Hexham Long Term Train Support Facility

Biodiversity Development Assessment Report Waiver Request

21 September 2021

Aurizon

Hexham Long Term Train Support Facility

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v.1	24/08/2021	Draft 1	J. Bayada, T. Maher	C.Thomson	C.Thomson	C.Thomson
v.2	08/09/2021	Revised Draft 1	J. Bayada	C.Thomson	C.Thomson	C.Thomson
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Contents

Executive Summary

This summary provides the detail required in **Table 1** and **Table 2** of the document *How to apply for a biodiversity development assessment report waiver for a Major Project Application* (NSW Department of Planning, Industry and Environment 2019 (DPIE)).

Table 1: BDAR waiver request information requirements	
Admin	▪ Proponent name and contact details – Aurizon ('the proponent'), contact: Harry Egan, Senior Adviser Environment, 0438 136 697, Harry.Egan@aurizon.com.au ▪ Project ID – The proposed development works requires a modification (MOD 2) to the Hexham Long Term Train Support Facility (LTTSF) project approval MP07_0171 (as modified by MOD 1) under Part 5.1 of the *Environment Planning & Assessment Act 1979* (EP&A Act) ('Modification Proposal'). Due to the location of the proposed development works and lack of any impact to areas of ecological value, the proponent is seeking the completion of a Biodiversity Development Assessment Report (BDAR) waiver request to accompany this Modification Proposal. ▪ Name and ecological qualifications of person completing **Table 2** –Julia Bayada, Bachelor of Environmental Science and Management (Ecosystems and Biodiversity) and Timothy Maher, Bachelor of Advanced Science (Biology) and Master of Research (Plant Ecology). A full list of contributor's qualifications is provided in **Table 2-1**.
Site details	▪ Street address, Lot and DP, local government area – Off Anderson Drive, Hexham, NSW 2322, Lot 104 in DP 1189565, Newcastle Local Government Area. ▪ Description of existing development site – The development site is located to the west of the Hunter River at Hexham and is bounded by Maitland Road and the Hunter railway line in the east, and the Hunter Wetlands National Park (Hexham Swamp Nature Reserve) in the west (refer to Figure 2-2). It is approximately 12 kilometres to the Port of Newcastle and is situated adjacent to the main northern railway line within the Newcastle Local Government Area. ▪ According to the Native Vegetation Regulatory Map (2021d), the development site is mapped as 'Excluded Land'. Lands mapped as Excluded are not subject to native vegetation land management requirements prescribed in the *Local Land Services Act 2013* (LLS Act). Therefore, the 'Category 1 - exempt land' under the Land Management Framework is not applicable to the development site. ▪ The location map showing the development site in the context of surrounding areas and landscape features is displayed on **Figure 2-2**. ▪ The development site is displayed on **Figure 1-1**.
Proposed development	▪ The proposed development works requires a modification (MOD 2) to the Hexham LTTSF project approval MP07_0171 (as modified by MOD 1) ('Modification Proposal') under Part 5.1 of the EP&A Act. Due to the location of the proposed development works and lack of any impact to areas of ecological value, the proponent is seeking a BDAR waiver request to accompany this Modification Proposal. ▪ The proponent has identified two respective areas at the Hexham LTTSF to construct new infrastructure to relocate the Newcastle Train Crew Depot and Maintenance Warehouse (Depot) (known as Area 1) and a long-term wagon storage area (known as Area 2). ▪ Area 1 – Depot: The proposed construction and operation of the depot would support the deployment of train crews operating the Aurizon fleet throughout the Hunter Valley and site maintenance activities. The depot, inclusive of car parking and ancillary structures, would cover an area of approximately 0.9 hectares and would generally comprise of a single storey office, amenities and driver shift sign-on, car parking, and maintenance warehouse. ▪ Area 2 – Long-term Wagon Storage: The long-term wagon storage would be approximately 1.8 hectares, located immediately west of the proposed depot area. Due to the reduction in

Table 1: BDAR waiver request information requirements	
	coal haulage demand, the long-term wagon storage is needed. Wagons will be placed directly on soil by mobile cranes after being transported to the location from the adjacent rail line by truck. ▪ The location of the development site (Area 1 and Area 2) is displayed on **Figure 1-1**.
Impacts on biodiversity values	▪ Refer to the completed **Table 2** below on biodiversity values. ▪ Biodiversity values in the development site are shown on **Figure 3-3**.

Table 2: Impacts of the proposed development works on biodiversity values

Biodiversity value	Meaning	Relevant (✓ or N/A)	Explain and document potential impacts including additional impacts prescribed under the BC Regulation Attach additional supporting documentation where appropriate
Vegetation abundance - 1.4(b) *Biodiversity Conservation Regulation 2017* (BC Regulation)	Occurrence and abundance of vegetation at a particular site	N/A	There is some native vegetation (according to the definition of native vegetation provided in the LLS Act) that has naturally established in the development site, namely *Cynodon dactylon* (Common Couch), and a few individuals of *Juncus usitatus* (Common Rush) and *Eleocharis acutus*. However, this native vegetation is very minimal in extent and cannot be assigned to a PCT as identified in the DPIE BioNet Vegetation Classification. As such, the vegetation cannot be allocated to vegetation zones. The habitat types in the development site and immediate surrounds are best described as miscellaneous ecosystems as identified by the BioNet Vegetation Classification database and threatened species profiles (DPIE 2021c), specifically: Highly disturbed areas with no or limited native vegetation. Vegetation abundance (as it would apply to a PCT) would not be impacted by removal of vegetation within the development site.
Vegetation integrity 1.5(2)(a) BC Act	Degree to which the composition, structure and function of vegetation at a particular site and the surrounding landscape has been altered from a near-natural state	N/A	As the native vegetation cannot be assigned to a native PCT, it is not possible to assess vegetation integrity against benchmark scores by undertaking an assessment of the composition, structure or function of the vegetation according to the field methods outlined in Section 5.3 of the BAM. A vegetation integrity score cannot be determined in accordance with Section 5.4 of the BAM as there are no PCTs that will be impacted by the proposed development works. There would be no loss of vegetation composition, structure, or function (as assessed

Table 2: Impacts of the proposed development works on biodiversity values			
Biodiversity value	**Meaning**	**Relevant (✓ or N/A)**	**Explain and document potential impacts including additional impacts prescribed under the BC Regulation** **Attach additional supporting documentation where appropriate**
			in accordance with the BAM) due to the proposed development works.
Habitat suitability 1.5(2)(b) BC Act	Degree to which the habitat needs of threatened species are present at a particular site	N/A	The exotic dominated vegetation in the development site does not provide any suitable habitat for threatened species.
Threatened species abundance 1.4(a) BC Regulation	Occurrence and abundance of threatened species or threatened ecological communities, or their habitat, at a particular site	N/A	The habitat assessment (refer to **Appendix A**) identified limited habitat in the development site for threatened species. In addition to this, the field survey identified no high-quality threatened species habitats on the development site. For this reason, no targeted threatened species surveys have been undertaken as part of this assessment. The proposed development works are unlikely to have an appreciable impact on threatened species abundance.
Habitat connectivity 1.4(c) BC Regulation	Degree to which a particular site connects different areas of habitat of threatened species to facilitate the movement of those species across their range	✓	The development site is surrounded by highly modified land where natural habitats have been cleared. There is no obvious physical habitat connectivity associated with the development site. However, functional connectivity exists for flying animals such as birds and bats that use the airspace above the development site to move between habitats. The proposed development works are considered unlikely to have a detrimental effect on habitat connectivity for these species.
Threatened species movement 1.4(d) BC Regulation	Degree to which a particular site contributes to the movement of threatened species to maintain their lifecycle	✓	The development site is unlikely to contribute to the movement of threatened species, apart from flying species, such as Fork-tailed Swift, White-throated Needletail, Eastern Osprey, White-bellied Sea-Eagle, Square-tailed Kite, Wedge-tailed Shearwater, Sharp-tailed Sandpiper, Red-necked Stint, Latham's Snipe, Common Greenshank and Marsh Sandpiper. These species are powerful flyers capable of covering large distances between habitat patches. Their movement would not be impeded as to affect their lifecycles.
Flight path integrity 1.4(e) BC Regulation	Degree to which the flight paths of protected animals over a particular site are free from interference	✓	The development site is located approximately 1-kilometre from the Hunter Wetlands National Park in the south-east, 350 metres from the Hunter Wetlands National Park (Hexham Swamp

Table 2: Impacts of the proposed development works on biodiversity values			
Biodiversity value	**Meaning**	**Relevant (✓ or N/A)**	**Explain and document potential impacts including additional impacts prescribed under the BC Regulation** **Attach additional supporting documentation where appropriate**
			Nature Reserve) in the west and 750 metres from the Hunter River south channel and Hunter River in the east. These areas are known to contain habitat and species sightings for threatened and migratory birds. Migratory bird species may fly over the development site on occasion, however, considering the current disturbance and absence of suitable habitat preferences within the development site, the proposed development works are unlikely to increase the current barrier to flights paths and no new barriers will be introduced.
Water sustainability 1.4(f) BC Regulation	Degree to which water quality, water bodies and hydrological processes sustain threatened species and threatened ecological communities at a particular site	N/A	No threatened species or threatened ecological communities have been identified on the development site that are being sustained by water quality, water bodies and hydrological processes.

The information provided in this BDAR waiver request has considered the guidance provided in the DPIE (2019) *How to apply for a biodiversity development assessment report waiver for a Major Project Application*. In accordance with Section 7.9 of the BC Act and after consideration of the potential impacts on biodiversity values (refer to **Table 2** above and **Section 4**) as outlined in the BC Act and the BC regulation, the proposed development works are not likely to have any significant impact on biodiversity values. This BDAR waiver request highlights the absence of native vegetation and important ecological values from the development site, and it is evident that the proposed development works would not have a significant impact on threatened species, populations, or ecological communities (refer to **Section 3**). Therefore, a BDAR is not considered necessary for the proposed development works associated with the development site.

1. Introduction

1.1 Proposed development background

Aurizon ('the proponent') owns 255 hectares of industrial zoned land located at Hexham in the Hunter Valley of New South Wales (NSW). The Hexham Long Term Train Support Facility (LTTSF) occupies approximately 38 hectares of this industrial zoned land.

The proponent is proposing to:

- construct new infrastructure for a depot at Hexham LTTSF to support the relocation of the Newcastle Train Crew Depot and Maintenance Warehouse from 121 Woodstock Street, North Mayfield, to a designated area at the Hexham LTTSF, and
- store wagons on soil at a designated area at the Hexham LTTSF due to a reduction in coal haulage demand (refer to **Figure 1-1**).

The functions of the Newcastle Train Crew Depot and Maintenance Warehouse, and Hexham LTTSF are intrinsically related in that the Newcastle Train Crew Depot and Maintenance Warehouse primarily provides rail, safety and maintenance staff and supplies which are utilised and mobilised by the Hexham LTTSF. As a result, there is a considerable amount of transportation of personnel and goods between these operational facilities.

The depot relocation aims to provide efficiencies in the deployment of train crews accessing locomotives servicing the Hunter Valley; and consolidate Aurizon's operations, maintenance and warehousing staff and facilities into a single location.

1.2 Proposed development overview

The proponent has identified two respective areas at the Hexham LTTSF to construct new infrastructure for the depot relocation (known as Area 1) and a long-term wagon storage area (known as Area 2). The proposed works also include the installation of ancillary infrastructure within these areas including hardstand, water management, landscaping, lighting etc. ('proposed development works').

1.2.1 Area 1 – Depot

The proposed construction of the depot would support the deployment of train crews operating the Aurizon fleet throughout the Hunter Valley and consolidate maintenance warehouse infrastructure. The depot would cover an area of approximately 0.9 hectares and would comprise of:

- a single storey office, amenities and driver shift sign-on,
- car parking, and
- a warehouse.

The proposed location of the depot site is displayed on **Figure 1-1**.

1.2.2 Area 2 – Long-term Wagon Storage

The long-term wagon storage would be approximately 1.8 hectares, located immediately west of the proposed depot area. Due to the reduction in coal haulage demand, the long-term wagon storage is needed. Wagons will be placed directly on soil by mobile cranes after being transported to the location from the adjacent rail line by truck.

The proposed location of the long-term wagon storage site is displayed on **Figure 1-1**.

1.3 Proposal location

The development site is located to the west of the Hunter River at Hexham and is bounded by Maitland Road and the Hunter railway line in the east and the Hunter Wetlands National Park (Hexham Swamp Nature Reserve) in the west (refer to **Figure 2-2)**. It is approximately 12 kilometres to the Port of Newcastle and is situated adjacent to the main northern railway line within the Newcastle Local Government Area. The development site is legally described as Lot 104 in DP 1189565.

The entire development site has been comprehensively modified from its original state and now exists as highly modified land, with a notable absence of trees, shrubs and native groundlayer vegetation, evidence of widespread soil disturbance (excavation and filling), interspersed with primarily exotic flora species and depressions. Moreover, the development site has been historically cleared of any native vegetation and has been reportedly used in the past for heaped placement of spoil material (coal reject, gravel and brick), and subsequently seeded with hardy annual grasses, mainly *Cenchrus clandestinus* (Kikuyu Grass) to stabilise the material and prevent erosion.

1.4 Purpose of this report

The proposed development works requires a modification (MOD 2) to the Hexham LTTSF project approval MP07_0171 (as modified by MOD 1) ('Modification Proposal') under Part 5.1 of the EP&A Act. Due to the location of the proposed development works and lack of any impact to areas of ecological value, the proponent is seeking a BDAR waiver request to accompany this Modification Proposal.

This report is a BDAR Waiver Request, which will be submitted to the Department of Planning, Industry and Environment (DPIE) to enable DPIE to determine whether the proposed development works are not likely to have any significant impact on biodiversity values, in accordance with section 7.9(2) of the BC Act and whether the Biodiversity Offset Scheme (BOS) should apply if a BDAR is required. The BDAR waiver request addresses the impacts on biodiversity values associated with the proposed development works to which the BOS applies under section 6.3 of the BC Act. Biodiversity values are defined in the BC Act and the BC Regulation.

1.5 Terms and definitions

The following terms are used throughout this report and are defined as:

- Development site: represents the proposed development works boundary for the project (see **Figure 1-1**). This includes the construction boundary limits of the depot (Area 1) and the long-term wagon storage (Area 2). Area 1 is 0.9 hectares and Area 2 is 1.8 hectares. In accordance with the BAM, the development site is known as the 'subject land'.
- Assessment area: includes the development site and a 1,500-metre buffer surrounding the outside edge of the development site boundary (as defined in Section 3.1.2 of the BAM).
- Bioregion: the development site is situated in the Sydney Basin bioregion within the Hunter sub-region, as recognised by the Interim Biogeographic Regionalisation for Australia (IBRA) (Thackway and Cresswell 1995).

