

ORICA

DECEMBER 2018

BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT

LOT 9 DP1205673
NO. 28 MCPHERSON
STREET,
BANKSMEADOW



Question today *Imagine tomorrow* Create for the future

Biodiversity Development Assessment Report
Lot 9 DP1205673 No. 28 McPherson Street, Banksmeadow

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GLOSSARY

*	Denotes exotic species
BAM	Biodiversity Assessment Methodology 2017 that supports the <i>Biodiversity Conservation Act 2016</i> .
Biodiversity	The biological diversity of life is commonly regarded as being made up of the following three components: — Genetic diversity — the variety of genes (or units of heredity) in any population. — Species diversity — the variety of species. — Ecosystem diversity — the variety of communities or ecosystems.
Bioregion (region)	A bioregion defined in a national system of bioregionalisation. The site is in the Sydney Basin Bioregion as defined in the Interim Biogeographic Regionalisation for Australia (Thackway and Cresswell 1995).
Candidate species	Species assessed as having a moderate to high likelihood of occurrence within the development site.
Critical habitat	The whole or any part or parts of an area or areas of land comprising the habitat of an Endangered species, an Endangered population or an Endangered Ecological Community that is critical to the survival of the species, population or ecological community (Department of Environment and Conservation 2004). Critical habitat is listed under the EPBC Act with the Secretary (Department of the Environment and Energy) maintaining a register of this habitat. Capitalisation of the term ‘Critical Habitat’ in this report refers to the habitat listed specifically under Commonwealth legislation.
Cryptic species	An inconspicuous species which can be difficult to identify
Department of the Environment and Energy	The department develops and implements national policy, programs and legislation to protect and conserve Australia’s natural environment and cultural heritage and administers the EPBC Act. The Commonwealth Department of Department of the Environment was previously known as: — Department of Sustainability, Environment, Water, Population and Communities (SEWPAC) — Department of the Environment, Water, Heritage and the Arts (DEWHA). — Department of Environment and Heritage (DEH). — Department of the Environment and Water Resources (DEWR).
Development footprint	the area of land that is directly impacted on by a proposed development, including access roads, and areas used to store construction materials. The term development footprint is also taken to include clearing footprint except where the reference is to a small area development or a major project development.
Development site	An area of land that is subject to a proposed development that is under the EP&A Act.
Ecological community	An assemblage of species occupying a particular area.
Environmental weed	Any plant that is not native to a local area that has invaded native vegetation.

Exotic	Introduced from outside the area (Stralberg, Jongsomjit et al. 2009). Used in the context of this report to refer to species introduced from overseas.
GPS	Global Positioning System – a navigational tool which uses radio receivers to pick up signals from four or more special satellites to provide precise determination of location.
Habitat	An area or areas occupied, or periodically or occasionally occupied, by a species, population or ecological community, including any biotic or abiotic components.
High Threat Weed	Vascular plants not native to Australia that if not controlled will invade and outcompete native species. A list of high threat weeds is available as part of the BAM Calculator (https://www.lmbc.nsw.gov.au/bamcalc)
Indigenous	Native to the area: not introduced (Stralberg, Jongsomjit et al. 2009).
Introduced	Not native to the area: not indigenous (Stralberg, Jongsomjit et al. 2009). Refers to both exotic and non-indigenous Australian native species of plants and animals.
Key threatening processes	A process that threatens, or could threaten, the survival, abundance or evolutionary development of native species, populations or ecological communities (Department of Environment and Conservation 2004). Key threatening processes are listed under the TSC Act, the FM Act and the EPBC Act. Capitalisation of the term ‘Key Threatening Processes’ in this report refers to those processes listed specifically under the relevant state and Commonwealth legislation.
Likely	Taken to be a real chance or possibility (Department of Environment and Conservation 2004).
Local population	The population that occurs within the site, unless the existence of contiguous or proximal occupied habitat and the movement of individuals or exchange of genetic material across the boundary can be demonstrated as defined by Department of Environment and Climate Change (2007).
Locality	The area within a 10 kilometre radius of the development site.
Migratory species	Species listed as Migratory under the EPBC Act relating to international agreements to which Australia is a signatory. These include Japan-Australia Migratory Bird Agreement, China-Australia Migratory Bird Agreement, Republic of Korea-Australia Migratory Bird Agreement and the Bonn Convention on the Conservation of Migratory Species of Wild Animals. Capitalisation of the term ‘Migratory’ in this report refers to those species listed as Migratory under the EPBC Act.
NSW	New South Wales
Plant community type (PCT)	A NSW plant community type identified using the PCT classification system.
Priorities action statements (PAS)	Priorities action statements outline the broad strategies and detailed priority actions to be undertaken in NSW to promote the recovery of Threatened species, population and ecological communities and manage key threatening processes (Department of Environment and Climate Change 2007).

Priority Weeds	An introduced species listed under the <i>Biosecurity Act 2015</i> . Under the Act, priority weeds have specific control measures for each region.
Proposal	The proposed works as described in detail in Section 1.2.
Protected species	Those species defined as protected under the <i>National Parks and Wildlife Act 1974</i> . Includes all native animals, as well as all native plants listed on Schedule 13 of the <i>National Parks and Wildlife Act 1974</i> .
Region	A bioregion defined in a national system of bioregionalisation. The Proposal is located within the Sydney Basin Bioregion as defined in the Interim Biogeographic Regionalisation for Australia (IBRA) (Thackway and Cresswell 1995).
Significant	Important, weighty or more than ordinary
Species richness	Species richness is simply the number of species present in a sample, community, or taxonomic group. Species richness is one component of the concept of species diversity, which also incorporates evenness, that is, the relative abundance of species (Matteson and Langellotto 2010).
Threatened biodiversity	Threatened species, populations or ecological communities as listed under the BC Act, FM Act or the EPBC Act.
Threatened species, populations and ecological communities	Species, populations and ecological communities listed as Vulnerable, Endangered or Critically Endangered (collectively referred to as threatened) under the TSC Act, FM Act or the EPBC Act. Capitalisation of the terms ‘Vulnerable’, ‘Endangered’ or ‘Critically Endangered’ in this report refers to listing under the relevant state and/or Commonwealth legislation.
Viable local population	A population that has the capacity to live, develop and reproduce under normal conditions, unless the contrary can be conclusively demonstrated through analysis of records and references (Department of Environment and Climate Change 2007).
Weed	A plant growing out of place or where it is not wanted: often characterised by high seed production and the ability to colonise disturbed ground quickly (Stralberg, Jongsomjit et al. 2009). Weeds include both exotic and Australian native species of plant naturalised outside of their natural range.

ABBREVIATIONS

BAM	Biodiversity Assessment Method 2017
BC Act	The NSW <i>Biodiversity Conservation Act 2016</i>
BC Regulation	The NSW Biodiversity Conservation Regulation 2017
BDAR	Biodiversity Development Assessment Report
BOS	Biodiversity Offset Scheme
CAMBA	China Australia Migratory Bird Agreement
CEEC	Critically Endangered Ecological Community
DOEE	The Commonwealth Department of the Environment and Energy
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EP&A Act	The NSW <i>Environmental Planning & Assessment Act 1979</i>
EPBC Act	The Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
IBRA	Interim Biogeographic Regionalisation for Australia
JAMBA	Japan Australia Migratory Bird Agreement
MNES	Matters of National Environmental Significance
OEH	The NSW Office of Environment & Heritage
PCT	Plant Community Type
RoKAMBA	Republic of Korea Australia Migratory Bird Agreement
SAII	Serious and Irreversible Impact
TEC	Threatened Ecological Community

EXECUTIVE SUMMARY

This Biodiversity Development Assessment Report (BDAR) has been prepared in accordance with the NSW Biodiversity Assessment Method 2017 established under the *Biodiversity Conservation Act 2016* (BC Act) to form part of an Environmental Impact Statement (EIS) for a State Significant Development application for a proposed warehouse development on land known as Lot 9 DP 1205673, 28 McPherson Street, Banksmeadow in the Bayside local government area.

The proposed development comprises the staged construction of two warehousing buildings, associated offices and hardstand/car parking areas on a suspended concrete platform.

No remnant native vegetation or associated plant community types (PCTs) were recorded on the development site or within the development footprint. The absence of any remnant native vegetation is the result of a long and extensive history of disturbance associated with the development site including extensive earthworks across the site.

A total of two non-native vegetation types were recorded with the development site, being:

- Miscellaneous ecosystem – highly disturbed areas with no or limited native vegetation
- Miscellaneous ecosystem – urban exotic / native landscape plantings

Targeted surveys for the Green & Golden Bell Frog were undertaken during optimal conditions generally in accordance with survey guidelines. These surveys failed to identify any evidence of the Green & Golden Bell Frog within the development site or adjacent lands and this species is generally accepted to be extinct in the Botany Wetland locality based on lack of any recent records (>10 years).

No threatened species, ecological communities or their habitat, listed under the BC Act, have been determined to be affected by the project.

Given the development will not result in the direct or indirect impact on any remnant native vegetation or associated PCTs, the Biodiversity Offset Scheme is not applicable for this development.

The development footprint is considered unlikely to result in a significant impact on any Matters of National Environmental Significance (MNES). Given this, a referral of this development under the *Environment Protection and Biodiversity Conservation Act 1999* to the Department of Environment & Energy is not warranted.

1 PROJECT BACKGROUND

1.1 INTRODUCTION

This Biodiversity Development Assessment Report (BDAR) has been prepared in accordance with the Biodiversity Assessment Method 2017 (BAM) and specifically addresses legislative matters prescribed under the *Biodiversity Conservation Act 2016* (BC Act) and Biodiversity Conservation Regulation 2017.

The land subject to this BDAR (hence forth referred to as the ‘development site’) is known as Lot 9 DP 1205673, 28 McPherson Street, Banksmeadow and forms part of an area that is colloquially referred to as ‘Southlands’. The development site is wholly located within the Bayside Council Local Government Area and has a land zoning of IN1 – General Industrial under State Environmental Planning Policy (Three Ports) 2013. The general locality of the development site is shown in Figure 1.1.

The development site has a long history of modification and disturbance from land uses such as water extraction, peat cutting, sand extraction and land filling with waste paper, boiler ash and building rubble (Orica 2017). The Southlands area once occupied a low-lying poorly drained coastal sandplain known as Veterans Swamp that formed part of a broader area known as the Botany Swamps. During the 1830’s and 1840’s these swamp areas formed part of Sydney’s water supply which resulted in lowering the water table and exposing peat lenses that were subsequently cut and extracted for commercial purpose (Orica 2017).

In the 1950’s, the Southlands were acquired by Australian Paper Manufactures that used the development site to store waste paper bales and discharge paper waste slurries into a series of ponds and pits (now removed) that were the result of former peat cutting and sand extraction (Orica 2017). These ponds and pits were also used for dumping bottom end furnace ash from coal fired boilers used by industry in the area along with a variety of other solid and liquid waste products.

In the early 2000’s, Orica received development consent for the redevelopment of the Southlands that comprised of new warehouse development and ancillary office components, site remediation and flood mitigation works (Major Project approval MP 06-0191). As part of this development, the development site was assigned as compensatory flood storage and involved the mechanical stripping and removal of fill material to create the new flood basin profile. The project approval also required the preparation and implementation of a Landscape Management Plan for the new regraded flood basin (Jocelyn Ramsay & Assoc. Pty Ltd, 2013).

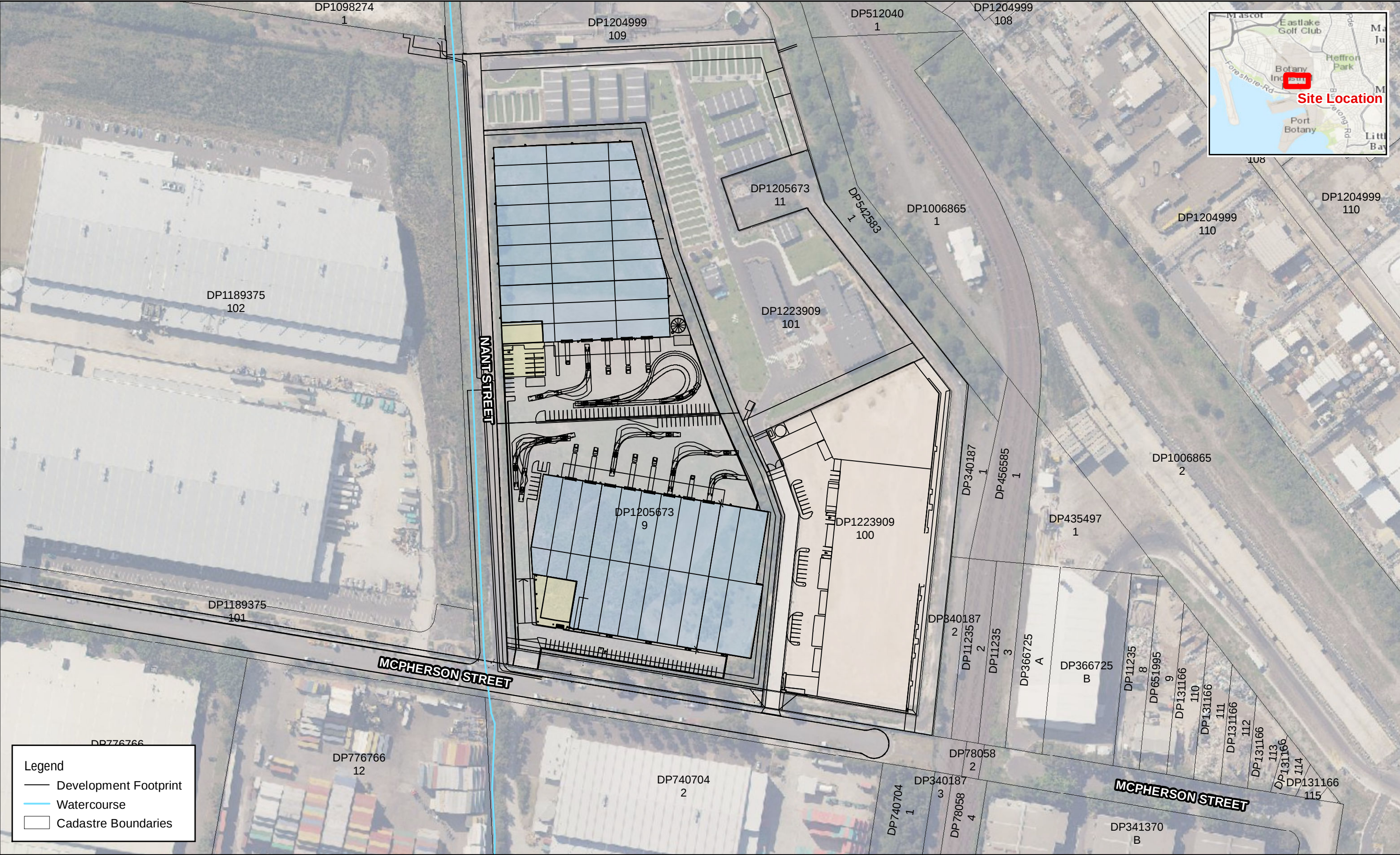
Because of the substantial modification and disturbance of the development site including previous bulk earthworks activities, no remnant native vegetation remains on the development site and all current vegetation is the result of landscape plantings and/or exotic weed recruitment of previously disturbed areas.

1.2 THE DEVELOPMENT

The proposed development comprises the construction of two warehousing buildings, associated offices and hardstand/car parking areas on a suspended concrete platform. An overview of the development footprint is presented in Figure 1.2.

Overall, the proposed development footprint will be constructed in a manner that allows the land to function for the primary purpose of compensatory flood storage whilst enabling a secondary industrial development use located above the flood storage area.





2 LEGISLATIVE CONTEXT

2.1 BIODIVERSITY CONSERVATION ACT 2016

The NSW *Biodiversity Conservation Act 2016* (BC Act) came into effect on the 25 August 2017. This Act repealed the *Threatened Species and Conservation Act 1995* (TSC Act), *Native Vegetation Act 2003* and parts of the *National Parks and Wildlife Act 1974*. All threatened entities previously listed under the TSC Act have now been listed under the schedules of the BC Act.

The BC Act outlines the framework for addressing impacts on biodiversity from development and clearing. It establishes a framework to avoid, minimise and offset impacts on biodiversity from development through the Biodiversity Offsets Scheme. The Biodiversity Offsets Scheme (BOS) creates a transparent, consistent and scientifically based approach to biodiversity assessment and offsetting for all types of development that are likely to have a significant impact on biodiversity (Office of Environment and Heritage, 2017a).

The Biodiversity Assessment Method (BAM) was established by OEH as a standard method to implement the aims of the BOS and to address the loss of biodiversity and threatened species. The scheme creates a market framework for the conservation of biodiversity values and the offsetting of development impacts. It also provides the mechanisms to offset impacts of development, clearing or biodiversity certification such that there is no loss of biodiversity values.

This BDAR has been prepared in accordance with the BAM and includes prescribed biodiversity matters under the Biodiversity Conservation Regulation 2017.

2.2 FISHERIES MANAGEMENT ACT 1994

The key objects of the *Fisheries Management Act 1994* (FM Act) are to conserve, develop and share the fishery resources of the State for the benefit of present and future generations. The Act provides for the listing of threatened species, populations and ecological communities, listing of 'Key Threatening Processes', and the requirements or otherwise for the preparation of a Species Impact Statement (SIS).

One of the objectives of the FM Act is to 'conserve key fish habitats' which includes aquatic habitats that are important to the maintenance of fish populations generally and the survival and recovery of threatened aquatic species. To assist in the protection of key fish habitats, the Department of Primary Industries (DPI) has produced the Policy and guidelines for fish habitat conservation and management (DPI 2013). This policy applies to the following developments, works or activities, each of which can impact on key fish habitat:

- Dredging or reclamation
- Impeding fish passage
- Damaging marine vegetation
- De-snagging.

The development footprint will not impact on any watercourse or potential fish habitat such that it would result in dredging or reclamation, impeded fish passage, damage marine vegetation or de-snagging. Springvale drain occurs to the west of Nant Street that runs adjacent to the development footprint and will not be directly impacted upon by the development.

2.3 BIOSECURITY ACT 2015

The *Biosecurity Act 2015* provides for risk-based management of biosecurity in NSW. It provides a statutory framework to protect the NSW economy, environment and community from the negative impact of pests, diseases and weeds.

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

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

Priority weeds recorded in the development site and their control measures are detailed in section 5.4.

2.4 ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

The objective of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is to ensure that actions likely to cause a significant impact on 'Matters of National Environmental Significance' (MNES) undergo an assessment and approval process. Under the EPBC Act, an action includes a project, a development, an undertaking, an activity or a series of activities, or an alteration of any of these things. An action that 'has, will have or is likely to have a significant impact on a matter of national environmental significance' is deemed to be a 'controlled action' and may not be undertaken without prior approval from the Australian Minister for the Environment. MNES relevant to this report include threatened species and ecological communities and migratory species.

