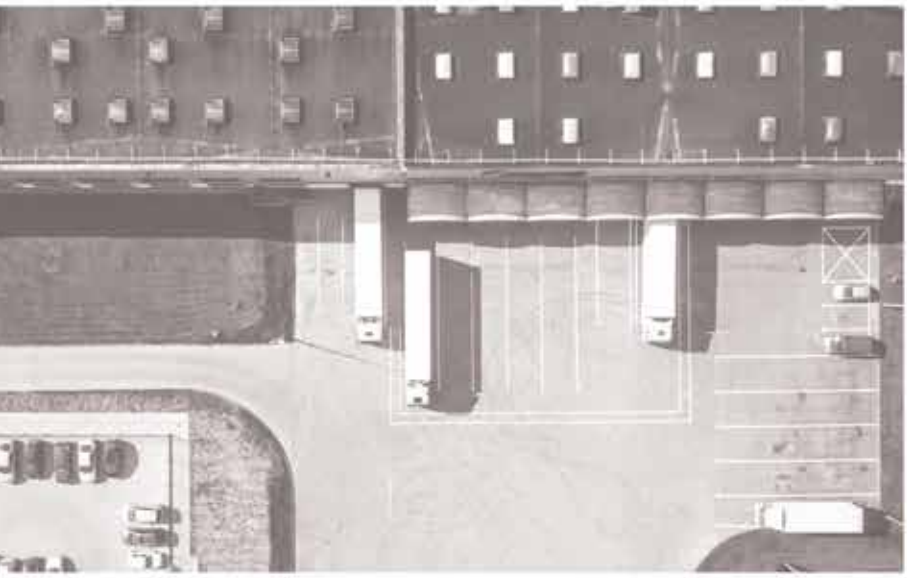
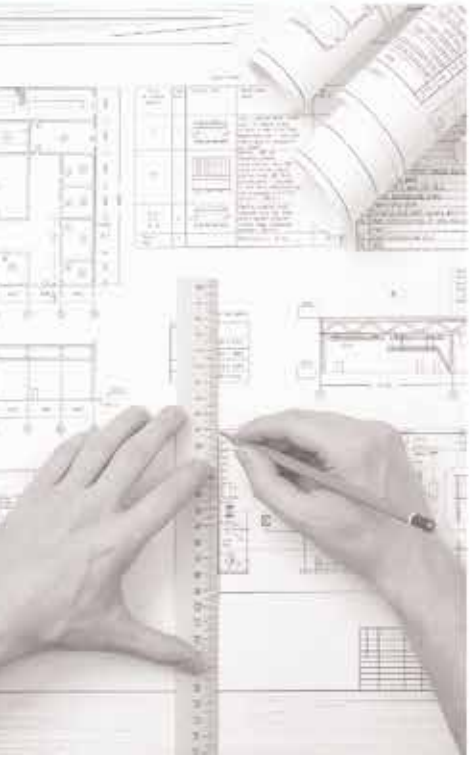
Appendix B

Ecological impact assessment





Ecological Assessment

Moorebank Cove Residential Development

Prepared for Mirvac Homes (NSW) Pty Ltd | 14 December 2016

Ecological Assessment

Final

Report J16050ARP3 | Prepared for Mirvac Homes (NSW) Pty Ltd | 14 December 2016

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Table of contents

Table of contents *(Cont'd)*

Appendices

Tables

Figures

Photographs

1 Introduction

Mirvac Homes (NSW) Pty Ltd have commissioned EMM Consulting Pty Limited (EMM) to assess the ecological impacts of the Moorebank Cove Residential Estate which is proposed to be developed on part of Lot 7 DP 1065574 at 146 Newbridge Road, Moorebank (Figure 1.1). The ecological assessment aims to build on and update previous studies conducted within the site.

1.1 Background

The site is currently used for extractive industry and recycling operations. Subject to development approval, both the Moorebank Cove Residential Estate, containing 179 dwellings, and a marina, south of the study area would be constructed within Lot 7 DP 1065574.

The study area is approximately 10 ha and is located in the Liverpool Local Government Area (LGA), operated by Benedict Industries.

1.2 Purpose of this report

The ecological assessment was undertaken by EMM to consider the impacts of the proposal residential development. The aims of this assessment are to:

- conduct new record searches for threatened species and communities;
- assess the characteristics and ecological condition of the vegetation communities and habitats within the study area, which may have altered since previous assessments;
- determine the occurrence, or likelihood of occurrence of threatened species, populations and endangered ecological communities listed under the NSW *Environmental Planning and Assessment Act 1995* (TSC Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act 2000* (EPBC Act), including those species recently listed;
- describe and quantify impacts on biodiversity resulting from the proposal; and
- provide recommendations to avoid, minimise and mitigate potential impacts of the proposal on threatened biodiversity.

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The project location

Moorebank Cove Residential Development Ecological Assessment,
Prepared for Mirvac Homes (NSW) Pty Ltd

Figure 1.1

1.3 Legislative framework

Legislation and planning policies relevant to the protection of biodiversity or their habitats and this ecological assessment are provided below. These statutory instruments provide conditions, matters for consideration, and requirements to seek authorisation (licences and approvals) to undertake various actions and activities. The State and Commonwealth legislation applicable to this assessment are:

- Environmental Planning and Assessment Act (1979);
- TSC Act;
- NSW *Native Vegetation Act 2003* (NV Act);
- NSW *National Parks and Wildlife Act 1974* (NPW Act);
- NSW *Noxious Weeds Act 1993* (NW Act);
- *State Environmental Planning Policy No. 44 – Koala Habitat Protection* (SEPP 44); and
- EPBC Act.

1.3.1 NSW Environmental Planning and Assessment Act 1979

The relevant planning legislation for NSW is the EP&A Act. The EP&A Act institutes a system of environmental planning and assessment in NSW and is administered by the Department of Planning and Environment (DPE)

1.3.2 State Environmental Planning Policy No. 44 – Koala Habitat Protection

SEPP 44 aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reserve the current trend of koala population decline by:

- requiring the preparation of plans of management before development consent can be granted in relation to areas of core koala habitat;
- encouraging the identification of areas of core koala habitat; and
- encouraging the inclusion of areas of core koala habitat in environment protection zones.

This policy only applies to the LGAs listed in Schedule 1 of the policy but does not apply to land dedicated or reserved under the NPW Act or to land dedicated under the NSW *Forestry Act 1916* as a state forest or flora reserve. Liverpool LGA is listed within Schedule 1 and therefore SEPP 44 applies to the proposed development.

1.3.3 Threatened Species Conservation Act 1995

The TSC Act is administered by NSW Office of Environment and Heritage (OEH) and establishes mechanisms for:

- management and protection of listed threatened species of native flora and fauna (excluding fish and marine vegetation);
- listing of threatened species or key threatening processes;
- development and implementation of recovery and threat abatement plans;
- declaration of critical habitat;
- consideration and assessment of threatened species impacts in development assessment process; and
- management and regulation of actions that may damage critical or other habitat or otherwise significantly affect threatened species, populations and ecological communities.

The TSC Act lists threatened species, populations and ecological communities, which are priorities for conservation within NSW, under Schedules 1 and 2 of the Act. Schedule 3 of the Act lists key threatening processes for species, populations and ecological communities within NSW.

Section 5A of the EP&A Act sets out seven factors to be considered during assessments of significance (seven-part test) when determining whether a proposed action will, or is likely to, have a significant effect on a threatened species, endangered populations or Endangered Ecological Communities (EECs) listed under the schedules of the TSC Act. Potential impacts of the proposed development to threatened species, endangered populations or EECs are considered in Chapter 4. Seven-part tests are provided in Appendix D.

1.3.4 NSW Native Vegetation Act 1997

The NV Act provides for the management of native vegetation in NSW. Generally, approval to clear native vegetation in NSW is required under the NV Act. Potential impacts of the proposed development on native vegetation is considered in Chapter 4.

1.3.5 NSW National Parks and Wildlife Act 1974

The NPW Act is administered by OEH and contains provisions that relate to the protection of native terrestrial fauna, flora and EECs. Under the NPW Act, it is an offence to harm threatened species; buy, sell or possess threatened species; damage critical habitat; or damage the habitat of a threatened species without approval under the Act. Under section 171 of the Act, the Secretary may authorise the harming of threatened and protected flora and fauna species and habitats. It is a defence to prosecution under the Act if the offence is necessary for carrying out a project that has received development consent under the EP&A Act.

1.3.6 NSW Fisheries Management Act 1994

The FM Act provides management of marine and aquatic fish species, population communities and marine vegetation. Any impact to marine vegetation such as mangroves requires a permit under the Act.

1.3.7 Noxious Weeds Act 1993

The NW Act defines the roles of government, councils, private landholders and public authorities in the management of noxious weeds. The NW Act sets up categorisation and control actions for noxious weeds and imposes penalties for various offences. All private landowners, occupiers, public authorities and councils are required to control noxious weeds on their land under Part 3, Division 1 of the NW Act.