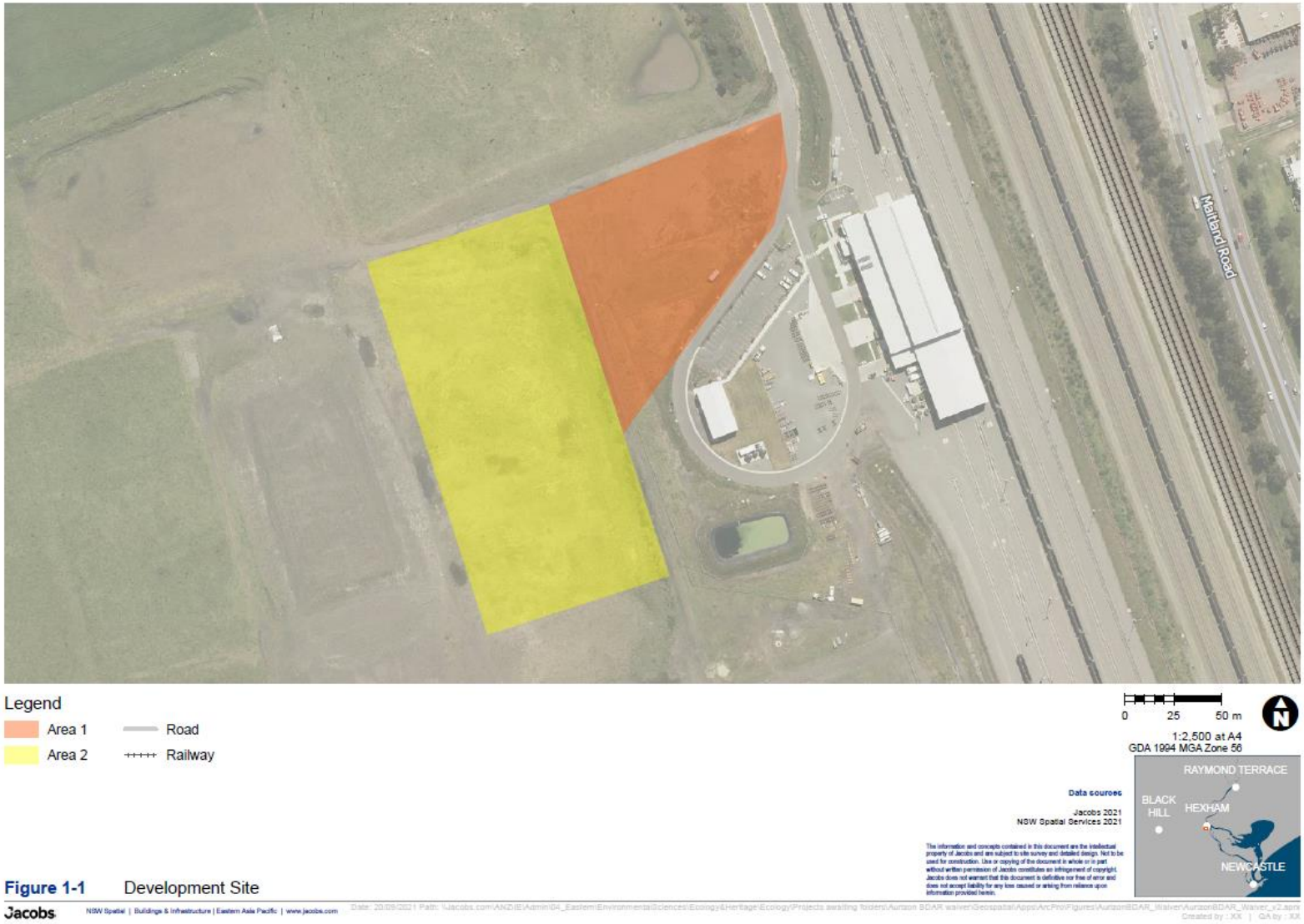

Figure 1-1: Development site

2. Methodology

2.1 Personnel

This biodiversity assessment was undertaken and prepared by suitably qualified and experienced ecologists (refer to **Table 2-1**).

Table 2-1: Personnel, roles, and experience

Name	Role	Qualifications	Experience
Chris Thomson	Principal Ecologist – Technical review, ecological site assessment, reporting	Graduate Certificate in Natural Resources Bachelor of Applied Science Accredited under Section 6.10 of the BC ACT as a Biodiversity Assessment Method Assessor (No. BAAS18058)	25 years' experience in ecological assessment of major infrastructure projects in NSW.
Julia Bayada	Ecologist – Reporting	Bachelor of Environmental Science and Management (Ecosystems and Biodiversity)	2 years' experience as a project officer working for government and almost 2 years' experience in ecological assessment of major infrastructure projects in NSW.
Tim Maher	Ecologist - Reporting	Bachelor of Advanced Science (Biology) Master of Research (Plant Ecology)	3 years' experience in ecological assessment of major infrastructure projects in NSW.

2.2 Background research

A background review of existing information was undertaken to identify the existing environment of the assessment area and applying a 10-kilometre search radius centred on the development site. The review focussed on database searches, relevant reports pertaining to the assessment area, property boundaries, and relevant GIS layers. The review was used to prepare a list of threatened species, populations, and communities as well as important habitat for migratory species, to undertake a likelihood of occurrence assessment in the development site.

The following information and database searches were reviewed as part of this study:

- QR National – Train Support Facility, Hexham, Ecological Investigations (Eco Logical Australia, 2012)
- Biodiversity Values Map and Threshold Tool (viewed 27 August 2021) (DPIE 2021a)
- BioNet Atlas of NSW Wildlife and Threatened Biodiversity Data Collection (accessed 24 August 2021) (DPIE 2021b)
- BioNet Vegetation Classification database and threatened species profiles (accessed 27 August 2021) (DPIE 2021c)
- Register of Declared Areas of Outstanding Biodiversity Value (viewed 27 August 2021) (DPIE 2021e)
- Directory of Important Wetlands (viewed 27 August 2021) (DoAWE 2008)
- Protected Matters Search Tool (PMST) (accessed 24 August 2021) (DoAWE 2021)
- Greater Hunter Native Vegetation Mapping, Version 4.0 (VIS ID 3855) (DPIE 2012)
- Lower Hunter Vegetation Mapping, 2013 (VIS_ID 4513) (DPIE 2017a).

Preliminary and provisional determinations to list species and ecological communities as threatened under the BC Act were viewed on the NSW Threatened Species Scientific Committee website. There were no preliminary or provisional listings of relevance to the development site.

The annual Final Priority Assessment List of nominated species and ecological communities that have been approved for assessment by the Minister responsible for the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), was reviewed. None of the nominated species and ecological communities on this list are of relevance to the development site.

2.3 Field survey

A field survey was undertaken within the development site on the 25 August 2021 to ground-truth the results of the background research and habitat assessment.

2.3.1 Vegetation surveys

Due to the characteristics of the development site, a vegetation survey was not able to be completed using the field survey methods in line with Chapter 4 of the Biodiversity Assessment Method (BAM) (Department of Planning, Industry & Environment, 2020). A plot-based vegetation survey of the development site was not undertaken as there are no Plant Community Types (PCTs) present in the development site and hence vegetation zones could not be established. A vegetation integrity assessment was not able to be undertaken.

The vegetation survey was limited to identification of any existing plant species by traversing the entire development site. As the vegetation present is predominantly exotic and uniformly spread across the development site, mapping was not undertaken.

2.3.2 Habitat assessment

A habitat assessment was undertaken within the assessment area on the identified list of threatened flora and fauna species known or predicted to occur in the Hunter IBRA sub-region that have been recorded within a 10-kilometre search radius centred on the development site (see **Appendix A** for the habitat assessment results). This list was identified from databases and literature as well as past surveys. The habitat assessment compared the preferred habitat features for these species with the type and quality of the habitats identified in the development site and assessment area. This habitat assessment was completed to assess the likelihood of species being present in the development site (i.e., subject species). The criteria used in the habitat assessment are detailed in **Table 2-2**. The results of the habitat assessment are provided in **Appendix A**.

Table 2-2: Likelihood of occurrence classification and criteria

Likelihood	Criteria
Recorded	The species was observed in the development site during the field survey.
High	It is highly likely that a species inhabits the development site and is dependent on identified suitable habitat (i.e., for breeding or important life cycle periods such as winter flowering resources), recent records in the assessment area are numerous and/or widespread and is known or likely to maintain resident populations in the development site. Also includes species known or likely to visit the development site during regular seasonal movements or migration.
Moderate	Potential habitat is present in the development site. Species unlikely to maintain sedentary populations, however, may seasonally use resources within the development site opportunistically or during migration. The species is unlikely to be dependent (i.e., for breeding or important life cycle periods such as winter flowering resources) on habitat within the development site.
Low	It is unlikely that the species inhabits the development site and has not been recorded recently in the assessment area. Specific habitat features are not present in the development site.

Likelihood	Criteria
Unlikely	Suitable habitat is absent from the development site.

2.3.3 Threatened species surveys

The habitat assessment identified that there is limited habitat in the development site for threatened species. For this reason, targeted surveys were not undertaken for preparation of this report.

2.4 Limitations

The field survey was able to provide adequate spatial coverage and survey effort for the entire development site. This was achievable in the timeframe given the small size of the development site. Detailed floristic survey of vegetation was not able to be undertaken as no native vegetation that could be assigned to a PCT was present on the development site. The conclusions of this report are based upon available data and field survey and are indicative of the environmental condition of the development site at the time of the survey. It should be recognised that the development site conditions, including the presence of threatened species, can change with time. To address this limitation, the assessment has aimed to identify the presence and suitability of the habitat for threatened species.

3. Existing environment

3.1 Historical landscape context

The development site evidences a history of being cleared of vegetation for sixty years. Historically, the northern vicinity of the Hexham LTTSF has been used for agricultural purposes, while the southern vicinity has a long history of use for rail activities and coal storage, preparation, loading and unloading. The southern vicinity of the Hexham LTTSF contains approximately 1.5 million tonnes of coal reject material, including coal tailings and chitter. Some structures remain on the Hexham LTTSF from previous uses, including concrete footings, a former dilapidated bath house and a control box / lunchroom.

The development site originally formed part of the Hexham Swamp Estuarine Wetlands. However, over the past 150 years the development site has been disturbed by human activities such as coal stockpiling and washing, infilling of wetlands, construction of tailings ponds, and irrigation of wastewater, and as a result the drainage patterns have been significantly altered.

Google Earth satellite imagery as shown in **Photos 1** to **5** below, indicates the historical context of the development site and adjoining areas from 2012 to 2016. The previous land use in relation to the depot (Area 1) was used as a construction compound and can be seen from **Photos 2** to **4** below. Additionally, the previous land use in relation to the long-term wagon storage (Area 2) has been subject to coal stockpiling, excavation works and is essentially an artificial landscape.

Photo 1. Satellite imagery of the development site and adjoining areas from October 2012 (Google Earth)

Photo 2. Satellite imagery of the development site and adjoining areas from April 2014 (Google Earth)

Photo 3. Satellite imagery of the development site and adjoining areas from October 2014 (Google Earth)

Photo 4. Satellite imagery of the development site and adjoining areas from June 2015 (Google Earth)

Photo 5. Satellite imagery of the development site and adjoining areas from October 2016 (Google Earth)

3.2 Current landscape context

A summary of the current landscape context is provided below in **Table 3-1**.

Table 3-1: Summary of current landscape context

Landscape feature	Details
IBRA bioregions and IBRA sub-regions	The development site is situated within the Hunter sub-region of the Sydney Basin Bioregion as defined by Thackway and Cresswell (1995).
Mitchell landscapes	The development site is within the Lower Hunter Channels and Floodplains Mitchell Landscape as described by the NSW Department of Environment and Climate Change (2008) and mapped by the NSW Department of Planning, Industry and Environment (2017b).
Rivers, streams and estuaries	There are no rivers, streams and estuaries present in the development site. Within the assessment area, the development site is located approximately 1-kilometre from the Hunter Wetlands National Park in the south-east, 350 metres from the Hunter Wetlands National Park (Hexham Swamp Nature Reserve) in the west and 750 metres from the Hunter River south channel and Hunter River in the east.
Wetlands	There are no important wetlands (SEPP Coastal Management or Ramsar sites) present in the development site. Within the assessment area, the development site is situated nearest 8 SEPP Coastal Management wetlands and the Hunter Estuary Wetlands Ramsar site.
Connectivity of different areas of habitat	The development site is located within a highly modified landscape where fauna habitats have been largely cleared. The Pacific Highway and Hexham industrial area form barriers to movement to the east of the development site. Cleared pasture interspersed with low-lying wetland areas occur to the west of the development site. The closest patches of naturally occurring habitat to the development site are present within the Hunter Wetlands National Park (Hexham Swamp Nature Reserve), over 350 metres to the west of the development site. There is no habitat connectivity associated with the development site. However, flying animals such as birds and bats use the airspace to move between habitat and may use the landscape as a foraging or perching resource as part of regular movements.

Landscape feature	Details
Areas of geological significance and soil hazard features	The development site is classified as disturbed terrain by the Soil Landscapes of the Newcastle 1:100,000 Sheet map and report (DPIE, 1995) and is mapped as having a 'High Probability of Occurrence' of Acid Sulfate Soils (DPIE, 2011). Acid Sulfate Soils in this area are widespread or sporadic and may also be very close to the surface or buried by many metres of alluvium or windblown sand. Bottom sediments of estuaries, rivers, creeks and lakes are also considered areas of High Probability of Occurrence (Naylor et al., 1998). No areas of geological significance (e.g., karst, caves, crevices, cliffs) occur within or adjacent to the development site.
Areas of outstanding biodiversity value	There are no areas of outstanding biodiversity value within or adjoining the development site.
Native vegetation cover	Under the BAM, native vegetation has the same meaning as in section 1.6 of the BC Act. Under section 1.6 of the BC Act, native vegetation has the same meaning as in Part 5A of the LLS Act. Part 5A section 60B of the LLS Act outlines the following meaning of "native vegetation": For the purposes of this Part, native vegetation means any of the following types of plants native to New South Wales: a) trees (including any sapling or shrub or any scrub), b) understorey plants, c) groundcover (being any type of herbaceous vegetation), d) plants occurring in a wetland. The development site has been historically cleared of any native vegetation. The closest patches of naturally occurring native vegetation to the development site are present within the Hunter Wetlands National Park (Hexham Swamp Nature Reserve), over 350 metres to the west of the development site. However, according to the definition of native vegetation provided in the LLS Act, there is some native vegetation that has naturally established in the development site, namely *Cynodon dactylon* (Common Couch), and a few individuals of *Juncus usitatus* (Common Rush) and *Eleocharis acutus* where standing water sits in depressions. Though, this native vegetation cannot be assigned to a PCT for the purposes of the BAM (refer Section 3.2). Considering the very low cover of mapped vegetation shown in **Figure 2-2**, the percent of native vegetation cover has not been calculated and is likely to score the lowest category of 0-10% in accordance with Section 3.2 of the BAM.
Patch size	Under the BAM a patch size is assigned to each vegetation zone. A vegetation zone means an area of native vegetation on the subject land (development site) that is the same PCT and has a similar broad condition state. The development site does not contain an abundance of naturally occurring native vegetation that can be assigned to a PCT. As there are no PCTs on the development site there are no vegetation zones for which a patch size can be determined.