The EPBC Act has been considered in this assessment through:

- Desktop review to determine the listed biodiversity matters that are predicted to occur within the locality of the project and hence could occur, subject to the habitats present
- Targeted field surveys for listed threatened biota and migratory species
- Assessment of potential impacts on threatened and migratory biota, including assessments of significance in accordance with the EPBC Act significant impact guidelines (Department of the Environment 2013) where relevant
- Identification of suitable impact mitigation and environmental management measures for threatened and migratory biota, where required.

2.5 SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

The Secretary of the NSW Department of Planning & Environment has issued requirements for the proposed development to be assessed as State Significant Development (SSD) under Part 4, Division 4.7 of the EP&A Act (Appendix E). The Secretary's Environmental Assessment Requirements (SEARs) for biodiversity are;

'Biodiversity – including: an assessment of the proposal's biodiversity impacts in accordance with the *Biodiversity Conservation Act 2016*, including the preparation of a Biodiversity Development Assessment Report (BDAR) where required under the Act, except where a waiver for preparation of a BDAR has been granted.'

This BDAR has been prepared in accordance with the BAM 2017 and addresses the proposal's biodiversity impacts in accordance with the BC Act.

3 METHODOLOGY

The following methods have been undertaken in the preparation of this BDAR in accordance with the BAM. All work was carried out under the appropriate licences, including a scientific licence as required under Part 2 of the BC Act (License Number: SL100630) and an Animal Research Authority issued by the DPI (Agriculture).

3.1 PERSONNEL

The contributors to the preparation of this report, their qualifications and roles are provided in Table 3.1.

Table 3.1 Contributors and their qualifications

NAME	QUALIFICATIONS	ROLE
Mark Stables	Bachelor of Science (Hons) Accredited BAM Assessor (BAAS18097)	Principal Ecologist - Field surveys / reporting
Alex Cockerill	Bachelor of Science (Hons) Accredited BAM Assessor (BAAS17020)	Principal Ecologist - Field surveys / technical review
Julia Wyllie	Bachelor of Environment; Certificate 3 Conservation and Land Management Accredited BAM Assessor (BAAS18034)	Ecologist - Field surveys
Troy Jennings	Bachelor Biodiversity Conservation Masters of Wildlife Management	Ecologist - Field surveys / reporting
Trent Bowman	Bachelor of Science (Hons); Master of Science in Geoscience	GIS Consultant – Mapping and data management

3.2 NOMENCLATURE

Names of vegetation communities used in this report are based on the PCTs used in the NSW BioNet Vegetation Classification Database (Office of Environment & Heritage 2018).

These names are cross-referenced with those used for threatened ecological communities listed under the BC Act and/or the EPBC Act.

Names of plants used in this document follow PlantNET (Royal Botanic Gardens 2018). Scientific names are used in this report for species of plant. Scientific and common names (where available) are provided in the species results provided in Appendix C. The names of introduced species are denoted with an asterisk (*).

For threatened species of plants, the names used in the OEH Threatened Species Website (Office of Environment & Heritage 2018) are also provided in Appendix A where these differ from the names used in the PlantNET database.

Names of vertebrate fauna follow the Australian Faunal Directory maintained by the Department of the Environment and Energy (Department of Environment and Energy, 2018). Common names are used in the report for species of animal.

For threatened species of animals, the names used in the OEH Threatened Species Website and NSW Department Primary Industries (Office of Environment and Heritage, 2018, Department of Primary Industries, 2018).

3.3 BACKGROUND RESEARCH

Background research was conducted to identify:

- landscape-scale features of the development site in accordance with Section 4.2 of the BAM (Office of Environment & Heritage 2017a)
- site context of the development site that includes assessing vegetation cover and patch size as required under Subsections 4.3.2 and 5.3.2 of the BAM (Office of Environment & Heritage 2017a).
- the likely distribution of native vegetation and threatened ecological communities, based on previous mapping and aerial photograph interpretation, for targeted field verification as required under Section 5 of the BAM (Office of Environment & Heritage 2017a)
- a list of predicted and candidate threatened species and populations of flora and fauna to assess the habitat suitability and threatened biodiversity data collection as required under Section 6 of the BAM (Office of Environment & Heritage 2017a)
- baseline information to determine whether additional surveys, mapping and reporting is required to support project approval.

The background research included analysis of the following information sources:

- Aerial photographic imagery (Land and Property Information, 2018a)
- NSW Mitchell Landscapes (Land and Property Information, 2018b)
- Interim Biogeographic Regionalisation of Australia (IBRA version 7.0) (Department of Environment & Energy 2016)
- Atlas of Groundwater Dependent Ecosystems (GDE) (Australian Bureau of Meteorology 2018)
- Directory of Important Wetlands of Australia (DIWA – Department of Environment & Energy 2018a)
- State Environmental Planning Policy (Coastal Management) 2018 – Coastal Wetlands (NSW Department of Planning & Environment, 2018)
- Priority weed listings for the Greater Sydney region (Department of Primary Industries 2018)
- The Native Vegetation of the Sydney Metropolitan Area (Office of Environment and Heritage 2016a).
- Native vegetation of Southeast NSW: A Revised Classification and Map for the Coast and Eastern Tablelands (Tozer et al. 2010)
- Landscape Management Plan (incorporating the Southlands Weed and Pest Management Plan) – Southlands Redevelopment, Unpublished report for Orica (Jocelyn Ramsay & Assoc. Pty Ltd, 2013).
- Threatened species database searches outlined in Table 3.2.

Table 3.2 Threatened species database searches

DATABASE	SEARCH DATE	AREA SEARCHES	REFERENCE
PlantNET spatial search	November 2018	5 km radius centred on the suburb of Banksmeadow	Royal Botanic Gardens and Domain Trust (2018)
BioNet Atlas species sighting search	November 2018	10 km x 10 km centred on the development site	Office of Environment and Heritage (2018b)
EPBC Protected Matters Search Tool	November 2018	10 km x 10 km centred on the development site	Department of Environment & Energy (2018d)

DATABASE	SEARCH DATE	AREA SEARCHES	REFERENCE
NSW Department of Primary Industries (Fishing and Aquaculture) spatial data	November 2018	Bayside Council LGA	Department of Primary Industries (2018a)

3.4 NATIVE VEGETATION AND THREATENED FLORA SURVEYS

Native vegetation and threatened flora surveys were undertaken on the 7, 8 & 9 November 2018. Surveys focused on the mapping of any native and non-native vegetation types and targeting the possible presence of threatened flora species using a combination of vegetation integrity plots, random meanders and parallel field traverses generally in accordance with the NSW Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working Draft) (Department of Environment and Conservation 2004), NSW Guide to Surveying Threatened Plants (Office of Environment & Heritage 2016) and the BAM (Office of Environment & Heritage 2017). A detailed overview of terrestrial flora survey methods is presented below.

3.4.1 STRATIFICATION AND VERIFICATION OF EXISTING VEGETATION MAPPING

Preliminary mapping of vegetation community boundaries was undertaken through analysis of existing vegetation mapping and aerial photograph interpretation.

Vegetation within the development site and locality has been mapped at the regional scale in:

- Native vegetation of the Southeast NSW: Revised Classification and Map for the Coast and Eastern Tablelands (Tozer et al. 2010).
- The Native Vegetation of the Sydney Metropolitan Area (Office of Environment and Heritage 2016).

Analysis of the aerial photographs was used to identify areas of disturbance (e.g. buildings, vehicle tracks, dams and power lines), vegetation structure and likely native versus exotic species composition throughout the site. This provided an initial definition of vegetation communities into simple structural and disturbance classifications for verification during field surveys.

Data on geology, dominant canopy species, native species richness, vegetation structure and condition was collected across the development site during field surveys to validate and refine this existing vegetation classification to determine their associated PCT in accordance with the BioNet Vegetation Classification System (Office of Environment & Heritage, 2018a).

No remnant native vegetation has been mapped within the development site. Historic literature and field validation was undertaken to verify the broad scale mapping.

3.4.2 MAPPING OF VEGETATION ZONES

The vegetation within the development site was firstly assessed to determine if it met PCT level and then if it was to be aligned to a vegetation zone which is defined in the BAM as 'an area of native vegetation on the subject land that is the same PCT and has a similar broad condition state' (Office of Environment & Heritage, 2017a). No patches of any remnant native vegetation were observed within the development site and therefore no PCT or vegetation zones were assigned as part of the BDAR.

3.4.3 *VEGETATION INTEGRITY PLOTS*

No remnant native vegetation remains within the development site and as such vegetation integrity plots were not completed as part of this BDAR.

3.4.4 *RANDOM MEANDER SURVEY*

Random meander surveys are a variation of the transect type survey and were completed in accordance with the technique described by Cropper (1993), whereby the recorder walks in a random meander throughout the development site recording dominant and key plant species (e.g. threatened species, priority weeds), boundaries between various vegetation communities and condition of vegetation. The time spent in each vegetation community was generally proportional to the size of the community and its species richness.

Random meander surveys were conducted to locate candidate threatened species and populations within area of suitable habitat.

3.4.5 *PARALLEL FIELD TRAVERSES*

Parallel field traverses followed methods outlined in the NSW Guide to Surveying Threatened Plants (Office of Environment & Heritage 2016b). Parallel field traverses involved two people walking a fixed bearing transect at 10 metre intervals over known or high likelihood potential habitat for candidate threatened flora species.

3.4.6 *THREATENED FLORA LIKELIHOOD OF OCCURRENCE ASSESSMENT*

Threatened flora species and populations subject to likelihood of occurrence assessments were those identified during the background research, BAM calculator candidate and predicted species lists and any additional species considered to have the potential to occur in the professional opinion of contributors to this assessment.

The likelihood of occurrence assessment was utilised to produce a candidate species list to inform appropriate targeted surveys. The assessment was based on the habitat profile for the species and other habitat information in the Threatened Species Profile Database (Office of Environment and Heritage 2017b) and the Species Profile and Threats Database (Department of the Environment and Energy 2018b).

The assessment also included consideration of the dates and locations of nearby records and information about species distribution and populations in the locality along with key habitat requirements such as:

- Associated native plant community types and taxa
- Topographic, soil or geological preferences
- Microhabitats (e.g. preference for rocky outcrops, ground soaks or tree canopies)
- Disturbances, such as fire history, and the level and type of disturbance (e.g. slashing, canopy removal).

For this study, the likelihood of occurrence of threatened flora species and populations was determined based on the criteria outlined in Table 3.3.

Table 3.3 Likelihood of occurrence criteria for terrestrial threatened flora species and populations

LIKELIHOOD	CRITERIA
Known	The species was observed in the development site either during the current survey or during another survey less than 5 years prior; assuming no significant change in conditions on site (e.g. vegetation clearing, fire).

LIKELIHOOD	CRITERIA
High	A species has a high likelihood of occurrence if: — The development site contains or forms part of a large area (> 1 ha) of high quality suitable habitat that has not been subject to recent disturbance (e.g. fire), the species is known to form a persistent soil seedbank and the species has been recorded recently (within 10 years) in the locality — The species is a cryptic flowering species that has been recorded recently (within 10 years) in the locality and has a large area (> 1 ha) of high quality potential habitat on site that was not seasonally targeted by surveys.
Moderate	A species has a moderate likelihood of occurrence if: The species: — Has a small area (< 1 ha) of high quality suitable habitat or a large area (> 1 ha) of marginal habitat in the development site that has not been subject to recent disturbance (e.g. fire), and — The species is known to form a persistent soil seedbank, and — The species has been recorded recently (within 10 years) in the locality. The species is a cryptic flowering species, with a small area of high quality potential habitat (< 1 ha) or a large area of marginal habitat on site (> 1 ha), that was not seasonally targeted by surveys.
Low	A species has a low likelihood of occurrence if: — The species' potential habitat is of high quality but is small in area (< 1 ha) and it is not a cryptic species nor a species known to have a persistent soil seedbank or — The species' potential habitat is marginal and the species has not been recorded in the locality.
None	Potentially suitable habitat is absent from the development site.

3.5 THREATENED FAUNA SURVEYS

This section outlines the fauna survey effort completed for candidate species which were predicted to have a moderate to high likelihood of occurrence within the development site based on database searches outlined in section 3.3. Threatened fauna surveys completed within the development site were carried out as described below and where applicable, considering the methodology detailed in the NSW Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working Draft) (Department of Environment and Conservation 2004). Fauna surveys were limited to fauna habitat assessments, opportunistic sightings, diurnal bird surveys and amphibian surveys.

3.5.1 FAUNA HABITAT ASSESSMENT

Fauna habitat assessments were undertaken to assess the likelihood of threatened species of animal (those species known or predicted to occur within the locality from the literature and database review) occurring within the development site. Fauna habitat assessments were the primary assessment tool in assessing whether threatened species were likely to occur within the development site. Fauna habitat characteristics assessed included:

- Structure and floristics of the canopy, understorey and ground vegetation, including the presence of flowering and fruiting trees providing potential foraging resources
- Presence of hollow-bearing trees providing roosting and breeding habitat for arboreal mammals, birds and reptiles

- Presence of the ground cover vegetation, leaf litter, rock outcrops and fallen timber and potential to provide protection for ground-dwelling mammals, reptiles and amphibians
- Presence of waterways (ephemeral or permanent) and water bodies.

The criteria were used to evaluate the condition of habitat values is outlined in Table 3.4.

Table 3.4 Fauna habitat assessment evaluation criteria

HABITAT VALUE	EVALUATION CRITERIA
Good	A full range of fauna habitat components are usually present (for example, old growth trees, fallen timber, feeding and roosting resources) and habitat linkages to other remnant ecosystems in the landscape are intact.
Moderate	Some fauna habitat components are missing or greatly reduced (for example, old-growth trees and fallen timber), although linkages with other remnant habitats in the landscape are usually intact, but sometimes degraded.
Poor	Many fauna habitat elements in low quality remnants have been lost, including old growth trees (for example, due to past timber harvesting or land clearing) and fallen timber, and tree canopies are often highly fragmented. Habitat linkages with other remnant ecosystems in the landscape have usually been severely compromised by extensive clearing in the past.

3.5.2 OPPORTUNISTIC RECORDING OF FAUNA SPECIES AND EVIDENCE OF FAUNA ACTIVITY

Opportunistic sightings of animals were recorded during field surveys. Evidence of animal activity, such as scats, diggings, scratch marks, nests/dreys, burrows etc. were also noted. This provided indirect information on animal presence and activity.

During these surveys, a hand-held GPS was used to record the locations significant fauna habitat values such as large hollow-bearing trees, aquatic habitat and rock outcrops where observed.

3.5.3 DIURNAL BIRD SURVEYS

Formal 20-minute diurnal bird searches were completed within the development site. Bird surveys were completed by actively walking through the development site over a period of 20 minutes. All birds were identified to the species level, either through direct observation or identification of calls. Bird surveys were completed generally during morning or evening hours. Birds were also recorded opportunistically during all other surveys.

Where seasonal conditions for some species were not suitable during the timing of onsite investigations, as was the case for endangered blossom nomads such as Swift Parrot, likelihood of occurrence assessments were conducted by the presence/absence of suitable habitat and its condition.

3.5.4 TARGETED GREEN AND GOLDEN BELL FROG SURVEYS

Targeted Green and Golden Bell Frog surveys were conducted generally in accordance with:

- Survey guidelines for Australia's threatened frogs: Guidelines for detecting frogs listed as threatened under the EPBC Act (Department of Environment, Water, Heritage and the Arts, 2010a), and
- Significant impact guidelines for the vulnerable green and golden bell frog (*Litoria aurea*) (Department of Environment, Water, Heritage and the Arts, 2010b).

For each survey, an initial listening period of 10 to 15 minutes was undertaken, followed by a spotlight search for 10 minutes to detect any animals in the immediate vicinity. The calls of the target species were then played intermittently for five minutes followed by a 10-minute listening period. After the calls were played, another 10 minutes of spotlighting

was done in the vicinity to check for animals attracted by the calls, but not vocalising. Calls were broadcast using a portable media player and megaphone.

Table 3.5 Targeted Green and Golden Bell Frog surveys

DATE	MIN. TEMP °	MAX. TEMP °	RAINFALL (MM)	RAINFALL 7 DAY TOTAL (MM)	SURVEY EFFORT EXPENDED	FROG SPECIES RECORDED
7 Nov 2018	20.2	22.1	1.0	4.6	3 person hours (spotlighting, call playback)	Common Eastern Froglet (calling)
8 Nov 2018	11.5	19.3	17.2	21.8	3 person hours (spotlighting, call playback)	No frogs detected
29 Nov 2018	15.5	21.2	23.0	62.2	3 person hours (spotlighting, call playback)	Striped Marsh Frog (calling)

Weather data collected from Sydney Airport AMO (station 066037).

3.5.5 THREATENED FAUNA LIKELIHOOD OF OCCURRENCE ASSESSMENT

Threatened species identified in the desktop review were assessed for likelihood of occurrence based on results of the desk and field-based assessments. The likelihood of threatened species occurring within the development site was assessed against the criteria outlined in Table 3.6.

Table 3.6 Likelihood of occurrence criteria for threatened fauna species

LIKELIHOOD	CRITERIA
Known	The species was observed in the development site either during the current survey or during another survey less than 5 years prior; assuming no significant change in conditions on site (e.g. vegetation clearing, fire).
High	A species has a high likelihood of occurrence if: — the development site contains or forms part of a large area (home range of more than a single individual or pair) of high quality suitable habitat — important habitat elements (i.e. for breeding or important life cycle periods such as winter foraging periods) are abundant within the development site — the species has been recorded recently in similar habitat in the locality — the development site is likely to support a resident population or to contain habitat that is visited by the species during regular seasonal movements or migration.
Moderate	A species has a moderate likelihood of occurrence if: — the development site contains or forms part of a small area (home range of more than a single individual or pair) of high quality suitable habitat — the development site contains or forms part of a large area of marginal habitat — important habitat elements (i.e. for breeding or important life cycle periods such as winter foraging periods) are sparse or absent within the development site — the development site is unlikely to support a resident population or to contain habitat that is visited by the species during regular seasonal movements or migration but is likely to be used occasionally during seasonal movements and/or dispersal.

LIKELIHOOD	CRITERIA
Low	A species has a low likelihood of occurrence if: — potentially suitable habitat exists but — the species has not been recorded recently (previous 10 years) in the locality despite intensive survey (i.e. the species is considered to be locally extinct) — the habitat is marginal and small in area and isolated from other areas of suitable habitat. and/or — the species is considered to be a rare vagrant, likely only to visit the development site very rarely; e.g. during juvenile dispersal or exceptional climatic conditions (e.g. extreme drought conditions in typical habitat of inland birds).
None	Potentially suitable habitat is absent from the development site.

4 LANDSCAPE CONTEXT

4.1 LANDSCAPE FEATURES

The development site is in the Sydney Basin IBRA bioregion and occurs within the SYB07 Pittwater IBRA subregion (IBRA version 7.0). Landscape features within the development site as prescribed in Section 4 of the BAM are summarised in Table 4.1 and shown in Figure 4 1.