1.3.8 Commonwealth Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities, heritage places and water resources which are defined as MNES (Matters of National Environmental Significance), as defined under the EPBC Act as:

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

Under the EPBC Act, an action that may have a significant impact on a MNES is deemed to be a 'controlled action' and can only proceed with the approval of the Commonwealth Minister for the Environment. An action that may potentially have an impact on a MNES is to be referred to Commonwealth Department of the Environment (DoE) for determination as to whether or not it is a controlled action. The proposed development will not have a significant impact on any MNES and, therefore, is not required to be referred to DoE and does not require approval from the Commonwealth Minister for the Environment.

2 Methods

2.1 Desktop review

2.1.1 Previous local studies

Two ecological studies have been previously completed at the site, which were reviewed prior to completing the field survey. These are described below.

i Total Earth Care (2006)

A flora and fauna assessment was completed to support a rezoning application (Total Earth Care 2006). The assessment included site surveys and classification of ecological constraints within an area which includes the current study area.

Desktop searches were completed for a 5 km radius of the project area in 2004, followed by two days of survey (23 August 2004 and 11 January 2005) including:

- identification of plant species;
- mapping and classification of plant communities;
- targeted searches for plant species of conservation significance;
- diurnal observation of fauna;
- searches for fauna evidence; and
- targeted searches for habitat types of threatened fauna.

ii Total Earth Care 2011

An updated flora and fauna assessment was completed to support the development application for the Georges Cove Marina (Total Earth Care 2011), which includes the current study area (refer to Figure 1.1). The assessment assessed the conservation significance of biodiversity values at the site and provided an indication of the potential constraints to the development of the marina.

Updated database searches (5 km) were completed prior to a field survey on 5 September 2011. The survey included:

- identification of plant species;
- mapping and classification of plant communities;
- targeted searches for plant species of conservation significance;
- diurnal observation of fauna including aural and visual detection of birds and frogs;
- searches for fauna evidence; and
- targeted searches for habitat types of threatened fauna.

Several studies have also been conducted in adjacent to the current study area including:

- A flora and fauna assessment for Boral, Moorebank, which included targeted threatened species surveys (ERM 2002);
- assessments of impacts for a proposed service road at Morebank for Boral (ERM 2003); and
- a flora and fauna assessment for the proposed rezoning of land south of the marina study area (AES 2002).

2.1.2 Database searches

Background literature reviews and database searches were conducted to obtain recent data on flora and fauna species, populations, communities and habitats. The search area included the study area and the locality (defined as within 5 km of the study area), prior to the field survey. Background information reviewed included:

- topographic map, aerial photograph and geographic information system (GIS) interpretations;
- the NSW OEH Atlas of NSW Wildlife database (Bionet 2016) to identify threatened and migratory species records, the search was limited to records within a 20 year period to exclude historical records; and
- the Commonwealth Department of the Environment's (DoE) online Protected Matters Search Tool (PMST) to identify species and ecological community habitat listed under the EPBC Act (refer to Appendix A for the full report).

The results of the literature review and database search informed survey effort and design through the identification of threatened species, populations and ecological communities as listed under the EPBC Act or the TSC Act that may occur in the study area.

2.2 Field survey

The field investigation was not designed to detect all resident and transitory species within the study area. Instead, it aimed to provide an overall assessment of the ecological features of the study area, building on and updating the previous ecological surveys completed. An EMM ecologist conducted a field survey on Friday 15 July 2016.

2.2.1 Flora and Vegetation

Details regarding the vegetation structure and dominant flora species were recorded within the study area. Notes were taken describing any disturbances (such as weed invasion, human disturbance) to assess the vegetation condition. Dominant species in each vegetation layer (ground, shrub and canopy) were recorded to identify vegetation communities, particularly those representative of EECs, and to identify potential habitat for threatened flora species. Meander searches were conducted through native vegetation to target threatened flora species.

Where possible, vegetation communities identified within the vegetation community were classified into PCTs described by OEH. The vegetation information system (VIS) classification database (OEH 2016) contains descriptions of all Plant Community Types (PCTs) identified. The database was established as the NSW standard community level vegetation classification for use in site based planning processes and standardised vegetation mapping.

2.2.2 Fauna

Targeted fauna surveys were not undertaken and fauna species were recorded opportunistically as they were encountered during the field survey. Any evidence of fauna such as tracks, scats, scratches on and around trees, and any potential fauna habitat features were also noted, including:

- the presence of nesting/sheltering/basking sites such as tree hollows, litter, fallen timber and logs and rocks;
- the cover/abundance of ground, shrub and canopy layers;
- drainage and the presence of freshwater habitats noting their permanency (ie permanent, semi-permanent or ephemeral);
- connectivity to adjacent areas of habitat;
- the extent and nature of previous disturbances, including the presence of fire scars and dieback;
- vegetation assemblage and structure;
- soil type and topography; and
- habitat surveys for Koala habitat and feed trees, including opportunistic surveys for individuals and scats (faeces).

3 Results

3.1 Desktop review

3.1.1 Previous studies

Two endangered ecological communities listed under the TSC Act, were identified within wider project area considered by TEC (2011): River Flat Eucalypt Forest and Swamp Oak Floodplain Forest. Both of these communities were described as almost entirely modified and highly disturbed.

Remnant Castlereagh Ironbark Forest and Cumberland Plain Woodland were identified on the adjacent Boral site during field investigations by ERM (2002) and Cooks River - Castlereagh Ironbark Forest was also identified within the Moorebank Recyclers site, to the south of the marina development (AES 2002).

A total of 87 flora species were recorded within the wider project area considered by TEC (2011) comprising 38 native species and 49 introduced species. Of the 49 introduced flora species, nine were listed noxious weeds for the Liverpool LGA. No threatened flora species were recorded by TEC during either of the 2006 or 2012 surveys or were considered likely to occur. One threatened plant species, *Acacia pubescens*, has been recorded on the sites adjacent to the study area (ERM 2002).

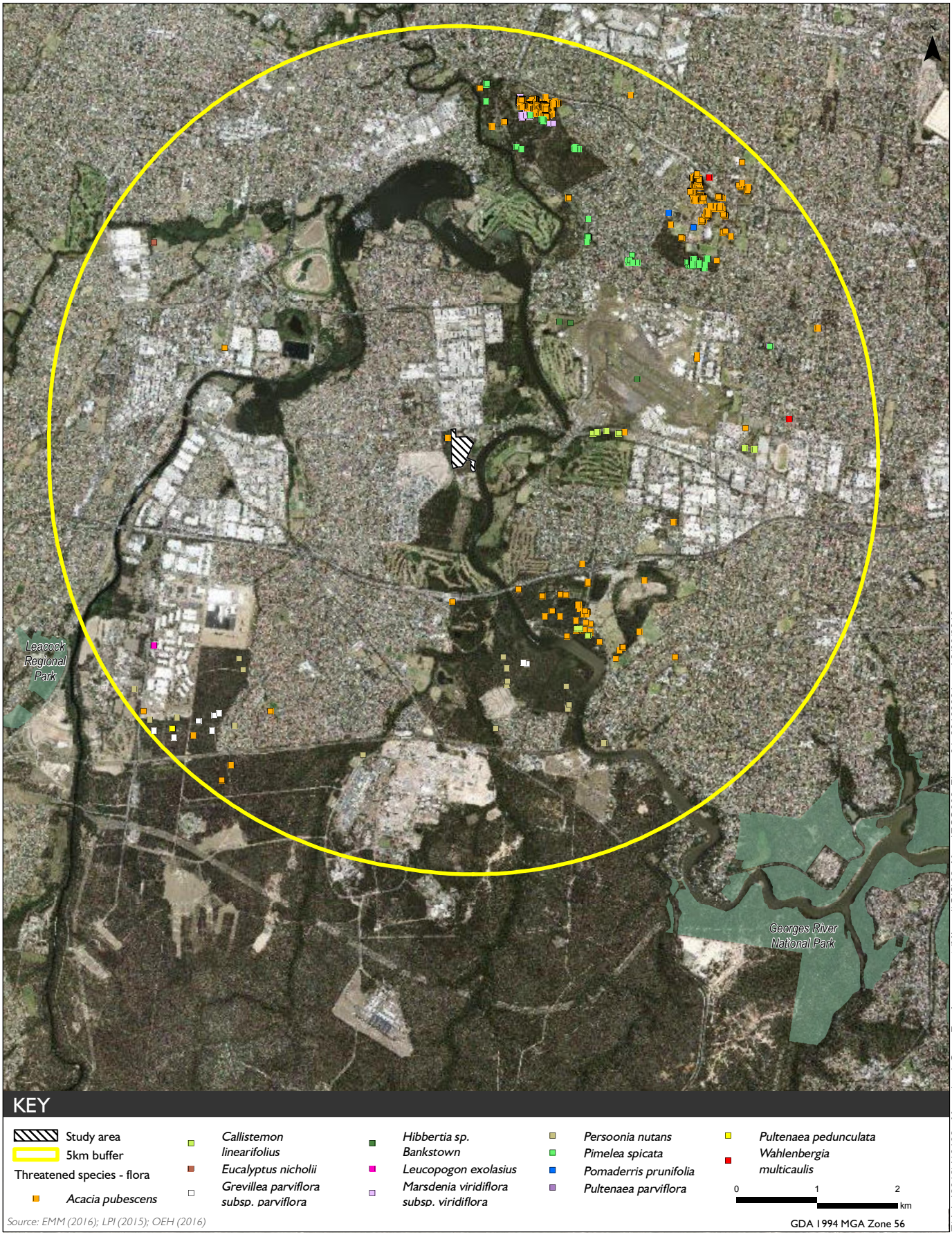
A total of 22 vertebrate fauna species were identified by TEC during 2011 field investigations, none of which were threatened. One EPBC listed migratory species was recorded, the White-bellied Sea Eagle (*Haliaeetus leucogaster*). A conservative approach was undertaken for two threatened microbat species, Eastern Freetail-bat (*Mormopterus norfolkensis*) and Yellow–bellied Sheathtail Bat (*Saccolaimus flaviventris*). They were considered as present within the site as they had been recorded at the adjacent Boral site. Other threatened species were considered unlikely to occur on the site, other than a transient basis in the case of mobile, wide ranging and nomadic species. For example some bat and bird species may occur on the site temporarily or transiently during foraging excursions. The Cumberland Land Snail (*Meridolum corneovirens*) was recorded at the adjacent Boral site (ERM 2002).