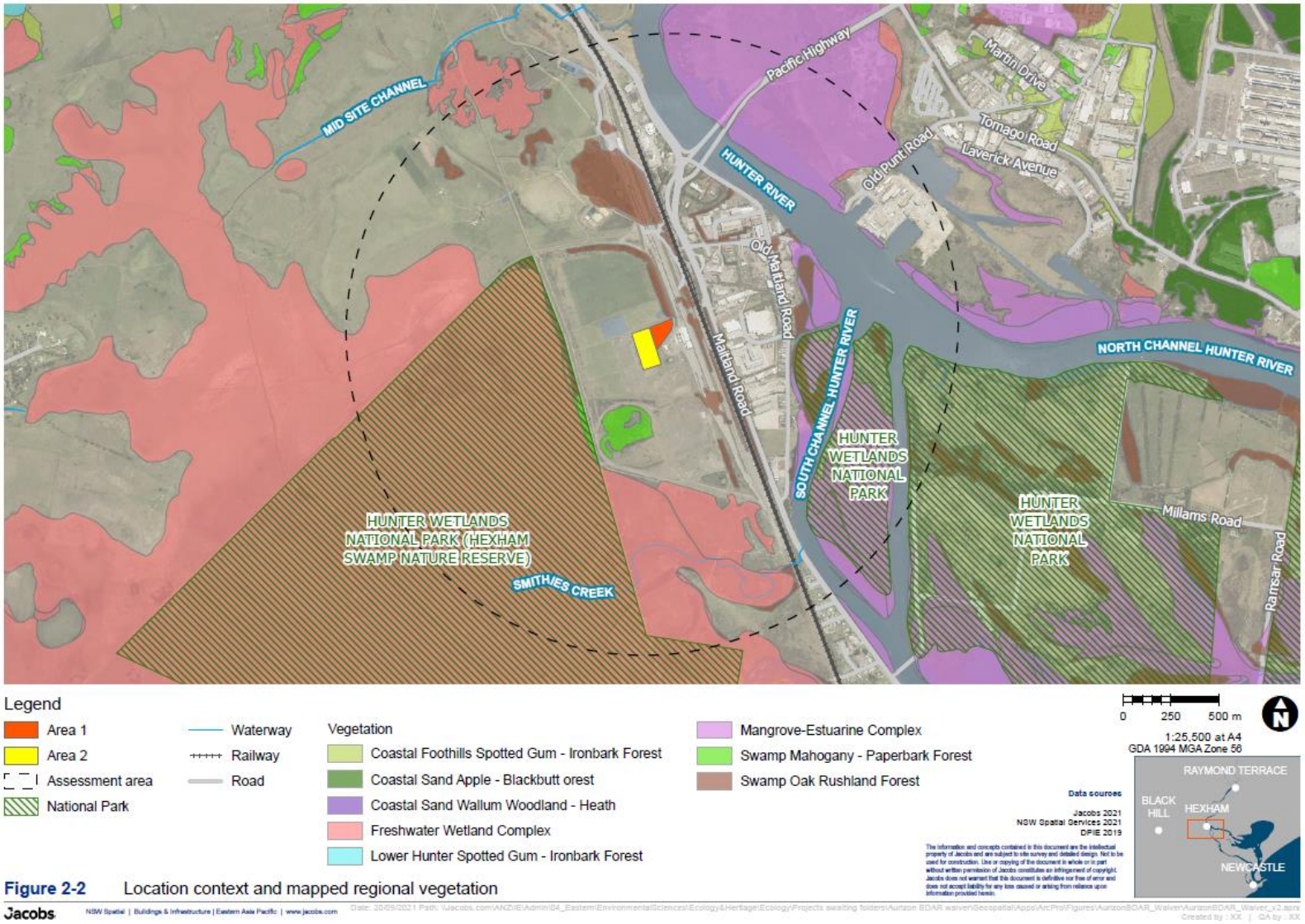

Figure 2-2 Location context and mapped regional vegetation

Figure 2-2 Location context and mapped regional vegetation

3.3 Native vegetation and vegetation integrity

The entire development site has been completely modified from its original state and now exists as a highly disturbed area, with a notable absence of trees, shrubs and native groundlayer vegetation. The development site has been historically cleared of any native vegetation and has been reportedly used in the past for heaped placement of spoil material (coal reject, gravel and brick), and subsequently seeded with hardy annual grasses, mainly *Cenchrus clandestinus* (Kikuyu Grass) to stabilise the material and prevent erosion. The closest patches of naturally occurring native vegetation to the development site are present within the Hunter Wetlands National Park (Hexham Swamp Nature Reserve), over 350 metres to the west of the development site (refer to **Figure 3-3**).

There is some native vegetation (according to the definition of native vegetation provided in the LLS Act) that has naturally established in the development site, namely *Cynodon dactylon* (Common Couch), and a few individuals of *Juncus usitatus* (Common Rush) and *Eleocharis acutus* where standing water sits in depressions. However, this native vegetation cannot be assigned to a PCT as identified in the DPIE BioNet Vegetation Classification. As such, the vegetation cannot be allocated to vegetation zones. The habitat types in the development site and immediate surrounds are best described as miscellaneous ecosystems as identified by the BioNet Vegetation Classification database and threatened species profiles (DPIE 2021c), specifically: Highly disturbed areas with no or limited native vegetation.

As the native vegetation cannot be assigned to a PCT, it is not possible to assess vegetation integrity by undertaking an assessment of the composition, structure or function of the vegetation according to the field methods outlined in Section 4.3 of the BAM. A vegetation integrity score cannot be determined in accordance with Section 4.4 of the BAM as there are no PCTs that will be impacted. The proposed development works would not result in any alteration to vegetation integrity. There will be no loss of vegetation composition, structure or function (as assessed according to the BAM) because of the proposed development works.

A one-off survey of plant species within the development site recorded a total of twenty species, comprising 17 exotic species (85%), and the three native species described previously. The dominant species across much of the development site is the exotic *Cenchrus clandestinus* (Kikuyu Grass), and other common weeds include *Trifolium repens* (White Clover), *Medicago polymorpha* (Burr Medic), *Senecio madagascariensis* (Fireweed), *Plantago lanceolata* (Plantain), *Sonchus oleraceus* (Common Sow Thistle) and *Anagallis arvensis* (Pimpernell). There are no native trees or shrubs present. A list of flora species recorded during the field survey is provided in **Appendix D**.

The typical vegetation and type of habitats present in the development site are illustrated in **Photos 6** to**11**.

Photo 6. Lower section of the development site adjacent to the existing carpark showing dense grasses and weeds.

Photo 7. Elevated portion of the development site on fill.

Photo 8. Example of imported fill material.

Photo 9. Profile from shallow excavation, showing example of imported coal reject and rock.

Photo 10. Shallow depression temporarily holding water after heavy rain, contains 4-5 *Juncus usitatus* (Common Rush), this habitat is considered too degraded and small for threatened amphibian or bird species and would dry up quickly.

Photo 11. Water sitting at eastern end of the development site that is elevated and held by bunding.

3.4 Threatened ecological communities

There are no threatened ecological communities located in or directly adjacent to the development site.

3.5 Threatened species

No threatened species were identified at the development site and the habitat that is present is considered unsuitable for threatened species known from the assessment area.

3.6 Habitat suitability for threatened species

3.6.1 Ecosystem-credit species

Ecosystem-credit species are those threatened species where the likelihood of occurrence of a species or elements of the species' habitat can be predicted by vegetation surrogates and landscape features, or for which targeted survey has a low probability of detection. Ecosystem-credit threatened species must be assessed in conjunction with information about location context of the development site (Section 4.3 and Subsection 5.3.2 of the BAM), PCTs and vegetation integrity attributes (Chapter 5 of the BAM), and data from BioNet (Section 6.1 of the BAM).

During the assessment of biodiversity values as required by Chapter 5 of the BAM, the development site is mainly dominated by exotic flora species and very few native flora species. This vegetation is not a naturally occurring ecosystem and cannot be assigned to a PCT. As a result, if the BAM were applied to the assessment there would be no ecosystem credit species predicted to occur on the development site since there is no suitable habitat that can be used as a habitat surrogate. Ecosystem-credit species would not be considered any further as there are no PCTs present on the development site, hence ecosystem-credits could not be created.

3.6.2 Species-credit species

Species-credit species are those species for which the likelihood of occurrence, or elements of suitable habitat, cannot be confidently predicted by vegetation surrogates or landscape features. Species-credit species can be reliably detected by survey. If the BAM was applied to the development site, species-credit species would be assessed in conjunction with information collected about the location context of the development site (referred to as the 'subject land' under the BAM) (Section 4.3 of the BAM), on PCTs and vegetation integrity attributes in (Section 5 of the BAM), and data obtained from BioNet (Section 6.1 of the BAM).

The vegetation within the development site is mainly dominated by exotic species and very few native species. This native vegetation cannot be assigned to a PCT under the BioNet Vegetation Classification database. The habitat types in the development site are best described as miscellaneous ecosystems in the BioNet Vegetation Classification database, specifically referred to as "Highly disturbed areas with no or limited native vegetation". As there are no PCTs on the development site, the BAM calculator would not return a list of species-credit species for assessment.

However, there are some species-credit species that can use highly disturbed areas with no or limited native vegetation. Additionally, the TBDC was examined to retrieve a list of species-credit species that are known to use the miscellaneous ecosystems present within the development site and immediate surrounds and have been previously recorded in the assessment area. Based on this information, the only species that may be applicable to the development site includes, the Green and Golden Bell Frog (*Litoria aurea*), listed as vulnerable under the EPBC Act, and endangered under the BC Act.

Threatened plant species have not been considered due to the disturbed characteristics of the development site. The vegetation is primarily exotic and there is no suitable habitat present in the development site for threatened plant species. No threatened plants were observed in the development site during the field survey.

The habitat constraints identified in the TBDC were used to assess the habitat on the development site for the Green and Golden Bell Frog. Some species do not have habitat constraints identified in the TBDC, so this step is not applicable, and these species would be automatically referred to as a 'candidate species-credit species' that require further assessment (if the BAM was to be applied to the development site).

The species-credit species with habitat constraints identified in the TBDC are detailed below in **Table 3-2.**

Table 3-2 Species-credit species potentially occurring within the development site that have breeding habitat constraints

Species	Habitat constraint	Habitat suitability in development site
Green and Golden Bell Frog	Semi-permanent/ephemeral wet areas - within 1-kilometre of wet areas; swamps - within 1-kilometre of swamps; waterbodies - within 1-kilometre of waterbody	There are three small depressions located in Area 2 of the development site that holds shallow water after heavy rain. One of these contains a small number of Common Rush. The development site is elevated above the floodplain, having been developed on fill and these depressions would only hold water for very short periods, as evidenced by the grassy bottom. They are considered too degraded and not suitable for this species. Semi-permanent wetlands occur within the Hunter Wetlands National Park (Hexham Swamp Nature Reserve), that are within 1-kilometre of the development site and on the floodplain.

In conclusion, the development site does not contain suitable habitat for any species-credit species that would require their further assessment.

3.7 Matters of National Environmental Significance

3.7.1 Threatened ecological communities

There are no nationally listed threatened ecological communities located in or directly adjacent to the development site.

3.7.2 Threatened species

No threatened plant species listed under the EPBC Act are considered likely to occur in the development site. The habitats present are highly disturbed, mostly consisting of exotic vegetation and there are no natural habitats present.

No threatened fauna under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), are likely to use the habitats in the development site. The habitats present are highly disturbed, mostly consisting of exotic vegetation that are isolated from suitable habitat patches for threatened fauna.

3.7.3 Migratory species

The development site is in proximity to the Hunter Wetlands National Park (Hexham Swamp Nature Reserve), Hunter River and Hexham Swamp, parts of which are known to contain habitat and species sightings for threatened and migratory birds. It is feasible that these migratory bird species may fly over the development site

on occasion, however, considering the current disturbance on the development site, the proposed development works is unlikely to increase the current barrier to flight paths and no new barriers will be introduced.

Forty-five listed migratory species were identified in the EPBC Act PMST as potentially occurring within a 10-kilometre search radius centred on the development site. This data is based on the distributional range of the species and modelled habitat. These migratory species, along with their preferred habitat requirements and an assessment of their likely presence in the assessment area are listed in **Appendix A**.

Migratory bird species such as the Fork-tailed Swift, White-throated Needletail, Eastern Osprey, White-bellied Sea-Eagle, Square-tailed Kite, Wedge-tailed Shearwater, Sharp-tailed Sandpiper, Red-necked Stint, Latham's Snipe, Common Greenshank and Marsh Sandpiper may fly over the development site but would not use it as habitat as there is no significant habitat resources provided for these species within the development site. Other listed migratory species have been considered as having a low likelihood to occur or may utilise the habitat within the development site due to a lack of suitable habitat resources (refer to **Appendix A**).

While some migratory species of bird may use the assessment area, the development site would not be classed as an 'important habitat'. A nationally significant proportion of the population would not be supported by the development site, as the habitat is not suitable or of high quality. The proposed development works would not substantially modify, destroy, or isolate an area of important habitat for any migratory species, and it would not disrupt the lifecycle of an ecologically significant proportion of a population of migratory birds.

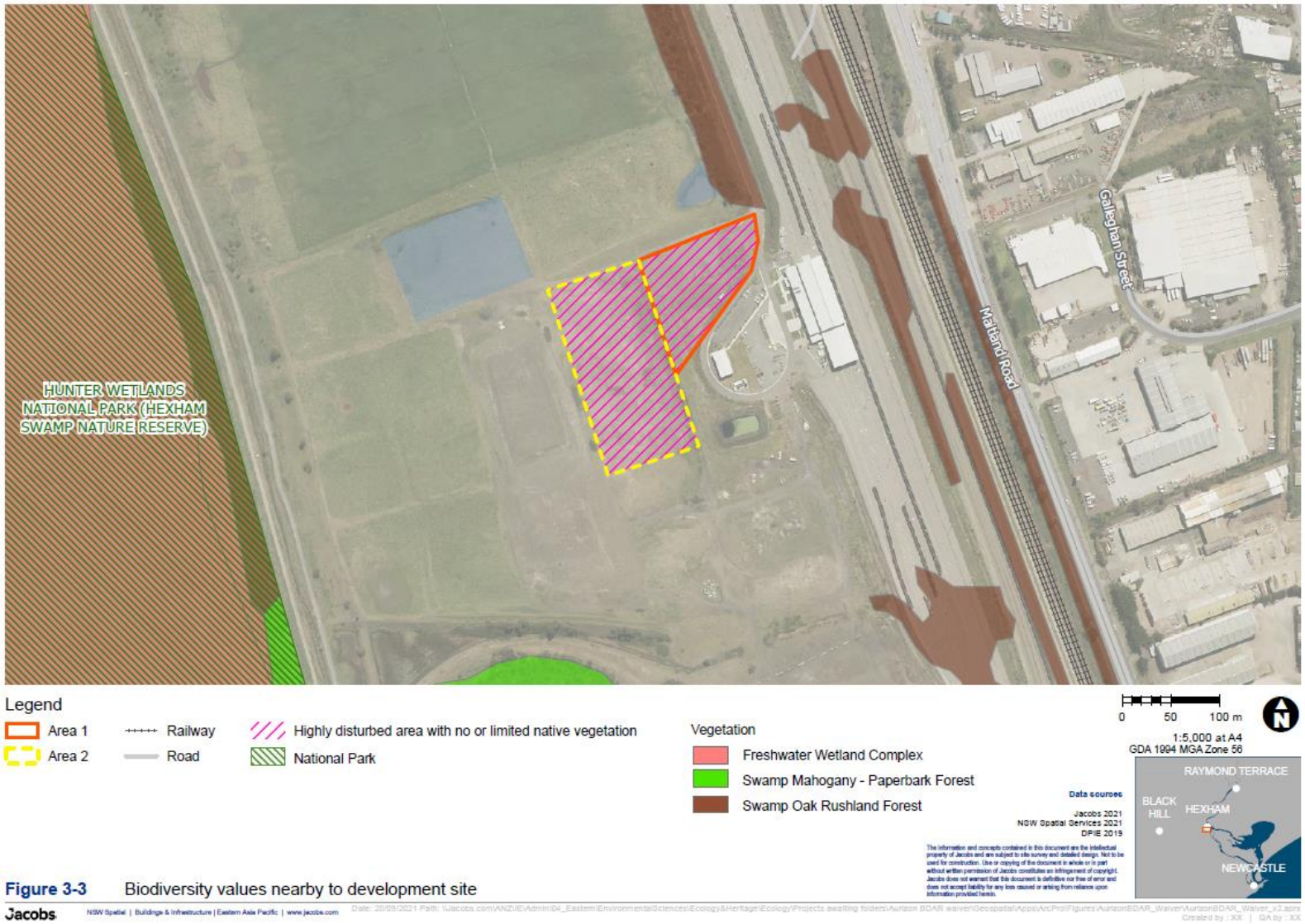

Figure 3-3 Biodiversity values nearby to development site

4. Impacts on biodiversity values

A description of the BDAR waiver request information requirements and potential impacts on biodiversity values associated with the development site is provided in **Table 4-1**. This follows the information requested in DPIE (2019) relating to *How to apply for a biodiversity development assessment report waiver for a Major Project Application*.

