corridor.

Plot Disturbance

Interfacing with exotic grassland within property.

GF Code: see Growth Form definitions in Appendix 1; N: native, E: exotic, HTE: high threat exotic; GF – circle code if 'top 3'; Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover)
Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Project name:	E211110				
Recorders:	CP	**Plot ID:**	P07	**Date:**	27/01/23

GF Code	Scientific name	Cover	Abundance	Voucher	N, E or HTE
Grass & grasslike (GG)	*Phragmites australis (Common Reed)*	85	30000		N
	Rumex crispus (Curled Dock)	0.1	20		E
Grass & grasslike (GG)	*Juncus usitatus*	0.1	50		N
	Verbena bonariensis (Purpletop)	0.1	10		E
	Paspalum dilatatum (Paspalum)	10	800		HTE
	Cenchrus clandestinus (Kikuyu Grass)	5	200		HTE
	Plantago lanceolata (Lamb's Tongues)	0.1	20		E
	Senecio madagascariensis (Fireweed)	0.1	10		HTE
	Cyperus brevifolius	0.1	100		E
	Medicago polymorpha (Burr Medic)	0.1	60		E
Forb (FG)	*Alternanthera denticulata (Lesser Joyweed)*	0.1	40		N
	Rubus fruticosus sp. agg. (Blackberry complex)	0.2	10		HTE
	Sonchus oleraceus (Common Sowthistle)	0.1	20		E
	Aster spp.	0.1	30		E
Grass & grasslike (GG)	*Typha orientalis (Broad-leaved Cumbungi)*	0.2	100		N

Appendix C
BAM import data

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plot	pct	area	patchsize	conditionclass	zone	easting	northing	bearing	compTree	compShrub	compGrass	compForbs	compFerns	compOther	strucTree	strucShrub	strucGrass	strucForbs	strucFerns	strucOther	funLargeTrees	funHollowtrees	funLitterCover	funLenFallenLogs	funTreeStem5to9	funTreeStem10to19	funTreeStem20to29	funTreeStem30to49	funTreeStem50to79	funTreeRegen	funHighThreatExotic
Text[Maximum 10 characters]	Number	Number with 2 decimal point	Number	Text[Letters, numbers, underscores and hyphens] Please fill condition-class name in all plots [Maximum 20 characters]	[54 or 55 or 56]			Range in [0-359]	Number	Number	Number	Number	Number	Number	Number with 1 decimal point	Number with 1 decimal point	Number with 1 decimal point	Number with 1 decimal point	Number with 1 decimal point	Number with 1 decimal point	Number	Number	Number with 1 decimal point	Number with 1 decimal point	[0,1]	[0,1]	[0,1]	[0,1]	[0,1]	[0,1]	Number with 1 decimal point
P07	3962	0.01	101	Wetland	56	302117	6169097.0	157	0	0	3	1	0	0	0.0	0.0	85.3	0.1	0.0	0.0	0	0	1.4	0.0	0	0	0	0	0	0	15.3

Appendix D
Biodiversity credit report

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BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00038332/BAAS17058/23/00038333

Proposal Name
New Shellharbour Hospital

BAM data last updated *
22/06/2023

Assessor Name
Cecilia Phu

Assessor Number
BAAS17058

BAM Data version *
61

Proponent Names

Report Created
26/02/2024

BAM Case Status
Finalised

Assessment Revision
4

Assessment Type
Part 4 Developments (Small Area)

Date Finalised
26/02/2024

BOS entry trigger
BOS Threshold: Area clearing threshold

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		

Species
Nil

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
No Changes

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
3962-Coastal Floodplain Phragmites Reedland	Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	0.0	0	1	1

BAM Biodiversity Credit Report (Like for like)

3962-Coastal Floodplain Phragmites Reedland

Like-for-like credit retirement options

Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions This includes PCT's: 1738, 3958, 3962, 3964, 3965, 3967, 3971, 3973, 3975, 3976	-	3962_moderate	No	1	Illawarra, Ettrema, Jervis, Moss Vale, Sydney Cataract and Northern Basalts. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

No Species Credit Data

Credit Retirement Options

Like-for-like credit retirement options

Appendix E
Likelihood of occurrence assessment

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Table C.1 Likelihood of occurrence of threatened species within the site

Class	Scientific name	Common name	BC Act Status	EPBC Act status	Habitat and geographic distribution	Likelihood of occurrence	Justification
Bird	*Anthochaera phrygia*	Regent Honeyeater	E	CE	The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. These birds are also found in drier coastal woodlands and forests in some years. Every few years non-breeding flocks are seen foraging in flowering coastal Swamp Mahogany (Eucalyptus robusta) and Spotted Gum (Corymbia maculata) forests, particularly on the central coast and occasionally on the upper north coast. Birds are occasionally seen on the south coast.	Low	The site lacks suitable foraging or nesting resources. No associated PCT's within the site. PMST; Species or species habitat known to occur within area.
Bird	*Apus pacificus*	Fork-tailed Swift	-	Mi	In Australia, the Fork-tailed Swift mostly occurs over inland plains but sometimes above foothills or in coastal areas. This species can also occur over cliffs and beaches and also over islands and sometimes well out to sea.	Negligible	Species may forage aerially over the site but unlikely to land within.
Bird	*Artamus cyanopterus cyanopterus*	Dusky Woodswallow	V	-	The species occurs throughout most of NSW, but is sparsely scattered in, or largely absent from, much of the upper western region. Most breeding activity occurs on the western slopes of the Great Dividing Range. The most common habitat for this species is in woodlands and dry open sclerophyll forests, usually dominated by eucalyptus, including mallee associations. The species has also been recorded in shrublands and heathlands and various modified habitats, including regenerating forests; very occasionally in moist forests or rainforests. Understorey is typically open with sparse Eucalyptus saplings, Acacia and other shrubs, including heath. The ground cover may consist of grasses, sedges or open ground, often with coarse woody debris (OEH 2018).	Low	Site lacks suitable foraging and nesting resources. Not commonly recorded within the locality. Species associated with PCT 1300.
Bird	*Botaurus poiciloptilus*	Australasian Bittern	E	E	The Australasian Bittern is widespread and found over most of NSW except for far north-west. Preferred habitat is comprised of wetlands with tall dense vegetation, where it forages in still, shallow water up to 0.3 m deep, often at the edges of pools or waterways, or from platforms or mats of vegetation over deep water. It favours permanent and seasonal freshwater habitats, particularly those dominated by sedges, rushes and reeds or cutting grass (Gahnia sp.) growing over a muddy or peaty substrate (OEH 2018).	Low	The dam within the study area is unlikely to provide suitable foraging habitat for this species. Low number of records from the locality. PMST; Species or species habitat known to occur within area.
Bird	*Burhinus grallarius*	Bush Stone-curlew	E	-	The Bush Stone-curlew has previously been recorded in all but the most arid parts of mainland Australia. Today the species is scarce or largely absent in many parts of its former range south and east of the Great Dividing Range. It inhabits open forests and woodlands with a sparse grassy ground layer and fallen timber. The curlew likes to roost and nest in grassy woodlands of Bull Oak, gum or box with low, sparse grassy or herb understorey. Nests are usually beside a fallen log, which probably makes it harder for foxes to find. Curlews prefer a sparse understorey so they can see predators while foraging for insects (OEH 2018).	Low	Species not known from the locality. No suitable habitat within the study area
Bird	*Callocephalon fimbriatum*	Gang-gang Cockatoo	V	E	In summer, the Gang-gang Cockatoo is generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, they may occur at lower altitudes in drier more open eucalypt forests and woodlands, and often found in urban areas.	Low	Site lacks heavily timbered areas. No hollow-bearing trees suitable for breeding within the subject site. Species associated with PCT1300. No records within the locality. PMST; Species or species habitat likely to occur within area.