3.1.2 Database searches

The PMST tool identified the following ecological values which may occur within the area, or may have suitable habitat for the entity within the area (refer to Appendix A):

- 8 threatened ecological communities which may occur within the area;
- 60 listed threatened species which may occur within the area or have suitable habitat within the area; and
- 31 listed migratory species which may occur within the area

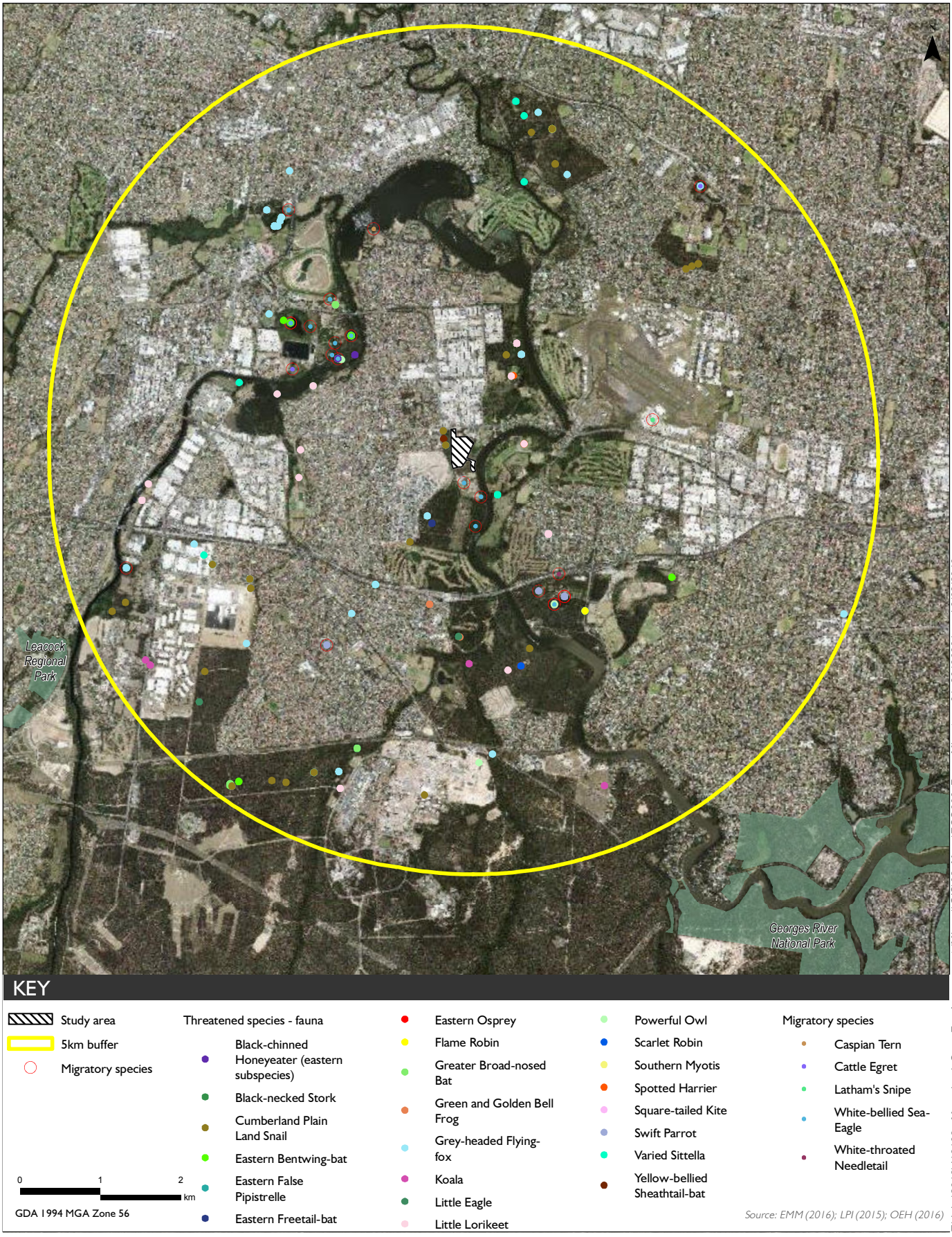
The Bionet search identified thirteen threatened plant species within the locality, none of which were located within the study area itself (Figure 3.1). A total of 22 threatened fauna species have been recorded within the locality, which consists of eight mammals, one gastropod, one amphibian and 12 birds (Figure 3.2). An additional five migratory species were also recorded. Refer to Appendix B for the list of species recorded within the locality and their listing status.



Threatend flora recorded within the locality

Moorebank Cove Residential Development Ecological Assessment,
Prepared for Mirvac Homes (NSW) Pty Ltd

Figure 3.1



Threatend fauna and migratory species recorded within the locality

Moorebank Cove Residential Development Ecological Assessment,
Prepared for Mirvac Homes (NSW) Pty Ltd

Figure 3.2

3.2 Field survey

3.2.1 Vegetation

The majority of the study area is cleared with bare sand and gravel, owing to its prior use for sand and gravel extraction and subsequent use as a recycling facility. Vegetation is largely limited to the northern and western peripheries of the study area and consists of disturbed regenerating communities. No remnant vegetation is present within the study area. Vegetation community classifications for the study area are described below.

i Swamp Oak Floodplain Forest

PCT 1232 Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion

This vegetation type primarily occurs in the north of the study area, with a very small patch also existing in the south-east adjacent to Georges River (refer to Figure 3.3 and Photograph 3.1). The total area of this community within the study area is 0.15 ha.

The dominant canopy species is Swamp Oak (*Casuarina glauca*), with scattered Forest Red Gum (*Eucalyptus tereticornis*) also present on the periphery of the community. The mid stratum is almost entirely absent, restricted to occasional Fringed Wattle (*Acacia fimbrata*). Native groundcover species are limited to Common Couch (*Cynodon dactylon*) and Scurvy Weed (*Commelina cyanea*), which occur at low densities. Exotic species dominate the ground strata with a high cover of Balloon Vine ((*Cardiospermum grandiflorum*), Panic Veldtgrass (*Ehrhatia erecta*), Cobbler's Pegs (*Bidens pilosa*), Caster Oil Plant (*Ricinus communis*) and Paddy's Lucerne (*Sida rhombifolia*).

This vegetation community is attributed to the PCT *1232 Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion.* In addition to the correct landscape position, the dominant canopy species of Swamp Oak is typical of this PCT. Forest Red Gum did not occur in sufficient quantities to consider placing this community in any of the Sclerophyll dominated PCTs. This PCT often has Melaluca species present in the mid story and canopy however the absence of Melaleuca may be due to disturbance or may be naturally absent. The two native groundcover species recorded are typically found within this PCT.

The dominant Swamp Oak canopy and landscape position of this vegetation community meets the scientific determination for the *Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions EEC* listing. The almost entirely exotic understory does not preclude this community being listed as the EEC, with very few examples of Swamp Oak Floodplain Forest remaining unaffected by weeds.