Table 4.1 Landscape feature associated with the development site

LANDSCAPE FEATURE	DEVELOPMENT SITE
IBRA bioregions and subregions	Sydney Basin Bioregion / SYB07 Pittwater subregion
NSW landscape regions (Mitchell landscapes)	Sydney – Newcastle Barriers and Beaches
Local Government Area (LGA)	Bayside
Rivers and streams	No river or streams occur within the development site or development footprint. Springvale drain (constructed) occurs to the west of Nant Street that runs adjacent to the development site
Important and local wetlands	Important wetland – Towra Point Wetland (~5km to the south)
Connectivity features	The development site is isolated from any surrounding areas of biodiversity value
Areas of geological significance and soil hazard features	The development site does not contain any areas of geological significance. The development site has been subject to contamination of both land and groundwater. Site remediation has occurred between 2014-2016 and is ongoing with respect to groundwater as part of the broader Botany Groundwater Clean-up Project
Areas of outstanding biodiversity value	No declared areas of outstanding biodiversity value occur in or near the development site

4.2 DETERMINING SITE CONTEXT

To determine site context as required under Section 4.3 of the BAM, an assessment of native vegetation cover and patch size in accordance with Subsections 4.3.2 and 5.3.2 of the BAM have been undertaken and are outlined below.

4.2.1 NATIVE VEGETATION COVER

Native vegetation cover within the development site and a 1500-metre buffer area surrounding the outside edge of the boundary of the development site was determined in accordance with Subsection 4.2.1.2 of the BAM and is summarised in Table 4.2 and shown in Figure 4.2.

Table 4.2 Native vegetation cover

ASSESSMENT AREA	TOTAL ASSESSMENT AREA (HA)	AREA OF NATIVE VEGETATION COVER (HA)	NATIVE VEGETATION PERCENTAGE COVER
1500m buffer	1030 ha	20.02 ha	0-10%

4.2.2 PATCH SIZE

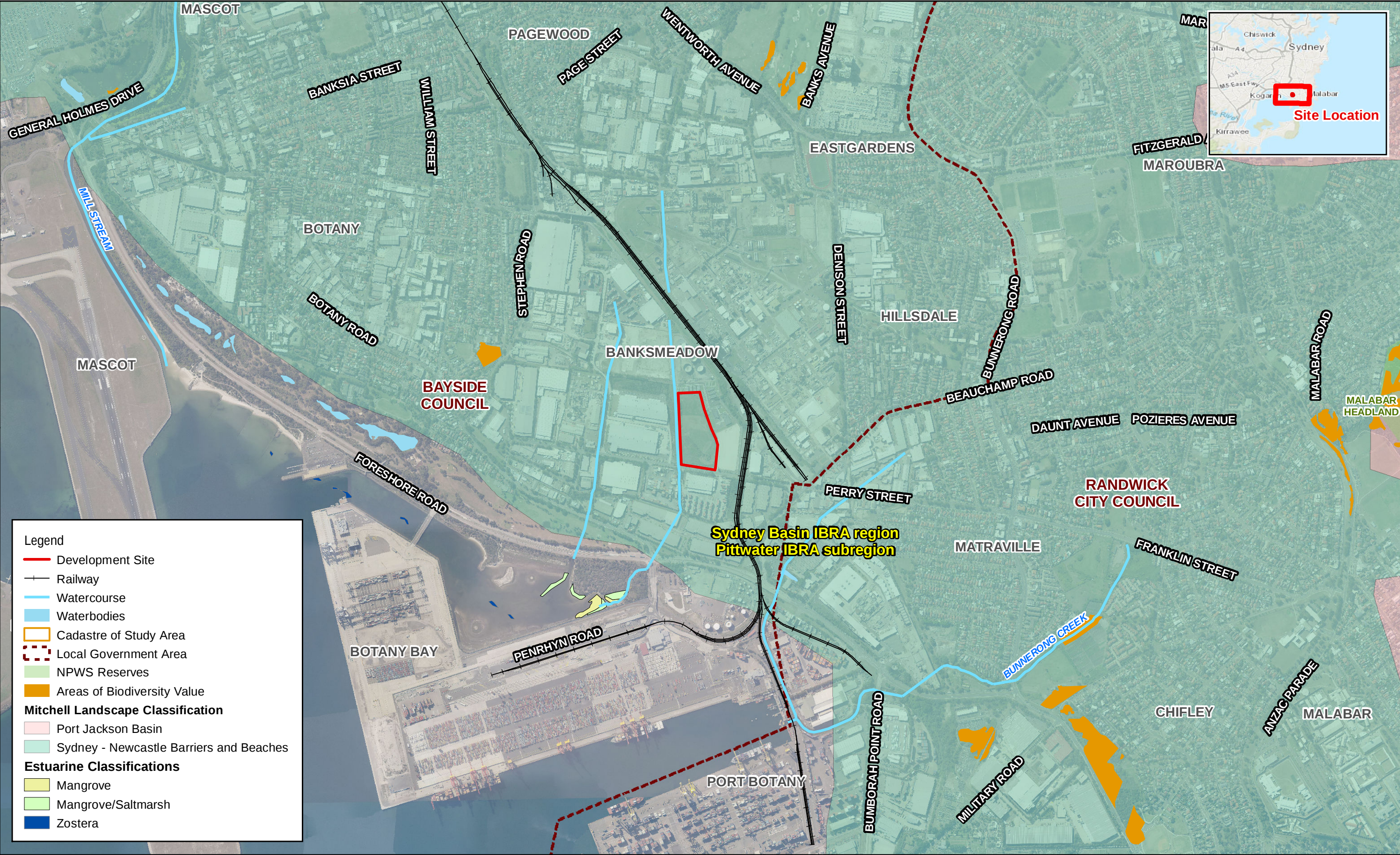
Patch size is defined under the BAM (Office of Environment & Heritage, 2017) as an area of native vegetation that:

- occurs on the development site or stewardship site, and
- includes native vegetation that has a gap of less than 100 m from the next area of moderate to good native vegetation (or ≤ 30 m for non-woody ecosystems).

Patch size may extend onto adjoining land that is not part of the development site.

Patch size area is assigned to each vegetation zone as a class, being < 5 ha, 5-24 ha, 25-100 ha or ≥ 100 ha. Due to the highly disturbed and fragmented landscape, patch size for each native vegetation zone has been determined to be < 5 ha.

It should be noted that due to the lack of any remnant native vegetation and associated PCTs, the biodiversity calculator was not able to be run for this BDAR. As such, native vegetation cover and patch size have been provided for completeness purpose only.



Legend

Development Site

Railway

Watercourse

Waterbodies

Cadastre of Study Area

Local Government Area

NPWS Reserves

Areas of Biodiversity Value

Mitchell Landscape Classification

Port Jackson Basin

Sydney - Newcastle Barriers and Beaches

Estuarine Classifications

Mangrove

Mangrove/Saltmarsh

Zostera

Map: PS112137_GIS_003_A2	Author: Trent.Bowman		 1:15,000
Date: 04-Dec-18	Approved by: Mark.Stables		
Data source: - Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community © Department of Finance, Services & Innovation 2018			Coordinate system: GDA 1994 MGA Zone 56 Scale ratio correct when printed at A3



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Lot 9, McPherson Street Biodiversity Assessment Report

Figure 4.1
Landscape Features



5 VEGETATION TYPES AND THREATENED ECOLOGICAL COMMUNITIES

The section has been prepared to address section 5 of the BAM. Specifically, this section maps and identifies all native and non-native vegetation types within the development site and provides an assessment of vegetation integrity and whether any recorded vegetation types correspond to threatened ecological communities listed under the BC Act.

5.1 OVERVIEW

No remnant native vegetation or associated PCTs were recorded in the development site or development footprint.

A total of two non-native vegetation types were assigned to a miscellaneous ecosystem class, being:

- Miscellaneous ecosystem – highly disturbed areas with no or limited native vegetation
- Miscellaneous ecosystem – urban exotic / native landscape plantings

The extent and distribution of each vegetation type is shown in Figure 5.1 and a summary and description of each non-native vegetation type is presented in Section 5.3.

5.2 NATIVE VEGETATION

No remnant native vegetation or associated PCTs were recorded in the development site or development footprint. The absence of any remnant native vegetation is the result of a long and extensive history of disturbance associated with the development site including extensive bulk earthworks activities. These disturbance impacts include peat cutting and sand extraction that resulted in the creation of a series of ponds and pits. These ponds and pits were used for dumping waste paper products, waste paper slurries, bottom end furnace ash from coal fired boilers used by industry in the area along with a variety of other solid and liquid waste products.

These previous land uses led to extensive contamination of the site that was subsequently remediated as part of development approval to use the site for compensatory flood basin storage. This resulted in mechanical stripping and removal of fill material to create the new flood basin profile and layering areas with jute matting and imported soil for landscape planting purpose. Based on this disturbance history and site modification, it is considered that no natural soil profiles exist within the development site and all patches of native vegetation occur because of landscape plantings.

5.3 NON-NATIVE VEGETATION

5.3.1 MISCELLANEOUS ECOSYSTEM – HIGHLY DISTURBED AREAS WITH NO OR LIMITED NATIVE VEGETATION

This non-native vegetation type primarily occurs over the central and northern portions of the development site (about 2.32 hectares) and is the result of previous site regrading for compensatory flood basin storage and sowing with a mix of exotic perennial grasses and forbs to provide soil stabilisation. The distribution of this vegetation type is shown in Figure 5.1 and represented in Photo 5.1 to Photo 5.3. The structure of this vegetation is mostly exotic perennial grassland although scattered *Acacia saligna** (Golden Wreath Wattle) shrubs occur.

Exotic grassland species include: *Cenchrus clandestinus** (Kikuyu Grass), *Lolium rigidum** (Wimmera Ryegrass), *Trifolium pratense** (Red Clover), *Melilotus indicus** (Hexham Scent), *Trifolium repens** (White Clover), *Lachnagrostis*

filiformis (Blown Grass), *Cynodon dactylon* (Common Couch), *Plantago major** (Large Plantain) along with a larger range of annual and perennial exotic grass and forb species.



Photo 5.1 Areas with no or limited native vegetation looking southwest from the central portion of the site



Photo 5.2 Areas with no or limited native vegetation looking northeast and east from the central portion of the site



Photo 5.3 Highly disturbed areas showing a dominance of *Cenchrus clandestinus** (Kikuyu Grass), *Trifolium pratense** (Red Clover), *Melilotus indicus** (Hexham Scent) and *Lachnagrostis filiformis* (Blown Grass)

5.3.2 MISCELLANEOUS ECOSYSTEM – URBAN EXOTIC / NATIVE LANDSCAPE PLANTINGS

As part of remediation and subsequent regrading of the site for compensatory flood storage, extensive landscape plantings were carried out (Jocelyn Ramsay & Assoc. Pty Ltd, 2013). Landscape plantings were recorded to include native species such as *Corymbia maculata* (Spotted Gum) along the McPhersons Road boundary, *Melaleuca quinquenervia* (Broad-leaved Paperbark), *Melaleuca styphelioides* (Prickly-leaved Tea Tree), *Melaleuca linariifolia* (Snow-in-Summer), *Melaleuca nodosa* (Ball Honeymyrtle), *Leptospermum laevigatum* (Coast Teatree), *Banksia integrifolia* (Coastal Banksia), *Banksia serrata* (Old-man Banksia), *Lomandra longifolia* (Spiny-headed Mat-rush), *Schoenoplectus validus*, *Typha orientalis* (Broad-leaved Cumbungi) and *Phragmites australis* (Common Reed).

Many of the landscape plantings have appeared to have failed with the most dominate planted (or naturalised) species being the non-indigenous native *Acacia saligna** (Golden Wreath Wattle). Plantings of *Typha orientalis* (Broad-leaved Cumbungi) and *Phragmites australis* (Common Reed) have naturalised in low depression areas that are subject to ephemeral water logging. The distribution of this vegetation type within the development site (about 1.80 ha) is shown in Figure 5.1 and represented in Photo 5.4 to Photo 5.7.



Photo 5.4 A low depression planted with *Phragmites australis* (Common Reed) and *Acacia saligna** (Golden Wreath Wattle)



Photo 5.5 Landscape planted low depression areas dominated by *Typha orientalis* (Broad-leaved Cumbungi)



Photo 5.6 Scattered landscape plantings adjacent to Nant Street



Photo 5.7 A planted *Melaleuca quinquenervia* (Broad-leaved Paperbark)

5.4 PRIORITY WEEDS

During field surveys, 84 species of plant were recorded. Of these 27 were planted natives and 57 were introduced species or planted exotic species (refer to Appendix C).

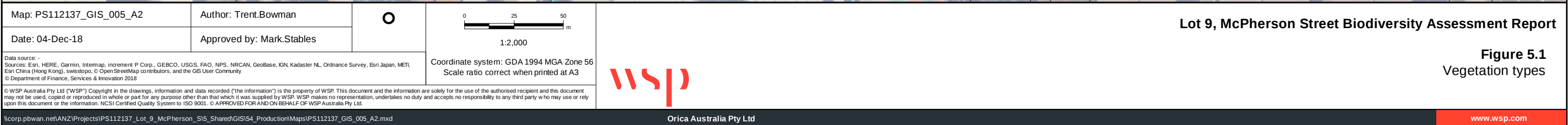
Of the 57 introduced species recorded within the development site, six species were listed under the NSW *Biosecurity Act 2015* (BA Act) as priority weeds for the Greater Sydney region (Department of Primary Industries, 2018) whilst nine are also listed as Weeds of National Significance (Australian Weeds Committee, 2018). All priority weeds identified and species listed as Weeds of National Significance are outlined below in Table 5.1.

Table 5.1 Priority weeds and weeds of national significant recorded

SCIENTIFIC NAME	COMMON NAME	DUTY UNDER THE BIOSECURITY ACT	WEED OF NATIONAL SIGNIFICANCE?
<i>Arundo donax</i> *	Giant Reed	Regional Recommended Measure Land managers should mitigate the risk of new weeds being introduced to their land. The plant should not be bought, sold, grown, carried or released into the environment.	No
<i>Cestrum parqui</i> *	Green Cestrum	Regional Recommended Measure Land managers should mitigate the risk of new weeds being introduced to their land. The plant should not be bought, sold, grown, carried or released into the environment.	No
<i>Cortaderia</i> species*	Pampas Grass	Prohibition on dealings Must not be imported into the State or sold	No
<i>Lantana camara</i> *	Lantana	Prohibition on dealings Must not be imported into the State or sold	Yes
<i>Ludwigia peruviana</i> *	Ludwigia	Regional Recommended Measure Land managers mitigate the risk of the plant being introduced to their land. Land managers prevent spread from their land where feasible. Land managers reduce the impact on priority assets. The plant should not be bought, sold, grown, carried or released into the environment. Local Control Authority is notified if the plant is found on the land.	No
<i>Senecio madagascarensis</i> *	Fireweed	Prohibition on dealings Must not be imported into the State or sold	Yes

5.5 THREATENED ECOLOGICAL COMMUNITIES

No remnant native vegetation or associated PCTs were recorded in the development site or development footprint. No areas of native landscape plantings are considered to meet any threatened ecological community listing under the BC Act. Patches of *Typha orientalis* (Broad-leaved Cumbungi) and *Phragmites australis* (Common Reed) are considered excluded from the Freshwater Wetland listing as the final determination specifically excludes artificial wetlands created for stormwater management (NSW Scientific Committee 2011).



6 HABITAT SUITABILITY FOR THREATENED SPECIES

6.1 FLORA HABITATS

As stated within section 5.2, based on disturbance history and site modification, it is considered that no natural soil profiles exist within the development site and all patches on native vegetation occur because of landscape plantings. Given this, the occurrence of native remnant flora and regeneration ability is considered unlikely.

6.2 THREATENED FLORA SPECIES

No remnant native vegetation or associated PCTs were recorded in the development site or development footprint. Due to the absence of any PCT, the BAM calculator was not possible to run and as such no candidate species list was generated.

Non-native vegetation is a prescribed matter under Reg 6.1 of the Biodiversity Conservation Regulation 2017 and section 6.7 of the BAM and requires the consideration of impacts on any biodiversity values. The non-native vegetation types recorded within the development site are considered to provide limited to no potential habitat for threatened flora species.

Based on the long history of disturbance (including peat and sand extraction and subsequent land filling), the overall likelihood of occurrence for the 19 threatened flora species that are known or predicted to occur within the locality have been assessed as low (Appendix A).

6.3 FAUNA HABITATS

Those fauna habitats identified within the development site include disturbed land with limited native vegetation (planted), exotic grassland and artificial flood basin (reed habitat) habitat.

The development site has a long disturbance history which included peat cutting and sand extraction that resulted in the creation of a series of ponds and pits. These ponds and pits were used for dumping waste products. Site remediation and restoration resulted in the removal of fill material to create the new flood basin profile and layering areas with jute matting and imported soil for landscape plantings. Site restoration has resulted in the development site to provide marginal fauna habitat in the form of semi-mature planted native vegetation, exotic grassland and wet soaks/reed habitat.

The exotic grassland vegetation is dominated with *Cenchrus clandestinus** (Kikuyu Grass), *Trifolium pratense** (Red Clover) and *Cynodon dactylon* (Common Couch). No fallen timber or rocky habitat was identified in these areas. These areas are likely to provide foraging habitat for common species typical of disturbed environments or parklands (i.e. Australian Magpie, Magpie-lark and Masked Lapwing).

Low lying areas where wet soaks and water pooling occurs has resulted in *Typha orientalis* (Broad-leaved Cumbungi) and *Phragmites australis* (Common Reed) becoming dominate. These reed habitats although disturbed do provide some habitat for small birds and amphibians. However, due to the sites disturbed nature and low connectivity they provide marginal habitat for these species and are likely only to be utilised by locally common species of birds and frogs (i.e. Striped Marsh Frog).

Landscape plantings include native species such as *Corymbia maculata* (Spotted Gum) along the McPhersons Road boundary, *Melaleuca quinquenervia* (Broad-leaved Paperbark), *Melaleuca styphelioides* (Prickly-leaved Tea Tree), *Melaleuca linariifolia* (Snow-in-Summer), *Melaleuca nodosa* (Ball Honeymyrtle), *Leptospermum laevigatum* (Coast Teatree), *Banksia integrifolia* (Coastal Banksia), *Banksia serrata* (Old-man Banksia). These landscape plantings provide some nectar and seed resources for fauna. However, it is likely that these resources would only be intermittently utilised in seasonal periods when resources are available. Due to the small amount of potential resources available and the site's

isolated nature, it is unlikely that the native plantings within the development site are highly relied upon by locally occurring fauna. No hollow-bearing trees were identified within development site.

Overall the fauna habitat is in a poor condition due to many habitat elements having been lost (i.e. old growth trees, fallen timber, rocky habitat etc.) and tree canopies are highly fragmented. Habitat linkages with other remnant ecosystems in the landscape are severely compromised by extensive clearing in the past.