Table 4-1 Impacts of the proposed development works on biodiversity values

Biodiversity value	**Meaning**	**Relevant (✓ or N/A)**	**Explain and document potential impacts including additional impacts prescribed under the BC Regulation** **Attach additional supporting documentation where appropriate**
Vegetation abundance - 1.4(b) *Biodiversity Conservation Regulation 2017* (BC Regulation)	Occurrence and abundance of vegetation at a particular site	N/A	There is some native vegetation (according to the definition of native vegetation provided in the LLS Act) that has naturally established in the development site, namely *Cynodon dactylon* (Common Couch), and a few individuals of *Juncus usitatus* (Common Rush) and *Eleocharis acutus*. However, this native vegetation cannot be assigned to a PCT as identified in the DPIE BioNet Vegetation Classification. As such, the vegetation cannot be allocated to vegetation zones. The habitat types in the development site and immediate surrounds are best described as miscellaneous ecosystems as identified by the BioNet Vegetation Classification database and threatened species profiles (DPIE 2021c), specifically: Highly disturbed areas with no or limited native vegetation. Vegetation abundance (as it would apply to a PCT) would not be impacted by removal of vegetation within the development site.
Vegetation integrity 1.5(2)(a) BC Act	Degree to which the composition, structure and function of vegetation at a particular site and the surrounding landscape has been altered from a near-natural state	N/A	As the native vegetation cannot be assigned to a native PCT, it is not possible to assess vegetation integrity against benchmark scores by undertaking an assessment of the composition, structure or function of the vegetation according to the field methods outlined in Section 5.3 of the BAM. A vegetation integrity score cannot be determined in accordance with Section 5.4 of the BAM as there are no PCTs that will be impacted by the proposed development works. There would be no loss of vegetation composition, structure, or function (as assessed in accordance with the BAM) due to the proposed development works.

Biodiversity value	Meaning	Relevant (✓ or N/A)	Explain and document potential impacts including additional impacts prescribed under the BC Regulation Attach additional supporting documentation where appropriate
Habitat suitability 1.5(2)(b) BC Act	Degree to which the habitat needs of threatened species are present at a particular site	N/A	The exotic dominated vegetation in the development site does not provide any suitable habitat for threatened species.
Threatened species abundance 1.4(a) BC Regulation	Occurrence and abundance of threatened species or threatened ecological communities, or their habitat, at a particular site	N/A	The habitat assessment (refer to **Appendix A**) identified limited habitat in the development site for threatened species. In addition to this, the field survey identified no high-quality threatened species habitats on the development site. For this reason, no targeted threatened species surveys have been undertaken as part of this assessment. The proposed development works are unlikely to have an appreciable impact on threatened species abundance.
Habitat connectivity 1.4(c) BC Regulation	Degree to which a particular site connects different areas of habitat of threatened species to facilitate the movement of those species across their range	✓	The development site is surrounded by highly modified land where natural habitats have been cleared. There is no obvious physical habitat connectivity associated with the development site. However, functional connectivity exists for flying animals such as birds and bats that use the airspace above the development site to move between habitats. The proposed development works are considered unlikely to have a detrimental effect on habitat connectivity for these species.
Threatened species movement 1.4(d) BC Regulation	Degree to which a particular site contributes to the movement of threatened species to maintain their lifecycle	✓	The development site is unlikely to contribute to the movement of threatened species, apart from flying species, such as Fork-tailed Swift, White-throated Needletail, Eastern Osprey, White-bellied Sea-Eagle, Square-tailed Kite, Wedge-tailed Shearwater, Sharp-tailed Sandpiper, Red-necked Stint, Latham's Snipe, Common Greenshank and Marsh Sandpiper. These species are powerful flyers capable of covering large distances between habitat patches. Their movement would not be impeded as to affect their lifecycles.
Flight path integrity 1.4(e) BC Regulation	Degree to which the flight paths of protected animals over a particular site are free from interference	✓	The development site is located approximately 1-kilometre from the Hunter Wetlands National Park in the south-east, 350 metres from the Hunter Wetlands National Park (Hexham Swamp Nature Reserve) in the west and 750 metres from the Hunter River south channel and Hunter River in the east. These areas are

Biodiversity value	Meaning	Relevant (✓ or N/A)	Explain and document potential impacts including additional impacts prescribed under the BC Regulation Attach additional supporting documentation where appropriate
			known to contain habitat and species sightings for threatened and migratory birds. Migratory bird species may fly over the development site on occasion, however, considering the current disturbance and absence of suitable habitat preferences within the development site, the proposed development works are unlikely to increase the current barrier to flights paths and no new barriers will be introduced.
Water sustainability 1.4(f) BC Regulation	Degree to which water quality, water bodies and hydrological processes sustain threatened species and threatened ecological communities at a particular site	N/A	No threatened species or threatened ecological communities have been identified on the development site that is being sustained by water quality, water bodies and hydrological processes.

5. Conclusion

The entire development site has been completely modified from its original state and now exists as a highly disturbed area with negligible biodiversity value. The development site has been historically cleared of any native vegetation. There is some native vegetation (according to the definition of native vegetation provided in the LLS Act) that has naturally established in the development site, namely *Cynodon dactylon* (Common Couch), and a few individuals of *Juncus usitatus* (Common Rush) and *Eleocharis acutus*. However, this native vegetation cannot be assigned to a PCT as identified in the DPIE BioNet Vegetation Classification. As such, the vegetation cannot be allocated to vegetation zones. The habitat types in the development site and immediate surrounds are best described as miscellaneous ecosystems as identified by the BioNet Vegetation Classification database and threatened species profiles (DPIE 2021c), specifically: Highly disturbed areas with no or limited native vegetation.

In accordance with Section 7.9 of the BC Act and after consideration of the potential impacts on biodiversity values as outlined in the BC Act and the BC regulation, the proposed development works are not likely to have any significant impact on biodiversity values. A waiver for the BDAR requirement is sought under Section 7.9(2) of the BC Act.

The information provided in this BDAR waiver request, has considered the guidance provided in the DPIE (2019) *How to apply for a biodiversity development assessment report waiver for a Major Project Application*. The report highlights the absence of native vegetation and important ecological values from the development site, and it is evident that the proposed development works would not have a significant impact on threatened species, populations, or ecological communities. Therefore, a BDAR is not considered necessary for the proposed development works associated with the development site.

6. References

Department of Agriculture, Water and the Environment (2008). Directory of Important Wetlands in Australia, https://www.environment.gov.au/water/wetlands/australian-wetlands-database/directory-important-wetlands

Department of Agriculture, Water and the Environment (2012a). Interim Biogeographic Regionalisation for Australia (Version 7) – Australia's 89 bioregions. Canberra, ACT, Commonwealth of Australia.

Department of Agriculture, Water and the Environment (2012b). Interim Biogeographic Regionalisation for Australia (Version 7) – Australia's 419 subregions. Canberra, ACT, Commonwealth of Australia.

Department of Agriculture, Water and the Environment (2021). Protected Matters Search Tool (PMST). https://www.environment.gov.au/epbc/protected-matters-search-tool

Department of Environment and Climate Change (2008). Descriptions for NSW (Mitchell) Landscapes, Version 2 (2002). Sydney, New South Wales.

Department of Planning, Industry and Environment (1995). Soil Landscapes of the Newcastle 1:100,000 Sheet map and report.

Department of Planning, Industry and Environment (2011). Acid Sulfate Soils Risk, Version 2.1.

Department of Planning, Industry and Environment (2012). Greater Hunter Native Vegetation Mapping, Version 4.0 (VIS ID 3855).

Department of Planning, Industry and Environment (2017a). Lower Hunter Vegetation Mapping, 2013 (VIS_ID 4513).

Department of Planning, Industry and Environment (2017b). NSW (Mitchell) Landscapes - version 3.1.

Department of Planning, Industry and Environment (2019). How to apply for a biodiversity development assessment report waiver for a Major Project Application. Sydney, State of New South Wales.

Department of Planning, Industry and Environment (2020). Biodiversity Assessment Method. Sydney, State of New South Wales.

Department of Planning, Industry and Environment (2021a). Biodiversity Values Map and Threshold Tool, https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap

Department of Planning, Industry and Environment (2021b). BioNet Atlas of NSW Wildlife and Threatened Biodiversity Data Collection. http://www.bionet.nsw.gov.au/

Department of Planning, Industry and Environment (2021c). BioNet Vegetation Classification database and threatened species profiles, https://www.environment.nsw.gov.au/NSWVCA20PRapp/LoginPR.aspx

Department of Planning, Industry and Environment (2021d). Native Vegetation Regulatory Map, https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=NVRMap

Department of Planning, Industry and Environment (2021e). Register of Declared Areas of Outstanding Biodiversity Value, https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/areas-of-outstanding-biodiversity-value/area-of-outstanding-biodiversity-value-register

Eco Logical Australia (2012). QR National – Train Support Facility, Hexham, Ecological Investigations.

Naylor, S.D., Chapman, G.A., Atkinson, G., Murphy, C.L., Tulau, M.J., Flewin, T.C., Milford, H.B., and Morand, D.T. (1998). *Guidelines for the Use of Acid Sulfate Soil Risk Maps*, 2nd ed., Department of Land and Water Conservation, Sydney.

NSW National Parks and Wildlife Service (2002). The Bioregions of New South Wales: their biodiversity, conservation and history. Hurstville, New South Wales.

Thackway, R. and Cresswell, I. D. (1995). An Interim Biogeographic Regionalisation for Australia: a framework for establishing the national system of reserves, Version 4.0. Australian Nature Conservation Agency, Canberra.

Appendix A. Habitat assessment

Table A.1 Likelihood of occurrence assessment – Threatened Flora

Scientific Name (Common Name)	EPBC Act	BC Act	Distribution and habitat requirements	Data source	Likelihood of occurrence
Angophora inopina (Charmhaven Apple)	V	V	Endemic to the Central Coast region of NSW. The known northern limit is near Karuah where a disjunct population occurs; to the south populations extend from Toronto to Charmhaven with the main population occurring between Charmhaven and Morisset. It has also been recorded near Bulahdelah and at Gwandalan. Populations are known at Charmhaven, Vales Point and Doyalson. The largest and most intact stands occur in the Wyong and Lake Macquarie local government areas. Approximately 1,250 hectares of occupied habitat has been mapped in the Wyong-Southern Lake Macquarie area. This species is locally frequent in open, dry sclerophyll woodland of Scribbly Gum (*Eucalyptus haemastoma*) and Red Bloodwood (*Corymbia gummifera*) with some Brown Stringybark (*Eucalyptus capitellata*) and a dense, shrubby understorey, including Dwarf Banksia (*Banksia oblongifolia*), Mountain Devil (*Lambertia formosa*) and Finger Hakea (*Hakea dactyloides*). Other associated trees are Smooth-barked Apple (*Angophora costata*) and Sydney Peppermint (*Eucalyptus piperita*).	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Asperula asthenes (Trailing Woodruff)	V	V	This small herb occurs only in NSW. It is found in scattered locations from the Central Coast north to near Kempsey, with several records from the Port Stephens / Wallis Lakes area / Forster (including Myall Lakes National Park, New England National Park, Wallingat National Park and Darawnk Nature Reserve). Occurs in damp sites, often along riverbanks.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Caladenia tessellata (Thick-lipped Spider-orchid)	V	E	The Thick Lip Spider Orchid is known from the Sydney area (old records), Wyong, Ulladulla and Braidwood in NSW. Populations in Kiama and Queanbeyan are presumed extinct. It was also recorded in the Huskisson area in the 1930s. The species occurs on the coast in Victoria from east of Melbourne to almost the NSW border. Generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Callistemon linearifolius (Netted Bottle Brush)	-	V	Recorded from the Georges River to Hawkesbury River in the Sydney area, and north to the Nelson Bay area of NSW. Recorded in 2000 at Coalcliff in the northern Illawarra. For the Sydney area, recent records are limited to the Hornsby Plateau area near the Hawkesbury River. The species was more widespread in the past, and there are currently only 5-6 populations remaining from the 22 populations historically recorded in the Sydney area. Three of the remaining populations are reserved in Ku-ring-gai Chase National Park, Lion Island Nature Reserve and Spectacle Island Nature Reserve. The species has also been recorded from Yengo National Park. Grows in dry sclerophyll forest on the coast and adjacent ranges.	251 – BioNet	Low – no records within the development site. Records are nearest to Beresfield.

Commersonia prostrata (Dwarf Kerrawang)	E	E	Dwarf Kerrawang occurs on the Southern Highlands and Southern Tablelands (one plant at Penrose State Forest, one plant at Tallong, a small population near the Corang and about 2000 plants at Rowes Lagoon), a larger population in the Thirlmere Lakes area (particularly among the dying reeds at the edge of the water), and on the North Coast (less than 100 plants at the Tomago sandbeds north of Newcastle). It is also found in Victoria. Occurs on sandy, sometimes peaty soils in a wide variety of habitats: Snow Gum (*Eucalyptus pauciflora*) Woodland and Ephemeral Wetland floor at Rowes Lagoon; Blue leaved Stringybark (*E. agglomerata*) Open Forest at Tallong; and in Brittle Gum (*E. mannifera*) Low Open Woodland at Penrose; Scribbly Gum (*E. haemostoma*)/ Swamp Mahogany (*E. robusta*) Ecotonal Forest at Tomago. Associated native species may include *Imperata cylindrica, Empodisma* minus and *Leptospermum continentale*. Appears to respond positively to some forms of disturbance (e.g., some Victorian records are from gravel road surfaces and the Tomago population is on an area previously subject to sandmining), however, there are conflicting reports about the response of the species to fire.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Cryptostylis hunteriana (Leafless Tongue Orchid)	V	V	The Leafless Tongue Orchid has been recorded from as far north as Gibraltar Range National Park, south into Victoria around the coast as far as Orbost. Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. The larger populations 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*).	PMST	Unlikely – there is no habitat considered suitable for this species in the development site and the site has been established on imported fill.
Cynanchum elegans (White-flowered Wax Plant)	E	E	Occurs from the Gloucester district to the Wollongong area and inland to Mt Dangar. Typically occurs in rainforest gullies, scrub and scree slopes and at the ecotone between dry rainforest vegetation and dry subtropical forest/woodland communities. Other 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.	PMST, 2 – BioNet	Low – no records within the development site. Records are south-east of the development site within the Hunter Wetlands.
Dichanthium setosum (Bluegrass)	V	V	Bluegrass occurs on the New England Tablelands, North West Slopes and Plains and the Central Western Slopes of NSW, extending to northern Queensland. It occurs widely on private property, including in the Inverell, Guyra, Armidale and Glen Innes areas. Associated with heavy basaltic black soils and red-brown loams with clay subsoil. It is often collected from disturbed open grassy woodlands on the northern tablelands, where the habitat has been variously grazed, nutrient-enriched and water-enriched. The species may tolerate or benefit from disturbance, otherwise, disturbance is indicative of threatening processes in its habitat.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Dillwynia tenuifolia	-	V	The core distribution is the Cumberland Plain from Windsor and Penrith east to Dean Park near Colebee. Other populations in western Sydney are recorded from Voyager Point and Kemps Creek in the Liverpool LGA, Luddenham in the Penrith LGA and South Maroota in the Baulkham Hills Shire. Disjunct localities outside the Cumberland Plain include the Bulga Mountains at Yengo in the north, and Kurrajong Heights and Woodford in the Lower Blue Mountains. In western Sydney, may be locally abundant particularly within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays. May also be	1 – BioNet	Low – recorded along Babilla Close. The habitat within the development site is considered too disturbed for this species to occur.

			common in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland. At Yengo, is reported to occur in disturbed escarpment woodland on Narrabeen sandstone.		
Diuris arenaria (Sand Doubletail)	-	E	Sand Doubletail is known from the Tomaree Peninsula near Newcastle. This species occurs in coastal heath and dry grassy eucalypt forest on sandy flats. Grows in gently undulating country in eucalypt forest with a grassy understorey on clay soil.	32 – BioNet	Low – no records within the development site. Records are nearest to Heatherbrae.
Diuris praecox (Rough Doubletail)	V	V	Known from between Bateau Bay and Smiths Lake. Grows on hills and slopes of near-coastal districts in open forests which have a grassy to fairly dense understorey. Exists as subterranean tubers most of the year. It produces leaves and flowering stems in winter.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Eucalyptus camaldulensis - endangered population (Eucalyptus camaldulensis population in the Hunter catchment)	-	EP	The Hunter population occurs from the west at Bylong, south of Merriwa, to the east at Hinton, on the bank of the Hunter River, in the Port Stephens local government area. It has been recorded in the local government areas of Lithgow, Maitland, Mid-Western Regional, Muswellbrook, Port Stephens, Singleton and Upper Hunter. May occur with *Eucalyptus tereticornis, Eucalyptus melliodora, Casuarina cunninghamiana subsp. cunninghamiana* and *Angophora floribunda*. Most of the occurrences are on private land and there are no known occurrences in conservation reserves.	1 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site. Record is approximately 1.5 kilometres south of the development site.
Eucalyptus camfieldii (Camfield's Stringybark)	V	V	Restricted distribution in a narrow band with the most northerly records in the Raymond Terrace area south to Waterfall. Poor coastal country in shallow sandy soils overlying Hawkesbury sandstone. Coastal heath mostly on exposed sandy ridges. Occurs mostly in small, scattered stands near the boundary of tall coastal heaths and low open woodland of the slightly more fertile inland areas. Associated species frequently include stunted specimens of *E. oblonga* (Narrow-leaved Stringybark), *E. capitellata* (Brown Stringybark) and *E. haemastoma* (Scribbly Gum).	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Eucalyptus parramattensis subsp. decadens (Earp's Gum / Earp's Dirty Gum)	V	V	There are two separate meta-populations of *E. parramattensis subsp. decadens*. The Kurri Kurri meta-population is bordered by Cessnock—Kurri Kurri in the north and Mulbring—Abedare in the south. Large aggregations of the subspecies are located in the Tomalpin area. The Tomago Sandbeds meta-population is bounded by Salt Ash and Tanilba Bay in the north and Williamtown and Tomago in the south. Generally, occupies deep, low-nutrient sands, often those subject to periodic inundation or where water tables are relatively high. It occurs in dry sclerophyll woodland with dry heath understorey. It also occurs as an emergent in dry or wet heathland. Often where this species occurs, it is a community dominant. In the Kurri Kurri area, *E. parramattensis subsp. decadens* is a characteristic species of 'Kurri Sand Swamp Woodland in the Sydney Basin Bioregion', an endangered ecological community under the BC Act. In the Tomago Sandbeds area, the species is usually associated with the 'Tomago Swamp Woodland' as defined by NSW NPWS (2000). Very little is known about the biology or ecology of this species. Flowers from November to January. Propagation mechanisms are currently poorly known. Seed dispersal is likely to be affected by wind and animals.	PMST, 95 – BioNet	Unlikely – no records within the development site. Records are nearest to Tomago.