Class	Scientific name	Common name	BC Act Status	EPBC Act status	Habitat and geographic distribution	Likelihood of occurrence	Justification
Bird	*Calyptorhynchus lathami*	Glossy Black-Cockatoo	V	-	The Glossy Black Cockatoo inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000 m in which stands of She-oak species, particularly Black She-oak (Allocasuarina littoralis), Forest She-oak (A. torulosa) or Drooping She-oak (A. verticillata) occur.	Low	Site lacks heavily timbered areas and she-oak species. No hollow-bearing trees suitable for breeding within the subject site. Species not associated with any PCT within the site. Not commonly recorded within the locality.
Bird	*Circus assimilis*	Spotted Harrier	V	-	The Spotted Harrier occurs widely in NSW, mainly within grassy open woodland including Acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. The species also occurs in agricultural land, foraging over open woodlands (OEH 2018).	Low	Species has been recorded 11 times within the locality. This species may fly over the site on occasion, however the site is unlikely to provide significant foraging or habitat The site may be part of an individual or pairs foraging range.
Bird	*Dasyornis brachypterus*	Eastern Bristlebird	E	E	Habitat of the Eastern Bristlebird is characterised by dense, low vegetation including heath and open woodland with a heathy understorey; in northern NSW, this species occurs in open forest with tussocky grass understorey; all of these vegetation types are fire prone.	Negligible	The site lacks low dense vegetation. Species not associated with PCT's within the site. No records of this species within the locality. PMST; Species or species habitat likely to occur within area.
Bird	*Epthianura albifrons*	White-fronted Chat	V	-	Gregarious species, usually found foraging on bare or grassy ground in wetland areas, singly or in pairs. They are insectivorous, feeding mainly on flies and beetles caught from or close to the ground. Have been observed breeding from late July through to early March, with 'open-cup' nests built in low vegetation. Nests in the Sydney region have also been seen in low isolated mangroves. Nests are usually built about 23 cm above the ground (but have been found up to 2.5 m above the ground).	Moderate	Species known from the locality. Not associated with PCT's within the site, however can occur within a variety of habitats.
Bird	*Falco hypoleucos*	Grey Falcon	E	V	The Grey Falcon is sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. The species is usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast. Also occurs near wetlands where surface water attracts prey (OEH 2018).	Low	No suitable wooded watercourses or woodland habitat within the site. Species not associated with PCT's within the site. PMST; Species or species habitat may occur within area.
Bird	*Gallinago hardwickii*	Latham's Snipe	-	Mi	Latham's Snipe is a non-breeding visitor to south-eastern Australia, and is a passage migrant through northern Australia. Latham's Snipe occurs in permanent and ephemeral wetlands up to 2000 m above sea-level. They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies)	Negligible	No suitable wetland habitat within the site.

Class	Scientific name	Common name	BC Act Status	EPBC Act status	Habitat and geographic distribution	Likelihood of occurrence	Justification
Bird	*Glossopsitta pusilla*	Little Lorikeet	V	-	Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophora, Melaleuca and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Isolated flowering trees in open country, e.g. paddocks, roadside remnants and urban trees also help sustain viable populations of the species. Feeds mostly on nectar and pollen, occasionally on native fruits such as mistletoe, and only rarely in orchards. The Little Lorikeet is distributed widely across the coastal and Great Divide regions of eastern Australia from Cape York to South Australia. NSW provides a large portion of the species' core habitat, with lorikeets found westward as far as Dubbo and Albury. Nomadic movements are common, influenced by season and food availability, although some areas retain residents for much of the year and 'locally nomadic' movements are suspected of breeding pairs.	Low	No records of this species within the locality. The site does not contain suitable foraging or breeding habitat Species associated with PCT 1300.
Bird	*Grantiella picta*	Painted Honeyeater	E	V	The species is sparsely distributed from south-eastern Australia to north-western Queensland, with its greatest concentrations and breeding locations occurring on the inland slopes of the Great Dividing Range in NSW. It inhabits mistletoes in eucalypt forests/woodlands, riparian woodlands of Black Box (E. largiflorens) and River Red Gum (E. camaldulensis), Box-Ironbark-Yellow Gum woodlands, Acacia-dominated woodlands, Paperbarks, Casuarina, Callitris, and trees on farmland or gardens. The species prefers woodlands which contain a higher number of mature trees, as these host more mistletoes. It is more common in wider blocks of remnant woodland than in narrower strips although it breeds in quite narrow roadside strips if ample mistletoe fruit is available (OEH 2018).	Negligible	No records of this species within the locality. PMST; Species or species habitat may occur within area.
Bird	*Haliaeetus leucogaster*	White-bellied Sea-Eagle	V	-	The White-bellied Sea-Eagle is found in coastal habitats (especially those close to the sea-shore) and around terrestrial wetlands in tropical and temperate regions of mainland Australia and its offshore islands. The habitats occupied by the sea-eagle are characterised by the presence of large areas of open water (larger rivers, swamps, lakes and the sea).	Low	Site lacks large trees suitable for breeding. No suitable foraging habitat within the site.
Bird	*Hieraaetus morphnoides*	Little Eagle	V	-	The Little Eagle is found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. This species occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used.	Low	Site lacks large trees suitable for breeding. No degraded potential foraging habitat within the site. Species associated with PCT 1300.
Bird	*Hirundapus caudacutus*	White-throated Needletail	-	Mi	The White-throated Needletail is widespread in eastern and south-eastern Australia. In NSW this species extends inland to the western slopes of the Great Divide and occasionally onto the adjacent inland plains. In Australia, the White-throated Needletail is almost exclusively aerial, recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland (DoEE 2018).	Low	This species may forage aerially over the site, however is unlikely to be impacted by the project. Species associated with PCT 1300 PMST; Species or species habitat known to occur within area.