Photograph 3.1 Swamp Oak Floodplain forest within the north east of the study area.

ii River Flat Eucalypt Forest

PCT 836 Forest Red Gum - Rough-barked Apple open forest on poorly drained lowlands of the Central Coast, Sydney Basin Bioregion

This vegetation type primarily occurs on the eastern perimeter of the study area, refer to Figure 3.3 and Photograph 3.2. The total area of this community within the study area is 0.41 ha.

The canopy species are mixed with Forest Red Gum, Sydney Blue Gum (*Eucalyptus saligna*), Swamp Mahogany (*Eucalyptus robusta*) and Rough-barked Apple (*Angophora floribunda*). Few native species are present in the mid stratum, limited to occasional Swamp Oak, Sweet Pittosporum (*Pittosporum undulatum*) and Willow Bottlebrush (*Callistemon salignus*). The mid stratum has a high coverage of weed species including Camphor Laurel (*Cinnamomum camphora*), Large-leaf Privet (*Ligustrum lucidum*), Small-leaf Privet (*Ligustrum sinense*), Green Cestrum (*Cestrum parqui*) and Lantana (*Lantana camera*). The ground stratais dominated by exotic herbs and grasses including Balloon Vine, Purpletop (*Cestrum parqui*), Paspalum (*Paspalum dilatatum*), Guinea grass (*Panicum maximum*) and Trad (*Tradescantia fluminensis*).

This vegetation community is attributed to the PCT *836 Forest Red Gum - Rough-barked Apple open forest on poorly drained lowlands of the Central Coast, Sydney Basin Bioregion.* The PCT lists five characteristic species within upper stratum of which four occur within the community within the study area: Forest Red Gum, Swamp Oak, Swamp Mahogany and Rough-barked Apple.

None of the mid stratum or ground stratum species listed for this PCT were recorded within the community, which is likely to be due to the highly disturbed nature of the community and the very high prevalence of weed species.

This community meets the scientific determination for the *River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions EEC*, given the presence of characteristic Eucalypt and Angophora canopy. Whilst the largely exotic mid and ground stratum reduces the value of this community, it does not preclude the community from being part of the EEC.

Photograph 3.2 River Flat Eucalypt forest

iii Planted vegetation

Planted vegetation exists on the bank of the drainage line in the south eastern corner of the study area, refer to Figure 3.3 and Photograph 3.3. The total area of this community within the study area is 0.03 ha.

It comprises a mixture of small trees and shrubs which do not reflect any naturally occurring communities or PCTs. The most frequent species include are Coast Myall (*Acacia binervia*), Swamp Oak, River Oak (*Casuarina cunninghamiana*), Fringed Wattle and the invasive Golden Wreath Wattle (*Acacia saligna*). The ground cover is sparse and largely restricted to weeds including Fireweed (*Senecio madagascariensis*), Crofton Weed (*Ageratina adenophora*), Cobblers Pegs and Panic Veldtgrass.

Photograph 3.3 Planted vegetation

iv Mangrove forest

PCT 916 Mangrove - Grey Mangrove low closed forest of the NSW Coastal Bioregion

There is a narrow band of mangroves on the banks of the Georges River with co-dominant Grey Mangrove (*Avicennia marina*) and River Mangrove (*Aegiceras corniculatum*) (refer to Figure 3.3 and Photograph 3.4). Mangroves are considered marine vegetation and therefore listed under the FM Act. If these are to be cleared a permit is required. This community is outside of the study area and are not considered further in this terrestrial assessment.

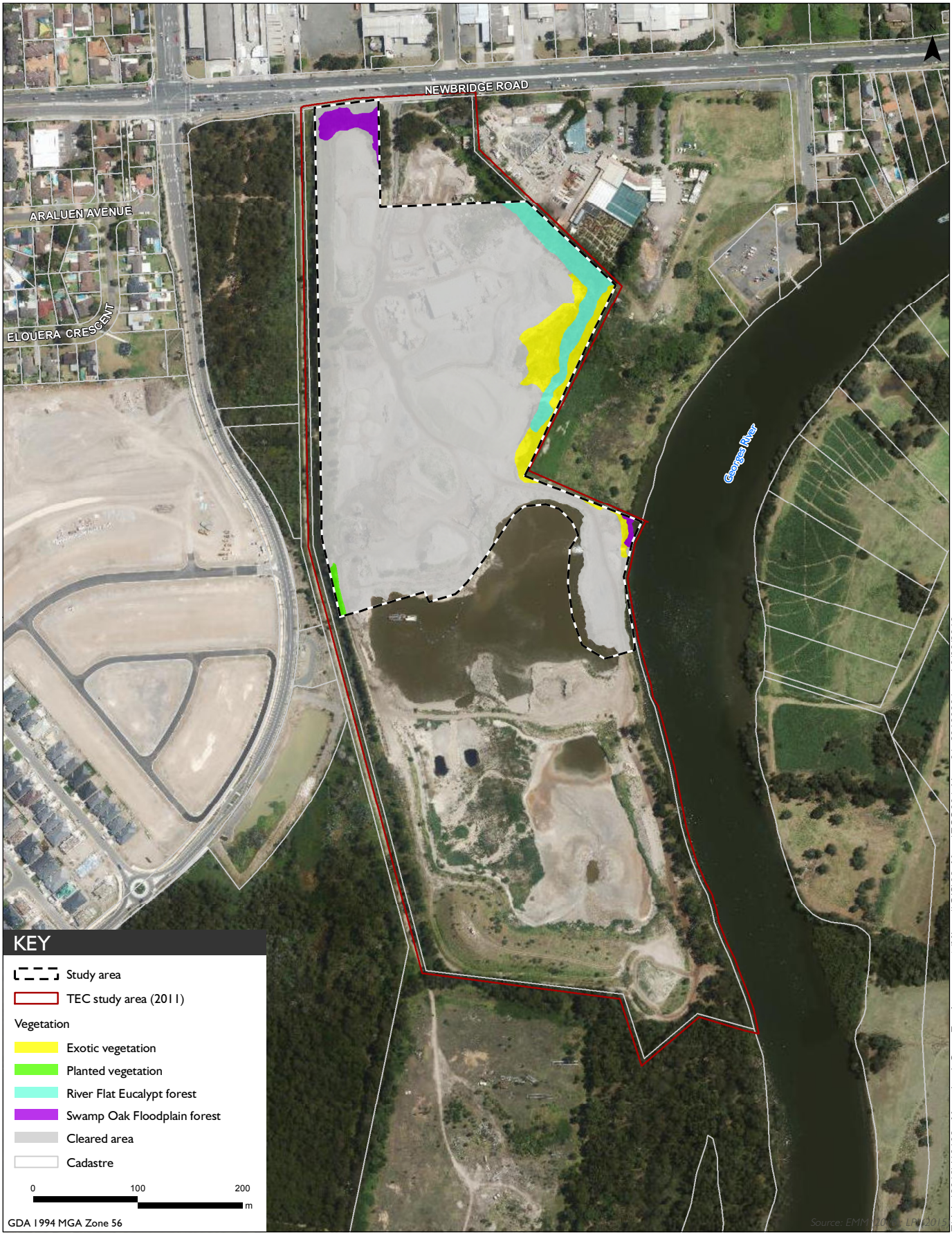
Photograph 3.4 Mangrove forest outside of the study area

v Exotic vegetation

Several patches of exotic vegetation occur within the study area. These have no native canopy species and a modified soils structure (Figure 3.3). These areas are dominated by variety of exotic forbs, grasses and small shrubs, including: Purpletop, Paspalum, Kikuyu and Paddy's Lucerne. The introduced Golden Wreath Wattle also occur as scattered shrubs.

vi Cleared areas

The cleared areas are unvegetated, consisting of unconsolidated soils, sand and gravels. There is evidence of recent clearance of small patches of vegetation within the study area; mostly along the drainage line and in the south of the site



Vegetation Communities within the study area

Moorebank Cove Residential Development Ecological Assessment,
Prepared for Mirvac Homes (NSW) Pty Ltd

Figure 3.3

3.2.2 Flora

A total of 39 flora species were recorded within the study area of which 18 are native species and 21 are weed species. No threatened flora species were recorded during the most recent field survey, nor have any other threatened flora been identified on site during previous investigations (TEC 2006 & 2012).

i Noxious Weeds

Eleven noxious weeds species, declared in the Local Control Authority area of Liverpool City Council, were recorded within the study area by EMM (2016). An additional five species have been recorded previously in the wider area surveyed by TEC (2011). These additional species have been included in Table 3.1 as there is a high potential for the species to spread into the site through natural dispersal or by anthropogenic means. Two of the species recorded by TEC are aquatic, associated with the drainage line on the western boundary of the study area. Immediately prior to the most recent field survey, the vegetation within and adjacent to the drainage line had been removed, therefore it is possible that the aquatic weed species had been removed. These species regenerate rapidly vegetatively and therefore, if these species were previously present, re-colonisation of the watercourse is highly likely.