Euphrasia arguta	CE	CE	Historically, *Euphrasia arguta* has only been recorded from relatively few places within an area extending from Sydney to Bathurst and north to Walcha. Was rediscovered in the Nundle area of the NSW north western slopes and tablelands in 2008. Historic records of the species are noted in the following habitats: 'in the open forest country around Bathurst in sub humid places', 'on the grassy country near Bathurst', and 'in meadows near rivers'. Plants from the Nundle area have been reported from eucalypt forest with a mixed grass and shrub understorey; here, plants were most dense in an open disturbed area and along the roadside, indicating the species had regenerated following disturbance.	PMST, 1 – BioNet	Unlikely – record is old. No recent records within or adjacent to the development site.
Grevillea parviflora subsp. *Parviflora* (Small-flower Grevillea)	V	V	Sporadically distributed throughout the Sydney Basin with the main occurrence centred around Picton, Appin and Bargo. Separate populations are also known further north from Putty to Wyong and Lake Macquarie on the Central Coast, and Cessnock and Kurri Kurri in the Lower Hunter. Grows in sandy or light clay soils usually over thin shales. Occurs in a range of vegetation types from heath and shrubby woodland to open forest. Found over a range of altitudes from flat, low-lying areas to upper slopes and ridge crests. Often occurs in open, slightly disturbed sites such as along tracks.	PMST, 2 – BioNet	Unlikely – no records within the development site. Records are nearest to Tomago.
Grevillea shiressii	V	V	Known from two populations near Gosford, on tributaries of the lower Hawkesbury River north of Sydney (Mooney Creek and Mullet Creek). Both populations occur within the Gosford Local Government Area. There is also a naturalised population at Newcastle. Grows along creek banks in wet sclerophyll forest with a moist understorey in alluvial sandy or loamy soils. Flowers mainly late winter to Spring (July-December), with seed released at maturity in October. Flowers are bird pollinated and seeds are dispersed by ants. A fire sensitive obligate seeder that is highly susceptible to local extinction due to frequent fire, however, fire is likely to be relatively infrequent in the habitat of *G. shiressii*. Seed germination does occur in the absence of fire; however, some physical disturbance is likely to promote seed germination.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Maundia triglochinoides	-	V	Restricted to coastal NSW and extending into southern Queensland. The current southern limit is Wyong; former sites around Sydney are now extinct. Grows in swamps, lagoons, dams, channels, creeks or shallow freshwater 30 - 60 cm deep on heavy clay, low nutrients. Associated with wetland species e.g., *Triglochin procerum*.	6 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
Melaleuca biconvexa (Biconvex Paperbark)	V	V	Found only in NSW, with scattered and dispersed populations found in the Jervis Bay area in the south and the Gosford-Wyong area in the north. Generally, grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Persicaria elatior (Tall 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). This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance.	PMST, 2 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
Phaius australis	E	E	Occurs in Queensland and north-east NSW as far south as Coffs Harbour. Historically, it extended farther south, to Port Macquarie. Swampy grassland or swampy forest including rainforest, eucalypt, or paperbark forest, mostly in coastal areas.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.

(Lesser Swamp-orchid / Southern Swamp Orchid)					
Pomaderris brunnea (Brown Pomaderris)	V	E	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. Brown Pomaderris grows in moist woodland or forest on clay and alluvial soils of flood plains and creek lines.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Prasophyllum sp. Wybong (A leek-orchid)	CE	-	Endemic to NSW, it is known from near Ilford, Premer, Muswellbrook, Wybong, Yeoval, Inverell, Tenterfield, Currabubula and the Pilliga area. A perennial orchid, appearing as a single leaf over winter and spring. Flowers in spring and dies back to a dormant tuber over summer and autumn. Known to occur in open eucalypt woodland and grassland.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Pterostylis gibbosa (Illawarra Greenhood)	E	E	Known from a small number of populations in the Hunter region (Milbrodale), the Illawarra region (Albion Park and Yallah) and the Shoalhaven region (near Nowra). It is apparently extinct in western Sydney which is the area where it was first collected (1803). All known populations grow in open forest or woodland, on flat or gently sloping land with poor drainage.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Rhizanthella slateri (Eastern Australian Underground Orchid)	E	V	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. The Eastern Underground Orchid is difficult to detect. It is usually located when the soil is disturbed, and there may well be more locations of the species within its known range. Based on currently available information, the Eastern Underground Orchid has a relatively large extent of occurrence, from the NSW south coast to the mid north coast. However, the species is likely to have a very restricted area of occupancy, as it is known from fewer than 10 small, isolated populations within its extent of occurrence. There are insufficient data available to adequately quantify the species' geographic distribution. 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. It is a highly cryptic species given that it grows almost completely below the soil surface, with flowers being the only part of the plant that can occur above ground.	PMST	Low – records are known from the Bulahdelah region. There is no habitat considered suitable for this species in the development site.
Rhodamnia rubescens (Scrub Turpentine)	CE	CE	Occurs in coastal districts north from Batemans Bay in New South Wales, approximately 280 kilometres 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 metres above sea level in areas with rainfall of 1,000 - 1,600 millimetres. Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils. This species is characterised as highly to extremely susceptible to infection by Myrtle Rust.	PMST, 5 – BioNet	Unlikely – no records within the development site. Records are nearest to Maryland.

Rhodomyrtus psidioides (Native Guava)	CE	CE	Occurs from Broken Bay, approximately 90 kilometres north of Sydney, NSW, to Maryborough in Queensland. Populations are typically restricted to coastal and sub-coastal areas of low elevation however the species does occur up to 120 kilometres 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.	PMST, 1 – BioNet	Unlikely – no suitable habitat occurs within the development site.
Rutidosis heterogama (Heath Wrinklewort)	V	V	Recorded from near Cessnock to Kurri Kurri with an outlying occurrence at Howes Valley. On the Central Coast it is located north from Wyong to Newcastle. There are north coast populations between Wooli and Evans Head in Yuraygir and Bundjalung National Parks. It also occurs on the New England Tablelands from Torrington and Ashford south to Wandsworth south-west of Glen Innes. Grows in heath on sandy soils and moist areas in open forest and has been recorded along disturbed roadsides.	PMST	Unlikely – no suitable habitat occurs within the development site.
Syzygium paniculatum (Magenta Lilly Pilly)	V	E	The Magenta Lilly Pilly is found only in NSW, in a narrow, linear coastal strip from Upper Lansdowne to Conjola State Forest. On the south coast it occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest. On the central coast it occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities.	PMST	Unlikely – no suitable habitat occurs within the development site.
Tetratheca juncea (Black-eyed Susan)	V	V	Confined to the northern portion of the Sydney Basin bioregion and the southern portion of the North Coast bioregion in the local government areas of Wyong, Lake Macquarie, Newcastle, Port Stephens, Great Lakes and Cessnock. It is usually found in low open forest/woodland with a mixed shrub understorey and grassy groundcover. However, it has also been recorded in heathland and moist forest. The majority of populations occur on low nutrient soils associated with the Awaba Soil Landscape. While the species prefers cooler southerly aspects, it has been found on slopes with a variety of aspects. It generally prefers well-drained sites and occurs on ridges, although it has also been found on upper slopes, mid-slopes and occasionally in gullies.	PMST, 3 – BioNet	Unlikely – records are old. No suitable habitat occurs within the development site.
Zannichellia palustris	-	E	A submerged aquatic plant. In NSW, known from the lower Hunter and in Sydney Olympic Park. Grows in fresh or slightly saline stationary or slowly flowing water. Flowers during warmer months. NSW populations behave as annuals, dying back completely every summer.	29 – BioNet	Unlikely – no suitable habitat occurs within the development site.

Distribution and habitat requirement information adapted from:

- Australian Government Department of the Environment http://www.environment.gov.au/biodiversity/threatened/index.html
- NSW Department of Planning, Industry and Environment http://www.environment.nsw.gov.au/threatenedspecies/

Data source includes:

- Number of records from the NSW Department of Planning, Industry and Environment BioNet Atlas (Accessed 24 August 2021); and
- Identified from the Protected Matters Search Tool (PMST) Australian Government Department of Agriculture, Water and the Environment (Accessed 24 August 2021)

Key: CE = critically endangered E = endangered EP = endangered population V = vulnerable

Table A.2 Likelihood of occurrence assessment – Threatened Fauna

Scientific Name (Common Name)	EPBC Act	BC Act	Distribution and habitat requirements	Data source	Likelihood of occurrence
Birds					
Anseranas semipalmata (Magpie Goose)	-	V	Mainly found in shallow wetlands (less than 1 metre deep) with dense growth of rushes or sedges. Equally at home in aquatic or terrestrial habitats; often seen walking and grazing on land; feeds on grasses, bulbs and rhizomes. Activities are centred on wetlands, mainly those on floodplains of rivers and large shallow wetlands formed by run-off; breeding can occur in both summer and winter dominated rainfall areas and is strongly influenced by water level; most breeding now occurs in monsoonal areas; nests are formed in trees over deep water; breeding is unlikely in south-eastern NSW.	77 – BioNet	Low – there is no habitat considered suitable for this species in the development site.
Anthochaera Phrygia (Regent Honeyeater)	CE	CE	The Regent Honeyeater that has a patchy distribution between south-east Queensland and central Victoria. It mostly inhabits inland slopes of the Great Dividing Range, in areas of low to moderate relief with moist, fertile soils. It is most commonly associated with box-ironbark eucalypt woodland and dry sclerophyll forest, but also inhabits riparian vegetation such as sheoak (*Casuarina spp*) where it feeds on needle-leaved mistletoe and sometimes breeds. It sometimes utilises lowland coastal forest, which may act as a refuge when its usual habitat is affected by drought. It also uses a range of disturbed habitats within these landscapes including remnant patches in farmland and urban areas and roadside vegetation. It feeds primarily on the nectar of eucalypts and mistletoes and, to a lesser extent, lerps and honeydew; it prefers taller and larger diameter trees for foraging. It is nomadic and partly migratory with its movement through the landscape being governed by the flowering of select eucalypt species. There are four known key breeding areas: three in NSW and one in Victoria. Breeding varies between regions and corresponds with flowering of key eucalypt and mistletoe species. It usually nests in horizontal branches or forks in tall mature eucalypts and Sheoaks.	PMST, 2 – BioNet	Low – there is no habitat considered suitable for this species in the development site.
Artamus cyanopterus (Dusky Woodswallow)	-	V	The Dusky Woodswallow has two separate populations. The eastern population is found from Atherton Tableland, Queensland south to Tasmania and west to Eyre Peninsula, South Australia. The other population is found in south-west Western Australia. The Dusky Woodswallow is found in open forests and woodlands and may be seen along roadsides and on golf courses.	1 – BioNet	Low – there is no habitat considered suitable for this species in the development site.
Botaurus poiciloptilus (Australasian Bittern)	E	E	Occurs from south-east Queensland to south-east South Australia, Tasmania and the south-west of Western Australia. The Australasian Bittern's 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 (e.g., *Phragmites, Cyperus, Eleocharis, Juncus, Typha, Baumea, Bolboschoenus*) or cutting grass (*Gahnia*) growing over a muddy or peaty substrate.	PMST, 24 – BioNet	Low – there is no habitat considered suitable for this species in the development site.

Calidris canutus (Red Knot)	E, M	-	Common in all the main suitable habitats around the coast of Australia. Mainly inhabit intertidal mudflats, sand flats and sandy beaches of sheltered coasts, in estuaries, bays, inlets, lagoons and harbours; sometimes on sandy ocean beaches or shallow pools on exposed wave-cut rock platforms or coral reefs.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Calidris ferruginea (Curlew Sandpiper)	CE, M	E	In Australia, Curlew Sandpipers occur around the coasts of all states and are also quite widespread inland, though in smaller numbers. They occur in Australia mainly during the non-breeding period but also during the breeding season when many non-breeding one-year old birds remain. Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They generally roost on bare dry shingle, shell or sand beaches, sandspits and islets in or around coastal or near-coastal lagoons and other wetlands, occasionally roosting in dunes during very high tides and sometimes in saltmarsh and in mangroves.	PMST, 9 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
Calidris tenuirostris (Great Knot)	CE, M	V	In NSW, the species has been recorded at scattered sites along the coast down to about Narooma. It has also been observed inland at Tullakool, Armidale, Gilgandra and Griffith. Occurs within sheltered, coastal habitats containing large, intertidal mudflats or sand flats, including inlets, bays, harbours, estuaries and lagoons. Often recorded on sandy beaches with mudflats nearby, sandy spits and islets and sometimes on exposed reefs or rock platforms. Migrates to Australia from late August to early September, although juveniles may not arrive until October-November.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Charadrius mongolus (Lesser Sand Plover)	E, M	V	The Lesser Sand-plover breeds in central and north eastern Asia, migrating further south for winter. In Australia the species is found around the entire coast but is most common in the Gulf of Carpentaria, and along the east coast of Queensland and northern NSW. Individuals are rarely recorded south of the Shoalhaven estuary, and there are few inland records. Almost entirely coastal in NSW, favouring the beaches of sheltered bays, harbours and estuaries with large intertidal sand flats or mudflats; occasionally occurs on sandy beaches, coral reefs and rock platforms. Highly gregarious, frequently seen in flocks exceeding 100 individuals; also, often seen foraging and roosting with other wader species. Roosts during high tide on sandy beaches, spits and rocky shores; forage individually or in scattered flocks on wet ground at low tide, usually away from the water's edge.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Diomedea antipodensis (Antipodean Albatross)	V, M	V	The majority of the Antipodean Albatross breed on Antipodes Island, with a small number of pairs breeding on Campbell Island. The Antipodean Albatross breeds biennially in colonies on ridges, slopes and plateaus of isolated subantarctic islands, usually in vegetation such as grass tussocks. This species regularly occurs in small numbers off the NSW south coast from Green Cape to Newcastle during winter where they feed on cuttlefish. Forage for the Antipodean Albatross is extremely patchy, both spatially and temporally, and individuals traverse great distances in search of food. This species feeds pelagically on squid, fish and crustaceans.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Diomedea antipodensis gibsoni (Gibson's Albatross)	V, M	V	This species is known only to breed on the Adams, Disappointment and Auckland Islands in the subantarctic Auckland Island group. Breeds bienially in colonies among grass tussocks on isolated subantarctis islands, using the	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.