Class	Scientific name	Common name	BC Act Status	EPBC Act status	Habitat and geographic distribution	Likelihood of occurrence	Justification
Bird	*Irediparra gallinacea*	Comb-crested Jacana	V	-	Inhabit permanent freshwater wetlands, either still or slow-flowing, with a good surface cover of floating vegetation, especially water-lilies, or fringing and aquatic vegetation. Forage on floating vegetation, primarily on insects and other invertebrates, as well as some seeds and other vegetation. The Comb-crested Jacana occurs on freshwater wetlands in northern and eastern Australia, mainly in coastal and subcoastal regions, from the north-eastern Kimberley Division of Western Australia to Cape York Peninsula then south along the east coast to the Hunter region of NSW, with stragglers recorded in south-eastern NSW (possibly in response to unfavourable conditions further north).	Low	No suitable wetland habitat within the site. Only two records within the locality.
Bird	*Ixobrychus flavicollis*	Black Bittern	V	-	The Black Bittern inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves.	Low	No suitable wetland habitat within the site. Only one record within the locality.
Bird	*Lathamus discolor*	Swift Parrot	E	CE	This species migrates in the autumn and winter months to south-eastern Australia. In NSW, it mostly occurs on the coast and south-west slopes in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations (OEH 2018). Favoured feed trees include winter flowering species such as Swamp Mahogany, Spotted Gum, Red Bloodwood (C. gummifera), Mugga Ironbark and White Box. Commonly used lerp infested trees include Inland Grey Box, Grey Box (E. moluccana) and Blackbutt (E. pilularis).	Low	An individual Eucalyptus tereticornis occurs within the site. This is unlikely to be an important foraging resource for this species. PMST; Species or species habitat likely to occur within area.
Bird	*Lophoictinia isura*	Square-tailed Kite	V	-	Within NSW the Square-tailed Kite is a regular resident in the north, north-east and along major flowing river systems and migrates to the south-east for breeding. The species is found in a variety of timbered habitats including dry woodlands and open forests, showing a particular preference for timbered watercourses. The species is a specialist hunter of passerines, especially honeyeaters, and most particularly nestlings, and insects in the tree canopy, picking most prey items from the outer foliage The species appears to occupy large hunting ranges of more than 100km2. Nest sites are generally located along or near watercourses, in a fork or on large horizontal limbs (OEH 2018).	Low	Site lacks large trees suitable for breeding. No degraded potential foraging habitat within the site. Species not associated with PCTs within the site.
Bird	*Neophema chrysogaster*	Orange-bellied Parrot	E	CE	Spends winter mostly within 3 km of the coast in sheltered coastal habitats including bays, lagoons, estuaries, coastal dunes and saltmarshes. The species also inhabits small islands and peninsulas and occasionally saltworks and golf courses. Birds forage in low samphire herbland or taller coastal shrubland. Some birds have been seen foraging on weed species several hundred metres from the coast.	Low	Species has been recorded foraging in exotic grassland near Shellharbour. PMST; Species or species habitat may occur within area.
Bird	*Ninox connivens*	Barking Owl	V	-	The Barking Owl inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. This species roosts in shaded portions of tree canopies, including tall midstorey trees with dense foliage such as Acacia and Casuarina species.	Low	Site lacks suitable tree hollows for breeding and would not provide a suitable foraging habitat. Species associated with PCT 1300
Bird	*Ninox strenua*	Powerful Owl	V	-	In NSW, the Powerful Owl is widely distributed throughout the eastern forests from the coast inland to tablelands, with scattered, mostly historical records on the western slopes and plains. This species roosts by day in dense vegetation comprising species such as Turpentine (Syncarpia glomulifera), Black She-oak (Allocasuarina littoralis), Blackwood (Acacia melanoxylon), Rough-barked Apple (Angophora floribunda), Cherry Ballart (Exocarpus cupressiformis) and a number of eucalypt species.	Low	Site lacks suitable tree hollows for breeding and would not provide a suitable foraging habitat. Species associated with PCT 1300

Class	Scientific name	Common name	BC Act Status	EPBC Act status	Habitat and geographic distribution	Likelihood of occurrence	Justification
Bird	*Oxyura australis*	Blue-billed Duck	V	-	The Blue-billed Duck is widespread in NSW, but most common in the southern Murray-Darling Basin area. This species prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation. The species is completely aquatic, swimming low in the water along the edge of dense cover (OEH 2018).	Low	Not commonly recorded within the locality. Species has been observed in Killalea Lagoon to the West of the site. Farm dams within the subject site do not contain dense aquatic vegetation favoured by this species.
Bird	*Pandion cristatus*	Eastern Osprey	V	-	Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water. Breed from July to September in NSW. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea.	Low	Species may fly over the site on rare occasion due to the sites close proximity to the coast, however the site is unlikely to provide suitable foraging or nesting habitat.
Bird	*Petroica boodang*	Scarlet Robin	V	-	In NSW, the Scarlet Robin occurs from the coast to the inland slopes. This species lives in both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. Scarlet Robin habitat usually contains abundant logs and fallen timber: these are important components of its habitat.	Negligible	Site lacks habitat requirements such as mature or regrowth vegetation and abundant logs and fallen timber. One record from locality. Species not associated with PCT within the site.
Bird	*Petroica phoenicea*	Flame Robin	V	-	Within NSW the Flame Robin breeds in upland areas and during winter many birds move to the inland slopes and plains. The species breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. In winter, birds migrate to drier more open habitats in the lowlands (i.e. valleys below the ranges, and to the western slopes and plains). Here, the species lives in dry forests, open woodlands and in pastures and native grasslands, with or without scattered trees (OEH 2018).	Negligible	Site lacks habitat requirements such as native grassland or woodland. One record from locality. Species not associated with PCT within the site.
Bird	*Ptilinopus regina*	Rose-crowned Fruit-Dove	V	-	Rose-crowned Fruit-doves occur mainly in sub-tropical and dry rainforest and occasionally in moist eucalypt forest and swamp forest, where fruit is plentiful. They are shy pigeons, not easy to see amongst the foliage, and are more often heard than seen. They feed entirely on fruit from vines, shrubs, large trees and palms, and are thought to be locally nomadic as they follow the ripening of fruits. Some populations are migratory in response to food availability - numbers in north-east NSW increase during spring and summer then decline in April or May.	Low	Site lacks plentiful fruit sources for foraging. Species associated with PCT 1300
Bird	*Ptilinopus superbus*	Superb Fruit-Dove	V	-	Inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species such as figs and palms. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees. The Superb Fruit-dove occurs principally from north-eastern in Queensland to north-eastern NSW. It is much less common further south, where it is largely confined to pockets of suitable habitat as far south as Moruya. There are records of vagrants as far south as eastern Victoria and Tasmania.	Low	Site lacks rainforest or similar habitat types. No records of this species within the locality. Species associated with PCT 1300.
Bird	*Rostratula australis*	Australian Painted Snipe	E	E	The Australian Painted Snipe generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. The species also uses inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains (OEH 2018).	Negligible	Site lacks shallow freshwater wetland areas of suitable quality to be utilised by this species. PMST; Species or species habitat known to occur within area.

Class	Scientific name	Common name	BC Act Status	EPBC Act status	Habitat and geographic distribution	Likelihood of occurrence	Justification
Bird	*Stictonetta naevosa*	Freckled Duck	V	-	The Freckled Duck is found primarily in south-eastern and south-western Australia, and breeds in large temporary swamps created by floods in the Murray Darling System. The species prefers permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds. Generally rest in dense cover during the day, usually in deep water. Nests are usually located in dense vegetation at or near water level (OEH 2018).	Low	Not commonly recorded within the locality. Species has been observed in Killalea Lagoon to the West of the site. Farm dams within the subject site do not contain dense aquatic vegetation favoured by this species.
Bird	*Tyto novaehollandiae*	Masked Owl	V	-	Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides. The typical diet consists of tree-dwelling and ground mammals, especially rats. Pairs have a large home-range of 500 to 1000 hectares. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting. Extends from the coast where it is most abundant to the western plains. Overall records for this species fall within approximately 90% of NSW, excluding the most arid north-western corner. There is no seasonal variation in its distribution.	Low	No records of this species within the locality. Site lacks suitable foraging or nesting habitat. Species associated with PCT 1300.
Bird	*Tyto tenebricosa*	Sooty Owl	V	-	Occurs in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests. Roosts by day in the hollow of a tall forest tree or in heavy vegetation; hunts by night for small ground mammals or tree-dwelling mammals such as the Common Ringtail Possum (Pseudocheirus peregrinus) or Sugar Glider (Petaurus breviceps). Nests in very large tree-hollows. Occupies the easternmost one-eighth of NSW, occurring on the coast, coastal escarpment and eastern tablelands. Territories are occupied permanently.	Low	No records of this species within the locality. Site lacks suitable foraging or nesting habitat. Species associated with PCT 1300.
Fish	*Prototroctes maraena*	Australian Grayling	-	V	Currently, the Australian Grayling occurs in streams and rivers on the eastern and southern flanks of the Great Dividing Range, from Sydney, southwards to the Otway Ranges of Victoria and in Tasmania. The species is found in fresh and brackish waters of coastal lagoons, from Shoalhaven River in NSW to Ewan Ponds in South Australia. It is absent from the inland Murray-Darling system. The Australian Grayling is diadromous, spending part of its lifecycle in freshwater and at least part of the larval and/or juvenile stages in coastal seas. Adults (including pre spawning and spawning adults) inhabit cool, clear, freshwater streams with gravel substrate and areas alternating between pools and riffle zones such as the Tambo River, which is also known to have granite outcrops. The species has also been associated with clear, gravel-bottomed habitats in the Mitchell and Wonnangatta Rivers (Victoria) and in a muddy-bottomed, heavily silted habitat in the Tarwin River (Victoria). The species has been found over 100 km upstream from the sea.	Negligible	The creek downstream of the site is highly disturbed and modified, unlikely to support suitable habitat. PMST; Species or species habitat likely to occur within area.
Flora	*Boronia deanei*	Deane's Boronia	V	V	Grows in wet heath, often at the margins of open forest adjoining swamps or along streams. The species mainly occurs in conservation reserves and once grew profusely in Morton National Park near Bundanoon but has rarely been seen in that area since being impacted by devastating bushfires of the 1960s	Negligible	No suitable habitat within study area.