6.4 THREATENED FAUNA SPECIES

Background investigations identified 38 threatened fauna species (BC Act) as having been previously recorded or are predicted to occur within the locality (Appendix B). The likelihood of these species occurring within the development site was determined based on field investigations and fauna habitat available. No threatened fauna has been identified to have a moderate – high likelihood to occur. No threatened fauna was identified utilising the development site during field surveys.

6.4.1 GREEN & GOLDEN BELL FROG

There is a low likelihood of threatened fauna species occurring on the development site. As noted in Section 6.2 above, the BAM credit calculator was unable to be run due to the lack of remnant native vegetation and associated PCTs. However, the Green and Golden Bell Frog was considered a potential species of interest based on historic records in the broader locality and due to the creation of two artificially constructed frog ponds on adjoining land to the west of Nant Street and Springvale drain. The artificial frog ponds were constructed as part of the conditions of approval for MP 06_0191 which required the creation of appropriate offset habitat for the Green and Golden Bell Frog to be provided in the form of two small frog ponds and associated foraging areas (Photo 6.1).



Photo 6.1 Artificially constructed frog ponds on adjacent land to the west of Nant Street and Springvale drain

Targeted surveys for the Green and Golden Bell Frog were conducted within the development site and adjoining areas (Springvale drain and artificially constructed frog ponds) on three separate evenings during November 2018 following moderate to heavy rain (Table 3.5). These surveys failed to identify any evidence of the Green & Golden Bell Frog within the development site or adjacent lands. Targeted surveys for the species were also undertaken as part of previous development applications relating to the site in January and February 2007. These targeted surveys also failed to locate any individual species on the site.

No evidence of the species has been recorded from the boarder Botany Wetlands area since 1993, although there were records from Sir Joseph Banks Park dated 2007 that were part of a reintroduction program for the species and it is generally accepted that the species is extinct in this area (Office of Environment & Heritage 2018b).

Given the result of targeted surveys and the lack of any recent records of the species in the broader locality, the Green and Golden Bell Frog is not considered to be affected by the development.

6.5 THREATENED AQUATIC SPECIES

The development site does not contain any mapped watercourses or permanent water bodies that would provide habitat for any listed threatened aquatic species under the FM Act.

An inspection of Springvale drain (constructed) that occurs to the west of Nant Street and runs adjacent to the development site, identified the channel to be choked with *Ludwigia peruviana** (Ludwigia) and exhibits little in the way of suitable habitat for any listed threatened aquatic species under the FM Act.

7 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

7.1 THREATENED ECOLOGICAL COMMUNITIES

No patches of remnant native vegetation were recorded within the development site. The two recorded non-native vegetation types do not contain floristic, structural and locational characteristics that would meet key diagnostic characteristics or condition thresholds for any listed threatened ecological community under the EPBC Act.

7.2 THREATENED SPECIES

7.2.1 *THREATENED FLORA SPECIES*

The protected matters search conducted for this project identified 17 predicted threatened flora species as potentially occurring within the locality. The results of the field surveys and likelihood of occurrence assessments have determined these species to have a low likelihood of occurrence and are not considered to be affected by the development (Appendix A).

7.2.2 *THREATENED FAUNA SPECIES*

The protected matters search conducted for this project identified 59 EPBC listed threatened fauna species that have been previously recorded or have the potential to occur within the locality (Appendix B). The likelihood of these species occurring within the development site was determined based on field investigations and fauna habitat available. No EPBC listed threatened fauna species have been identified to have a moderate – high likelihood to occur. No threatened fauna was identified utilising that development site during field surveys.

7.3 MIGRATORY SPECIES

Migratory species are protected under international agreements to which Australia are a signatory, including Japan-Australia Migratory Bird Agreement (JAMBA), China-Australia Migratory Bird Agreement (CAMBA), Republic of Korea-Australia Migratory Bird Agreement (RoKAMBA) and the Bonn Convention on the Conservation of Migratory Species of Wild Animals. Migratory species are considered MNES and are protected under the EPBC Act.

Based on field investigations, EPBC Protected Matters area search and other desktop database searches, 40 migratory fauna species were identified that could occur within the locality. Based on field investigations and habitat assessments none of these have a moderate – high likelihood to utilise the development site, due to the site's isolated and disturbed nature.

The habitats within the development site is unlikely to constitute important habitat for any of the identified species. The habitat present is unlikely to support significant proportions of the population of any migratory species nor are the habitats critical to any life stage of these species. Due to their mobile nature, the mentioned species are likely to utilise higher quality habitat within the greater locality and where more extensive tracts of native vegetation occur. Because of this, the identified species are not considered to be impacted by the action proposed and are not considered further in this report.

8 AVOID AND MINIMISING IMPACTS ON BIODIVERSITY VALUES

8.1 MEASURES TO AVOID IMPACTS

Given the development site contains no patches of remnant vegetation and overall limited biodiversity values, the positioning of the development footprint was not considered to warrant any specific avoidance or mitigation measures.

Limited biodiversity values associated with Springvale drain and the two constructed artificial frog ponds to the west of Nant Street are unlikely to be affected by any direct or indirect impacts associated with the development.

8.2 RECOMMENDED MEASURES TO MINIMISE IMPACTS

A Construction Environmental Management Plan (CEMP) would be required for the construction phase of the development. The CEMP would include, as a minimum, industry-standard measures for the management of soil, surface water, weeds and pollutants, as well as site-specific measures, including the procedures outlined below. The proposed mitigation measures would include environmental safeguards for protection of neighbouring properties and waterways in accordance with relevant policy documentation and Government guidelines.

Mitigation measures are detailed in section 10.

9 ASSESSMENT OF IMPACTS

9.1 ASSESSMENT OF IMPACTS ON NATIVE VEGETATION AND THREATENED SPECIES HABITAT

9.1.1 NATIVE VEGETATION

The development footprint will not result in a direct or indirect impact on any area of native vegetation or associated PCT as outlined under section 9.1 of the BAM.

9.1.2 THREATENED FLORA SPECIES

No threatened flora species or their habitat, listed under BC Act, have been determined to be affected by the project.

9.1.3 THREATENED FAUNA SPECIES

No threatened fauna species or their habitat, listed under BC Act, have been determined to be affected by the project.

9.2 SERIOUS AND IRREVERSIBLE IMPACTS

9.2.1 THREATENED ECOLOGICAL COMMUNITIES

No Serious and Irreversible Impacts to threatened ecological community entities under the BC Act were recorded within the development site.

9.2.2 THREATENED SPECIES

No Serious and Irreversible Impacts to threatened species entities under the BC Act were recorded within the development site.

9.3 PRESCRIBED BIODIVERSITY IMPACTS

Prescribed biodiversity impacts are outlined under section 9.2 of the BAM and addressed below.

9.3.1 AREAS OF GEOLOGICAL SIGNIFICANCE

No areas of geological significance are present. No caves for breeding by bats are present.

9.3.2 HUMAN MADE STRUCTURES AND NON-NATIVE VEGETATION

No human made structures have been identified within the development site that would provide suitable habitat for any threatened species.

Two non-native vegetation types have been recorded within the development site. The non-native vegetation types, extent within the development site and the impact development footprint is outlined in Table 9.1.

Table 9.1 Development footprint impacts on non-native vegetation types

NON-NATIVE VEGETATION TYPE	DEVELOPMENT SITE	DEVELOPMENT FOOTPRINT
Miscellaneous ecosystem – highly disturbed areas with no or limited native vegetation	2.32	2.09
Miscellaneous ecosystem – urban exotic / native landscape plantings	1.80	1.26
Total	4.12	3.35

Based on targeted field surveys and habitat assessments, these two non-native vegetation types have been assessed as providing limited to no habitat for any threatened species listed under the BC Act.

9.3.3 CONNECTIVITY AND MOVEMENT

The development site is isolated from any large patches of native remnant vegetation and is surrounded by industrial development. Given this, the development is not considered to adversely impact on wildlife connectivity or movement in the locality.

9.3.4 HYDROLOGY

The development footprint will not result in any adverse changes to the local hydrology and the development has been designed to maintain existing compensatory flood storage levels. The development will not directly impact on any watercourse and stormwater management will be appropriately addressed through water sensitive urban design.

During construction, ground surface disturbances have the potential to cause pollution of adjacent waterbodies (Springvale drain) and as such mitigation measures have been provided in section 10 to address these impacts.

9.3.5 VEHICLE STRIKE

The development site is in a busy industrial area within Sydney, subject to high levels of vehicular traffic. Regular movements of trucks currently occur along McPhersons Road. The development footprint will increase the number of truck movements per day. This would increase the risk of fauna mortality or injury because of vehicle strike. Use of vehicles and plant during construction also increase the risk of fauna mortality in areas adjacent to the development footprint. Few terrestrial fauna species occur in the development site that are at risk of vehicle strike. The increased risk of vehicle strike is unlikely to have a substantial impact on any local populations of fauna species.

9.4 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

Given the general lack of habitat present and small area of non-native vegetation to be removed, the development footprint is considered unlikely to result in a significant impact on any MNES. A referral of this development to the Department of the Environment and Energy is not warranted.

9.5 OTHER IMPACTS

9.5.1 GROUNDWATER DEPENDENT ECOSYSTEMS

Groundwater associated with the development site is known to be contaminated and is currently subject to remediation as part of the Botany Groundwater Cleanup Project (Orica 2017).

The development site has not been identified to contain any remnant native vegetation or groundwater dependent ecosystems. Further, the development will not result in groundwater interference or activities that would result in groundwater lowering.

10 MITIGATION MEASURES

To address the potential impacts of the proposal on biodiversity as discussed in Section 9, the mitigation and management measures outlined below would be implemented as part of the CEMP for the site.

- Erosion and sediment control plans would be established prior to the commencement of piling and construction and be updated and managed throughout as relevant to the activities during the construction phase.
- Best practice erosion and sediment controls should be implemented in accordance with Volume 2D of *Managing Urban Stormwater: soils and construction* (Department of Environment and Climate Change 2008). Design temporary scour protection and energy dissipation measures to protect receiving environments from erosion.
- Temporary scour protection and energy dissipation measures should be designed to protect receiving environments from erosion.
- Stormwater and flood management will remain per the current circumstance with the basin continuing to discharge into Springvale Drain. New stormwater outlets from the decked development will be treated with appropriate scour protection at ground level.
- Stabilised surfaces should be reinstated as quickly as practicable after construction. With a capping layer being created under the deck. Where possible existing planting in setback zones will be maintained and supplemented by new planting per the Landscape Plans for the project.
- All stockpiled material should be stored in bunded areas and kept away from waterways to avoid sediment entering the waterway
- Restrict equipment storage and stockpiling of resources to designated areas in cleared land.

11 CONCLUSION

No remnant native vegetation or associated PCTs were recorded in the development site or development footprint. The absence of any remnant native vegetation is the result of a long and extensive history of disturbance associated with the development site.

A total of two non-native vegetation types were recorded within the development site, being:

- Miscellaneous ecosystem – highly disturbed areas with no or limited native vegetation
- Miscellaneous ecosystem – urban exotic / native landscape plantings

Targeted surveys for the Green & Golden Bell Frog were undertaken during optimal conditions generally in accordance with survey guidelines. These surveys failed to identify any evidence of the Green & Golden Bell Frog within the development site or adjacent lands and this species is generally accepted to be extinct in the Botany Wetland locality based on lack of any recent records (>10 years).

No threatened species, ecological communities or their habitat, listed under the BC Act, have been determined to be affected by the project. This is supported by previous biodiversity assessments carried out at the site (as part of separate development applications) that also determined there to be no threatened species, ecological communities or their habitat present.

Given the development will not result in the direct or indirect impact on any remnant native vegetation or associated PCT, the Biodiversity Offset Scheme is not applicable for this development.

The development footprint is considered unlikely to result in a significant impact on any Matters of National Environmental Significance (MNES). Given this, a referral of this development under the EPBC Act to the Department of the Environment and Energy is not warranted.

12 LIMITATIONS

12.1 SCOPE OF SERVICES

This report has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the client and WSP (scope of services). In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

12.2 RELIANCE ON DATA

In preparing the report, WSP has relied upon data, surveys, analyses, designs, plans and other information provided by the client and other individuals and organisations, most of which are referred to in the report (the data). Except as otherwise stated in the report, WSP has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report (conclusions) are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. WSP will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to WSP.

12.3 ENVIRONMENTAL CONCLUSIONS

In accordance with the scope of services, WSP has relied upon the data provided for the preparation of the report. Within the limitations imposed by the scope of services, the surveys and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.

12.4 REPORT FOR BENEFIT OF CLIENT

The report has been prepared for the benefit of the client (and no other party). WSP assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of WSP or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report). Except as provided below parties other than the client should not rely upon the report or the accuracy or completeness of any conclusions and should make their own enquiries and obtain independent advice in relation to such matters.

REFERENCES

- Atlas of Living Australia (ALA) (2018). Spatial Portal. From <https://spatial.ala.org.au/>
- Australian Bureau of Meteorology (BOM) (2018). Atlas of Groundwater Dependent Ecosystems (GDE)
- Cropper, S.C. (1993) Management of Endangered Plants. CSIRO Publications Victoria.
- Department of the Environment and Energy (2016). An Interim Biogeographic Regionalisation of Australia (IBRA) - Version 7. Canberra, Department of the Environment and Energy.
- Department of the Environment and Energy (2017). EPBC Act Policy Statement 3.21: Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species.
<http://www.environment.gov.au/system/files/resources/67d7eab4-95a5-4c13-a35e-e74cca47c376/files/bio4190517-shorebirds-guidelines.pdf>
- Department of the Environment and Energy (2018a). Protected Matters Search Tool.
- Department of the Environment and Energy (2018b). Directory of Important Wetlands of Australia (DIWA) from <http://www.environment.gov.au/webgis-framework/apps/pmst/pmst.jsf>.
- Department of the Environment and Energy (2018c). Species Profiles and Threats Database. Online resource. Department of Sustainability, Environment, Water, Population and Communities.
<http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>
- Department of the Environment and Energy (2018d). Weeds in Australia – Weeds of National Significance (WoNS) <http://www.environment.gov.au/biodiversity/invasive/weeds/weeds/lists/wons.html>
- Department of the Environment and Energy (2018e). "EPBC Protected Matters Search Tool." 2018, from <http://www.environment.gov.au/webgis-framework/apps/pmst/pmst.jsf>.
- Department of Environment and Climate Change (2008a). NSW (Mitchell) Landscapes Version 3 (2008). NSW DECC Hurstville, NSW. Department of Environment and Climate Change.
- Department of Environment and Climate Change (2008b). Management Plan for the Green and Golden Bell Frog Key Population on the lower Cooks River. Department of Environment and Climate Change (NSW), Sydney.
- Department of Environment and Climate Change (2007). Introducing the NSW threatened species priorities action statement (PAS). Sydney South NSW, Department of Environment and Climate Change.
- Department of Environment and Conservation (2004). Threatened biodiversity survey and assessment: Guidelines for developments and activities (working draft).
- Department of Environment, Climate Change and Water (2010). Towra Point Nature Reserve Ramsar site. Ecological character description. Department of Environment, Climate Change and Water, Sydney.
- Department of Environment, Water, Heritage and the Arts (2010a). Survey guidelines for Australia's threatened frogs: Guidelines for detecting frogs listed as threatened under the EPBC Act. Department of Environment, Water, Heritage and the Arts.
- Department of Environment, Water, Heritage and the Arts (2010b). Significant impact guidelines for the vulnerable green and golden bell frog (*Litoria aurea*). <http://www.environment.gov.au/system/files/resources/e882f6c7-a511-4fba-9116-2f2f7ef941aa/files/litoria-aurea-policy.pdf>
- Department of Primary Industries (2018). Priority weed listings for the Greater Sydney region
- Jocelyn Ramsay & Assoc. Pty Ltd, (2013). Landscape Management Plan (incorporating the Southlands Weed and Pest Management Plan) – Southlands Redevelopment, Unpublished report for Orica

- Land and Property Information (2018). Aerial photographic imagery.
- Land and Property Information (2018). NSW Mitchell Landscapes.
- Matteson, K. C. and G. A. Langellotto (2010). "Determinates of inner city butterfly and bee species richness." *Urban Ecosyst*: 1-15.
- NSW Scientific Committee (2011). Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions listing as an endangered ecological community under the *Threatened Species Conservation Act 1995* (now BC Act).
- Office of Environment and Heritage (2016a). NSW Guide to surveying threatened plants. State of NSW and Office of Environment and Heritage
- Office of Environment and Heritage (2016b). The Native Vegetation of the Sydney Metropolitan Area
- Office of Environment and Heritage (2017a). "Biodiversity Assessment Method."
- Office of Environment and Heritage (2018a) NSW BioNet Vegetation Classification Database from <http://www.environment.nsw.gov.au/NSWVCA20PRapp/default.aspx>
- Office of Environment and Heritage (2018b). "BioNet the Atlas of NSW Wildlife Database Search." from http://www.environment.nsw.gov.au/atlaspublicapp/UI_Modules/ATLAS_/AtlasSearch.aspx
- Office of Environment and Heritage (2018c). NSW Threatened Species profiles from <http://www.environment.nsw.gov.au/threatenedspecies/>
- Office of Environment and Heritage (2018d). Towra Point Nature Reserve. <http://www.environment.nsw.gov.au/topics/water/wetlands/internationally-significant-wetlands/towra-point>
- Office of Environment and Heritage (2018e) Threatened Species Profile Database. Accessed via the licenced bionet site. <http://www.bionet.nsw.gov.au/>
- Royal Botanic Gardens and Domain Trust (RGBT) (2018). PlantNET - The Plant Information Network System of The Royal Botanic Gardens and Domain Trust, Sydney, Australia. From <http://plantnet.rbgsyd.nsw.gov.au>
- Stralberg, D., et al. (2009). "Re-Shuffling of Species with Climate Disruption: A No-Analog Future for California Birds?" *PLoS ONE* 4(9): e6825.
- Thackway, R. and I. D. Cresswell (1995). *An Interim Biogeographic Regionalisation of Australia*. Canberra, Australian Nature Conservation Agency.
- Tozer et al. (2010). Native vegetation of Southeast NSW: A Revised Classification and Map for the Coast and Eastern Tablelands
- White, AW. And Pyke, GH. (2008a). Green and Golden Bell Frogs in New South Wales: current status and future prospects. *Australian Zoologist* 34: 319-333.
- White, AW. And Pyke, GH. (2008b). Frogs on the hop: Translocations of Green and Golden Bell Frogs *Litoria aurea* in Greater Sydney. *Australian Zoologist* 34: 249-260.