Of the sixteen species recorded, six are Class 3 Regionally Controlled Weeds, meaning the plant must be 'fully and continuously suppressed and destroyed, the plant must not be sold, propagated or knowingly distributed'(DPI, 2016). Ten species are Class 4 Locally Controlled Weeds, meaning that 'the growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread, the plant must not be sold, propagated or knowingly distributed' (DPI 2016).

Table 3.1 Noxious weeds within and adjacent to the study area

Scientific Name	Common Name	TEC (2011)	EMM (2016)	Class
Alternanthera philoxeroides	Alligator Weed	x	-	3
Cortaderia selloana	Pampas Grass	x	x	3
Genista monspessulana	Montpellier Broom	x	-	3
Ludwigia peruviana	Peruvian Water Primrose	x	-	3
Cestrum parqui	Green Cestrum	x	x	3
Chrysanthemoides monilifera sp. rotundata	Bitou Bush	-	x	3
Arundo donax	Spanish Reed	x	-	4
Asparagus asparagoides	Bridal Creeper	x	x	4
Lantana camera	Lantana	x	x	4
Ligustrum lucidum	Large Leaved Privet	x	x	4
Ligustrum sinense	Small Leaved Privet	x	x	4
Opuntia monacantha	Drooping Pear	x	-	4
Ricinus communis	Castor Oil Plant	x	x	4

Table 3.1 Noxious weeds within and adjacent to the study area

Scientific Name	Common Name	TEC (2011)	EMM (2016)	Class
Senecio madagascariensis	Fireweed	x	x	4
Celtis sinensis	Chinese Celtis	-	x	4
Olea europaea subsp. cuspidata	African Olive	-	x	4

3.2.3 Fauna

i Fauna habitat

a. Forested areas

The forested areas within the study area consist of the River Flat Eucalypt forest, Swamp Oak Floodplain forest and planted vegetation. None of these areas contain remnant trees with no hollow bearing trees recorded. This lowers the suitability of the habitat to provide shelter for arboreal mammals and nesting sites for hollow dependant birds. Several of the eucalypt species within this habitat were in poor condition with canopy dieback evident and the high levels of weed invasion is likely to limit the diversity of fauna present. The species which utilise this habitat are likely to be common species with the ability to persist in disturbed habitats, such as Noisy Miner (*Manorina melanocephala*) and the Australian Raven (*Corvus coronoides*).

The River Flat Eucalypt forest includes tree species listed as Schedule 2 feed tree species under SEPP 44; River Red Gum and Swamp Mahogany (*Eucalyptus robusta*). The combined coverage of these feed tree species are approximately 15-20% in some patches therefore qualifying the habitat as potential Koala habitat. No Koala have been recorded within the study area or in any adjacent habitats. The study area has poor connectivity to areas of known Koala habitat and the small patch size within the study area would be unable to support the species in isolation. Core habitat under SEPP 44 refers to an area of land which has a resident population of Koalas, evidenced by attributes such as breeding females, recent sightings and historical records of a population. The study area and surrounding habitats have been well studied and the lack of any records historically or recently, indicate it is very unlikely that the species occurs (even transiently) and there is no evidence to suggest a resident population.

b. Aquatic Habitats

A large artificial pond exists south of the study area, which results from previous extraction of sand and gravels. This provides habitat for a wide range of waterbirds including Australasian Darter (*Anhinga novaehollandiae*), Little Black Cormorant (*Phalacrocorax sulcirostris*) and Pacific Black Duck (*Anas superciliosa*). The pond is devoid of marginal vegetation and are unlikely to provide important habitat for frogs, and is likely to support only the most disturbance tolerant species.

The tidal reaches of the Georges River, adjacent to the study area is likely to support a range of bird species including migratory species, euryhaline fish and marine vegetation such as mangrove. The Georges River is outside of the study area and is not considered further in this terrestrial impact assessment.

There is an earthen drainage line immediately outside of the study area, on the western boundary. This was constructed approximately 20 years ago. The Dusky Moorhen (*Gallinula tenebrosa*) and the White-faced Heron (*Egretta novaehollandiae*) were observed foraging within this habitat.

Recent mechanical clearing within the study area had removed vegetation on the banks of the drain; however the opposite bank was vegetated with Water Pepper (*Persicaria hydropiper*) and Cumbungi (*Typha sp*). No fish were observed within the drain, although have the potential to occur owing to connectivity to Georges River downstream. Frogs may also be present within the drain, although likely to be restricted to disturbance tolerant species such as the Common Eastern Froglet (*Crinia signifera*). Evidence of flood debris at high levels on adjacent vegetation indicated that that this drain experiences high flow events.

Photograph 3.5 Drainage line on the study area boundary

c. Exotic Vegetation

The exotic vegetation within the study area may provide habitat for cosmopolitan species, especially seed eating birds. However no species are likely to be reliant on this habitat type.

ii Fauna recorded within the study area

A total of 16 bird native bird species were noted during the field survey, all of which can be considered to be common (refer to Table 3.2). No threatened or migratory species were recorded. The majority of the Honeyeater species were observed on the western boundary of the study area associated with remnant forest habitat, which does not occur within the study area. The majority of the waterbird species was associated with the southern ponds, which is outside of the study area.

Table 3.2 Fauna recorded incidentally during the field survey

Common Name	Scientific Name	EPBC Act	TSC Act
Anas gracilis	Grey Teal	-	-
Anas superciliosa	Pacific Black Duck	-	-
Anhinga novaehollandiae	Australasian Darter	-	-
Aythya australis	Hardhead	-	-
Corvus coronoides	Australian Raven	-	-
Egretta novaehollandiae	White-faced Heron		
Fulica atra	Coot	-	-
Gallinula tenebrosa	Dusky Moorhen	-	-
Lichenostomus fuscus	Fuscous Honeyeater	-	-
Manorina melanocephala	Noisy Miner	-	-
Meliphaga lewinii	Lewin's Honeyeater	-	-
Phalacrocorax sulcirostris	Little Black Cormorant	-	-
Phalacrocorax varius	Little Pied Cormorant	-	-
Phylidonyris niger	White Cheeked Honeyeater	-	-
Rhipidura leucophrys	Willy Wagtail	-	-
Tachybaptus novaehollandiae	Australian Grebe	-	-

4 Impact assessment

4.1 Vegetation clearance

The direct impact of the proposed residential development is the clearance of vegetation within the study area. The impact assessment for this project assumes complete disturbance/removal of vegetation within the study area which occupies an area of 9.71 ha. The majority of this area is cleared, with the total vegetation loss (excluding exotic vegetation) restricted to 0.59 ha. A breakdown of the vegetation loss for each community is detailed in Table 4.1.

Table 4.1 Impact area for each vegetation community

Community type	Area to be cleared (ha)
Exotic vegetation	0.50
Planted vegetation	0.03
River Flat Eucalypt forest	0.41
Swamp Oak Floodplain forest	0.15
Non-vegetated area	8.62
Total study area	9.71

4.2 Endangered ecological communities, threatened ecological communities and native vegetation

Both the River Flat Eucalypt Forest and Swamp Oak Floodplain Forest meet the description of EECs under the TSC Act. An assessment of significance was undertaken for these communities (refer to Appendix D), which found that no significant impact would result from project, given the small area impacted, the poor condition of the communities present and the unlikelihood of the long term viability of the communities. There are no TECs listed under the EPBC Act within the study area and therefore no impacts will occur.

The other vegetation types requiring clearance include 0.03 ha of planted vegetation and 0.50 ha of exotic vegetation. These areas are unlikely to provide any important habitat for threatened flora or fauna. The removal of a small area of these vegetation types is not likely to cause any significant biodiversity loss.

The vegetation within the study area is highly fragmented and is unlikely to provide any important linkages for flora and fauna within the landscape. The removal of small patches of vegetation are unlikely to significantly chance connectively within the landscape.

4.3 Threatened flora

Previous assessments within the study area have concluded that there is a low likelihood of threatened flora occurring within the study area. Recent field surveys have supported this assertion, with no threatened species recorded.

One threatened flora species, the Downy Wattle (*Acacia pubescens*), has been recorded in the Boral site adjacent to study area. The vegetation within the Boral site includes remnant communities of Cumberland Plain Woodland and Castlereagh Ironbark Forest which is typical habitat for this species. Despite the close proximity of the species to the study area, the species is not anticipated to occur within the study area, owing to dominance of the weed species and the lack of any observed Downy Wattle individuals.