Class	Scientific name	Common name	BC Act Status	EPBC Act status	Habitat and geographic distribution	Likelihood of occurrence	Justification
Flora	*Cynanchum elegans*	White-flowered Wax Plant	E	E	The rare species is known in rainforest gullies scrub and scree slopes. Associated vegetation types include littoral rainforest; Coastal Tea-tree Leptospermum laevigatum – Coastal Banksia Banksia integrifolia subsp. integrifolia coastal scrub; Forest Red Gum Eucalyptus tereticornis aligned open forest and woodland; Spotted Gum Corymbia maculata aligned open forest and woodland; and Bracelet Honeymyrtle Melaleuca armillaris scrub to open scrub	Low	Species not recorded during field surveys. Species records within the locality. Species associated with PCT 1300 PMST; Species or species habitat known to occur within area.
Flora	*Daphnandra johnsonii*	Illawarra Socketwood	E	E	Restricted to the Illawarra region where it has been recorded from the local government areas of Shoalhaven, Kiama, Shellharbour and Wollongong. Occupies the rocky hillsides and gullies of the Illawarra lowlands, occasionally extending onto the upper escarpment slopes. Associated vegetation includes rainforest and moist eucalypt forest. Associated soils are loams and clay loams derived from volcanic and fertile sedimentary rocks. Possibly killed by fire.	Negligible	Site does not have rocky hillsides, gullies or and does not have characteristic rainforest or moist eucalypt forest species. PMST; Species or species habitat likely to occur within area.
Flora	*Gossia acmenoides*	-	E	-	Found in subtropical and dry rainforest on the ranges and coastal plain of eastern Australia. Estimated less than 100 mature plants, through approximately 30 sites. Occurring often as a single individual or small group. Known from Shellharbour, Wollongong and Kiama LGAs and encompasses all occurrences south of the Georges River. This population is the southern most occurrence of the species and is approximately 175 km from the nearest population to the north in the Hunter region of NSW	Negligible	Not recorded during surveys. Not associated with PCT1300
Flora	*Haloragis exalata subsp. exalata*	Square Raspwort	V	V	Square Raspwort occurs in 4 widely scattered localities in eastern NSW. It is disjunctly distributed in the Central Coast, South Coast and North Western Slopes botanical subdivisions of NSW. Square Raspwort appears to require protected and shaded damp situations in riparian habitats	Low	Site lacks protected and shaded riparian habitat. PMST; Species or species habitat likely to occur within area. One recorded within the locality
Flora	*Irenepharsus trypherus*	Illawarra Irene	E	E	The species has been recorded from 18 sites within the local government areas of Kiama, Shellharbour, Shoalhaven, Tallaganda, Wingecarribee, and Wollongong. Found at such places as Minnamurra Falls, the Jamberoo area, and Morton and Macquarie Pass National Parks. The species has rarely been collected, perhaps because it looks like a weed. Typically inhabits steep rocky slopes near cliff lines and ridge tops. The species is less typically found growing out of rock crevices or on narrow benches along cliff lines. The vast majority of sites are recorded from the upper slopes of the ridge systems that extend south and east of the Illawarra escarpment, although the species has also been recorded from the deep sandstone gorges of the Shoalhaven River. Associated vegetation includes moist sclerophyll forest, Ironwood Backhousia myrtifolia thicket, and rainforest.	Low	Site lacks steep rocky slopes or similar habitat types where this species is found. Species associated with PCT 1300
Flora	*Persoonia acerosa*	Needle Geebung	V	V	The Needle Geebung occurs in dry sclerophyll forest, scrubby low-woodland and heath on low fertility soils. The Needle Geebung has been recorded only on the central coast and in the Blue Mountains, from Mt Tomah in the north to as far south as Hill Top where it is now believed to be extinct. Mainly in the Katoomba/ Wentworth Falls/ Springwood area.	Low	No suitable habitat within study area and not within known geographic distribution
Flora	*Pimelea spicata*	Spiked Rice-flower	E	E	Found on well-structured clay soils. It occurs commonly in Coast Banksia open woodland with a better developed shrub and grass understorey. Coastal headlands and hilltops are the favoured sites.	Low	Site is highly disturbed. Species not associated with PCTs within the site. PMST; Species or species habitat known to occur within area.
Flora	*Prostanthera densa*	Villous Mintbush	V	V	Prostanthera densa generally grows in sclerophyll forest and shrubland on coastal headlands and near coastal ranges, chiefly on sandstone, and rocky slopes near the sea.	Negligible	No suitable areas of sandstone or dry sclerophyll woodland within study area

Class	Scientific name	Common name	BC Act Status	EPBC Act status	Habitat and geographic distribution	Likelihood of occurrence	Justification
Flora	*Pterostylis pulchella*	Pretty Greenhood	V	V	The Waterfall Greenhood is found on cliff faces close to waterfalls and creek banks and mossy rocks alongside running water. The Waterfall Greenhood is found only at Fitzroy Falls, Belmore Falls, upper Bundanoon Creek (Meryla) and Minnamurra Falls.	Negligible	No suitable habitat within study area and not within known geographic distribution
Flora	*Pultenaea aristata*	Prickly Bush-pea	V	V	The species occurs in either dry sclerophyll woodland or wet heath on sandstone. Prickly Bush-pea is restricted to the Woronora Plateau, a small area between Helensburgh, south of Sydney, and Mt Kiera above Wollongong.	Negligible	No suitable areas of sandstone or dry sclerophyll woodland within study area
Flora	*Rhodamnia rubescens*	Scrub Turpentine	CE	CE	Occurs in coastal districts north from Batemans Bay in New South Wales, approximately 280 km south of Sydney, to areas inland of Bundaberg in Queensland. Populations of R. rubescens typically occur in coastal regions and occasionally extend inland onto escarpments up to 600 m a.s.l. in areas with rainfall of 1,000-1,600 mm. Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils.	Negligible	Unsuitable habitat for the species to occur. Species not recorded during surveys. Soils unsuitable in addition to the vegetation within the site. Species associated with PCT 1300. PMST; Species or species habitat likely to occur within area.
Flora	*Solanum celatum*	-	E	-	Grows in rainforest clearings, or in wet sclerophyll forests. Restricted to an area from Wollongong to just south of Nowra, and west to Bungonia. Majority of records are prior to 1960 and the majority of populations are likely to have been lost to clearing.	Negligible	Not recorded during field surveys. Habitat unsuitable. Species associated with PCT 1300
Flora	*Zieria granulata*	Illawarra Zieria	E	E	The typical habitat is dry ridge tops and rocky outcrops on shallow volcanic soils, usually on Bumbo Latite. Less frequently found on the moist slopes of the Illawarra escarpment and in low-lying areas on Quaternary sediments. Associated vegetation includes Bracelet Honey-myrtle Melaleuca armillaris scrub, Forest Red Gum Eucalyptus tereticornis woodland and rainforest margins, although the species has been recorded from a number of other vegetation types. Most vegetation types are also listed as Endangered Ecological Communities. Restricted to the Illawarra region where it is recorded from a number of sites. The species primarily occupies the coastal lowlands between Oak Flats and Toolijooa, in the local government areas of Shellharbour and Kiama. This is a range of approximately 22 kilometres.	Low	Species not recorded during surveys. Habitat degraded. Species associated with PCT 1300. PMST; Species or species habitat likely to occur within area.
Frog	*Heleioporus australiacus*	Giant Burrowing Frog	V	V	The Giant Burrowing Frog is found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based. They spend more than 95% of their time in non-breeding habitat in areas up to 300 m from breeding sites. Whilst in non-breeding habitat, the Giant Burrowing Frog burrows below the soil surface or in the leaf litter.	Low	Species mostly found in heath or woodland with deep leaf litter. PMST; Species or species habitat may occur within area. Species not known from locality.
Frog	*Litoria aurea*	Green and Golden Bell Frog	E	V	Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (Gambusia holbrooki), have a grassy area nearby and diurnal sheltering sites available. It has also been found to inhabit many disturbed sites, including abandoned mines and quarries	Moderate	Species has the potential to occur in the dam and drainage line within the site. Species associated with PCT 1300. PMST; Species or species habitat known to occur within area.