APPENDIX A

THREATENED FLORA SPECIES
LIKELIHOOD OF OCCURRENCE



A1 THREATENED FLORA SPECIES LIKELIHOOD OF OCCURRENCE



A.1 THREATENED FLORA LIKELIHOOD OF OCCURRENCE WITHIN THE DEVELOPMENT SITE

SCIENTIFIC NAME	COMMON NAME	BC ACT STATUS ¹	EPBC ACT STATUS ²	HABITAT ASSOCIATION ³	NATURE OF RECORD	LIKELIHOOD OF OCCURRENCE
<i>Acacia bynoeana</i>	Bynoe's Wattle	E	V	This species occurs in heath or dry sclerophyll forest on sandy soils and is generally associated with overstorey species such as Red Bloodwood, Scribbly Gum, Parramatta Red Gum, Saw Banksias and Narrow-leaved Apple.	EPBC Act Protected matters search	Low This species has not been recorded within the locality. The development site does not contain associated habitat attributes such as vegetation formation, floristic assemblage or geological substrate. The occurrence of <i>Acacia bynoeana</i> within the development site is considered unlikely.
<i>Acacia pubescens</i>	Downy Wattle	V	V	Restricted to the Sydney Region from Bilpin to the Georges River and also at Woodford where it usually grows in open sclerophyll forest and woodland on clay soils. Typically it occurs at the intergrade between shales and sandstones in gravelly soils often with ironstones.	EPBC Act Protected matters search	Low This species has not been recorded within the locality. The development site does not contain associated habitat attributes such as vegetation formation, floristic assemblage or geological substrate. The occurrence of <i>Acacia pubescens</i> within the development site is considered unlikely.
<i>Acacia terminalis</i> subsp. <i>terminalis</i>	Sunshine Wattle	E	E	This species is associated with coastal scrub and dry sclerophyll woodland on sandy soils.	BioNet, PlantNET	Low This species has not been recorded within the locality. The development site does not contain associated habitat attributes such as vegetation formation, floristic assemblage or geological substrate. The occurrence of <i>Acacia terminalis</i> subsp. <i>terminalis</i> within the development site is considered unlikely.

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SCIENTIFIC NAME	COMMON NAME	BC ACT STATUS ¹	EPBC ACT STATUS ²	HABITAT ASSOCIATION ³	NATURE OF RECORD	LIKELIHOOD OF OCCURRENCE
<i>Allocasuarina glareicola</i>	Allocasuarina glareicola	E	E	Primarily restricted to the Richmond (NW Cumberland Plain) district, but with an outlier population found at Voyager Point, Liverpool. Grows on lateritic soil in open forest.	EPBC Act Protected matters search	Low This species has not been recorded within the locality. The development site does not contain associated habitat attributes such as vegetation formation, floristic assemblage or geological substrate. The occurrence of <i>Allocasuarina glareicola</i> within the development site is considered unlikely.
<i>Allocasuarina portuensis</i>	Nielsen Park She-oak	E	E	The original known habitat of the Neilsen Park She-oak is at Nielsen Park, in Woollahra local government area. There are no plants left at the original site where it was discovered. However, propagation material has been planted successfully at a number of locations at Nielsen Park and other locations in the local area, e.g. Gap Bluff, Hermit Point and Vacluse House.	EPBC Act Protected matters search	Low The development site does not contain associated habitat attributes such as vegetation formation, floristic assemblage or geological substrate. The occurrence of <i>Allocasuarina portuensis</i> within the development site is considered unlikely.
<i>Caladenia tessellata</i>	Thick Lip Spider Orchid	E	V	Occurs south of Swansea where it grows on clay loam or sandy soils. Prefers low open forest with a heathy or sometimes grassy understorey. Within NSW, currently known from two disjunct areas; one population near Braidwood on the Southern Tablelands and three populations in the Wyong area on the Central Coast. Previously known also from Sydney and South Coast areas.	BioNet	Low Two historic records of this species occur within the locality. These records exceed 100 years in date and are located within highly urbanised areas of Marrickville South and Tempe. The local occurrence of this species is considered to be extinct. In addition, the development site does not contain associated habitat attributes such as vegetation formation, floristic assemblage or geological substrate. The occurrence of <i>Caladenia tessellata</i> within the development site is considered unlikely.

SCIENTIFIC NAME	COMMON NAME	BC ACT STATUS ¹	EPBC ACT STATUS ²	HABITAT ASSOCIATION ³	NATURE OF RECORD	LIKELIHOOD OF OCCURRENCE
<i>Callistemon linearifolius</i>	Netted Bottle Brush	V	-	This species is associated with dry sclerophyll forest on the coast and adjacent ranges.	BioNet, PlantNET	Low There are 3 known records of this species within the locality (OEH 2018). These records occur to the east of the development site at Phillip Bay and La Perouse. The development site does not contain associated habitat attributes such as vegetation formation, floristic assemblage or geological substrate. The occurrence of <i>Callistemon linearifolius</i> within the development site is considered unlikely.
<i>Cryptostylis hunteriana</i>	Leafless Tongue-orchid	V	V	Occurs south from the Gibraltar Range, chiefly in coastal districts but also extends on to tablelands. Grows in swamp-heath and drier forest on sandy soils on granite & sandstone. Occurs in small, localised colonies most often on the flat plains close to the coast but also known from some mountainous areas growing in moist depressions and swampy habitats.	EPBC Act Protected matters search	Low This species has not been recorded within the locality. The development site does not contain associated habitat attributes such as vegetation formation, floristic assemblage or geological substrate. The occurrence of <i>Cryptostylis hunteriana</i> within the development site is considered unlikely.
<i>Genoplesium baueri</i>	Yellow Gnat-orchid	E	E	Grows in dry sclerophyll forest and moss gardens over sandstone. The species has been recorded from locations between Ulladulla and Port Stephens (OEH 2018).	EPBC Act Protected matters search	Low This species has not been recorded within the locality. The development site does not contain associated habitat attributes such as vegetation formation, floristic assemblage or geological substrate. The occurrence of <i>Genoplesium baueri</i> within the development site is considered unlikely.

SCIENTIFIC NAME	COMMON NAME	BC ACT STATUS ¹	EPBC ACT STATUS ²	HABITAT ASSOCIATION ³	NATURE OF RECORD	LIKELIHOOD OF OCCURRENCE
<i>Melaleuca biconvexa</i>	Biconvex Paperbark	V	V	Occurs as disjunct populations in coastal New South Wales from Jervis Bay to Port Macquarie, with the main concentration of records is in the Gosford/Wyong area. Grows in damp places, often near streams, or low-lying areas on alluvial soils of low slopes or sheltered aspects.	EPBC Act Protected matters search	Low This species has not been recorded within the locality. The development site does not contain associated habitat attributes such as vegetation formation, floristic assemblage or geological substrate. The occurrence of <i>Melaleuca biconvexa</i> within the development site is considered unlikely.
<i>Pelargonium</i> sp. <i>Striatellum</i>	Omeo Stork's-bill	E	E	Known from only 4 locations in NSW, with three on lake-beds on the basalt plains of the Monaro and one at Lake Bathurst. The only other known population is at Lake Omeo, Victoria. It has a narrow habitat that is usually just above the high-water level of irregularly inundated or ephemeral lakes, in the transition zone between surrounding grasslands or pasture and the wetland or aquatic communities. It occurs on sandy soils or gravelly soils or amongst rocks.	EPBC Act Protected matters search	Low This species has not been recorded within the locality. The development site does not contain associated habitat attributes such as vegetation formation, floristic assemblage or geological substrate. The occurrence of <i>Pelargonium</i> sp. <i>Striatellum</i> within the development site is considered unlikely.
<i>Persoonia hirsuta</i>	Hairy Geebung	E	E	The species is distributed from Singleton in the north, along the east coast to Bargo in the south and the Blue Mountains to the west. It has a large area of occurrence, but occurs in small populations. Found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone or very rarely on shale. Often occurs in areas with clay influence, in the ecotone between shale and sandstone.	BioNet, EPBC Act Protected matters search	Low This species has not been recorded within the locality. The development site does not contain associated habitat attributes such as vegetation formation, floristic assemblage or geological substrate. The occurrence of <i>Persoonia hirsuta</i> within the development site is considered unlikely.

SCIENTIFIC NAME	COMMON NAME	BC ACT STATUS ¹	EPBC ACT STATUS ²	HABITAT ASSOCIATION ³	NATURE OF RECORD	LIKELIHOOD OF OCCURRENCE
<i>Pimelea curviflora</i> var. <i>curviflora</i>	Pimelea curviflora var. <i>curviflora</i>	V	V	Confined to coastal areas around Sydney where it grows on sandstone and laterite soils. It is found between South Maroota, Cowan, Narrabeen, Allambie Heights, Northmead and Kellyville, but its former range extended south to the Parramatta River and Port Jackson region including Five Dock, Bellevue Hill and Manly. Usually occurs in woodland in the transition between shale and sandstone, often on Lucas Heights soil landscape.	EPBC Act Protected matters search	Low This species has not been recorded within the locality. The development site does not contain associated habitat attributes such as vegetation formation, floristic assemblage or geological substrate. The occurrence of <i>Pimelea curviflora</i> var. <i>curviflora</i> within the development site is considered unlikely.
<i>Pimelea spicata</i>	Spiked Rice-flower	E	E	This species occurs in two disjunct areas: in coastal districts from Lansdowne to Shellharbour, and in Cumberland Plain Woodland inland to Penrith. In western Sydney it grows on Wianamatta Shales in Greybox - Ironbark Woodland with <i>Bursaria spinosa</i> and <i>Themeda australis</i> . In the Illawarra, it occurs on well structured clay soils in grassland or open woodland.	EPBC Act Protected matters search	Low This species has not been recorded within the locality. The development site does not contain associated habitat attributes such as vegetation formation, floristic assemblage or geological substrate. The occurrence of <i>Pimelea spicata</i> within the development site is considered unlikely.
<i>Pterostylis saxicola</i>	Sydney Plains Greenhood	E	E	Known now only from Freemans Reach to Picton district. Grows in Sydney Sandstone Gully Forest in shallow or skeletal soils over sandstone shelves, often near streams.	EPBC Act Protected matters search	Low This species has not been recorded within the locality. The development site does not contain associated habitat attributes such as vegetation formation, floristic assemblage or geological substrate. The occurrence of <i>Pterostylis saxicola</i> within the development site is considered unlikely.
<i>Pterostylis</i> sp. Botany Bay	Botany Bay Bearded Greenhood	E	E	This species favours moist level sites on skeletal sandy soils derived from sandstone. It is associated with coastal heath vegetation dominated by <i>Melaleuca nodosa</i> and <i>Baeckea imbricata</i> .	EPBC Act Protected matters search	Low The development site does not contain associated habitat attributes such as vegetation formation, floristic assemblage or geological substrate. The occurrence of <i>Pterostylis</i> sp. Botany Bay within the development site is considered unlikely.

SCIENTIFIC NAME	COMMON NAME	BC ACT STATUS ¹	EPBC ACT STATUS ²	HABITAT ASSOCIATION ³	NATURE OF RECORD	LIKELIHOOD OF OCCURRENCE
<i>Senecio spathulatus</i>	Coast Groundsel	E	-	Grows on frontal dunes and recorded from Nadgee Nature Reserve (Cape Howe) and between Kumell in Sydney and Myall Lakes National Park (with a possible occurrence at Cudmirrah). In Victoria there are scattered populations from Wilsons Promontory to the NSW border.	BioNet	Low The development site does not contain associated habitat attributes such as vegetation formation, floristic assemblage or geological substrate. The occurrence of <i>Senecio spathulatus</i> within the development site is considered unlikely.
<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	E	E	Occurs between Bulahdelah and St Georges Basin where it grows in subtropical and littoral rainforest on sandy soils or stabilized dunes near the sea. On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest. On the central coast Magenta Lilly Pilly occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities.	BioNet, EPBC Act Protected matters search	Low The development site does not contain associated habitat attributes such as vegetation formation, floristic assemblage or geological substrate. The occurrence of <i>Syzygium paniculatum</i> within the development site is considered unlikely.
<i>Thesium australe</i>	Austral Toadflax	V	V	Grows in grassland or woodland often in damp sites. It is a semi-parasitic herb and hosts are likely to be <i>Themeda triandra</i> (Syn. <i>Themeda australis</i> and <i>Poa</i> spp.	EPBC Act Protected matters search	Low This species has not been recorded within the locality. The development site does not contain associated habitat attributes such as vegetation formation, floristic assemblage or geological substrate. The occurrence of <i>Thesium australe</i> within the development site is considered unlikely.

(1) Listed as Vulnerable (V), Endangered (E) or Critically Endangered (CE) under the NSW *Biodiversity Conservation Act 2016* (BC Act).

(2) Listed as Vulnerable (V), Endangered (E) or Critically Endangered (CE) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

(3) Habitat association data derived from BioNet (Office of Environment & Heritage 2018).

APPENDIX B

THREATENED FAUNA SPECIES
LIKELIHOOD OF OCCURRENCE



B1 THREATENED FAUNA SPECIES LIKELIHOOD OF OCCURRENCE



A.2 THREATENED FAUNA LIKELIHOOD OF OCCURRENCE WITHIN THE DEVELOPMENT SITE

SCIENTIFIC NAME	COMMON NAME	BC ACT STATUS ¹	EPBC ACT STATUS ²	HABITAT ³	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
Amphibians (3)						
<i>Crinia tinnula</i>	Wallum Froglet	V		Occurs along coast from south-eastern Queensland to Sydney. Mostly associated with swamps, dams and flooded roadside ditches, usually in heathland, where it is confined to acid, paperbark swamps and sedge swamps of the 'wallum' country. Males call any time of year. Breed in late winter.	Bionet	Low – no suitable habitat identified within development site
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V	V	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 300m from breeding sites. Whilst in non-breeding habitat it burrows below the soil surface or in the leaf litter. Breeding habitat of this species is generally soaks or pools within first or second order streams. Species is dependent on hanging swamps on the top of sandstone plateaus and deeply dissected gullies that occur as erosion features in the Sydney Basin.	EPBC	Low – no suitable habitat identified within development site

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<i>Litoria aurea</i>	Green and Golden Bell Frog	E1	V	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. Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (<i>Typha</i> spp.) or spikerushes (<i>Eleocharis</i> spp.). Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (<i>Gambusia holbrooki</i>), have a grassy area nearby and diurnal sheltering sites available.	Bionet, EPBC	Low – the development site does not contain ponds of open water or basking habitat in the form of rocks or logs. Sub-optimal habitat occurs in the form of planted ephemeral water depressions that contain <i>Typha orientalis</i> and <i>Phragmites australis</i> . There is a lack of any recent records in the locality with the Botany Wetland population being generally accepted to be extinct locally.
Birds (56)						
<i>Actitis hypoleucos</i>	Common Sandpiper		M	The Common Sandpiper frequents a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity. It is mostly encountered along muddy margins or rocky shores and rarely on mudflats. It has been recorded in estuaries and deltas of streams, banks farther upstream; around lakes, pools, billabongs, reservoirs, dams and claypans, and occasionally piers and jetties. The muddy margins utilised by the species are often narrow, and may be steep. The species is often associated with mangroves, and sometimes found in areas of mud littered with rocks or snags. Roost sites are typically on rocks or in roots or branches of vegetation, especially mangroves. The species is known to perch on posts, jetties, moored boats and other artificial structures, and to sometimes rest on mud or 'loaf' on rocks.	EPBC	Low – no suitable habitat identified within development site

SCIENTIFIC NAME	COMMON NAME	BC ACT STATUS ¹	EPBC ACT STATUS ²	HABITAT ³	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Anthochaera phrygia</i> (syn. <i>Xanthomyza phrygia</i>)	Regent Honeyeater	CE	EM	Inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. There are only three known key breeding regions remaining: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region. In NSW the distribution is very patchy and mainly confined to the two main breeding areas and surrounding fragmented woodlands. It inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. It feeds mainly on the nectar from a relatively small number of eucalypts that produce high volumes of nectar. Key eucalypt species include Mugga Ironbark, Yellow Box, White Box and Swamp Mahogany.	Bionet, EPBC	Low – no suitable habitat identified within development site
<i>Apus pacificus</i>	Fork-tailed Swift		M	Breeds in the northern hemisphere, wintering south to Australia. It is almost exclusively aerial, flying from less than 1 m to at least 300 m above ground. It mostly occurs over inland plains but sometimes above foothills or in coastal areas over cliffs, beaches, islands and well out to sea. It also occurs over towns and cities. It mostly occurs over dry and/or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh, grassland, spinifex sandplains, farmland and sand-dunes. It sometimes occurs above forests. It probably roosts aerially, but has occasionally been observed to land.	EPBC	Low – although species may use aerial spaces above subject site is unlikely to occur within terrestrial vegetation within the site.
<i>Arenaria interpres</i>	Ruddy Turnstone		M	Occurs at beaches and coasts with exposed rock, stony or shell beaches, mudflats, exposed reefs and wave platforms.	EPBC	Low – no suitable habitat identified within development site

SCIENTIFIC NAME	COMMON NAME	BC ACT STATUS ¹	EPBC ACT STATUS ²	HABITAT ³	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	V		Dusky woodswallows are widespread in eastern, southern and south western Australia. The species occurs throughout most of New South Wales, but is sparsely scattered in, or largely absent from, much of the upper western region. Most breeding activity occurs on the western slopes of the Great Dividing Range. Primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland.	Bionet	Low – marginal habitat within the development site.
<i>Botaurus poiciloptilus</i>	Australasian Bittern	E1	E	Australasian Bitterns are widespread but uncommon over south-eastern Australia. In NSW they may be found over most of the state except for the far north-west. Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (<i>Typha</i> spp.) and spikerushes (<i>Eleocharis</i> spp.). Feeding platforms may be constructed over deeper water from reeds trampled by the bird; platforms are often littered with prey remains. Breeding occurs in summer from October to January; nests are built in secluded places in densely-vegetated wetlands on a platform of reeds.	EPBC	Low – no suitable habitat identified within development site

SCIENTIFIC NAME	COMMON NAME	BC ACT STATUS ¹	EPBC ACT STATUS ²	HABITAT ³	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Calidris (Crocethia) alba</i>	Sanderling	V	M	The Sanderling occurs in coastal areas around Australia. Inland records have occurred in most states of singles or small groups, birds probably on migration. In Australia, the species is almost always found on the coast, mostly on open sandy beaches exposed to open sea-swell, and also on exposed sandbars and spits, and shingle banks, where they forage in the wave-wash zone and amongst rotting seaweed. Sanderlings also occur on beaches that may contain wave-washed rocky outcrops. Less often the species occurs on more sheltered sandy shorelines of estuaries, inlets and harbours. Rarely, they are recorded in near-coastal wetlands, such as lagoons, hypersaline lakes, saltponds and samphire flats. There are rare inland records from sandy shores of ephemeral brackish lakes and brackish river-pools.	Bionet, EPBC	Low – no suitable habitat identified within development site
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper		M	Occurs in a variety of habitats: tidal mudflat, mangrove swamps, saltmarshes, shallow fresh, brackish, salt inland swamps and lakes; flooded and irrigated paddocks, sewage farms and commercial saltfields.	EPBC	Low – no suitable habitat identified within development site
<i>Calidris canutus</i>	Red Knot		EM	In Australasia the Red Knot mainly inhabit intertidal mudflats, sandflats 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. They are occasionally seen on terrestrial saline wetlands near the coast, such as lakes, lagoons, pools and pans, and recorded on sewage ponds and saltworks, but rarely use freshwater swamps. They rarely use inland lakes or swamps.	EPBC	Low – no suitable habitat identified within development site
<i>Calidris ferruginea</i>	Curlew Sandpiper	E1	M	Occurs in inter-tidal mudflats of estuaries, lagoons, mangrove channels and also around lakes, dams, floodwaters and flooded saltbush surrounding inland lakes.	Bionet, EPBC	Low – no suitable habitat identified within development site