			wind to travel great distances both during and between breeding seasons. This species regularly occurs off the NSW coast from Green Cape to Newcastle. This species feeds pelagically on squid, fish and crustaceans.		
Diomedea epomophora (Southern Royal Albatross)	V, M	-	During the non-breeding season, the Southern Royal Albatross has a wide and possibly circumpolar distribution, ranging north to about 35°S. The Southern Royal Albatross is moderately common throughout the year in offshore waters of southern Australia, mostly off south-eastern NSW, Victoria and Tasmania. Off South Australia, they are mostly seen May to September. It breeds on Campbell, Adams, Enderby and Auckland Islands, south of New Zealand. Nests on flat or gently sloping ground on slopes, ridges, gullies and plateaux of large islands, and on the summits of islets. Depressions, gullies, lee slopes and vegetation provide shelter for its nests, but exposed sites are also needed nearby so that the Southern Royal Albatross can take off and land. Its nests are placed among vegetation that is sparse enough for easy access.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Diomedea exulans (Wandering Albatross)	V, M	E	The Wandering Albatross breeds on Macquarie Island. Macquarie Island lies in the southwest Pacific Ocean, about half-way between New Zealand and Antarctica. A single breeding pair has also been recorded on Heard Island. The Territory of Heard Island and McDonald Islands are an Australian external territory and volcanic group of barren Antarctic islands, about two-thirds of the way from Madagascar to Antarctica. It feeds in Australian portions of the Southern Ocean. On breeding islands, the Wandering Albatross nests on coastal or inland ridges, slopes, plateaux and plains, often on marshy ground. Nests of the Wandering Albatross are sited on moss terraces, in dense tussocks, and often in loose aggregations on the west (windward) side of islands. It prefers open or patchy vegetation (tussocks, ferns or shrubs), and it requires nesting areas that are near exposed ridges or hillocks so that it can take off.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Diomedea sanfordi (Northern Royal Albatross)	E, M	-	The Northern Royal Albatross ranges widely over the Southern Ocean, with individuals seen in Australian waters off south-eastern Australia. It breeds on Chatham Island and Tiara Head on the South Island of New Zealand. Its habitat includes subantarctic, subtropical, and occasionally Antarctic waters. The Northern Royal Albatross nests on flat or gently sloping ground, on slopes, ridges, gullies and plateaux of large islands, and on the summits of islets. Depressions, gullies, lee slopes and vegetation provide shelter for its nests, but exposed sites are also needed nearby so that the Southern Royal Albatross can take off and land. Its nests are placed among vegetation that are open enough for adults to easily walk through.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Calyptorhynchus lathami (Glossy Black-Cockatoo)	-	V	The species is uncommon although widespread throughout suitable forest and woodland habitats, from the central Queensland coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW, with a small population in the Riverina. An isolated population exists on Kangaroo Island, South Australia. Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of Sheoak occur. Black Sheoak (*Allocasuarina littoralis*) and Forest Sheoak (*A. torulosa*) are important foods. Inland populations feed on a wide range of Sheoaks, including Drooping Sheoak, *Allocasuarina diminuta*, and *A. gymnanthera.* Belah is also utilised and may be a critical food source for some populations. In the Riverina, birds are associated with hills and rocky rises supporting Drooping Sheoak, but also recorded in open woodlands dominated by Belah (*Casuarina cristata*).	1 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.

Circus assimilis (Spotted Harrier)	-	V	The Spotted Harrier occurs throughout the Australian mainland, except in densely forested or wooded habitats of the coast, escarpment and ranges, and rarely in Tasmania. Individuals disperse widely in NSW and comprise a single population. Occurs in grassy open woodland including Acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands.	6 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
Daphoenositta chrysoptera (Varied Sittella)	-	V	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. 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. Nests in an upright tree fork high in the living tree canopy.	12 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
Ephippiorhynchus asiaticus (Black-necked Stork)	-	E	In Australia, Black-necked Storks are widespread in coastal and subcoastal northern and eastern Australia, as far south as central NSW (although vagrants may occur further south or inland, well away from breeding areas). In NSW, the species becomes increasingly uncommon south of the Clarence Valley, and rarely occurs south of Sydney. Since 1995, breeding has been recorded as far south as Bulahdelah. Floodplain wetlands (swamps, billabongs, watercourses and dams) of the major coastal rivers are the key habitat in NSW for the Black-necked Stork. Secondary habitat includes minor floodplains, coastal sandplain wetlands and estuaries. Storks usually forage in water 5-30 centimetres deep for vertebrate and invertebrate prey. Eels regularly contribute the greatest biomass to their diet, but they feed on a wide variety of animals, including other fish, frogs and invertebrates (such as beetles, grasshoppers, crickets and crayfish). Black-necked Storks build large nests high in tall trees close to water. Trees usually provide clear observation of the surroundings and are at low elevation (reflecting the floodplain habitat).	85 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
Epthianura albifrons (White-fronted Chat)	-	V	The White-fronted Chat is found across the southern half of Australia, from southernmost Queensland to southern Tasmania, and across to Western Australia as far north as Carnarvon. Found mostly in temperate to arid climates and very rarely sub-tropical areas, it occupies foothills and lowlands up to 1,000 metres above sea level. In NSW, it occurs mostly in the southern half of the state, in damp open habitats along the coast, and near waterways in the western part of the state. Along the coastline, it is found predominantly in saltmarsh vegetation but also in open grasslands and sometimes in low shrubs bordering wetland areas. The White-fronted Chat is a 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 centimetres above the ground (but have been found up to 2.5 metres above the ground).	45 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
Erythrotriorchis radiatus (Red Goshawk)	V	CE	This unique Australian endemic raptor is distributed sparsely through northern and eastern Australia, from the western Kimberley Division of northern Western Australia to north-eastern Queensland and south to far north-eastern NSW, and with scattered records in central Australia. The species is very rare in NSW, extending south to about 30°S, with most records north of this, in the Clarence River Catchment, and a few around the lower Richmond	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.

			and Tweed Rivers. Formerly, it was at least occasionally reported as far south as Port Stephens. Red Goshawks inhabit open woodland and forest, preferring a mosaic of vegetation types, a large population of birds as a source of food, and permanent water, and are often found in riparian habitats along or near watercourses or wetlands. In NSW, preferred habitats include mixed subtropical rainforest, Melaleuca swamp forest and riparian Eucalyptus forest of coastal rivers.		
Falco hypoleucos (Grey Falcon)	V	E	Sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. 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.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Glossopsitta pusilla (Little Lorikeet)	-	V	In NSW the Little Lorikeet is found from the coast to the western slopes of the Great Dividing Range, extending westwards to the vicinity of Albury, Parkes, Dubbo and Narrabri. The species forages primarily in the canopy of dry open eucalypt forest and woodland but also utilises paperbark (*Melaleuca* sp.) dominated forests. 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. Nests in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of Smooth-barked Eucalypts.	7 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
Grantiella picta (Painted Honeyeater)	V	V	The Painted Honeyeater is nomadic and occurs at low densities throughout its range. The greatest concentrations of birds, and almost all breeding, occur on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. During the winter it is more likely to be found in the north of its distribution. Inhabits Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus *Amyema*.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Haliaeetus leucogaster (White-bellied Sea-Eagle)	M	V	Distributed along the coastline (including offshore islands) of mainland Australia and Tasmania. 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. Habitats occupied by the sea-eagle are characterised by the presence of large areas of open water (larger rivers, swamps, lakes, and the sea). It feeds opportunistically on a variety of fish, birds, reptiles, mammals and crustaceans, and on carrion. It generally forages over large expanses of open water; this is particularly true of birds that occur in coastal environments close to the sea-shore. However, it will also forage over open terrestrial habitats (such as grasslands). Nests may be built in a variety of sites including tall trees (especially *Eucalyptus* species), bushes, mangroves, cliffs, rocky outcrops, crevices, on the ground or even on artificial structures.	PMST, 62 – BioNet	Low – may use airspace above the development site. Unlikely to utilise the vegetation within the development site or be impacted by proposed development works.
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. Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used.	9 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
Hirundapus caudacutus (White-throated Needletail)	V, M	-	Widespread in eastern and south-eastern Australia. Almost exclusively aerial, from heights of less than 1 metre up to more than 1,000 metres above the ground. They also commonly occur over heathland but less often over treeless areas, such as grassland or swamps.	PMST, 3 – BioNet	Low – may use airspace above the development site. Unlikely to utilise the vegetation within the

					development site or be impacted by the proposed development works.
Irediparra gallinacea (Comb-crested Jacana)	-	V	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). 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.	5 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
Ixobrychus flavicollis (Black Bittern)	V	-	The Black Bittern is found along the coastal plains within NSW, although individuals have rarely been recorded south of Sydney or inland. It inhabits terrestrial and estuarine wetlands such as flooded grasslands, forests, woodlands, rainforests and mangroves with permanent water and dense waterside vegetation. The Black Bittern typically roosts on the ground or in trees during the day and forages at night on frogs, reptiles, fish and invertebrates. The breeding season extends from December to March. Nests are constructed of reeds and sticks in branches overhanging the water.	1 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
Lathamus discolor (Swift Parrot)	CE	E	The swift parrot breeds in Tasmania during the summer and the entire population migrates north to mainland Australia for the winter. Whilst on the mainland the swift parrot disperses widely to forage on flowers and psyllid lerps in eucalypt species, with the majority being found in Victoria and NSW. In NSW they forage in forests and woodlands throughout the coastal and western slopes regions each year. Coastal regions tend to support larger numbers of birds when inland habitats are subjected to drought. Non-breeding birds preferentially feed in inland box-ironbark and grassy woodlands, and coastal swamp mahogany (*E. robusta*) and spotted gum (*Corymbia maculata*) woodland when in flower, otherwise often in coastal forests. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as *Eucalyptus robusta, Corymbia maculata, C. gummifera, E. sideroxylon,* and *E. albens*. Commonly used lerp infested trees include *E. microcarpa, E. moluccana* and *E. pilularis*.	PMST, 5 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
Limosa lapponica baueri (Western Alaskan Bar-tailed Godwit)	V, M	-	The Western Alaskan Bar-tailed Godwit is a migratory wader which undertakes the largest non-stop flight of any bird. Birds arrive in NSW between August and October and then leave between February and April, with a small number of individuals overwintering. The subspecies is most frequently recorded along major coastal river estuaries and sheltered embayments, particularly the Tweed, Richmond, Clarence, Macleay, Hastings, Hunter and Shoalhaven river estuaries, Port Stephens and Botany Bay. It is a rare visitor to wetlands away from the coast with scattered records as far west as along the Darling River and the Riverina. It is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. Less frequently it occurs in salt lakes and brackish wetlands, sandy ocean beaches and rock platforms.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Limosa limosa (Black-tailed Godwit)	M	V	A migratory wading bird that breeds in Mongolia and Eastern Siberia and flies to Australia for the southern summer, arriving in August and leaving in March. In NSW, it is most frequently found at Kooragang Island (Hunter River estuary). Occurs in sheltered bays, estuaries and lagoons with large intertidal mudflats and sand flats. Also found at inland mudflats, swamps.	PMST, 4 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.

Lophoictinia isura (Square-tailed Kite)	-	V	Typically inhabits coastal forested and wooded lands of tropical and temperate Australia. In NSW it is often associated with ridge and gully forests dominated by *Eucalyptus longifolia, Corymbia maculata, E. elata*, or *E. smithii*. Individuals appear to occupy large hunting ranges of more than 100 kilometres squared. They require large living trees for breeding, particularly near water with surrounding woodland forest close by for foraging habitat. Nest sites are generally located along or near watercourses, in a tree fork or on large horizontal limbs.	1 – BioNet	Low – may use airspace above the development site. Unlikely to utilise the vegetation within the development site or be impacted by the proposed development works.
Macronectes giganteus (Southern Giant Petrel)	E, M	E	The Southern Giant Petrel has a circumpolar pelagic range from Antarctica to approximately 20° S and is a common visitor off the coast of NSW. Over summer, the species nests in small colonies amongst open vegetation on Antarctic and subantarctic islands, including Macquarie and Heard Islands and in Australian Antarctic territory.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Macronectes halli (Northern Giant Petrel)	V, M	V	The Northern Giant-Petrel has a circumpolar pelagic distribution, usually between 40-64°S in open oceans. Their range extends into subtropical waters (to 28°S) in winter and early spring, and they are a common visitor in NSW waters, predominantly along the south-east coast during winter and autumn. Breeding in Australian territory is limited to Macquarie Island and occurs during spring and summer. Adults usually remain near the breeding colonies throughout the year (though some do travel widely) while immature birds make long and poorly known circumpolar and trans-oceanic movements. Hence most birds recorded in NSW coastal waters are immature birds. Northern Giant-Petrels seldom breed in colonies but rather as dispersed pairs, often amidst tussocks in dense vegetation and areas of broken terrain.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Neophema pulchella (Turquoise Parrot)	-	V	Range extends from southern Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range. Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland.	3 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
Ninox strenua (Powerful Owl)	-	V	In NSW, it is widely distributed throughout the eastern forests from the coast inland to tablelands, with scattered records on the western slopes and plains suggesting occupancy prior to land clearing. Now at low densities throughout most of its eastern range, rare along the Murray River and former inland populations may never recover. The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation.	15 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
Numenius madagascariensis (Eastern Curlew)	CE, M	-	Within Australia, the Eastern Curlew has a primarily coastal distribution. The species is found in all states, particularly the north, east, and south-east regions including Tasmania. The Eastern Curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sand flats, often with beds of seagrass.	PMST, 33 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
Oxyura australis (Blue-billed Duck)	-	V	Endemic to south-eastern and south-western Australia. It is widespread in NSW, but most common in the southern Murray-Darling Basin area. Birds disperse during the breeding season to deep swamps up to 300 kilometres away. It is generally only during summer or in drier years that they are seen in coastal areas. Prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation. The species is completely aquatic, swimming low	3 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.

			in the water along the edge of dense cover. It will fly if disturbed but prefers to dive if approached. Partly migratory, with short-distance movements between breeding swamps and overwintering lakes with some long-distance dispersal to breed during spring and early summer. Usually nest solitarily in Cumbungi over deep water between September and February. They will also nest in trampled vegetation in Lignum, Sedges or Spike-rushes, where a bowl-shaped nest is constructed.		
Pachyptila turtur subantarctica (Fairy Prion (southern))	V	-	Fairy Prions (including other subspecies) are often beachcast on the south-eastern coast of Australia and are commonly seen offshore over the continental shelf and over pelagic waters. The southern subspecies of the Fairy Prion is a marine bird, found mostly in temperate and subantarctic seas. On Macquarie Island and adjacent islets, the burrows of Fairy Prions are usually in crevices, in hollows beneath cushions of *Colobanthus muscoides* or in burrows in peaty soil held together by a thick cover of *Cotula plumosa*.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Pandion cristatus (syn. P. haliaetus cristatus) (Eastern Osprey)	M	V	The Osprey has a global distribution with four subspecies previously recognised throughout its range. Eastern Ospreys are found right around the Australian coastline, except for Victoria and Tasmania. They are common around the northern coast, especially on rocky shorelines, islands and reefs. The species is uncommon to rare or absent from closely settled parts of south-eastern Australia. There are a handful of records from inland areas. Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water.	12 – BioNet	Low – may use airspace above the development site. Unlikely to utilise the vegetation within the development site or be impacted by the proposed development works.
Petroica boodang (Scarlet Robin)	-	V	The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in both mature and re-growth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. This species' nest is built in the fork of tree usually more than 2 metres above the ground; nests are often found in a dead branch in a live tree, or in a dead tree or shrub.	4 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
Pomatostomus temporalis temporalis (Grey-crowned Babbler (eastern subspecies))	-	V	In NSW, the eastern sub-species occurs on the western slopes of the Great Dividing Range, and on the western plains reaching as far as Louth and Balranald. It also occurs in woodlands in the Hunter Valley and in several locations on the north coast of NSW. It may be extinct in the southern, central and New England tablelands. Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. Build and maintain several conspicuous, dome-shaped stick nests about the size of a football. A nest is used as a dormitory for roosting each night. Nests are usually located in shrubs or sapling eucalypts, although they may be built in the outermost leaves of low branches of large eucalypts.	5 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
Pterodroma solandri (Providence Petrel)	-	V	Ranges across eastern Pacific. Only known breeding sites are at Lord Howe Island and Philip Island, offshore from Norfolk Island. Previously also bred on main Norfolk Island but extinct there by 1800. Nest on the tops of Mount Gower and Mount Lidgbird and to a less extent, on the lower slopes of the mountains.	1 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
Ptilinopus regina (Rose-crowned Fruit-Dove)	-	V	Found along the coast and ranges of eastern NSW and Queensland, from Newcastle to Cape York. Vagrants are occasionally found further south to Victoria. They occur mainly in sub-tropical and dry rainforest and occasionally in moist eucalypt forest and swamp forest, where fruit is plentiful.	1 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.