Class	Scientific name	Common name	BC Act Status	EPBC Act status	Habitat and geographic distribution	Likelihood of occurrence	Justification
Frog	*Litoria littlejohni*	Littlejohn's Tree Frog, Heath Frog	V	V	This species breeds in the upper reaches of permanent streams and in perched swamps. Non-breeding habitat is heath based forests and woodlands where it shelters under leaf litter and low vegetation, and hunts for invertebrate prey either in shrubs or on the ground. Littlejohn's Tree Frog has a distribution that includes the plateaus and eastern slopes of the Great Dividing Range from Watagan State Forest (90 km north of Sydney) south to Buchan in Victoria.	Low	Study area lacks upper reaches of streams or swamps. The study area also lacks deep leaf litter.
Frog	*Litoria watsoni*	Watson's Tree Frog	-	E	Watson’s Tree Frog is a forest-dependent species, recorded from wet and dry forest, woodland, bushland, and heathland at low to high elevations. Watson’s Tree Frog prefers moister areas, with most records from wet forest, followed by damp forest, and warm temperate rainforest. Watson’s Tree Frog is distributed from the Budderoo National Park (NP) in south-eastern New South Wales (NSW) to the eastern side of the Snowy River NP in the East Gippsland region of	Low	Study area forest vegetation and other suitable habitat.
Frog	*Mixophyes balbus*	Stuttering Frog	E	V	The Stuttering Frog is restricted to the eastern slopes of the Great Divide, from the Cann River catchment in far East Gippsland, Victoria, to tributaries of the Timbarra River near Drake, New South Wales. They are found in association with permanent streams through temperate and sub-tropical rainforest and wet sclerophyll forest, rarely in dry open tableland riparian vegetation.	Low	No records of this species within the locality. Species associated with PCT 1300. PMST; Species or species habitat may occur within area.
Frog	*Mixophyes iteratus*	Giant Barred Frog	E	E	Giant Barred Frogs are found along freshwater streams with permanent or semi-permanent water, generally (but not always) at lower elevation. Moist riparian habitats such as rainforest or wet sclerophyll forest are favoured for the deep leaf litter that they provide for shelter and foraging, as well as open perching sites on the forest floor. However, Giant Barred Frogs will also sometimes occur in other riparian habitats, such as those in drier forest or degraded riparian remnants, and even occasionally around dams. The Giant Barred Frog is distributed along the coast and ranges from Eumundi in south-east Queensland to Warrimoo in the Blue Mountains. Declines appear to have occurred at the margins of the species' range, with no recent records south of the Hawkesbury River and disappearances from a number of streams in QLD. Northern NSW, particularly the Coffs Harbour-Dorrigo area, is a stronghold.	Negligible	Site lacks deep leaf litter used by this species. No records of this species within the locality. Species associated with PCT 1300.

Class	Scientific name	Common name	BC Act Status	EPBC Act status	Habitat and geographic distribution	Likelihood of occurrence	Justification
Mammal	*Cercartetus nanus*	Eastern Pygmy-possum	V	-	Feeds largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes; an important pollinator of heathland plants such as banksias; soft fruits are eaten when flowers are unavailable. Also feeds on insects throughout the year; this feed source may be more important in habitats where flowers are less abundant such as wet forests. Shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum dreys or thickets of vegetation, (e.g. grass-tree skirts); nest-building appears to be restricted to breeding females; tree hollows are favoured but spherical nests have been found under the bark of eucalypts and in shredded bark in tree forks. The Eastern Pygmy-possum is found in south-eastern Australia, from southern Queensland to eastern South Australia and in Tasmania. In NSW it extends from the coast inland as far as the Pilliga, Dubbo, Parkes and Wagga Wagga on the western slopes.	Negligible	No records of this species within the locality. Habitat within the site is degraded. Species associated with PCT 1300.
Mammal	*Chalinolobus dwyeri*	Large-eared Pied Bat	V	V	In NSW this species has been recorded from a large range of vegetation types including: dry and wet sclerophyll forest; Cyprus Pine (Callitris glauca) dominated forest; tall open eucalypt forest with a rainforest sub-canopy; sub-alpine woodland; and sandstone outcrop country. The species requires a combination of sandstone cliff/escarpment to provide roosting habitat that is adjacent to higher fertility sites, particularly box gum woodlands or river/rainforest corridors which are used for foraging. Roosting has also been observed in disused mine shafts, caves, overhangs and disused Fairy Martin (Hirundo ariel) nests, also possibly roosts in the hollows of trees.	Moderate	Potential foraging habitat within the site and potential roosting habitat within buildings. No records of this species within the locality. Species associated with PCT 1300. PMST; Species or species habitat likely to occur within area.
Mammal	*Dasyurus maculatus*	Spotted-tailed Quoll	V	E	This species has been recorded from a wide range of habitats, including: coastal heathlands, open and closed eucalypt woodlands, wet sclerophyll and lowland forests (OEH 2018). Unlogged forest or forest that has been less disturbed by timber harvesting is preferable. Habitat requirements include suitable den sites such as hollow logs, tree hollows, rock outcrops or caves. Individuals require an abundance of food, such as birds and small mammals, and large areas of relatively intact vegetation through which to forage. Home ranges are estimated to be 620–2,560 ha for males and 90–650 ha for females (DoEE 2018).	Low	Site lacks preferred habitat structure and foraging resources. Species may travel through the site on a very rare occasion while dispersing. Species associated with PCT 1300. PMST; Species or species habitat likely to occur within area.
Mammal	*Falsistrellus tasmaniensis*	Eastern False Pipistrelle	V	-	Prefers moist habitats, with trees taller than 20 m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. Hunts beetles, moths, weevils and other flying insects above or just below the tree canopy. Hibernates in winter. Females are pregnant in late spring to early summer. The Eastern False Pipistrelle is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania.	Known	Species recorded (ELA 2022). Species could potentially roost within buildings on site and utilise casuarina habitat adjacent to the site for foraging and roosting. Species associated with PCT 1300.