The recent Bionet search identified one threatened species and two endangered populations within the locality, which have not been previously assessed. These are considered below.

i Netted Bottle Brush (*Callistemon linearifolius*)

This species is listed Vulnerable under the TSC Act. This species grows in dry sclerophyll forest on the coast and adjacent ranges. Suitable habitat does not exist within the study area; furthermore the species is readily detectable and was not recorded during recent field surveys. It is therefore considered absent.

ii *Marsdenia viridiflora R. Br. subsp. viridiflora* population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas - endangered population

This endangered population typically grows in vine thickets and open shale woodland, which does not exist in the study area. The species was not recorded within the study area and is considered unlikely to occur.

iii Tadgell's Bluebell in the local government areas of Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield – Endangered population

This population is closely aligned with the Villawood soil series. The bluebell is found in disturbed sites and grows in a variety of habitats including forest, woodland, scrub, grassland and the edges of watercourses and wetlands. Suitable habitat is not considered to occur in the project area and the study area is within the Liverpool LGA which is outside of the extent of the endangered listing.

Considering the lack of threatened flora records, the history of ground disturbance within the study area and the dominance of exotic groundcover, it is unlikely that any threatened flora species will occur within the study area. As such there are not anticipated to be any impacts to threatened flora as a result of this project.

4.4 Threatened fauna

An additional four threatened species have been recorded within the locality, since previous assessments were undertaken in 2012. As these species have not been assessed to date, they have been considered in Table 4.2. None of the additional species are likely to be impacted by the project and any occurrence of the species is likely to be transient.

Table 4.2 Recently recorded threatened species within the locality

Species	Status		Habitat requirements present?	Potential for impacts from the proposal
	EPBC Act	TSC Act		
Eastern Osprey (*Pandion cristatus*)		V	Favour coastal areas, especially the mouths of large rivers, lagoons and lakes.	Habitat for the species within the study area is absent although the species may fly over, given the close proximity to suitable foraging habitat.
Scarlet Robin (*Petroica boodang*)		V	Dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs..	Low potential to occur, given the absence of dry eucalypt forest, with no open grassy areas present, instead habitats are dominated by weedy groundcover.
Spotted Harrier (*Circus assimilis*)		V	Occurs in grassy open woodland including Acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe.	Low potential to occur given that the open areas of the site are cleared of vegetation, with an absence of prey species.
Black-necked Stork (*Ephippiorhynchus asiaticus*)		E	Floodplain wetlands of the major coastal rivers are the key habitat in NSW for the Black-necked Stork.	No suitable habitat exists within the study area considering the absence of shallow wetland areas. The ponds adjacent to the study area are too deep to be suitable habitat for this species.

No threatened fauna have been recorded within the study area to date. On a conservative basis, TEC (2001) assumed the presence of the Grey-headed Flying Fox (*Pteropus poliocephalus*), which is appropriate given its wide ranging habitat and numerous records within the locality. The foraging habitat for the Grey-headed Flying Fox is sub-optimal within the study area, restricted to small patches of eucalyptus and angophora species, most of which are small in size and in poor condition, with canopy dieback observed. These trees are unlikely to yield an abundance of nectar and are unlikely to be important to the species. No roosting sites are present within the study area and the project is not anticipated to adversely affect this species.

A suite of threatened microbat species listed under the TSC Act, were presumed present within the study area by TEC (2011): Eastern Bentwing Bat (*Miniopterus schreibersii oceansis*), Southern Myotis (*Myotis macropus*), Eastern Freetail-bat (*Mormopterus norfolkensis*), Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*) and Eastern False Pipistrelle (*Falsistrellus tasmaniensis*). These species have been assumed present owing to the presence of records within the adjacent Boral site, records existing within the wider locality and the lack of targeted survey effort required to indicate absence from the study area.

An updated assessment of significance has been undertaken for the above microbat species taking into account the loss of potential sub-optimal foraging habitat and roosting habitat where relevant. The assessment concluded that there would be no significant impact to any of the threatened microbat species, as a result of the project, due to the suboptimal nature of the habitat present and the small area to be cleared.

The Cumberland Land Snail is a species listed as critically endangered under the TSC Act and has been recorded adjacent to the study area in the Boral site, which is west of the study area, and separated by a drain. The Boral site contained Cumberland Plain Woodland and Castlereagh Ironbark Forest prior to its development into the Georges Fair residential estate. This community is not present within the study area. The Cumberland Land Snail typically inhabits Cumberland Plain Woodland, Shale Gravel Transition Forests, Castlereagh Swamp Woodlands and the margins of River-flat Eucalypt Forest, preferring grassy open woodland with occasional patches of shrubs.

The species can be found under logs and other debris, persisting in degraded environments provided that ground cover of logs or rubbish is available. The species is known to burry in loose soil to escape periods of drought. Very little is known about the species specific foraging preferences although it is known to be a fungal specialist.

Searches for the species in the study area by TEC (2006 & 2011) did not identify the Cumberland Land Snail within the study area, although noted that the species may occur within the less disturbed parts of the riparian habitat, adjoining the Georges River, which is outside the study area of this assessment. The River Flat Eucalypt forest within the current study area is highly disturbed with an almost entirely modified ground cover, with evidence of historic earthworks and a very dense cover of weeds such as Balloon Vine. It considered unlikely that the Cumberland Land Snail occurs within the River Flat Eucalypt forest given that the ground stratum is no longer representative of the original community and functioning of the community is likely to be severely compromised.

4.5 Migratory fauna

A total of five migratory species listed under the EPBC act have been recorded within the locality (refer to Appendix A). None of these species have been recorded within the study area. However, a pair of White-bellied Sea Eagle (*Haliaeetus leucogaster*) have recorded immediately south of the current study area (TEC 2011). There is potential for this species to fly over the site given the proximity of suitable foraging habitat along Georges River. However, there is no potential nesting habitat given the absence of large trees within the study area. No foraging resources are present within the study area due to the lack of suitable water bodies, consisting of a predominately cleared terrestrial area.

The study area does not contain any restricted habitat or important habitat for any migratory species, nor are the migratory species likely to be dependent on the habitats present within the study area. There is no breeding habitat for any of the five migratory species recorded within the locality, furthermore there are no habitat attributes which would encourage large aggregations of a population to occur. The project will not substantially modify, destroy or isolate an area of important habitat for these species; result in harmful invasive species becoming established within the investigation area; or seriously disrupt the life cycle of an ecologically significant proportion of a population of the species. Whilst migratory species may fly over the site or occur transiently, no significant impacts are anticipated.

4.6 Indirect impacts

Without management, ground clearing and disturbance may result in the spread of weeds within the study area and off site. Given the existing occurrence of some noxious and invasive weeds, measures should be impacted to minimise the risk of further weed invasion into surrounding areas.

The study area is adjacent to three different waterbodies; the Georges River, a Pond and a drain. There is potential for construction works to cause indirect impacts to these habitats, due to increase sediment input and contaminated runoff. Sediment input is already likely to be high, due the presence of unconsolidated sediment on the banks of these waterbodies and controls should be implemented to reduce any impacts.

5 Recommendations

The following measures are recommended to reduce the potential for ecological impacts as a result of the proposed development:

- Implement erosion and sediment control measures in accordance with a Construction Environmental Management Plan (CEMP) to prevent inputs of sediment and contaminated runoff into the adjacent drainage line, Georges River and pond areas;

- manage clearance of areas of weed infestation, to allow for separate stockpiling and disposal of weed material. Vehicle hygiene protocols should also be included within the CEMP and will assist to control the movement of both pathogens and weeds;

- no hollow trees were recorded within the impact area, however an Ecologist should inspect trees prior to clearance, for signs of habitat (nest, hollow etc), or presence of fauna, and appropriate pre-clearance steps be taken if fauna if found to be present; and

- all workers will be made aware of the potential presence of threatened species on the site and the manner in which they should be treated.

Should any injured fauna be encountered, work in the immediate area should cease. For small native animals (lizards, birds, possums) throw a blanket or towel over it to immobilise it, then capture the animal and put it in a well ventilated box and cover it. Keep it warm, quiet and undisturbed to minimise shock. Large animals may be too dangerous to handle (Kangaroo, Koala). Keep an eye on the animal and protect it from further harm until assistance arrives. Injured animals should be immediately taken to the nearest appropriately qualified veterinary clinic or fauna rescue organisation contacted.

Given the design requirements of the proposed residential development and the low residual ecological impact, further avoidance is not required or recommended.

6 Conclusion

No threatened species listed under the TSC Act or EPBC act have been recorded in the study area to date. There is the potential for several listed threatened and migratory fauna species to fly over the study area or occur transiently. However the habitat present is not considered important for any of these species. The clearance of two EECs which occur within the study area is considered negligible, given the small area of proposed to be impacted and the poor condition of the communities affected..

The construction of the proposed residential development is not likely to cause any significant ecological impacts within the study area.