SCIENTIFIC NAME	COMMON NAME	BC ACT STATUS ¹	EPBC ACT STATUS ²	HABITAT ³	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Calidris melanotos</i>	Pectoral Sandpiper		M	In Australasia, the Pectoral Sandpiper prefers shallow fresh to saline wetlands. The species frequents coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. It is usually found in coastal or near coastal habitat but occasionally further inland. It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire. It has also been recorded in swamp overgrown with lignum. They forage in shallow water or soft mud at the edge of wetlands.	EPBC	Low – no suitable habitat identified within development site
<i>Calidris ruficollis</i>	Red-necked Stint		M	Mostly found in coastal areas, including sheltered inlets, bays lagoons and estuaries. They also occur in shallow wetlands near the coast or inland, including lakes, waterholes and dams. They forage in mudflats, shallow water, sandy open beaches, flooded paddocks and in samphire feeding along the edges. The species roosts on sheltered beaches, spits, banks or islets, of sand, mud, coral or shingle. Occasionally they roost on exposed reefs or shoals and amongst seaweed, mud and cow-pats. During high tides they may also use sand dunes and claypans.	EPBC	Low – no suitable habitat identified within development site
<i>Calidris tenuirostris</i>	Great Knot	V	CEM	Generally a coastal species found on tidal mudflats and sandy ocean shores. A migratory species visiting Australian waters between September and March.	Bionet, EPBC	Low – no suitable habitat identified within development site

SCIENTIFIC NAME	COMMON NAME	BC ACT STATUS ¹	EPBC ACT STATUS ²	HABITAT ³	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Calyptorhynchus lathami</i>	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. Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur. Black Sheoak (<i>Allocasuarina littoralis</i>) and Forest Sheoak (<i>A. torulosa</i>) are important foods. Inland populations feed on a wide range of sheoaks, including Drooping Sheoak, <i>Allocasuarina diminuta</i> , and <i>A. gymnathera</i> . 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 (<i>Casuarina cristata</i>). Feeds almost exclusively on the seeds of several species of she-oak (<i>Casuarina</i> and <i>Allocasuarina</i> species), shredding the cones with the massive bill. Dependent on large hollow-bearing eucalypts for nest sites.	Bionet	Low – marginal habitat within development site.
<i>Charadrius bicinctus</i>	Double-banded Plover		M	The Double-banded Plover is found on littoral, estuarine and fresh or saline terrestrial wetlands and also saltmarsh, grasslands and pasture. It occurs on muddy, sandy, shingled or sometimes rocky beaches, bays and inlets, harbours and margins of fresh or saline terrestrial wetlands such as lakes, lagoons and swamps, shallow estuaries and rivers. It is sometimes associated with coastal lagoons, inland saltlakes, exposed seagrass beds, exposed reefs and rock platforms and coastal sand dunes.	EPBC	Low – no suitable habitat identified within development site
<i>Charadrius leschenaultii</i>	Greater Sand Plover	V	VM	Entirely coastal in NSW foraging on intertidal sand and mudflats in estuaries, and roosting during high tide on sand beaches or rocky shores. A migratory species it is found in New South Wales generally during the summer months.	EPBC	Low – no suitable habitat identified within development site

SCIENTIFIC NAME	COMMON NAME	BC ACT STATUS ¹	EPBC ACT STATUS ²	HABITAT ³	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Charadrius mongolus</i>	Lesser Sand Plover	V	EM	Migratory bird that migrates from the northern hemisphere to coastal areas of northern and east coast of Australia. The species is almost strictly coastal during the non-breeding season, preferring sandy beaches, mudflats of coastal bays and estuaries, sand-flats and dunes near the coast, occasionally frequenting mangrove mudflats (IUCN Redlist entry).	Bionet, EPBC	Low – no suitable habitat identified within development site
<i>Charadrius veredus</i>	Oriental Plover		M	Oriental Plovers are found in coastal habitats, including estuarine mudflats and sandbanks, on sandy or rocky ocean beaches, nearby reefs, or near-coastal grasslands. They also disperse further inland inhabiting flat, open, semi-arid or arid grasslands, where the grass is short and sparse, and interspersed with hard, bare ground, such as claypans, dry paddocks, playing fields, lawns and cattle camps. Oriental Plovers may move to lightly wooded grasslands in wet season and sometimes roost on soft wet mud or in shallow waters of ocean or mudflats, and also occasionally in dry, open habitats, such as saltmarsh or paddocks.	EPBC	Low – no suitable habitat identified within development site
<i>Cuculus opatus</i> (syn. <i>Cuculus saturatus</i>)	Oriental Cuckoo, Himalayan Cuckoo		M	A non-breeding migrant to Australia, it often inhabits rainforest, vine thickets, wet sclerophyll forest and open woodland and sometimes occurs in mangroves, wooded swamps and as vagrants in gardens. The population trend appears to be stable.	EPBC	Low – no suitable habitat identified within development site

SCIENTIFIC NAME	COMMON NAME	BC ACT STATUS ¹	EPBC ACT STATUS ²	HABITAT ³	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Dasyornis brachypterus</i>	Eastern Bristlebird	E1	E	The distribution of the Eastern Bristlebird has contracted to three disjunct areas of south-eastern Australia. There are three main populations: Northern - southern Queensland/northern NSW, Central - Barren Ground NR, Budderoo NR, Woronora Plateau, Jervis Bay NP, Booderee NP and Beecroft Peninsula and Southern - Nadgee NR and Croajingalong NP in the vicinity of the NSW/Victorian border. Habitat for central and southern populations is characterised by dense, low vegetation including heath and open woodland with a heathy understorey. In northern NSW the habitat occurs in open forest with dense tussocky grass understorey and sparse mid-storey near rainforest ecotone; all of these vegetation types are fire prone. Age of habitat since fires (fire-age) is of paramount importance to this species.	EPBC	Low – no suitable habitat identified within development site
<i>Gallinago hardwickii</i>	Latham's Snipe		M	Occurs in freshwater or brackish wetlands generally near protective vegetation cover. This species feeds on small invertebrates, seeds and vegetation. It migrates to the northern hemisphere to breed.	EPBC	Low – no suitable habitat identified within development site

SCIENTIFIC NAME	COMMON NAME	BC ACT STATUS ¹	EPBC ACT STATUS ²	HABITAT ³	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Epthianura albifrons</i>	White-fronted Chat	E		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 1000 m 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. Two isolated sub-populations of White-fronted Chats are currently known from the Sydney Metropolitan Catchment Management Authority (CMA) area; one at Newington Nature Reserve on the Parramatta River and one at Towra Point Nature Reserve in Botany Bay. These sub-populations are separated from each other by 25 km of urbanised land, across which the Chats are unlikely to fly. The nearest extant populations outside Sydney Metropolitan CMA are at Ash Island north of Newcastle and Lake Illawarra, south of Wollongong. White-fronted Chats were previously recorded at Penrith Lakes (2001), Hawkesbury Swamps (2002), Tuggerah Lake (1997) and Lake Macquarie (1998).	Bionet	Low – no suitable habitat identified within development site
<i>Gallinago megala</i>	Swinhoe's Snipe		M	During the non-breeding season Swinhoe's Snipe occurs at the edges of wetlands, such as wet paddy fields, swamps and freshwater streams. The species is also known to occur in grasslands, drier cultivated areas (including crops of rapeseed and wheat) and market gardens. Habitat specific to Australia includes the dense clumps of grass and rushes round the edges of fresh and brackish wetlands. This includes swamps, billabongs, river pools, small streams and sewage ponds. They are also found in drying claypans and inundated plains pitted with crab holes.	EPBC	Low – no suitable habitat identified within development site

SCIENTIFIC NAME	COMMON NAME	BC ACT STATUS ¹	EPBC ACT STATUS ²	HABITAT ³	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Gallinago stenura</i>	Pintail Snipe		M	During non-breeding period the Pin-tailed Snipe occurs most often in or at the edges of shallow freshwater swamps, ponds and lakes with emergent, sparse to dense cover of grass/sedge or other vegetation. The species is also found in drier, more open wetlands such as claypans in more arid parts of species' range. It is also commonly seen at sewage ponds; not normally in saline or inter-tidal wetlands.	EPBC	Low – no suitable habitat identified within development site
<i>Grantiella picta</i>	Painted Honeyeater	V	V	The Painted Honeyeater is nomadic and occurs at low densities throughout its range. The greatest concentrations of the bird and almost all breeding occurs 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/ Weeping Myall (<i>Acacia pendula</i>), Brigalow (<i>A. harpophylla</i>) 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 <i>Amyema</i> .	EPBC	Low – no suitable habitat identified within development site
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	V		The Sooty Oystercatcher is found on rocky headlands, rock shelves, exposed reefs with rock pools, beaches and muddy estuaries. The species forages on exposed intertidal rocky shorelines at low tide. It breeds almost exclusively on offshore islands, and occasionally on isolated promontories during spring and summer. They nest on the ground in amongst rocks, seaweed, shells and pebbles.	Bionet	Low – no suitable habitat identified within development site
<i>Haematopus longirostris</i>	Australian Pied Oystercatcher	E1		The species is distributed around the entire Australian coastline, although it is most common in coastal Tasmania and parts of Victoria, such as Corner Inlet. In NSW the species is thinly scattered along the entire coast, with fewer than 200 breeding pairs estimated to occur in the State. Favours intertidal flats of inlets and bays, open beaches and sandbanks. Forages on exposed sand, mud and rock at low tide, for molluscs, worms, crabs and small fish. Nests mostly on coastal or estuarine beaches although occasionally they use saltmarsh or grassy areas.	Bionet	Low – no suitable habitat identified within development site

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<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V	Ma	The White-bellied Sea-eagle is distributed around the Australian coastline, including Tasmania, and well inland along rivers and wetlands of the Murray Darling Basin. In New South Wales it is widespread along the east coast, and along all major inland rivers and waterways. Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Occurs at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest). Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts'. Feed mainly on fish and freshwater turtles, but also waterbirds, reptiles, mammals and carrion.	Bionet	Low – no suitable habitat identified within development site. May occur flying over the development site whilst foraging in greater locality.

SCIENTIFIC NAME	COMMON NAME	BC ACT STATUS ¹	EPBC ACT STATUS ²	HABITAT ³	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Hirundapus caudacutus</i>	White-throated Needletail		M	Widespread in eastern and south-eastern Australia. In eastern Australia, it is recorded in all coastal regions of Queensland and NSW, extending inland to the western slopes of the Great Divide and occasionally onto the adjacent inland plains. It is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground. Because they are aerial, it has been stated that conventional habitat descriptions are inapplicable, but there are, nevertheless, certain preferences exhibited by the species. Although they occur over most types of habitat, they are probably recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland. They also commonly occur over heathland, but less often over treeless areas, such as grassland or swamps. When flying above farmland, they are more often recorded above partly cleared pasture, plantations or remnant vegetation at the edge of paddocks. In coastal areas, they are sometimes seen flying over sandy beaches or mudflats and often around coastal cliffs and other areas with prominent updraughts, such as ridges and sand-dunes.	EPBC	Low - although species may use aerial spaces above subject site is unlikely to occur within terrestrial vegetation within the development site.
<i>Lathamus discolor</i>	Swift Parrot	E1	CE	Breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW mostly occurs on the coast and south west slopes. 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 Swamp Mahogany <i>Eucalyptus robusta</i> , Spotted Gum <i>Corymbia maculata</i> , Red Bloodwood <i>C. gummifera</i> , Mugga Ironbark <i>E. sideroxylon</i> , and White Box <i>E. albens</i> . Commonly used lerp infested trees include Inland Grey Box <i>E. microcarpa</i> , Grey Box <i>E. moluccana</i> and Blackbutt <i>E. pilularis</i> .	Bionet, EPBC	Low – marginal habitat within development site. Irregular/sporadic occurrences during seasonal movements may occur, although potential habitat is limited to a small number of planted Spotted Gums fringing McPhersons Road.

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<i>Limicola falcinellus</i>	Broad-billed Sandpiper	V	M	A migratory species that breeds in the northern hemisphere between June and August. Individuals feed both on exposed mudflats and while wading in water.	Bionet, EPBC	Low – no suitable habitat identified within development site
<i>Limosa lapponica</i>	Bar-tailed Godwit		M	The Bar-tailed Godwit has been recorded in the coastal areas of all Australian states. It is widespread in the Torres Strait and along the east and south-east coasts of Queensland, NSW and Victoria, including the offshore islands. 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.	EPBC	Low – no suitable habitat identified within development site
<i>Limosa limosa</i>	Black-tailed Godwit	V	M	A coastal species found on tidal mudflats, swamps, shallow river margins and sewage farms. Also found inland on larger shallow fresh or brackish waters. A migratory species visiting Australia between September and May.	Bionet	Low – no suitable habitat identified within development site
<i>Monarcha melanopsis</i>	Black-faced Monarch		M	Occurs in rainforests, eucalypt woodlands, coastal scrubs, damp gullies in rainforest, eucalypt forest and in more open woodland when migrating.	EPBC	Low – marginal habitat available in development site.
<i>Monarcha trivirgatus</i>	Spectacled Monarch		M	Occurs in the understorey of mountain/lowland rainforests, thickly wooded gullies and waterside vegetation. Migrates to NE NSW in summer to breed.	EPBC	Low – no suitable habitat identified within development site

SCIENTIFIC NAME	COMMON NAME	BC ACT STATUS ¹	EPBC ACT STATUS ²	HABITAT ³	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Motacilla flava</i>	Yellow Wagtail		M	This species occurs in a range of habitats including estuarine habitats such as sand dunes, mangrove forests and coastal saltmarshes. This species also occurs in open grassy areas including disturbed sites such as sports grounds and has been recorded on the edges of wetlands, swamps, lakes and farm dams. This species migrates from Asia to Australia in spring-summer. It has been recorded in the estuarine areas of the Hunter River in Newcastle NSW and in QLD and the north of NT and WA.	EPBC	Low – no suitable habitat identified within development site
<i>Motacilla flava</i>	Yellow Wagtail		M	his species occurs in a range of habitats including estuarine habitats such as sand dunes, mangrove forests and coastal saltmarshes. This species also occurs in open grassy areas including disturbed sites such as sports grounds and has been recorded on the edges of wetlands, swamps, lakes and farm dams. This species migrates from Asia to Australia in spring-summer. It has been recorded in the estuarine areas of the Hunter River in Newcastle NSW and in QLD and the north of NT and WA.	EPBC	Low – no suitable habitat identified within development site

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<i>Myiagra cyanoleuca</i>	Satin Flycatcher		M	Widespread in eastern Australia. In Queensland, it is widespread but scattered in the east. In NSW, they are widespread on and east of the Great Divide and sparsely scattered on the western slopes, with very occasional records on the western plains. In Victoria, the species is widespread in the south and east, in the area south of a line joining Numurkah, Maldon, the northern Grampians, Balmoral and Nelson. Inhabit heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, and on migration, occur in coastal forests, woodlands, mangroves and drier woodlands and open forests. Satin Flycatchers mainly inhabit eucalypt forests, often near wetlands or watercourses. They generally occur in moister, taller forests, often occurring in gullies. They also occur in eucalypt woodlands with open understorey and grass ground cover, and are generally absent from rainforest. In south-eastern Australia, they occur at elevations of up to 1400 m above sea level, and in the ACT, they occur mainly between 800 m above sea level and the treeline.	EPBC	Low – no suitable habitat identified within development site
<i>Neochmia ruficauda</i>	Star Finch		E	Northern Australia from Cape York Peninsular in Northern Queensland and across the top end of Australia and down into the western coast of Western Australia as far as Port Headland and the Hamersley Ranges. The Star Finch (eastern) occurs mainly in grasslands and grassy woodlands that are located close to bodies of fresh water. It also occurs in cleared or suburban areas such as along roadsides and in towns. The Star Finch (eastern) was observed on the Namoi River in New South Wales, on sloping river banks covered with grass and herbs, and amongst beds of rushes growing along the side of the river.		Low – no suitable habitat identified within development site

SCIENTIFIC NAME	COMMON NAME	BC ACT STATUS ¹	EPBC ACT STATUS ²	HABITAT ³	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Ninox strenua</i>	Powerful Owl	V		The Powerful Owl is endemic to eastern and south-eastern Australia, mainly on the coastal side of the Great Dividing Range from Mackay to south-western Victoria. 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. It inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. It 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 comprising species such as Turpentine <i>Syncarpia glomulifera</i> , Black She-oak <i>Allocasuarina littoralis</i> , Blackwood <i>Acacia melanoxylon</i> , Rough-barked Apple <i>Angophora floribunda</i> , Cherry Ballart <i>Exocarpus cupressiformis</i> and a number of eucalypt species. The main prey items are medium-sized arboreal marsupials, particularly the Greater Glider, Common Ringtail Possum and Sugar Glider.	Bionet	Low – no suitable habitat identified within development site
<i>Numenius madagascariensis</i>	Eastern Curlew		CEM	Inhabits coastal estuaries, mangroves, mud flats and sand pits. It is a migratory shorebird which generally inhabits sea and lake shore mud flats, deltas and similar areas, where it forages for crabs and other crustaceans, clam worms and other annelids, molluscs, insects and other invertebrates. Its migration route ranges from its wintering grounds in Australia to its breeding grounds in northern China, Korea and Russia.	EPBC	Low – no suitable habitat identified within development site

SCIENTIFIC NAME	COMMON NAME	BC ACT STATUS ¹	EPBC ACT STATUS ²	HABITAT ³	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Numenius minutus</i>	Little Curlew		M	On passage the species shows a preference for foraging and resting in swampy meadows near lakes and along river valleys. It overwinters on dry inland grassland, bare cultivation, dry mudflats and coastal plains of black soil with scattered shallow pools of freshwater, swamps, lakes or flooded ground. It shows a preference for short grass swards of less than 20 cm tall, and occasionally occurs in dry saltmarshes, coastal swamps, mudflats or sandflats in estuaries, or on the beaches of sheltered coasts.	EPBC	Low – no suitable habitat identified within development site
<i>Numenius phaeopus</i>	Whimbrel		M	Migrates to Taiwan, Philippines, PNG, and a race breeding in NE Siberia is found on the north and south-eastern coastlines of Australia. Juveniles arrive to Australia from spring to early summer. Usually only juveniles remain in Australia but very occasionally adults in breeding plumage may be seen in Australian winters.	EPBC	Low – no suitable habitat identified within development site
<i>Pandion cristatus</i> (syn. <i>P. haliaetus</i>)	Eastern Osprey	V	M	Eastern Ospreys are found right around the Australian coast line, 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.	EPBC	Low – no suitable habitat identified within development site
<i>Pluvialis fulva</i>	Pacific Golden Plover		M	Prefers sandy, muddy or rocky shores, estuaries and lagoons, reefs, saltmarsh, and or short grass in paddocks and crops. The species is usually coastal, including offshore islands; rarely far inland. Often observed on beaches and mudflats, sandflats and occasionally rock shelves, or where these substrates intermingle; harbours, estuaries and lagoons.	EPBC	Low – no suitable habitat identified within development site