Class	Scientific name	Common name	BC Act Status	EPBC Act status	Habitat and geographic distribution	Likelihood of occurrence	Justification
Mammal	*Isoodon obesulus obesulus*	Southern Brown Bandicoot	E	E	The Southern Brown Bandicoot has a patchy distribution. It is found in south-eastern NSW, east of the Great Dividing Range south from the Hawkesbury River, southern coastal Victoria and the Grampian Ranges, south-eastern South Australia, south-west Western Australia and the northern tip of Queensland. Southern Brown Bandicoots are largely crepuscular (active mainly after dusk and/or before dawn). They are generally only found in heath or open forest with a heathy understorey on sandy or friable soils. Males have a home range of approximately 5-20 hectares whilst females forage over smaller areas of about 2-3 hectares. Nest during the day in a shallow depression in the ground covered by leaf litter, grass or other plant material. Nests may be located under Grass trees Xanthorrhoea spp., blackberry bushes and other shrubs, or in rabbit burrows. The upper surface of the nest may be mixed with earth to waterproof the inside of the nest.	Negligible	There are no records of this species within the locality and the site does not contain suitable foraging or breeding habitat. PMST; Species or species habitat may occur within area.
Mammal	*Micronomus norfolkensis*	Eastern Coastal Free-tailed Bat	V	-	Occurs in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures. Usually solitary but also recorded roosting communally, probably insectivorous. The Eastern Freetail-bat is found along the east coast from south Queensland to southern NSW	High	Potential foraging and roosting habitat within site. Species potentially recorded during surveys (ELA 2022) Species associated with PCT 1300
Mammal	*Miniopterus australis*	Little Bent-winged Bat	V	-	The Little Bentwing Bat is distributed on the East coast and ranges of Australia from Cape York in Queensland to Wollongong in NSW. It is generally found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats.	Moderate	Potential foraging and roosting habitat within site. Species associated with PCT 1300
Mammal	*Miniopterus orianae oceanensis*	Large Bent-winged Bat	V	-	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. This species hunts in forested areas, catching moths and other flying insects above the tree tops. Eastern Bentwing-bats occur along the east and north-west coasts of Australia	High	Species potentially recorded during surveys (ELA 2022). Species associated with PCT 1300
Mammal	*Myotis macropus*	Southern Myotis	V	-	The Southern Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers. They generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Southern Myotis forage over streams and pools catching insects and small fish by raking their feet across the water surface.	High	Species potentially recorded during surveys (ELA 2022). Species associated with PCT 1300
Mammal	*Petauroides volans*	Greater Glider	-	V	Largely restricted to eucalypt forests and woodlands. It is primarily folivorous, with a diet mostly comprising eucalypt leaves, and occasionally flowers. It is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows. The greater glider favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species.	Negligible	Site lacks mature forest and hollows. PMST; Species or species habitat likely to occur within area.
Mammal	*Petaurus australis australis*	Yellow-bellied Glider (south-eastern)	V	-	Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. The Yellow-bellied Glider is found along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria	Negligible	Site lacks abundance of mature Eucalyptus species with hollows. No records from locality. PMST; Species or species habitat likely to occur within area.

Class	Scientific name	Common name	BC Act Status	EPBC Act status	Habitat and geographic distribution	Likelihood of occurrence	Justification
Mammal	*Petrogale penicillata*	Brush-tailed Rock-wallaby	E	V	In NSW the Brush-tailed Rock Wallaby occurs from the Queensland border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. This species occupies rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. The Brush-tailed Rock Wallaby browse on vegetation in and adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees.	Negligible	Site lacks suitable rocky areas and escapements. No records of this species within the locality. Species associated with PCT 1300.
Mammal	*Phascolarctos cinereus*	Koala	V	E	The Koala inhabits eucalypt woodlands and forests and feeds on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species (OEH 2018). Large populations of koalas occur on the western slopes and plains, in particular the Pilliga region (Kavanagh and Barrott 2001) and in Gunnedah (Smith 1992) and Walgett LGAs (J. Callaghan, Australian Koala Foundation, pers. comm.). Primary feed trees within the Western Slopes and Plains Koala Management Area (KMA) are River Red Gum (E. camalduensis) and Coolabah (E. coolabah). These do not occur within the study area. White box (E. albens) which occurs within the woodland to the north and north-east of the existing DWD is listed as secondary feed tree within the Western Slopes and Plains KMA. No koalas, koala scratches or scats were detected within this area, despite targeted searches by DPM Envirosciences in 2015.	Low	One *Eucalyptus* species within the site. No records of the species from the locality. PMST; Species or species habitat likely to occur within area.
Mammal	*Phoniscus papuensis*	Golden-tipped Bat	V	-	Found in rainforest and adjacent wet and dry sclerophyll forest up to 1000m. Also recorded in tall open forest, Casuarina-dominated riparian forest and coastal Melaleuca forests. Bats will fly up to two kilometres from roosts to forage in rainforest and sclerophyll forest on mid and upper-slopes. Roost mainly in rainforest gullies on small first- and second-order streams in usually abandoned hanging Yellow-throated Scrubwren and Brown Gerygone nests modified with an access hole on the underside. Bats may also roost under thick moss on tree trunks, in tree hollows, dense foliage and epiphytes. The Golden-tipped Bat is distributed along the east coast of Australia in scattered locations from Cape York Peninsula in Queensland to south of Eden in southern NSW. It also occurs in New Guinea.	Moderate	Species not known from locality, however could potentially roost within buildings on site and utilise casuarina habitat adjacent to the site for foraging and roosting. No records of this species within the locality. Species associated with PCT 1300.
Mammal	*Potorous tridactylus trisulcatus*	Long-nosed Potoroo	V	V	The long-nosed potoroo is found on the south-eastern coast of Australia, from Queensland to eastern Victoria and Tasmania, including some of the Bass Strait islands. There are geographically isolated populations in western Victoria. In NSW it is generally restricted to coastal heaths and forests east of the Great Dividing Range, with an annual rainfall exceeding 760 mm. Inhabits coastal heaths and dry and wet sclerophyll forests. Dense understorey with occasional open areas is an essential part of habitat, and may consist of grass-trees, sedges, ferns or heath, or of low shrubs of tea-trees or melaleucas. A sandy loam soil is also a common feature. Mainly nocturnal, hiding by day in dense vegetation - however, during the winter months animals may forage during daylight hours. Individuals are mainly solitary, non-territorial and have home range sizes ranging between 2-5 ha.	Negligible	There are no records of this species within the locality and the site does not contain suitable foraging or breeding habitat. PMST; Species or species habitat may occur within area.