Rostratula australis (Australian Painted Snipe)	E	E	In NSW many records are from the Murray-Darling Basin including the Paroo wetlands, Lake Cowal, Macquarie Marshes, Fivebough Swamp and more recently, swamps near Balldale and Wanganella. Other important locations with recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys. Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.	PMST, 3 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
Sternula nereis nereis (Australian Fairy Tern)	V	-	Within Australia, the Fairy Tern occurs along the coasts of Victoria, Tasmania, South Australia and Western Australia, occurring as far north as the Dampier Archipelago near Karratha. The subspecies has been known from NSW in the past, but it is unknown if it persists there. The Fairy Tern (Australian) nests on sheltered sandy beaches, spits and banks above the high tide line and below vegetation. The subspecies has been found in embayment's of a variety of habitats including offshore, estuarine or lacustrine (lake) islands, wetlands and mainland coastline. The bird roosts on beaches at night.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Stictonetta naevosa (Freckled Duck)	-	V	Prefer 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.	12 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
Thalassarche bulleri (Buller's Albatross)	V, M	-	Buller's Albatross breed in New Zealand (Snares, Solander and Chatham Islands), but are regular visitors to Australian waters. They are frequently seen off the coast from Coffs Harbour, south to Tasmania and west to Eyre Peninsula. In Australia, Buller's Albatross are seen over inshore, offshore and pelagic waters. They appear to congregate over currents where water temperature exceeds 16 °C.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Thalassarche bulleri platei (Northern Buller's Albatross)	V, M	-	The Pacific Albatross is a non-breeding visitor to Australian waters. Foraging birds are mostly limited to the Pacific Ocean and the Tasman Sea, although birds do reach the east coast of the Australian mainland. The Pacific Albatross is a marine, pelagic species. It occurs in subtropical and subantarctic waters of the South Pacific Ocean.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Thalassarche cauta (Shy Albatross)	V	V	This species is circumpolar in distribution, occurring widely in the southern oceans. Islands off Australia and New Zealand provide breeding habitat. In Australian waters, the Shy Albatross occurs along the east coast from Stradbroke Island in Queensland along the entire south coast of the continent to Carnarvon in Western Australia. Although uncommon north of Sydney, the species is commonly recorded off southeast NSW, particularly between July and November, and has been recorded in Ben Boyd National Park. This pelagic or ocean-going species inhabits subantarctic and subtropical marine waters, spending the majority of its time at sea. Occasionally the species occurs in continental shelf waters, in bays and harbours. Known breeding locations include Albatross Island off Tasmania, Auckland Island, Bounty Island and The Snares, off New Zealand, where nesting colonies of 6-500 nests occur and may contain other species such as the Australian Gannet. Located on sheltered sides of islands, on cliffs and ledges, in crevices and slopes, nests are used annually and consist of a mound of mud, bones, plant matter and rocks.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Thalassarche eremita (Chatham Albatross)	E, M	-	Breeding for the Chatham Albatross is restricted to Pyramid Rock, Chatham Islands, off the coast of New Zealand. The principal foraging range for this species is in coastal waters off eastern and southern New Zealand, and Tasmania.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.

Thalassarche melanophris impavida (Campbell Albatross)	V, M	-	The Campbell Albatross is a non-breeding visitor to Australian waters. Non-breeding birds are most commonly seen foraging over the oceanic continental slopes off Tasmania, Victoria and New South Wales. They breed only on sub-Antarctic Campbell Island (New Zealand), south of New Zealand. After breeding, birds move north and may enter Australia's temperate shelf waters.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Thalassarche melanophris (Black-browed Albatross)	V, M	V	The Black-browed Albatross has a circumpolar range over the southern oceans and are seen off the southern Australian coast mainly during winter. This species migrates to waters off the continental shelf from approximately May to November and is regularly recorded off the NSW coast during this period. The species has also been recorded in Botany Bay National Park Inhabits Antarctic, subantarctic, subtropical marine and coastal waters over upwellings and boundaries of currents. Can tolerate water temperatures between 0°C and 24°C. Spends most of its time at sea, breeding on small, isolated islands.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Thalassarche salvini (Salvin's Albatross)	V, M	-	Salvin's Albatross breeds on Bounty, Snares and Chatham Islands, south of New Zealand, as well as on Crozet Island in the Indian Ocean. The species forages over most of the southern Pacific Ocean, where it is particularly common in the Humboldt Current, off South America. There are small numbers in the Indian Ocean and sometimes in the South Atlantic Ocean. During the non-breeding season, the species occurs over continental shelves around continents. It occurs both inshore and offshore and enters harbours and bays (Jehl 1973). Salvin's Albatross is scarce in pelagic waters.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Thalassarche cauta steadi (White-capped Albatross)	V, M	-	Breeding colonies occur on islands south of New Zealand. The White-capped Albatross is a marine species and occurs in subantarctic and subtropical waters. The White-capped Albatross is probably common off the coast of south-east Australia throughout the year.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Thinornis cucullatus cucullatus (Eastern Hooded Plover)	V	CE	The Eastern Hooded Plover is endemic to southern Australia and is nowadays found mainly along the coast from south of Jervis Bay, NSW, south through Victoria and Tasmania to the western side of the Eyre Peninsula (South Australia). In south-eastern Australia Hooded Plovers prefer sandy ocean beaches, especially those that are broad and flat, with a wide wave-wash zone for feeding, much beach cast seaweed, and backed by sparsely vegetated sand-dunes for shelter and nesting. Occasionally Hooded Plovers are found on tidal bays and estuaries, rock platforms and rocky or sand-covered reefs near sandy beaches, and small beaches in lines of cliffs. They regularly use near-coastal saline and freshwater lakes and lagoons, often with saltmarsh.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Tyto longimembris Longimembris (Eastern Grass Owl)	-	V	Eastern Grass Owls have been recorded occasionally in all mainland states of Australia but are most common in northern and north-eastern Australia. In NSW they are more likely to be resident in the north-east. Eastern Grass Owl numbers can fluctuate greatly, increasing especially during rodent plagues. Eastern Grass Owls are found in areas of tall grass, including grass tussocks, in swampy areas, grassy plains, swampy heath, and in cane grass or sedges on flood plains. They are also found in agricultural land (mainly sugar cane and sorghum, and rice fields in fallow).	11 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.

Tyto novaehollandiae (Masked Owl)	-	V	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. Lives in dry eucalypt forests and woodlands from sea level to 1,100 metres. Often hunts along the edges of forests, including roadsides	4 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
Mammals					
Chalinolobus dwyeri (Large-eared Pied Bat)	V	V	Forages over a broad range of open forest and woodland habitats, this species is a cave roosting bat which favours sandstone escarpment habitats for roosting, in the form of shallow overhangs, crevices and caves.	PMST, 1 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
Dasyurus maculatus (Spotted-tailed Quoll (SE Mainland))	E	V	Wet and dry sclerophyll forests and rainforests, and adjacent open agricultural areas. Generally associated with large expansive areas of habitat to sustain territory size. Requires hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces as den sites.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Falsistrellus tasmaniensis (Eastern False Pipistrelle)	-	V	Prefers moist habitats, with trees taller than 20 metres. Generally, roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings.	29 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
Micronomus norfolkensis (Eastern Coastal Free-tailed Bat)	-	V	Occur in dry sclerophyll forest and woodland east of the Great Dividing Range. Roosts mainly in tree hollows but will also roost under bark or in human-made structures.	148 – BioNet	Low – there is no habitat considered suitable for this species in the development site.
Miniopterus australis (Little Bent-winged Bat)	-	V	Occur along the east coast and ranges of Australia from Cape York in Queensland to Wollongong in NSW. Little Bent-Winged 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.	78 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
Miniopterus orianae oceanensis (Large Bent-winged Bat)	-	V	Large Bent-winged Bats occur along the east and north-west coasts of Australia. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other manmade structures. Populations disperse within about 300 kilometres range of maternity caves. Breeding or roosting colonies can number from 100 to 150,000 individuals.	40 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
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 kilometres 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.	48 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
Petauroides volans (Greater Glider)	V	-	The Greater Glider occurs in eucalypt forests and woodlands along the east coast of Australia from north-east Queensland to the Central Highlands of Victoria from sea level to 1,200 metres altitude. It feeds exclusively on eucalypt buds, flowers and mistletoe and favours forests with a diversity of eucalypt species, due to seasonal	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.

			variation in its preferred tree species. It roosts in tree hollows, with a particular selection for large hollows in large, old trees. Individuals use multiple hollows and a relatively high abundance of tree hollows (at least 4-8 suitable hollows per hectare) seems to be needed for the species to persist. Individuals occupy relatively small home ranges with an average size of 1 to 3 ha, but the species has relatively low persistence in small forest fragments and disperses poorly across vegetation that is not native forest. Forest patches of at least 160 kilometres squared may be required to maintain viable populations.		
Petaurus norfolcensis (Squirrel Glider)	-	V	The species is widely though sparsely distributed in eastern Australia, from northern Queensland to western Victoria. Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey.	29 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
Phascogale tapoatafa (Brush-tailed Phascogale)	-	V	The Brush-tailed Phascogale has a patchy distribution around the coast of Australia. In NSW it is mainly found east of the Great Dividing Range although there are occasional records west of the divide. Prefer dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter. Also inhabit heath, swamps, rainforest and wet sclerophyll forest.	1 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
Phascolarctos cinereus (Koala)	V	V	In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species.	PMST, 138 – BioNet	Low – there is no habitat considered suitable for this species in the development site.
Potorous tridactylus tridactylus (Long-nosed Potoroo (SE Mainland))	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. 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. The fruit-bodies of hypogeous (underground-fruiting) fungi are a large component of the diet of the Long-nosed Potoroo. They also eat roots, tubers, insects and their larvae and other soft-bodied animals in the soil.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Pseudomys novaehollandiae (New Holland Mouse)	V	-	Distribution is fragmented across all eastern states of Australia, where it inhabits open heath lands, open woodlands with heath understorey and vegetated sand dunes.	PMST, 12 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
Pteropus poliocephalus (Grey-headed Flying-fox)	V	V	Generally found within 200 kilometres of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. In times of natural resource shortages, they may be found in unusual locations. 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 kilometres of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Individual camps may have tens of thousands of animals and are used for mating, and for giving birth and rearing young.	PMST, 89 – BioNet	Low – there is no habitat considered suitable for this species in the development site.

Saccolaimus flaviventris (Yellow-bellied Sheathtail-bat)	-	V	Wide-ranging species found across northern and eastern Australia. Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows.	5 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
Scoteanax rueppellii (Greater Broad-nosed Bat)	-	V	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. Although this species usually roosts in tree hollows, it has also been found in buildings.	34 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
Vespadelus troughtoni (Eastern Cave Bat)	-	V	Found in a broad band on both sides of the Great Dividing Range from Cape York to Kempsey, with records from the New England Tablelands and the upper north coast of NSW. A cave-roosting species that is usually found in dry open forest and woodland, near cliffs or rocky overhangs; has been recorded roosting in disused mine workings, occasionally in colonies of up to 500 individuals.	7 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
Frogs					
Crinia tinnula (Wallum Froglet)	-	V	Wallum Froglets are found along the coastal margin from Litabella National Park in south-east Queensland to Kurnell in Sydney. Wallum Froglets are found in a wide range of habitats, usually associated with acidic swamps on coastal sand plains. They typically occur in sedgelands and wet heathlands. They can also be found along drainage lines within other vegetation communities and disturbed areas, and occasionally in swamp sclerophyll forests. The species breeds in swamps with permanent water as well as shallow ephemeral pools and drainage ditches. Wallum Froglets shelter under leaf litter, vegetation, other debris or in burrows of other species. Shelter sites are wet or very damp and often located near the water's edge.	1 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
Heleioporus australiacus (Giant Burrowing Frog)	V	V	The Giant Burrowing Frog is distributed in south-eastern NSW and Victoria and appears to exist as two distinct populations: a northern population largely confined to the sandstone geology of the Sydney Basin and extending as far south as Ulladulla, and a southern population occurring from north of Narooma through to Walhalla, Victoria. Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based. Spends more than 95% of its time in non-breeding habitat in areas up to 300 metres from breeding sites. Whilst in non-breeding habitat it burrows below the soil surface or in the leaf litter. Individual frogs occupy a series of burrow sites, some of which are used repeatedly. The home ranges of both sexes appear to be non-overlapping suggesting exclusivity of non-breeding habitat. Home ranges are approximately 0.04 hectares in size.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Litoria aurea (Green and Golden Bell Frog)	V	E	Since 1990 there have been approximately 50 recorded locations in NSW, most of which are small, coastal, or near coastal populations. These locations occur over the species' former range; however, they are widely separated and isolated. Large populations in NSW are located around the metropolitan areas of Sydney, Shoalhaven and mid north coast (one an island population). There is only one known population on the NSW Southern Tablelands. Ephemeral and permanent freshwater wetlands, ponds, dams with an open aspect and fringed by Typha and other aquatics, free from predatory fish.	PMST, 7, 751 – BioNet	Low – significant breeding population occurs approximately 3 kilometres to the south-east of the development site. There is no habitat considered suitable for this species in the development site.