SCIENTIFIC NAME	COMMON NAME	BC ACT STATUS ¹	EPBC ACT STATUS ²	HABITAT ³	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Ptilinopus superbus</i>	Superb Fruit-Dove	V		The Superb Fruit-dove occurs principally from north-eastern in Queensland to north-eastern NSW. It is much less common further south, where it is largely confined to pockets of suitable habitat as far south as Moruya. There are records of vagrants as far south as eastern Victoria and Tasmania. Inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species such as figs and palms. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees. Part of the population is migratory or nomadic.	Bionet	Low – no suitable habitat identified within development site
<i>Rhipidura rufifrons</i>	Rufous Fantail		M	Occurs in a range of habitats including the undergrowth of rainforests/wetter eucalypt forests/gullies, monsoon forests paperbarks, sub-inland and coastal scrubs, mangroves, watercourses, parks and gardens. When migrating they may also be recorded on farms, streets and buildings. Migrates to SE Australia in October-April to breed, mostly in or on the coastal side of the Great Dividing Range.	EPBC	Low – no suitable habitat identified within development site
<i>Rostratula australis</i> (syn. <i>R. benghalensis</i>)	Australian Painted Snipe (Painted Snipe)	E1	VM	The Australian Painted Snipe is restricted to Australia. Most records are from the south east, particularly the Murray Darling Basin, with scattered records across northern Australia and historical records from around the Perth region in Western Australia. 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. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds.	EPBC	Low – no suitable habitat identified within development site

SCIENTIFIC NAME	COMMON NAME	BC ACT STATUS ¹	EPBC ACT STATUS ²	HABITAT ³	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Stagonopleura guttata</i>	Diamond Firetail	V		Distributed through central and eastern NSW, extending north into southern and central Queensland and south through Victoria to the Eyre Peninsula, South Australia. In NSW, the species occurs predominantly west of the Great Dividing Range, although populations are known from drier coastal areas. Occurs in a range of eucalypt dominated communities with a grassy understorey including woodland, forest and mallee. Most populations occur on the inland slopes of the dividing range. Firetails nest in trees and bushes, and forage on the ground, largely for grass seeds and other plant material, but also for insects.	Bionet	Low – no suitable habitat identified within development site
<i>Sternula albifrons</i>	Little Tern	E1		Little Terns inhabit sheltered coastal environments, including lagoons, estuaries, river mouths and deltas, lakes, bays, harbours and inlets. They nest on sand-spits, sandbanks, ridges or islets in these habitats or gently sloping sandy ocean beaches and occasionally in sand-dunes.	Bionet	Low – no suitable habitat identified within development site
<i>Tringa brevipes</i> (syn. <i>Heteroscelus brevipes</i>)	Grey-tailed Tattler		M	It is often found on sheltered coasts with reefs, rock platforms or with intertidal mudflats. It is also found at intertidal rocky, coral or stony reefs, platforms and islets that are exposed at low tide. It has also been found in embayments, estuaries and coastal lagoons, especially fringed with mangroves. It is rarely seen on open beaches and occasionally found around near-coastal wetlands, such as lagoons, lakes and ponds in sewage farms and saltworks. Inland records for the species are rare. The species forages in shallow water, hard intertidal substrates, rock pools, intertidal mudflats, mangroves, banks of seaweed and among rocks and coral rubble, over which water may surge. The species roosts in mangroves, dense stands of shrubs, snags, rocks, beaches, reefs, artificial structures (sea walls, oyster racks), occasionally in near-coastal saltworks and sewage ponds and rarely on sandy beaches or sand banks.	EPBC	Low – no suitable habitat identified within development site

SCIENTIFIC NAME	COMMON NAME	BC ACT STATUS ¹	EPBC ACT STATUS ²	HABITAT ³	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Tringa incana</i> (syn. <i>Heteroscelus incanus</i>)	Wandering Tattler		CEM	Generally found on rocky coasts with reefs and platforms, points, spits, piers, offshore islands and shingle beaches or beds. Occasionally seen on coral reefs or beaches, and tends to avoid mudflats. Foraging habitat is among rocks or shingle, or in shallow pools at edges of reefs or beaches, mainly along the tideline. Wandering Tattlers have been recorded roosting or perching on top of boulders surrounded by or close to water.	EPBC	Low – no suitable habitat identified within development site
<i>Tringa nebularia</i>	Common Greenshank		M	Occurs in a range of inland and coastal environments. Inland, it occurs in both permanent and temporary wetlands, billabongs, swamps, lakes, floodplains, sewage farms, saltworks ponds, flooded irrigated crops. On the coast, it occurs in sheltered estuaries and bays with extensive mudflats, mangrove swamps, muddy shallows of harbours and lagoons, occasionally rocky tidal ledges. It generally prefers wet and flooded mud and clay rather than sand.	EPBC	Low – no suitable habitat identified within development site
<i>Tringa stagnatilis</i>	Marsh Sandpiper		M	Occurs in coastal and inland wetlands (salt or fresh water), estuarine and mangrove mudflats, beaches, shallow or swamps, lakes, billabongs, temporary floodwaters, sewage farms and saltworks ponds.	EPBC	Low – no suitable habitat identified within development site
<i>Stictonetta naevosa</i>	Freckled Duck	V		In most years this species appear to be nomadic between ephemeral inland wetlands. In dry years they congregate on permanent wetlands while in wet years they breed prolifically and disperse widely, generally towards the coast. In inland eastern Australia, they generally occur in brackish to hyposaline wetlands that are densely vegetated with Lignum (<i>Muehlenbeckia cunninghamii</i>) within which they build their nests.	Bionet	Low – no suitable habitat identified within development site
<i>Xenus cinereus</i>	Terek Sandpiper	V	M	In Australia widespread and common along north and east coasts than along south coastlines. It inhabits coastal areas, mostly saline intertidal mudflats in sheltered estuaries, embayments, harbours and lagoons; on islets, mudbanks or sandbanks and spits; often around mangroves.	Bionet, EPBC	Low – no suitable habitat identified within development site

Fish (3)

SCIENTIFIC NAME	COMMON NAME	BC ACT STATUS ¹	EPBC ACT STATUS ²	HABITAT ³	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Epinephelus daemeli</i>	Black Cod	V	V	Adult black cod are usually found in caves, gutters and beneath bomboras on rocky reefs. They are territorial and often occupy a particular cave for life. Small juveniles are often found in coastal rock pools, and larger juveniles around rocky shores in estuaries. Black cod are opportunistic carnivores, eating mainly other fish and crustaceans. They can change from one colour pattern to another in just a few seconds. They are usually black in estuaries and banded around clear water reefs. Black cod are apparently slow growing. Smaller fish are mostly females, but they generally change sex to become males at around 100-110 cm in length.	EPBC	Low – no suitable habitat identified within development site
<i>Macquaria australasica</i>	Macquarie Perch		E	Macquarie Perch are found in the Murray-Darling Basin (particularly upstream reaches) of the Lachlan, Murrumbidgee and Murray rivers, and parts of south-eastern coastal NSW, including the Hawkesbury/Nepean and Shoalhaven catchments. Macquarie Perch are found in both river and lake habitats; especially the upper reaches of rivers and their tributaries. It prefers clear water and deep, rocky holes with lots of cover. As well as aquatic vegetation, additional cover may comprise of large boulders, debris and overhanging banks. Spawning occurs just above riffles (shallow running water).	EPBC	Low – no suitable habitat identified within development site

SCIENTIFIC NAME	COMMON NAME	BC ACT STATUS ¹	EPBC ACT STATUS ²	HABITAT ³	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Prototroctes maraena</i>	Australian Grayling		V	Occurs in streams and rivers on the eastern and southern flanks of the Great Dividing Range, from Sydney, southwards to the Otway Ranges of Victoria and in Tasmania. The species is found in fresh and brackish waters of coastal lagoons, from Shoalhaven River in NSW to Ewan Ponds in South Australia. The Australian Grayling is diadromous, spending part of its lifecycle in freshwater and at least part of the larval and/or juvenile stages in coastal seas. Adults (including pre spawning and spawning adults) inhabit cool, clear, freshwater streams with gravel substrate and areas alternating between pools and riffle zones such as the Tambo River, which is also known to have granite outcrops. The species has also been associated with clear, gravel-bottomed habitats in the Mitchell and Wonnangatta Rivers (Victoria) and in a muddy-bottomed, heavily silted habitat in the Tarwin River (Victoria). The species has been found over 100 km upstream from the sea.	EPBC	Low – no suitable habitat identified within development site
Mammals (9)						
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	Found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. There are scattered records from the New England Tablelands and North West Slopes. Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (<i>Petrochelidon ariel</i>), frequenting low to mid-elevation dry open forest and woodland close to these features. Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves and overhangs. They remain loyal to the same cave over many years. Found in well-timbered areas containing gullies.	EPBC	Low – no suitable habitat identified within development site

SCIENTIFIC NAME	COMMON NAME	BC ACT STATUS ¹	EPBC ACT STATUS ²	HABITAT ³	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Dasyurus maculatus maculatus</i>	Spotted-Tailed Quoll	V	E	Found in eastern NSW, eastern Victoria, south-east and north-eastern Queensland, and Tasmania. Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock outcrops and rocky-cliff faces as den sites. Females occupy home ranges up to about 750 hectares and males up to 3500 hectares. Are known to traverse their home ranges along densely vegetated creeklines.	EPBC	Low – no suitable habitat identified within development site. Study highly fragmented and isolated from extensive remnant patches.
<i>Isodon obesulus</i>	Southern Brown Bandicoot	E1	E	The Southern Brown Bandicoot has a patchy distribution. It is found in south-eastern NSW, east of the Great Dividing Range south from the Hawkesbury River, southern coastal Victoria and the Grampian Ranges, south-eastern South Australia, south-west Western Australia and the northern tip of Queensland. They are generally only found in heath or open forest with a heathy understorey on sandy or friable soils. They feed on a variety of ground-dwelling invertebrates and the fruit-bodies of hypogeous (underground-fruited) fungi. Their searches for food often create distinctive conical holes in the soil. Males have a home range of approximately 5-20 hectares whilst females forage over smaller areas of about 2-3 hectares.	EPBC	Low – no suitable habitat identified within development site
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bent-wing Bat	V		Eastern Bentwing-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 man-made structures. Populations disperse within about 300 km range of maternity caves. Hunt in forested areas, catching moths and other flying insects above the tree tops.	Bionet	Low – marginal habitat within development site. Unlikely to utilise the development site on regularly basis due to lack of vegetation and floristic structure.

SCIENTIFIC NAME	COMMON NAME	BC ACT STATUS ¹	EPBC ACT STATUS ²	HABITAT ³	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Myotis macropus</i>	Southern Myotis, Large-footed Myotis	V		The Southern Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers. 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. Forage over streams and pools catching insects and small fish by raking their feet across the water surface.	Bionet	Low – no suitable habitat identified within development site
<i>Petauroides volans</i>	Greater Glider		V	The Greater Glider has a restricted distribution in eastern Australia, from the Windsor Tableland in north Queensland to central Victoria, with an elevated range from sea level to 1200m above sea level. The species is largely restricted to eucalypt forests and woodlands, feeds exclusively on eucalypt leaves, buds, flowers and mistletoe. It is found in abundance in montane eucalypt forest with relatively old trees and an abundance of hollows. It also favours forests with a diversity of eucalypts to cater for seasonal variation in food abundance.	EPBC	Low – no suitable habitat identified within development site
<i>Phascolarctos cinereus</i>	Koala	V	V	The Koala has a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. It was briefly historically abundant in the 1890s in the Bega District on the south coast of NSW, although not elsewhere, but it now occurs in sparse and possibly disjunct populations. Koalas are also known from several sites on the southern tablelands. 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. Some preferred species include Forest Red Gum, Grey Gum. In coastal areas, Tallowood and Swamp Mahogany are important food species, while in inland areas White Box, Bimble Box and River Red Gum are favoured. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size.	Bionet, EPBC	Low – no suitable habitat identified within development site

SCIENTIFIC NAME	COMMON NAME	BC ACT STATUS ¹	EPBC ACT STATUS ²	HABITAT ³	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Pseudomys novaehollandiae</i>	New Holland Mouse		V	The New Holland Mouse has a fragmented distribution across Tasmania, Victoria, New South Wales and Queensland. Genetic evidence indicates that the New Holland Mouse once formed a single continuous population on mainland Australia and the distribution of recent subfossils further suggest that the species has undergone a large range contraction since European settlement. Total population size of mature individuals is now estimated to be less than 10,000 individuals although, given the number of sites from which the species is known to have disappeared between 1999 and 2009, it is likely that the species' distribution is actually smaller than current estimates. Known to inhabit open heathlands, woodlands and forests with a heathland understorey and vegetated sand dunes.	EPBC	Low – no suitable habitat identified within development site
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	Grey-headed Flying-foxes are generally found within 200km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. 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 20km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Can travel up to 50km from the camp to forage; commuting distances are more often <20km. Feed on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines.	Bionet, EPBC	Low – marginal habitat within the development site. May occur as a fly-over or irregularly visit whilst foraging in greater locality.
Reptiles (1)						

SCIENTIFIC NAME	COMMON NAME	BC ACT STATUS ¹	EPBC ACT STATUS ²	HABITAT ³	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Hoplocephalus bungaroides</i>	Broad-headed Snake	E1	V	The Broad-headed Snake is largely confined to Triassic and Permian sandstones, including the Hawkesbury, Narrabeen and Shoalhaven groups, within the coast and ranges in an area within approximately 250km of Sydney. Shelters in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring. Moves from the sandstone rocks to shelters in crevices or hollows in large trees within 500m of escarpments in summer.	EPBC	Low – no suitable habitat identified within development site

(1) Listed as Vulnerable (V), Endangered (E1), Endangered populations (E2) or Critically Endangered (CE) under the NSW *Biodiversity Conservation Act 2016* (BC Act).

(2) Listed as Vulnerable (V), Endangered (E) or Critically Endangered (CE) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Note: due to no marine habitat present within or adjacent to the development site, marine species were not included within the likelihood of occurrence.

APPENDIX C

RECORDED FLORA



C1 RECORDED FLORA

Table C.1 Recorded flora species within the development site

FAMILY	SCIENTIFIC NAME	COMMON NAME
Alismataceae	<i>Alisma plantago-aquatica</i>	Water Plantain
Alliaceae	<i>Nothoscordum gracile</i> *	Onion Weed
Apiaceae	<i>Cyclospermum leptophyllum</i> *	Slender Celery
	<i>Hydrocotyle bonariensis</i> *	A Pennywort
Apocynaceae	<i>Gomphocarpus fruticosus</i> *	Narrow-leaved Cotton Bush
Asteraceae	<i>Aster subulatus</i> *	Wild Aster
	<i>Bidens pilosa</i> *	Cobbler's Pegs
	<i>Cirsium vulgare</i> *	Spear Thistle
	<i>Conyza bonariensis</i> *	Flaxleaf Fleabane
	<i>Conyza sumatrensis</i> *	Tall fleabane
	<i>Cotula australis</i>	Common Cotula
	<i>Hypochaeris radicata</i> *	Smooth Catsear
	<i>Lactuca serriola</i> *	Prickly Lettuce
	<i>Senecio madagascarensis</i> *	Fireweed
	<i>Sonchus oleraceus</i> *	Common Sowthistle
	<i>Taraxacum officinale</i> *	Dandelion
Blechnaceae	<i>Bolboschoenus caldwellii</i>	-
Brassicaceae	<i>Brassica rapa</i> *	Field Mustard
	<i>Raphanus raphanistrum</i> *	Wild Radish
	<i>Sisymbrium orientale</i> *	Indian Hedge Mustard
Casuarinaceae	<i>Casuarina glauca</i>	Swamp Oak
Cyperaceae	<i>Carex appressa</i>	Tall Sedge
	<i>Cyperus eragrostis</i> *	Umbrella Sedge
	<i>Ficinia nodosa</i>	knobby club-rush
	<i>Schoenoplectus validus</i>	-
Euphorbiaceae	<i>Ricinus communis</i> *	Castor Oil Plant
Fabaceae (Faboideae)	<i>Melilotus indicus</i> *	Hexham Scent
	<i>Trifolium campestre</i> *	Hop Clover
	<i>Trifolium pratense</i> *	Red Clover

FAMILY	SCIENTIFIC NAME	COMMON NAME
Fabaceae (Faboideae)(cont.)	<i>Trifolium repens</i> *	White Clover
	<i>Vicia hirsuta</i> *	Tiny Vetch
	<i>Vicia sativa</i> subsp. <i>sativa</i> *	Common Vetch
Fabaceae (Mimosoideae)	<i>Acacia longifolia</i> subsp. <i>longifolia</i>	Sydney Golden Wattle
	<i>Acacia longifolia</i> subsp. <i>sophorae</i>	Coastal Wattle
	<i>Acacia saligna</i> *	Golden Wreath Wattle
Gentianaceae	<i>Centaurium erythraea</i> *	-
Juncaceae	<i>Juncus acutus</i> *	Sharp Rush
	<i>Juncus cognatus</i> *	-
	<i>Juncus planifolius</i>	-
	<i>Juncus usitatus</i>	Common Rush
Lomandraceae	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
Lythraceae	<i>Lythrum hyssopifolia</i>	Hyssop Loosestrife
Malvaceae	<i>Modiola caroliniana</i> *	Red-flowered Mallow
	<i>Sida rhombifolia</i> *	Paddy's Lucerne
Myrsinaceae	<i>Anagallis arvensis</i> *	Scarlet/Blue Pimpernel
Myrtaceae	<i>Corymbia maculata</i>	Spotted Gum
	<i>Leptospermum laevigatum</i>	Coast Teatree
	<i>Melaleuca linariifolia</i>	Snow-in-Summer
	<i>Melaleuca nodosa</i>	Ball Honeymyrtle
	<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark
	<i>Melaleuca styphelioides</i>	Prickly-leaved Tea Tree
	<i>Tristaniopsis laurina</i>	Water Gum
Onagraceae	<i>Ludwigia peruviana</i> *	Peruvian Primrose
Plantaginaceae	<i>Plantago lanceolata</i> *	Lamb's Tongues
	<i>Plantago major</i> *	Large Plantain
Poaceae	<i>Andropogon virginicus</i> *	Whisky Grass
	<i>Arundo donax</i> *	Giant Reed
	<i>Bromus molliformis</i> *	Soft Brome
	<i>Cenchrus clandestinus</i> *	Kikuyu Grass
	<i>Cenchrus setaceus</i> *	Fountain Grass
	<i>Cortaderia selloana</i> *	Pampas Grass
	<i>Cynodon dactylon</i>	Common Couch