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Mammal	*Pseudomys novaehollandiae*	New Holland Mouse	-	V	Found from coastal areas and up to100 km inland on sandstone country. Known to inhabit a range of habitats including open heathland, open woodland with a heathland understory and vegetated sand dunes. Soil type may be an important indicator of suitability of habitat with deeper top soils and softer substrates being preferred for digging burrows. Other factors such as slope, geology and the amount of sun received in an area may also influence site selection.	Negligible	There are no records of this species within the locality and the site does not contain suitable foraging or breeding habitat. PMST; Species or species habitat likely to occur within area.
Mammal	*Pteropus poliocephalus*	Grey-headed Flying-fox	V	V	Grey-headed Flying foxes occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy.	Low	Species may forage adjacent ot the site, however the site lacks suitable foraging or roosting habitat. PMST; Species or species habitat known to occur within area.
Mammal	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	V	-	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows.	Moderate	Species not known from locality, however could potentially roost within buildings on site and utilise casuarina habitat adjacent to the site for foraging and roosting. One record of this species within the locality. Species associated with PCT 1300.
Mammal	*Scoteanax rueppellii*	Greater Broad-nosed Bat	V	-	The Greater Broad-nosed Bat is found mainly in the gullies and river systems that drain the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland. It extends to the coast over much of its range. In NSW it is widespread on the New England Tablelands, however does not occur at altitudes above 500 m. This species utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest.	High	Species potentially recorded during surveys (ELA 2022). Species could potentially roost within buildings on site and utilise casuarina habitat adjacent to the site for foraging and roosting. Two records of this species within the locality. Species associated with PCT 1300.
Plant	*Caladenia tessellata*	Thick-lipped Spider-orchid	E	V	Thick-lipped Spider Orchid is generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil. The single leaf regrows each year. Flowers appear between September and November (but apparently generally late September or early October in extant southern populations).	Low	Species not known from locality. Site highly disturbed. PMST; Species or species habitat likely to occur within area.
Plant	*Cryptostylis hunteriana*	Leafless Tongue-orchid	V	V	The larger populations of these species typically occur in woodland dominated by Scribbly Gum (Eucalyptus sclerophylla), Silvertop Ash (E. sieberi), Red Bloodwood (Corymbia gummifera) and Black Sheoak (Allocasuarina littoralis); appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (C. subulata) and the Tartan Tongue Orchid (C. erecta). Little is known about the ecology of the species; being leafless it is expected to have limited photosynthetic capability and probably depends upon a fungal associate to meet its nutritional requirements from either living or dead organic material. In addition to reproducing from seed, it is also capable of vegetative reproduction and thus forms colonies which can become more or less permanent at a site.	Low	Site highly disturbed and lacks suitable habitat. PMST; Species or species habitat likely to occur within area.
Plant	*Genoplesium baueri*	Yellow Gnat-orchid	E	E	Usually found growing in heathland to shrubby woodland on sands or sandy loams or open forest, shrubby forest and heathy forest on well-drained sandy and gravelly soils.	Low	Species not known from locality. Site highly disturbed. PMST; Species or species habitat likely to occur within area.

Class	Scientific name	Common name	BC Act Status	EPBC Act status	Habitat and geographic distribution	Likelihood of occurrence	Justification
Plant	*Melaleuca biconvexa*	Biconvex Paperbark	V	V	Not recorded within a 10km radius of the project. Biconvex Paperbark is only found in NSW, with scattered and dispersed populations found in the Jervis Bay area in the south and the Gosford-Wyong area in the north. Biconvex Paperbark generally grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects. Flowering occurs over just 3-4 weeks in September and October. This species resprouts following fire.	Negligible	Conspicuous species not observed during field surveys. PMST; Species or species habitat may occur within area.
Plant	*Persicaria elatior*	Knotweed	V	V	Tall Knotweed has been recorded in south-eastern NSW (Mt Dromedary (an old record), Moruya State Forest near Turlinjah, the Upper Avon River catchment north of Robertson, Bermagui, and Picton Lakes. In northern NSW it is known from Raymond Terrace (near Newcastle) and the Grafton area (Cherry Tree and Gibberagee State Forests). The species also occurs in Queensland. This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance.	Negligible	Species not recorded during field surveys. No known records from locality. PMST; Species or species habitat likely to occur within area.
Plant	*Persoonia hirsuta*	Hairy Geebung	E	E	Persoonia hirsuta has a scattered distribution around Sydney. The species is distributed from Singleton in the north, along the east coast to Bargo in the south and the Blue Mountains to the west. Persoonia hirsuta has a large area of occurrence, but occurs in small populations, increasing the species' fragmentation in the landscape. The Hairy Geebung is found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone. It is usually present as isolated individuals or very small populations. It is probably killed by fire (as other Persoonia species are) but will regenerate from seed.	Negligible	Species not recorded during field surveys. No known records from locality. PMST; Species or species habitat likely to occur within area.
Plant	*Pomaderris brunnea*	Brown Pomaderris	E	V	Brown Pomaderris grows in moist woodland or forest on clay and alluvial soils of flood plains and creek lines. Brown Pomaderris is found in a very limited area around the Colo, Nepean and Hawkesbury Rivers, including the Bargo area and near Camden. It also occurs near Walcha on the New England tablelands and in far eastern Gippsland in Victoria.	Negligible	Species not recorded during field surveys. No known records from locality. PMST; Species or species habitat likely to occur within area.
Plant	*Prasophyllum affine*	Jervis Bay Leek Orchid	E	E	Jervis Bay Leek Orchid is currently known from three areas south-east of Nowra on South Coast. These are Kinghorne Point, Wowly Gully near the town of Callala Bay, and near the township of Vincentia. Grows on poorly drained grey clay soils that support low heathland and sedgeland communities. The underground dormant tubers commence shooting in mid winter and leaves are known to have emerged above ground by June.	Negligible	Suitable soils for the species do not occur within the site. PMST; Species or species habitat likely to occur within area.
Plant	*Pterostylis gibbosa*	Illawarra Greenhood	E	E	All known populations grow in open forest or woodland, on flat or gently sloping land with poor drainage. In the Hunter region, the species grows in open woodland dominated by Narrow-leaved Ironbark E. crebra, Forest Red Gum and Black Cypress Pine Callitris endlicheri. The Illawarra Greenhood is a deciduous orchid that is only visible above the ground between late summer and spring, and only when soil moisture levels can sustain its growth. The leaf rosette grows from an underground tuber in late summer, followed by the flower stem in winter. After a spring flowering, the plant begins to die back and seed capsules form (if pollination has taken place). As with many other greenhoods, male fungus gnats are believed to be the pollinator. The Illawarra Greenhood can survive occasional burning and grazing because of its capacity to reshoot from an underground tuber.	Low	Habitat within the site is highly disturbed. No records from the locality. Species not associated with PCTs on site. PMST; Species or species habitat likely to occur within area.