Mixophyes balbus (Stuttering Frog)	V	E	Occur along the east coast of Australia from southern Queensland to north-eastern Victoria. Found in rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range. Outside the breeding season adults live in deep leaf litter and thick understorey vegetation on the forest floor.	PMST	Unlikely – there is no habitat considered suitable for this species in the development site.
Uperoleia mahonyi (Mahony's Toadlet)	E	-	Endemic to the mid-north coast of NSW and to date has been found between Kangy Angy and Seal Rocks. Inhabits ephemeral and semi-permanent swamps and swales on the coastal fringe of its range. Known records occur in heath or wallum habitats almost exclusively associated with leached (highly nutrient impoverished) white sand. Also is known to occur in wallum heath, swamp mahogany-paperbark swamp forest, heath shrubland and Sydney red gum woodland. Known records are associated with shallow ephemeral/semi-permanent water bodies with limited flow of water. Aquatic vegetation at breeding sites includes sedges (*Shoenoplectus* spp., *Baumea* spp. and *Lepironia articulata*) and Broadleaf Cumbungi (*Typha orientalis*). Females have been recorded up to 400 metres from waterbodies indicating moderate dispersal distances and use of multiple habitat types.	PMST, 3 – BioNet	Unlikely – there is no habitat considered suitable for this species in the development site.
Migratory Species					
Actitis hypoleucos (Common Sandpiper)	M	-	Found along all coastlines of Australia and in many areas inland, the Common Sandpiper is widespread in small numbers. The species utilises a wide range of Coastal Wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats.	PMST, 1 – BioNet	Unlikely – may use airspace above the development site. Unlikely to utilise the vegetation within the development site or be impacted by the proposed development works.
Anas querquedula (Garganey)	M	-	This species is highly migratory, breeding widely across Western Eurasia and wintering within the northern tropics. During non-breeding season the species shows a preference for large freshwater or occasionally brackish lakes, again with abundant floating, emergent and fringing vegetation, also shallow flood plains, shallow dams, pans and sewage ponds.	1 – BioNet	Unlikely – may use airspace above the development site. Unlikely to utilise the vegetation within the development site or be impacted by the proposed development works.
Apus pacificus (Fork-tailed Swift)	M	-	The Fork-tailed Swift is a non-breeding visitor to all states and territories of Australia. In NSW, the Fork-tailed Swift is recorded in all regions. Many records occur east of the Great Divide; however, a few populations have been found west of the Great Divide. These are widespread but scattered further west of the line joining Bourke and Dareton. Sightings have been recorded at Milparinka, the Bulloo River and Thurloo Downs. The Fork-tailed Swift is almost exclusively aerial, flying from less than 1 metre to at least 300 metres above ground and possibly much higher. In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas. They often occur over cliffs and beaches and also over islands and sometimes well out to sea. They also occur over settled areas, including towns, urban areas and cities. They mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They are also found at treeless grassland and sandplains	PMST, 3 – BioNet	Low – may use airspace above the development site. Unlikely to utilise the vegetation within the development site or be impacted by the proposed development works.

			covered with spinifex, open farmland and inland and coastal sand-dunes. The sometimes occur above rainforests, wet sclerophyll forest or open forest or plantations of pines.		
Ardenna pacifica (Wedge-tailed Shearwater)	M	-	The Wedge-tailed Shearwater breeds on the east and west coasts of Australia and on off-shore islands. The species is common in the Indian Ocean, the Coral Sea and the Tasman Sea. The Wedge-tailed Shearwater is a pelagic, marine bird known from tropical and subtropical waters. The species tolerates a range of surface-temperatures and salinities but is most abundant where temperatures are greater than 21 °C and salinity is greater than 34.6 %. In tropical zones the species may feed over cool nutrient-rich waters. The species has been recorded in offshore waters of eastern Victoria and southern NSW, mostly over continental slope with sea-surface temperatures of 13.9–24.4 °C and usually off the continental shelf in north-west Australia.	3 – BioNet	Low – may use airspace above the development site. Unlikely to utilise the vegetation within the development site or be impacted by the proposed development works.
Calidris acuminata (Sharp-tailed Sandpiper)	M	-	The Sharp-tailed Sandpiper spends the non-breeding season in Australia with small numbers occurring regularly in New Zealand. Most of the population migrates to Australia, mostly to the south-east and are widespread in both inland and coastal locations and in both freshwater and saline habitats. Many inland records are of birds on passage. Prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation; this includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline saltlakes inland. They also occur in saltworks and sewage farms. They use flooded paddocks, sedgelands and other ephemeral wetlands, but leave when they dry. They use intertidal mudflats in sheltered bays, inlets, estuaries or seashores, and also swamps and creeks lined with mangroves. They tend to occupy coastal mudflats mainly after ephemeral terrestrial wetlands have dried out, moving back during the wet season. Sometimes they occur on rocky shores and rarely on exposed reefs.	PMST, 105 – BioNet	Low – may use airspace above the development site. Unlikely to utilise the vegetation within the development site or be impacted by the proposed development works.
Calidris melanotos (Pectoral Sandpiper)	M	-	In NSW, the Pectoral Sandpiper is widespread, but scattered. Records exist east of the Great Divide, from Casino and Ballina, south to Ulladulla. West of the Great Divide, the species is widespread in the Riverina and Lower Western regions. Prefers shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.	PMST, 4 – BioNet	Unlikely – may use airspace above the development site. Unlikely to utilise the vegetation within the development site or be impacted by the proposed development works.
Calidris ruficollis (Red-necked Stint)	M	-	It is distributed along most of the Australian coastline with large densities on the Victorian and Tasmanian coasts. The Red-necked Stint breeds in Siberia and sporadically in north and west Alaska, probably from Taymyr region to Anadyr Territory and Koryakland. The Red-necked Stint mostly forages on bare wet mud on intertidal mudflats or sand flats, or in very shallow water; mostly in areas with a film of surface water and mostly close to edge of water. Roosts on sheltered beaches, spits, banks or islets, of sand, mud, coral or shingle, sometimes in saltmarsh or other vegetation.	PMST, 31 – BioNet	Low – may use airspace above the development site. Unlikely to utilise the vegetation within the development site or be impacted by the proposed development works.
Cuculus optatus (Oriental Cuckoo)	M	-	Oriental Cuckoos are winter migrants that do not breed in Australia. They are mainly seen in northern Australia, occasionally they are sighted as far south as Sydney. This species inhabits rainforest, vine thickets, wet sclerophyll forest and open woodland and sometimes occurs in mangroves, wooded swamps and as vagrants in gardens.	PMST, 1 – BioNet	Unlikely – may use airspace above the development site. Unlikely to utilise the vegetation within the development site or

					be impacted by the proposed development works.
Gallinago hardwickii (Latham's Snipe)	M	-	Latham's Snipe is a non-breeding visitor to south-eastern Australia and is a passage migrant through northern Australia (i.e., it travels through northern Australia to reach non-breeding areas located further south). The species has been recorded along the east coast of Australia from Cape York Peninsula through to south-eastern South Australia. In Australia, Latham's Snipe occurs in permanent and ephemeral wetlands up to 2000 metres 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). However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity.	PMST, 90 – BioNet	Low – may use airspace above the development site. Unlikely to utilise the vegetation within the development site or be impacted by the proposed development works.
Gelochelidon nilotica (Gull-billed Tern)	M	-	Gull-billed Terns are found in freshwater swamps, brackish and salt lakes, beaches and estuarine mudflats, floodwaters, sewage farms, irrigated croplands and grasslands. They are only rarely found over the ocean.	6 – BioNet	Unlikely – may use airspace above the development site. Unlikely to utilise the vegetation within the development site or be impacted by the proposed development works.
Hirundo rustica (Barn Swallow)	M	-	The Barn Swallow is a non-breeding visitor and usually occurs in northern Australia, on Cocos-Keeling Island, Christmas Island, Ashmore Reef, and patchily along the north coast of the mainland from the Pilbara region, Western Australia, to Fraser Island in Queensland. In Australia, the Barn Swallow is recorded in open country in coastal lowlands, often near water, towns and cities. Birds are often sighted perched on overhead wires, and also in or over freshwater wetlands, paperbark Melaleuca woodland, mesophyll shrub thickets and tussock grassland.	3 – BioNet	Unlikely – may use airspace above the development site. Unlikely to utilise the vegetation within the development site or be impacted by the proposed development works.
Hydroprogne caspia (Caspian Tern)	M	-	Within Australia, the Caspian Tern has a widespread occurrence and can be found in both coastal and inland habitat. The Caspian Tern breeds on variable types of sites including low islands, cays, spits, banks, ridges, beaches of sand or shell, terrestrial wetlands and stony or rocky islets or banks. This species usually forages in open wetlands, including lakes and rivers.	8 – BioNet	Unlikely – may use airspace above the development site. Unlikely to utilise the vegetation within the development site or be impacted by the proposed development works.
Limosa lapponica (Bar-tailed Godwit)	M	-	The Bar-tailed Godwit has been recorded in the coastal areas of all Australian states. The Bar-tailed Godwit is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It is found often around beds of seagrass and, sometimes, in nearby saltmarsh. It has been sighted in coastal sewage farms and saltworks, saltlakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats. It is rarely found on inland wetlands or in areas of short grass, such as farmland, paddocks and airstrips, although it is commonly recorded in paddocks at some locations overseas.	PMST, 4 – BioNet	Unlikely – may use airspace above the development site. Unlikely to utilise the vegetation within the development site or be impacted by the proposed development works.
Motacilla flava (Yellow Wagtail)	M	-	The Yellow Wagtail is a regular wet season visitor to northern Australia. Increasing records in NSW suggest this species is an occasional but regular summer visitor to the Hunter River region. Habitat requirements for the Yellow	PMST, 2 – BioNet	Unlikely – may use airspace above the development site.

			Wagtail are highly variable, but typically include open grassy flats near water. Habitats include open areas with low vegetation such as grasslands, airstrips, pastures, sports fields; damp open areas such as muddy or grassy edges of wetlands, rivers, irrigated farmland, dams, waterholes; sewage farms, sometimes utilise tidal mudflats and edges of mangroves.		Unlikely to utilise the vegetation within the development site or be impacted by the proposed development works.
Numenius phaeopus (Whimbrel)	M	-	The Whimbrel is a regular migrant to Australia and New Zealand, with a primarily coastal distribution. The Whimbrel is often found on the intertidal mudflats of sheltered coasts. It is also found in harbours, lagoons, estuaries and river deltas, often those with mangroves, but also open, unvegetated mudflats. It is occasionally found on sandy or rocky beaches, on coral or rocky islets, or on intertidal reefs and platforms.	PMST, 4 – BioNet	Unlikely – may use airspace above the development site. Unlikely to utilise the vegetation within the development site or be impacted by the proposed development works.
Pluvialis fulva (Pacific Golden Plover)	M	-	Most Pacific Golden Plovers occur along the east coast and are especially widespread along the Queensland and NSW coastlines. In non-breeding grounds in Australia this species usually inhabits coastal habitats, though it occasionally occurs around inland wetlands. Pacific Golden Plovers usually occur on beaches, mudflats and sand flats (sometimes in vegetation such as mangroves, low saltmarsh such as *Sarcocornia*, or beds of seagrass) in sheltered areas including harbours, estuaries and lagoons, and also in evaporation ponds in salt works.	PMST, 16 – BioNet	Unlikely – may use airspace above the development site. Unlikely to utilise the vegetation within the development site or be impacted by the proposed development works.
Pluvialis squatarola (Grey Plover)	M	-	Non-breeding visitor to Australia, Grey Plovers usually forage on large areas of exposed mudflats and beaches of sheltered coastal shores such as inlets, estuaries and lagoons. They usually roost in sandy areas, such as on unvegetated sandbanks or sand-spits on sheltered beaches or other sheltered environments such as estuaries or lagoons.	PMST, 2 – BioNet	Unlikely – may use airspace above the development site. Unlikely to utilise the vegetation within the development site or be impacted by the proposed development works.
Thalasseus bergii (Greater Crested Tern)	M	-	Greater Crested Terns are widespread around the coasts of the Indian Ocean, Southern Ocean and west-central Pacific Ocean. They inhabit coastal bays and inlets, lakes and large rivers. Terns are ground nesting birds that lay their eggs in shallow scrapes.	3 – BioNet	Unlikely – may use airspace above the development site. Unlikely to utilise the vegetation within the development site or be impacted by the proposed development works.
Tringa glareola (Wood Sandpiper)	M	-	The Wood Sandpiper has its largest numbers recorded in north-west Australia, with all areas of national importance located in Western-Australia. Uses well-vegetated, shallow, freshwater wetlands, such as swamps, billabongs, lakes, pools and waterholes.	1 – BioNet	Unlikely – may use airspace above the development site. Unlikely to utilise the vegetation within the development site or be impacted by the proposed development works.

Tringa nebularia (Common Greenshank)	M	-	The Common Greenshank does not breed in Australia; however, the species occurs in all types of wetlands and has the widest distribution of any shorebird in Australia. In NSW, the species has been recorded in most coastal regions. It is widespread west of the Great Dividing Range, especially between the Lachlan and Murray Rivers and the Darling River drainage basin, including the Macquarie Marshes, and north-west regions	PMST, 49 – BioNet	Low – may use airspace above the development site. Unlikely to utilise the vegetation within the development site or be impacted by the proposed development works.
Tringa stagnatilis (Marsh Sandpiper)	M	-	The Marsh Sandpiper is found on coastal and inland wetlands throughout Australia. It is recorded in all regions of NSW but especially the central and south coasts and (inland) on the western slopes of Great Divide and western plains. The Marsh Sandpiper lives in permanent or ephemeral wetlands of varying salinity, including swamps, lagoons, billabongs, saltpans, saltmarshes, estuaries, pools on inundated floodplains, and intertidal mudflats and regularly at sewage farms and saltworks. They are recorded less often at reservoirs, waterholes, soaks, bore-drain swamps and flooded inland lakes. In south-east Australia they prefer inland saline lakes and coastal saltworks. They are found infrequently around mangroves.	PMST, 38 – BioNet	Low – may use airspace above the development site. Unlikely to utilise the vegetation within the development site or be impacted by the proposed development works.

Note: This likelihood of occurrence assessment table does not consider habitat for marine species such as whales, sharks, dolphins, turtles and rays, as the development site contains no suitable habitat for these species.

Distribution and habitat requirement information adapted from:

- Australian Government Department of the Environment http://www.environment.gov.au/biodiversity/threatened/index.html
- NSW Department of Planning, Industry and Environment http://www.environment.nsw.gov.au/threatenedspecies/

Data source includes:

- Number of records from the NSW Department of Planning, Industry and Environment BioNet Atlas (Accessed 24 August 2021); and
- Identified from the Protected Matters Search Tool (PMST) Australian Government Department of Agriculture, Water and the Environment (Accessed 24 August 2021)

Key: CE = critically endangered E = endangered V = vulnerable M = migratory

Appendix B. Flora species recorded

FAMILY / *Scientific name*	Common Name	
POLYGONACEAE		
Rumex crispus	Curled Dock	i
FABACEAE		
FABOIDEAE		
Medicago polymorpha	Burr Medic	i
Trifolium repens	White Clover	i
Vicia sativa subsp. *sativa*	Common Vetch	i
EUPHORBIACEAE		
Ricinus communis	Castor Oil Plant	i
MYRSINACEAE		
Anagallis arvensis	Pimpernell	i
APOCYNACEAE		
Gomphocarpus fruticosus	Narrow-leaved Cotton Bush	i
PLANTAGINACEAE		
Plantago lanceolata	Plantain	i
VERBENACEAE		
Verbena bonariensis	Purple Top	i
ASTERACEAE		
Aster subulatus	Wild Aster	i
Cirsium vulgare	Scotch Thistle	i
Senecio madagascariensis	Fireweed	i
Sonchus oleraceus	Common Sow-thistle	i
Taraxacum officinale	Dandelion	i
CYPERACEAE		
Eleocharis acuta	Common Spike-rush	
JUNCACEAE		
Juncus acutus	Spiny Rush	i
Juncus usitatus	Common Rush	
POACEAE		
Briza minor	Shivery Grass	i
Cynodon dactylon	Common Couch	
Cenchrus clandestinus	Kikuyu Grass	i

TOTALS

Total Flora Species	*20*
Total Number of Families	*11*
Total Indigenous Native Species	*3*
Total Exotic Species	*17*

ABBREVIATIONS:

i = introduced (i.e. not indigenous to Australia)

n = native Australian species not considered to be indigenous to the site

c = cultivated (i.e. planted on the site)

t = listed as a threatened species under State and/or Commonwealth legislation

spp. = several species of the one genus (sometimes occurring as a hybrid swarm)

sp. = unidentified species[4]

sp. aff. = unidentified species with characteristics similar to the indicated species or genus[3]

? = unconfirmed species[4]

var. = variety

subsp. = subspecies

cv. = cultivar (i.e. a anthropogenic form of the species)

agg. = an aggregate of several yet to be defined species

NOTES:

1. Recent 'synonyms' include misapplied names.

2. A sample flora assemblage obtained from a short-term survey, such as the present one, cannot be considered to be comprehensive, but rather indicative of the actual flora assemblage. It can take many years of flora surveys to record all of the plant species occurring within any area, especially species that are only apparent in some seasons.

3. Not all species can be accurately identified in a 'snapshot' survey due to absence of flowering or fruiting material, etc.

SCIENTIFIC NAMES & AUTHORITIES:

Scientific names & families are those used in the *Flora of New South Wales* as maintained by the Royal Botanic Gardens (http://.plantnet.rbgsyd.gov.au).