FAMILY	SCIENTIFIC NAME	COMMON NAME
Poaceae (cont.)	<i>Echinochloa crus-galli</i> *	Barnyard Grass
	<i>Lachnagrostis filiformis</i>	Brown Grass
	<i>Lagurus ovatus</i> *	Hare's Tail Grass
	<i>Lolium perenne</i> *	Perennial Ryegrass
	<i>Lolium rigidum</i> *	Wimmera Ryegrass
	<i>Paspalum dilatatum</i> *	Paspalum
	<i>Paspalum urvillei</i> *	Vasey Grass
	<i>Phragmites australis</i>	Common Reed
	<i>Setaria parviflora</i> *	Slender Pigeon Grass
	<i>Sporobolus africanus</i> *	Parramatta Grass
	<i>Vulpia myuros</i> *	Rat's Tail Fescue
Polygonaceae	<i>Persicaria decipiens</i>	Slender Knotweed
	<i>Rumex crispus</i> *	Curled Dock
Proteaceae	<i>Banksia integrifolia</i>	Coastal Banksia
	<i>Banksia serrata</i>	Old-man Banksia
Solanaceae	<i>Cestrum parqui</i> *	Green Cestrum
	<i>Solanum nigrum</i> *	Black-berry Nightshade
Typhaceae	<i>Typha orientalis</i>	Broad-leaved Cumbungi
Urticaceae	<i>Parietaria judaica</i> *	Asthma Weed
Verbenaceae	<i>Lantana camara</i> *	Lantana
	<i>Verbena bonariensis</i> *	Purpletop
	<i>Verbena officinalis</i> *	Common Verbena

* Denotes exotic species

APPENDIX D

RECORDED FAUNA



D1 RECORDED FAUNA

Table D.1 Recorded fauna species within the development site

GROUP	SCIENTIFIC NAME	COMMON NAME
Amphibian	<i>Crinia signifera</i>	Common Eastern Froglet
	<i>Limnodynastes peronii</i>	Striped Marsh Frog
Bird	<i>Acridotheres tristis</i> *	Common Myna*
	<i>Acrocephalus australis</i>	Reed Warbler
	<i>Anthochaera carunculata</i>	Red Wattlebird
	<i>Cacatua galerita</i>	Sulphur-crested Cockatoo
	<i>Columba livia</i> *	Rock Dove*
	<i>Corvus coronoides</i>	Australian Raven
	<i>Cracticus torquatus</i>	Grey Butcherbird
	<i>Dacelo novaeguineae</i>	Laughing Kookaburra
	<i>Eolophus roseicapilla</i>	Galah
	<i>Grallina cyanoleuca</i>	Magpie-lark
	<i>Gymnorhina tibicen</i>	Australian Magpie
	<i>Hirundo neoxena</i>	Welcome Swallow
	<i>Malurus cyaneus</i>	Superb Fairy-wren
	<i>Manorina melanocephala</i>	Noisy Miner
	<i>Ocyphaps lophotes</i>	Crested Pigeon
	<i>Pycnonotus jocosus</i> *	Red-whiskered Bulbul*
	<i>Rhipidura leucophrys</i>	Willie Wagtail
	<i>Strepera graculina</i>	Pied Currawong
	<i>Streptopelia chinensis</i> *	Spotted Dove*
	<i>Trichoglossus haematodus</i>	Rainbow Lorikeet
	<i>Vanellus miles</i>	Masked Lapwing

* Denotes exotic species

APPENDIX E

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS



E1 SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

Planning Secretary's Environmental Assessment Requirements

Section 4.12(8) of the *Environmental Planning and Assessment Act 1979*
Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*

Application Number	SSD 9691
Project Name	Orica Southlands Warehouse Estate
Development	Establishment of a warehouse estate, comprising: • a suspended concrete platform above the flood detention basin to support warehouse buildings and hardstand / parking areas • construction of two warehouse buildings for the storage and distribution of general merchandise including goods arriving from Port Botany
Location	28 McPherson Street, Banksmeadow in the Bayside Local Government Area (Lot 9 DP 1205673)
Applicant	Orica Limited
Date of Issue	14 December 2018
General Requirements	The environmental impact statement (EIS) must be prepared in accordance with, and meet the minimum requirements of, clauses 6 and 7 of Schedule 2 of the <i>Environmental Planning and Assessment Regulation 2000</i> (the Regulation). In addition, the EIS must include: • a detailed description of the development, including: – the need for the proposed development – justification for the proposed development – likely staging of the development – likely interactions between the development and existing, approved and proposed operations in the vicinity of the site – plans of any proposed building works • consideration of all relevant environmental planning instruments, including identification and justification of any inconsistencies with these instruments • a risk assessment of the potential environmental impacts of the development, identifying the key issues for further assessment • a detailed assessment of the key issues specified below, and any other significant issues identified in this risk assessment, which includes: – a description of the existing environment, using sufficient baseline data – an assessment of the potential impacts of all stages of the development, including any cumulative impacts, taking into consideration relevant guidelines, policies, plans and statutes – a description of the measures that would be implemented to avoid, minimise, mitigate and if necessary, offset the potential impacts of the development, including proposals for adaptive management and/ or contingency plans to manage significant risks to the environment • a consolidated summary of all the proposed environmental management and monitoring measures, highlighting commitments included in the EIS The EIS must also be accompanied by a report from a qualified quantity surveyor providing: • a detailed calculation of the capital investment value (CIV) (as defined in clause 3 of the Regulation) of the proposal, including details of all assumptions and components from which the CIV calculation is derived.

	The report shall be prepared on company letterhead and indicate applicable GST component of the CIV • an estimate of jobs that will be created during the construction and operational phases of the proposed development • certification that the information provided is accurate at the date of preparation
Key issues	The EIS must address the following specific matters: • Statutory and Strategic Context – including: – detailed justification that the proposed land use is permissible – details of any proposed consolidation or subdivision of land – a description of how the proposal complies with the land restrictions contained within the section 88B(E) public covenant instrument for the land pursuant to the <i>Conveyancing Act 1919</i> – a description of how the proposal is consistent with the relevant requirements of the project approval for the Orica Southlands Remediation and Warehouse Project (MP_06_0191) (as modified) – demonstration that the proposal is consistent with all relevant planning strategies, environmental planning instruments, adopted precinct plans, draft district plan(s) and adopted management plans and justification for any inconsistencies. The following must be addressed: - o State Environmental Planning Policy (Three Ports) 2013 - o Greater Sydney Region Plan: A Metropolis of Three Cities - o Our Greater Sydney 2056: Eastern City District Plan - o Future Transport Strategy 2056. • Suitability of the Site – including: – an analysis of site constraints, such as hazard and risk, flooding impacts and road access to the site – a detailed justification that the site is suitable for the scale of the proposal and any constraints identified, having regard to the sites surrounds and the potential contamination, flooding and hazard impacts • Community and Stakeholder Engagement – including: – a detailed community and stakeholder participation strategy which identifies who in the community has been consulted and a justification for their selection, other stakeholders consulted and the form(s) of consultation, including a justification for this approach – a report on the results of the implementation of the strategy including issues raised by the community and surrounding land owners and occupiers that may be impacted by the proposal – details of how issues raised during community and stakeholder consultation have been addressed and whether they have resulted in changes to the proposal – details of the proposed approach to future community and stakeholder engagement based on the results of consultation • Hazards and Risk – including: – a preliminary risk screening completed in accordance with State Environmental Planning Policy No. 33 – Hazardous and Offensive Development and Applying SEPP 33 (DoP, 2011), with a clear indication of class, quantity and location of all dangerous goods and hazardous materials associated with the development. Should preliminary screening indicate that the development is "potentially hazardous," a Preliminary Hazard Analysis (PHA) must be prepared in accordance with Hazardous Industry Planning Advisory Paper No. 6 - Guidelines for Hazard Analysis (DoP, 2011) and Multi-Level Risk Assessment (DoP, 2011) – an evaluation and assessment of the risks posed by the Botany Industrial Park complex on the development and demonstrate that the

	development complies with the risk criteria for development in the vicinity of potentially hazardous facilities published in Hazardous Industry Planning Advisory Paper No. 10 – Land Use Safety Planning (DoP, 2011). The assessment must be undertaken in consultation with BIP, must be based on the most recently available data and must demonstrate that the development would not result in any increase of the overall societal risk in the area – address all relevant recommendations published in Botany-Randwick Industrial Area Land Use Safety Study (DUAP 2001) • Flooding – a detailed hydrological and hydraulic assessment which includes the following: – a comprehensive assessment of the impact of flooding on the development for the full range of flood events up to the probable maximum flood. – an assessment of the impacts of the development on flood behaviour (i.e. levels, velocities and duration of flooding) and on adjacent, downstream and upstream areas – details of proposed floor levels for all proposed habitable structures on the site having considered the full range of flood events up to the probable maximum flood – an emergency response plan for the site, which includes consideration of site accessibility, a flood-free access to and from the development site and evacuation measures in extreme flood events • Contamination – including: - assessment of the extent and nature of any contamination of the soil, groundwater and soil vapour including the potential risks to human health and the environmental receptors near the site - a remediation action plan (RAP) detailing the measures that will be undertaken to remediate and manage any contamination identified at the site - the engagement of a Site Auditor accredited under the <i>Contaminated Land Management Act 1997</i> NSW Site Auditor Scheme - a Section B Site Audit Statement and Site Audit Report prepared by a NSW Site Auditor, certifying site suitability for the intended use subject to the implementation of an appropriate RAP • Traffic and Transport – including: – a Traffic Impact Assessment prepared in accordance with relevant guidelines – details of all daily and peak traffic and transport movements likely to be generated by the development including the impact on the nearby intersections and the need/associated funding for the upgrading or road improvements works (if required) – impacts on the safety and capacity of the surrounding road network and access points, using SIDRA or similar modelling, to assess impacts from current traffic counts and cumulative traffic from existing and proposed development – demonstrate that sufficient loading/unloading, car parking and pedestrian and cyclist facilities have been provided for the development – details and a justification of access to, from and within the site (vehicular and pedestrian) – details of road upgrades, new roads or access points required for the development, if necessary • Soils and Water – including: – a description of the water demands and a breakdown of water supplies, including a detailed site water balance – identification of any water licensing requirements under the <i>Water Act 1912</i> or <i>Water Management Act 2000</i> – details of proposed erosion and sediment controls during construction
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	– an assessment of potential impacts on surface and groundwater resources, drainage patterns, soil (stability, salinity and acid sulfate soils), related infrastructure, watercourses and riparian land and proposed mitigation, management and monitoring measures • Infrastructure Requirements – including: – a detailed written and/or graphical description of infrastructure required on the site – identification of any infrastructure upgrades required off-site to facilitate the development, and describe any arrangements to ensure that the upgrades will be implemented in a timely manner and maintained – detailed design plans to demonstrate the development will allow safe heights under the floor slab of the warehouse, to allow for access and maintenance and installation of service – an infrastructure delivery and staging plan, including a description of how infrastructure on and off-site will be co-ordinated and funded to ensure it is in place prior to the commencement of construction – an assessment of the impacts of the development (construction and operation) on existing infrastructure surrounding the site – consideration of the <i>Civil Aviation (Buildings Control) Regulation 1988</i> (Cwth) • Biodiversity – including: – an assessment of the proposal's biodiversity impacts in accordance with the <i>Biodiversity Conservation Act 2016</i>, including the preparation of a Biodiversity Development Assessment Report (BDAR) where required under the Act, except where a waiver for preparation of a BDAR has been granted • Urban Design and Visual – including: – consideration of the layout and design of the development having regard to the surrounding vehicular, pedestrian and cycling networks – detailed plans showing suitable landscaping and urban green cover design which incorporates endemic species • Noise and Vibration – including: – a quantitative noise and vibration impact assessment undertaken by a suitably qualified person in accordance with the relevant Environment Protection Authority guidelines and including an assessment of nearby sensitive receivers – cumulative impacts of other developments – details of proposed mitigation, management and monitoring measures • Air Quality – including: – an assessment of the air quality impacts (including dust) during the construction and operation of the development, in accordance with the relevant Environment Protection Authority guidelines – details of proposed mitigation, management and monitoring measures • Waste – including: – details of the quantities and classification of all waste streams to be generated on site during the development – details of waste storage, handling and disposal during the development – details of the measures that would be implemented to ensure that the development is consistent with the aims, objectives and guidance in the NSW Waste Avoidance and Resource Recovery Strategy 2014-2021
Plans and Documents	The EIS must include all relevant plans, architectural drawings, diagrams and relevant documentation required under Schedule 1 of the Regulation.

	You should provide these as part of the EIS rather than as separate documents
Consultation	During the preparation of the EIS, you must consult with the relevant local, State or Commonwealth Government authorities, service providers, community groups and affected landowners In particular you must consult with: • Bayside Council • Office of Environment and Heritage • Environment Protection Authority • Roads and Maritime Services • Transport for NSW • Department of Industry – Crown Lands and Water • Ausgrid • AirServices Australia • Civil Aviation Safety Authority • Sydney Airport • Sydney Water • surrounding local residents and stakeholders • any other public transport or community service providers The EIS must describe the consultation process and the issues raised and identify where the design of the development has been amended in response to these issues. Where amendments have not been made to address an issue, a short explanation should be provided
Further consultation after 2 years	If you do not lodge a Development Application and EIS for the development within 2 years of the issue date of these SEARs, you must consult further with the Secretary in relation to the preparation of the EIS
References	The assessment of the key issues listed above must take into account relevant guidelines, policies, and plans as identified. While not exhaustive, the following attachment contains a list of some of the guidelines, policies, and plans that may be relevant to the environmental assessment of this proposal

ATTACHMENT 1

Technical and Policy Guidelines

The following guidelines may assist in the preparation of the environmental impact statement. This list is not exhaustive and not all of these guidelines may be relevant to your proposal.

Many of these documents can be found on the following websites:

<http://www.shop.nsw.gov.au/index.jsp>
<http://www.australia.gov.au/publications>
<http://www.epa.nsw.gov.au/>
<http://www.environment.nsw.gov.au/>
<http://www.dpi.nsw.gov.au/>

Policies, Guidelines & Plans

Aspect	Policy / Methodology
Hazards and Risk	State Environmental Planning Policy No. 33 – Hazardous and Offensive Development Applying SEPP 33 – Hazardous and Offensive Development Application Guidelines (DUAP) Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis Planning Advisory Paper No. 4 – Risk Criteria for Land Use Safety Planning (DoP 2011)
Soils and Water	
<i>Contamination</i>	National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPC) State Environmental Planning Policy No. 55 – Remediation of Land Managing Land Contamination - Planning Guidelines SEPP 55 – Remediation of Land (DUAP and EPA) Guidelines for the assessment and management of groundwater contamination (EPA, March 2007) Guidelines for the NSW Site Auditor Scheme, 3rd edition (EPA, October 2017)
<i>Acid Sulfate Soils</i>	Acid Sulfate Soil Manual (ASSMAC) Managing Urban Stormwater: Soils & Construction (Landcom)
<i>Erosion and Sediment</i>	Design Manual for Soil Conservation Works - Technical Handbook No. 5 (Soil Conservation Service of NSW) Soil and Landscape Issues in Environmental Impact Assessment (DLWC) Wind Erosion – 2nd Edition
<i>Groundwater</i>	National Water Quality Management Strategy Guidelines for Groundwater Protection in Australia (ARMCANZ/ANZECC) NSW State Groundwater Policy Framework Document (DLWC) NSW State Groundwater Quality Protection Policy (DLWC) NSW State Groundwater Quantity Management Policy (DLWC) Draft The NSW State Groundwater Dependent Ecosystem Policy (DLWC) NSW Aquifer Interference Policy (NOW) Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources (NOW) 2011
<i>Stormwater</i>	Bunding and Spill Management (EPA) Managing Urban Stormwater: Strategic Framework. Draft (EPA)

Policies, Guidelines & Plans

Aspect	Policy / Methodology
	Managing Urban Stormwater: Council Handbook. Draft (EPA)
	Managing Urban Stormwater: Treatment Techniques (EPA)
	Managing Urban Stormwater: Source Control. Draft (EPA)
	Managing Urban Stormwater: Harvesting and Reuse (DEC)
<i>Flooding</i>	NSW Floodplain Development Manual (2005)
<i>Wastewater</i>	National Water Quality Management Strategy: Guidelines for Sewerage Systems - Effluent Management (ARMCANZ/ANZECC)
	National Water Quality Management Strategy: Guidelines for Sewerage Systems - Use of Reclaimed Water (ARMCANZ/ANZECC)
	National Water Quality Management Strategy - Guidelines For Water Recycling: Managing Health And Environmental Risks (Phase1) (EPHC, NRMMC & AHMC)
Traffic, Transport and Access	
	<i>Roads Act 1993</i>
	State Environmental Planning Policy (Infrastructure) 2007
	Guide to Traffic Generating Development (Roads and Maritime Services)
	Road Design Guide (Roads and Maritime Services)
	Austroads Guide to Traffic Management – Pt 12: Traffic Impacts of Development
	Austroads Guidelines for Planning and Assessment of Road Freight Access in Industrial Areas
	NSW Long Term Transport Master Plan
Biodiversity	
	The Biodiversity Assessment Method (OEH, 2017)
Heritage	
	Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW (OEH 2011)
	Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW 2010)
	Draft Guidelines for Aboriginal Cultural Impact Assessment and Community Consultation (Department of Planning 2005)
	Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (DECCW 2010)
	<i>Heritage Act 1977</i>
Noise and Vibration	
	Assessing Vibration: A Technical Guide (DEC, 2006)
	Noise Policy for Industry (EPA, 2017)
	Environmental Criteria for Road Traffic Noise (EPA, 1999)
	Noise Guide for Local Government (EPA, 2013)
	Interim Construction Noise Guideline (DECC, 2009)
Hazards and Risk	
<i>Air Quality</i>	Protection of the Environment Operations (Clean Air) Regulation 2002
	Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales (DEC)
	Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (EPA 2016)
<i>Greenhouse Gas</i>	Guidelines for Energy Savings Action Plans (DEUS, 2005)
	AGO Factors and Methods Workbook (AGO)
Waste	
	Waste Avoidance and Resource Recovery Strategy 2014-21 (EPA)
Visual	

Policies, Guidelines & Plans

Aspect	Policy / Methodology
	Control of Obtrusive Effects of Outdoor Lighting (Standards Australia, AS 2482)
	State Environmental Planning Policy No 64 - Advertising and Signage
	Urban Green cover in NSW Technical Guidelines (OEH, 2015)
Social	
	Social Impact Assessment Guideline (Department of Planning and Environment)