Class	Scientific name	Common name	BC Act Status	EPBC Act status	Habitat and geographic distribution	Likelihood of occurrence	Justification
Plant	*Rhizanthella slateri*	Eastern Underground Orchid	V	E	Occurs from south-east Queensland to south-east NSW. In NSW, currently known from fewer than 10 locations, including near Bulahdelah, the Watagan Mountains, the Blue Mountains, Wiseman's Ferry area, Agnes Banks and near Nowra. Habitat requirements are poorly understood and no particular vegetation type has been associated with the species, although it is known to occur in sclerophyll forest.	Low	Site is highly disturbed. Despite unknown vegetation associations, the site does not occur near a known population. PMST; Species or species habitat may occur within area.
Plant	*Rhodomyrtus psidioides*	Native Guava	CE	CE	Occurs from Broken Bay, approximately 90 km north of Sydney, New South Wales, to Maryborough in Queensland. Populations are typically restricted to coastal and sub-coastal areas of low elevation however the species does occur up to c. 120 km inland in the Hunter and Clarence River catchments and along the Border Ranges in NSW. Pioneer species found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest often near creeks and drainage lines.	Negligible	Unsuitable habitat for the species to occur. Not associated with PCTs on site. Not recorded during surveys PMST; Species or species habitat may occur within area.
Plant	*Senna acclinis*	Rainforest Cassia	E	-	Grows on the margins of subtropical, littoral and dry rainforests. Often found as a gap phase shrub. Occurs in coastal districts and adjacent tablelands of NSW from the Illawarra in NSW to Queensland.	Negligible	Species not recorded during surveys. No records of this species within the locality. Species associated with PCT 1300.
Plant	*Syzygium paniculatum*	Magenta Lilly Pilly	E	V	On the central coast, the Magenta Lilly Pilly occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities.	Negligible	Species not recorded during field surveys. No known records from locality. PMST; Species or species habitat likely to occur within area.
Plant	*Thesium australe*	Austral Toadflax	V	V	Occurs on the coast, tablelands and western slopes in shrubland, grassland or woodland, often on damp sites.	Low	Habitat within the site is highly disturbed. No records from the locality. Species not associated with PCTs on site. PMST; Species or species habitat likely to occur within area.
Plants	*Acacia bynoeana*	Bynoe's Wattle	E	V	Occurs in heath or dry sclerophyll forest on sandy soils. Seems to prefer open, sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds and in recently burnt patches. Associated overstorey species include Red Bloodwood, Scribbly Gum, Parramatta Red Gum, Saw Banksia and Narrow-leaved Apple.	Negligible	Habitat within the site is highly disturbed. No records from the locality. Species not associated with PCTs on site. PMST; Species or species habitat likely to occur within area.
Reptile	*Hoplocephalus bungaroides*	Broad-headed Snake	E	V	Often found in rocky outcrops and adjacent sclerophyll forest and woodland, the most suitable sites occur in sandstone ridgetops. Recorded sightings in forests growing on shale or conglomerate slopes and bluffs with canopy species include Corymbia eximia, C. gummifera, Eucalyptus sieberi, E. punctata and E. piperita. Adult snakes show a seasonal, temperature induced, shift in habitat use. Adults use rocks and crevices as shelter sites in rocky outcrops in autumn, winter and early spring. During late spring and summer, adults move up into adjacent woodlands. Juvenile snakes remain in rocky habitat year round. The majority of occupied retreat sites occur on exposed cliff edges. In woodland, snakes shelter in hollows in a variety of tree species including Red Bloodwood (Eucalyptus gummifera), Grey Gum (E. punctata), Sydney Peppermint (E. piperita) and Blue Leaf Stringybark (E. agglomerata). Snakes show preferences for large trees, trees with multiple hollows, and dead trees. Most snakes use hollow branches rather than hollow stems. Individual snakes use between one and nine trees. Snakes spend long periods of inactivity in a single hollow, up to 48 days.	Negligible	No records of this species within the locality. Site lacks suitable habitat such as woody debris and tree hollows. Species associated with PCT 1300. PMST; Species or species habitat may occur within area.

Class	Scientific name	Common name	BC Act Status	EPBC Act status	Habitat and geographic distribution	Likelihood of occurrence	Justification
	Daphoenositta chrysoptera	Varied Sittella	V	-	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. Feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees and small branches and twigs in the tree canopy. Builds a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years. The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands. Distribution in NSW is nearly continuous from the coast to the far west. The Varied Sittella's population size in NSW is uncertain but is believed to have undergone a moderate reduction over the past several decades.	Low	This species forages in the canopy of trees in woodlands. The vegetation within the site is not suitable foraging or breeding habitat for this species. No records of this species within the locality. Species associated with PCT 1300.

Appendix F

EPBC assessments of significance

EMM
creating opportunities

F.1 Green and Golden Bell Frog (*Litoria aurea*)

Table F.1 Significant impact assessment – Green and Golden Bell Frog (Vulnerable)

Criteria	Discussion
Lead to a long-term decrease in size of an important population	All current populations of the Green and Golden Bell Frog (*Litoria aurea*) are regarded as important populations due to the continuing decline in the species and the restricted nature of known populations as well as the uncertainty in the status of populations in Victoria (DEWHA 2009b). There have been no records of Green and Golden Bell Frog (*Litoria aurea*) within the subject land based on survey (Eco Logical Australia 2022) and atlas records (DPE 2022b); and atlas records within the study area surrounding the subject land are over 40 years old (DPE 2022b). Population information in the broader locality includes the nearby Killalea Lagoon but the population at this location is considered to be extinct; the last year that the species was recorded at Killalea Lagoon was in 1992 (DEWHA 2009a; DCCEEW 2023a). The habitat of the Green and Golden Bell Frog (*Litoria aurea*) comprises one or more water bodies and associated terrestrial habitats (grassy areas and vegetation no higher than woodlands) within its known range (DEWHA 2009b). Water bodies include, but are not limited to ponds, wetlands, farm dams, creek lines and irrigation or drainage channels (DEWHA 2009b). There are no water bodies within the subject land and the dams present near the subject land represent suboptimal habitat as there is limited fringing vegetation. The first order drainage present is undifferentiated from surrounding grassland, with overland flow directed towards the railway line as sheet flow (Enstruct 2023b). Connecting grassland habitat is also considered suboptimal dispersal habitat as the grassland is represented by highly modified exotic pastures. On a very conservative basis, if the species were present in any of the dams or waterbodies that occur on adjacent lots, the species has potential to travel between dams through the subject land. However, the quality of the wetland and terrestrial habitats, and the lack of records within the locality suggests that it is highly unlikely that a population of the species would be moving through the subject land. Based on this, the project is unlikely to lead to a long-term decrease in the size of an important population.
Reduce the area of occupancy of an important population	For the reasons above, the project is unlikely to reduce the area of occupancy of an important population of the species.
Fragment an existing important population into two or more populations	For the reasons above, the project is unlikely to fragment an existing important population into two or more populations.
Adversely affect habitat critical to the survival of a species	No critical habitat has been declared for the Green and Golden Bell Frog (DEC 2005) and as such the project is unlikely to adversely affect habitat critical to the species.
Disrupt the breeding cycle of an important population	No breeding habitat exists within the subject land and therefore the breeding cycle of any Green and Golden Bell Frog population is unlikely to be affected by the project.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The project will remove up to 0.01 ha of wetland habitat represented by reedland and 9.95 ha of suboptimal foraging and dispersal habitat represented by exotic grassland. The removal of such habitats is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Invasive species of particular threat to the Green and Golden Bell Frog includes Mosquito Fish (*Gambusia holbrooki*), feral cats and feral foxes (DEWHA 2009b). The project is located within a peri-urban landscape and is unlikely to introduce invasive species to the subject land; pests such as foxes and cats are likely to already be in the landscape and the future use of the subject land as a hospital is unlikely to facilitate an increase in the numbers of feral pests.

Table F.1 Significant impact assessment – Green and Golden Bell Frog (Vulnerable)

Criteria	Discussion
Introduce disease that may cause the species to decline	Disease that is of particular threat to the Green and Golden Bell Frog includes chytrid fungus (*Batrachochytrium dendrobatidis*) (DEWHA 2009b). Mitigation measures will be implemented to ensure no diseases such as chytrid fungus (*Batrachochytrium dendrobatidis*) are introduced into the subject land during construction works.
Interfere substantially with the recovery of the species	The recovery objectives for the species are (DEC 2005): • to manage threats impacting on currently known populations so as to stabilise and prevent further decline • to return the species to its former distribution, abundance and role in the ecosystem. The project is unlikely to impact on a known population; and whilst the subject land may form part of a larger historical distribution, the subject land has not been known to support a population of the species. On these points, the project is not considered likely to interfere substantially with the recovery of the species.
Conclusion	Based on the assessment above, the project is unlikely to have a significant impact on Green and Golden Bell Frog as: • there is no known important population within the subject land and no current records within the locality of the subject land • the subject land does not contain breeding habitat for the species • the subject land does not contain valuable movement or dispersal habitat • the subject land does not represent habitat critical to the survival of the species • the project will not interfere with recovery of the species.

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