References

AES Environmental Consultancy 2002, *Flora and Fauna Assessment*, Proposed Rezoning of Lot 1 DP 336613 Newbridge Road, Moorebank

Bionet (2016) *NSW Bionet, the Website for the Atlas of NSW Wildlife.* NSW Office of Environment and Heritage

Department of Environment and Climate Change (DECC) 2007, *Threatened Species Assessment Guidelines: The Assessment of Significance,* Department of Environment and Climate Change NSW

Environmental Resource Management (ERM) 2002, *Boral Moorebank Flora and Fauna Assessment – Technical Report*, Environmental Resource Management Australia

NPWS (2000) *Cumberland Land Snail Environmental Impact Assessment Guidelines*, NSW National Parks and Wildlife Service.

Protected Matters Search Tool 2016, *Department of Environment online tool*, accessed 01/08/16

Total Earth Care 2006, *Flora and Fauna Assessment*: Proposed Rezoning of the Benedict Site No. 146 Newbridge Road, Moorebank, prepared for Benedict Industries Pty Ltd

Total Earth Care 2011, *Flora and Fauna Assessment*: No. 146 Newbridge Road, Moorebank, prepared for Benedict Industries Pty Ltd

OEH 2016, *Threatened Species Profiles*. Office of Environment and Heritage Online Species Profiles, accessed 02/08/2016

Appendix A

Protected matters search results

Australian Government

Department of the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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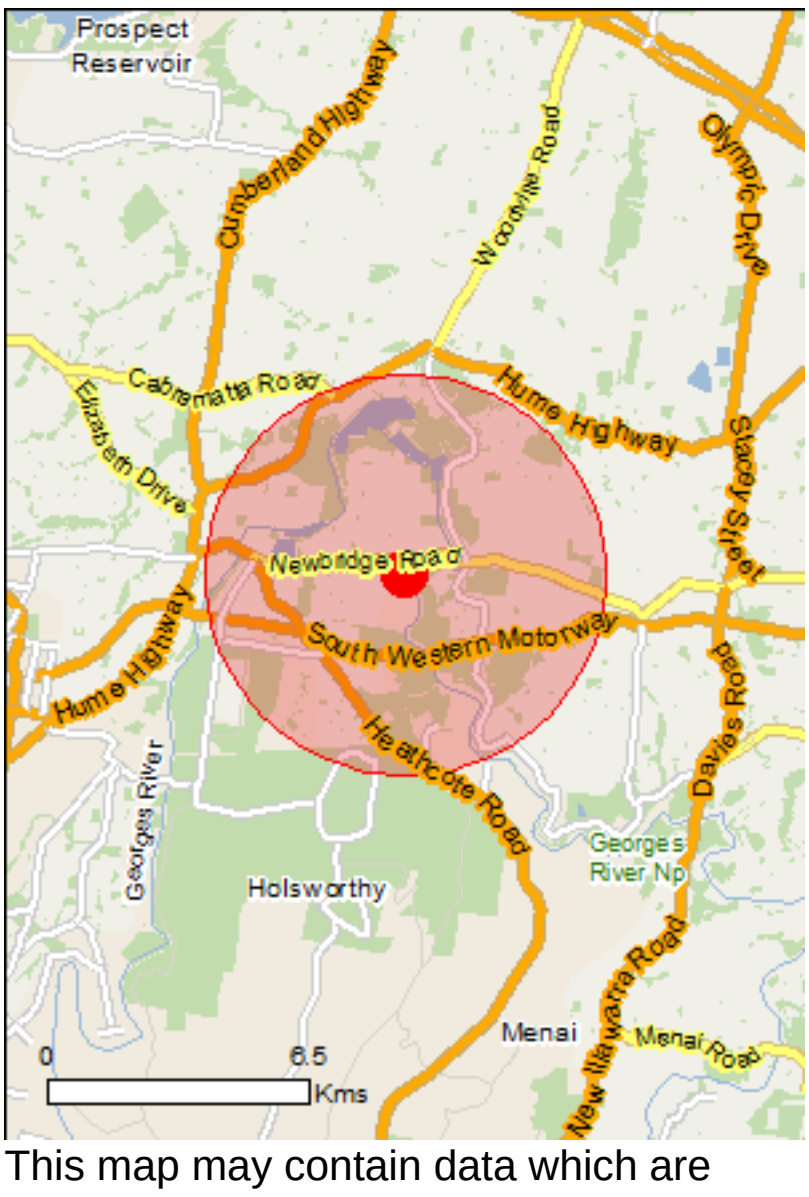

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Coordinates

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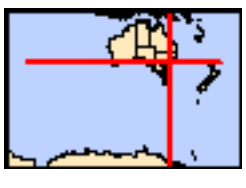

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	8
Listed Threatened Species:	60
Listed Migratory Species:	31

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	12
Commonwealth Heritage Places:	3
Listed Marine Species:	36
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	55
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion	Endangered	Community likely to occur within area
Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion	Critically Endangered	Community likely to occur within area
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	Critically Endangered	Community likely to occur within area
Shale Sandstone Transition Forest of the Sydney Basin Bioregion	Critically Endangered	Community likely to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area
Turpentine-Ironbark Forest in the Sydney Basin Bioregion	Critically Endangered	Community likely to occur within area
Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion	Endangered	Community may occur within area
Western Sydney Dry Rainforest and Moist Woodland on Shale	Critically Endangered	Community may occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat likely to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Species or species habitat likely to occur within area
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Species or species habitat likely to occur within area
Diomedea epomophora (sensu stricto) Southern Royal Albatross [1072]	Vulnerable	Species or species habitat likely to occur within area
Diomedea exulans (sensu lato) Wandering Albatross [1073]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche cauta steadi White-capped Albatross [82344]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Species or species habitat likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Species or species habitat likely to occur within area
Fish		
Epinephelus daemelii Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area
Frogs		
Heleioporus australiacus Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat likely to occur within area
Litoria aurea Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat known to occur within area
Litoria littlejohni Littlejohn's Tree Frog, Heath Frog [64733]	Vulnerable	Species or species habitat may occur within

Name	Status	Type of Presence
		area
Litoria raniformis		
Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog [1828]	Vulnerable	Species or species habitat may occur within area
Mammals		
Chalinolobus dwyeri		
Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus maculatus maculatus (SE mainland population)		
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat likely to occur within area
Petauroides volans		
Greater Glider [254]	Vulnerable	Species or species habitat may occur within area
Petrogale penicillata		
Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)		
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Pseudomys novaehollandiae		
New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat likely to occur within area
Pteropus poliocephalus		
Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area
Other		
Pommerhelix duralensis		
Dural Land Snail [85268]	Endangered	Species or species habitat likely to occur within area
Plants		
Acacia bynoeana		
Bynoe's Wattle, Tiny Wattle [8575]	Vulnerable	Species or species habitat may occur within area
Acacia pubescens		
Downy Wattle, Hairy Stemmed Wattle [18800]	Vulnerable	Species or species habitat likely to occur within area
Allocasuarina glareicola		
[21932]	Endangered	Migration route known to occur within area
Asterolasia elegans		
[56780]	Endangered	Species or species habitat may occur within area
Caladenia tessellata		
Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat likely to occur within area
Cryptostylis hunteriana		
Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat may occur within area
Genoplesium baueri		
Yellow Gnat-orchid [7528]	Endangered	Species or species habitat likely to occur within area
Grevillea parviflora subsp. parviflora		
Small-flower Grevillea [64910]	Vulnerable	Species or species habitat known to occur within area
Hibbertia puberula subsp. glabrescens		
[86645]	Critically Endangered	Species or species habitat likely to occur

Name	Status	Type of Presence within area
Leucopogon exolasius Woronora Beard-heath [14251]	Vulnerable	Species or species habitat likely to occur within area
Melaleuca biconvexa Biconvex Paperbark [5583]	Vulnerable	Species or species habitat may occur within area
Melaleuca deanei Deane's Melaleuca [5818]	Vulnerable	Species or species habitat likely to occur within area
Pelargonium sp. Striatellum (G.W.Carr 10345) Omeo Stork's-bill [84065]	Endangered	Species or species habitat may occur within area
Persoonia nutans Nodding Geebung [18119]	Endangered	Species or species habitat likely to occur within area
Pimelea curviflora var. curviflora [4182]	Vulnerable	Species or species habitat may occur within area
Pimelea spicata Spiked Rice-flower [20834]	Endangered	Species or species habitat known to occur within area
Pterostylis gibbosa Illawarra Greenhood, Rufa Greenhood, Pouched Greenhood [4562]	Endangered	Species or species habitat known to occur within area
Pterostylis saxicola Sydney Plains Greenhood [64537]	Endangered	Species or species habitat known to occur within area
Thelymitra kangaloonica Kangaloon Sun Orchid [81861]	Critically Endangered	Species or species habitat may occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat may occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Hoplocephalus bungaroides Broad-headed Snake [1182]	Vulnerable	Species or species habitat likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Species or species habitat likely to occur within area
Diomedea epomophora (sensu stricto) Southern Royal Albatross [1072]	Vulnerable	Species or species habitat likely to occur within area
Diomedea exulans (sensu lato) Wandering Albatross [1073]	Vulnerable	Species or species habitat likely to occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Species or species habitat likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat likely to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta (sensu stricto) Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Species or species habitat likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Species or species habitat likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Species or species habitat likely to occur within area
Migratory Marine Species		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat may occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur

Name	Threatened	Type of Presence within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Manta alfredi		
Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat may occur within area
Manta birostris		
Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
Migratory Terrestrial Species		
Cuculus optatus		
Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Hirundapus caudacutus		
White-throated Needletail [682]		Species or species habitat known to occur within area
Monarcha melanopsis		
Black-faced Monarch [609]		Species or species habitat known to occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat likely to occur within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons		
Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Pandion haliaetus		
Osprey [952]		Species or species habitat likely to occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -
Commonwealth Land - Australian Postal Commission
Commonwealth Land - Australian Telecommunications Commission
Commonwealth Land - Australian Telecommunications Corporation
Commonwealth Land - Defence Housing Authority
Commonwealth Land - Defence Service Homes Corporation
Commonwealth Land - Director of War Service Homes

Name
Commonwealth Land - Telstra Corporation Limited
Defence - CAMP SAPPER-EAST HILLS (Lot 2) : CAMP SAPPER TRAINING AREA (Lot 1)
Defence - EAST HILLS BARRACKS - OP SAFE HAVEN
Defence - MOOREBANK AREA INC SME
Defence - Suite 8, Library Plaza

Commonwealth Heritage Places [Resource Information]

Name	State	Status
Indigenous		
Cubbitch Barta National Estate Area	NSW	Listed place
Historic		
Bankstown Airport Air Traffic Control Tower	NSW	Listed place
Defence National Storage and Distribution Centre	NSW	Listed place

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Cuculus saturatus Oriental Cuckoo, Himalayan Cuckoo [710]		Species or species habitat may occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Species or species habitat likely to occur within area
Diomedea epomophora (sensu stricto) Southern Royal Albatross [1072]	Vulnerable	Species or species habitat likely to occur within area
Diomedea exulans (sensu lato) Wandering Albatross [1073]	Vulnerable	Species or species habitat likely to occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Species or species habitat likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta (sensu stricto) Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Species or species habitat likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Species or species habitat likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area
Reptiles		

Name	Threatened	Type of Presence
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat may occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area

Extra Information

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Carduelis chloris European Greenfinch [404]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Asparagus scandens Asparagus Fern, Climbing Asparagus Fern [23255]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Dolichandra unguis-cati Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Protasparagus densiflorus Asparagus Fern, Plume Asparagus [5015]		Species or species habitat likely to occur within area
Protasparagus plumosus Climbing Asparagus-fern, Ferny Asparagus [11747]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area

Nationally Important Wetlands	[Resource Information]
Name	State
Voyager Point	NSW

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-33.93177 150.96493

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Parks and Wildlife Commission NT, Northern Territory Government
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Atherton and Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Appendix B

Threatened and migratory species recorded within the locality

Table B.1 Threatened and migratory species recorded within the locality

Common Name	Scientific Name	EPBC Act	TSC Act
Flora			
Downy Wattle	*Acacia pubescens*	V	V
Netted Bottle Brush	*Callistemon linearifolius*		V
Narrow-leaved Black Peppermint	*Eucalyptus nicholii*	V	V
Small-flower Grevillea	*Grevillea parviflora subsp. parviflora*	V	V
	Hibbertia sp. Bankstown	CE	CE
Woronora Beard-heath	*Leucopogon exolasius*	V	V
Marsdenia viridiflora R. Br. subsp. *viridiflora* population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	*Marsdenia viridiflora R. Br. subsp. viridiflora*		E
Nodding Geebung	*Persoonia nutans*	E	E
Spiked Rice-flower	*Pimelea spicata*	E	E
Pomaderris prunifolia in the Parramatta, Auburn, Strathfield and Bankstown Local Government Areas	*Pomaderris prunifolia*		E
	Pultenaea parviflora	V	E
Matted Bush-pea	*Pultenaea pedunculata*		E
Tadgell's Bluebell in the local government areas of Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield	*Wahlenbergia multicaulis*		E
Amphibians			
Green and Golden Bell Frog	*Litoria aurea*	V	E
Birds			
Cattle Egret	*Ardea ibis*	Mi	
Spotted Harrier	*Circus assimilis*		V
Varied Sittella	*Daphoenositta chrysoptera*		V
Black-necked Stork	*Ephippiorhynchus asiaticus*		E
Latham's Snipe	*Gallinago hardwickii*	Mi	
Little Lorikeet	*Glossopsitta pusilla*		V
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	Mi	
Little Eagle	*Hieraaetus morphnoides*		V
White-throated Needletail	*Hirundapus caudacutus*	Mi	
Caspian Tern	*Hydroprogne caspia*	Mi	
Swift Parrot	*Lathamus discolor*	CE	E
Square-tailed Kite	*Lophoictinia isura*		V
Black-chinned Honeyeater (eastern subspecies)	*Melithreptus gularis gularis*		V
Powerful Owl	*Ninox strenua*		V
Eastern Osprey	*Pandion cristatus*		V

Table B.1 Threatened and migratory species recorded within the locality

Common Name	Scientific Name	EPBC Act	TSC Act
Scarlet Robin	*Petroica boodang*		V
Flame Robin	*Petroica phoenicea*		V
Invertebrates			
Cumberland Plain Land Snail	*Meridolum corneovirens*		E
Mammals			
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*		V
Eastern Bentwing-bat	*Miniopterus schreibersii oceanensis*		V
Eastern Freetail-bat	*Mormopterus norfolkensis*		V
Southern Myotis	*Myotis macropus*		V
Koala	*Phascolarctos cinereus*	V	V
Grey-headed Flying-fox	*Pteropus poliocephalus*	V	V
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*		V
Greater Broad-nosed Bat	*Scoteanax rueppellii*		V

Notes: 1. EPBC and TSC Act Status: V - vulnerable, E - Endangered, CE - critically endangered

Appendix C

Flora species recorded within the study area

Table C.1 Flora species recorded within the study area

Common Name	Scientific name	Weed Species
Coast Myall	*Acacia binervia*	
Fringed Wattle	*Acacia fimbrata*	
Coastal Wattle	*Acacia longifolia subsp. sophorae*	
Golden Wreath Wattle	*Acacia saligna*	*
River Mangrove	*Aegiceras corniculatum*	
Crofton Weed	*Ageratina adenophora*	*
Rough-barked Apple	*Angophora floribunda*	
Moth Vine	*Araujia sericifera*	*
Oats	*Avena sativa*	*
Grey Mangrove	*Avicennia marina*	
Willow Bottlebrush	*Callistemon salignus*	
Balloon Vine	*Cardiospermum grandiflorum*	*
River Oak	*Casuarina cunninghamiana*	
Swamp Oak	*Casuarina glauca*	
Chinese Celtis	*Celtis sinensis*	*
Green Cestrum	*Cestrum parqui*	*
Bitou Bush	*Chrysanthemoides monilifera ssp. rotundata*	*
Camphor Laurel	*Cinnamomum camphora*	*
Scurvy Weed	*Commelina cyanea*	
Couch	*Cynodon dactylon*	
Panic Veldt Grass	*Ehrhatia erecta*	*
African Love Grass	*Eragrostis curvula*	*
Grey Box	*Eucalyptus moluccana*	
Swamp Mahogany	*Eucalyptus robusta*	
Sydney Blue Gum	*Eucalyptus saligna*	
Forest Red Gum	*Eucalyptus tereticornis*	
Blue Morning Glory	*Ipomoea indica*	*
Lantana	*Lantana camera*	*
Variable Sword Sedge	*Lepidosperma laterale*	
Large Leaf Privet	*Ligustrum lucidum*	*
Small Leaf Privet	*Ligustrum sinense*	*
African Olive	*Olea europaea subsp. cuspidata*	*
Guinea Grass	*Panicum maximum*	*
Water Pepper	*Persicaria hydropiper*	
Common Reed	*Phragmites australis*	
Sweet Pittosporum	*Pittosporum undulatum*	
Castor Oil Plant	*Ricinus communis*	*
Fireweed	*Senecio madagascariensis*	*
	Senna pendula var glabrata	*
Trad	*Tradescantia fluminensis*	*

Appendix D

Assessments of Significance - TSC Act

D.1 Assessment of significance

Section 5A of the EP&A Act provides the criteria that must be considered in the assessment of the significance of potential impacts on threatened species listed under the TSC Act. The following assessment of significance has been undertaken in accordance with *Threatened Species Assessment Guidelines: The Assessment of Significance* (DECC 2007).

D.1.1 Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions – Endangered Ecological Communities

1. *In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction;*

This question is not relevant as River-flat Eucalypt Forest and Swamp Oak Floodplain Forest are communities rather than individual species.

2. *In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction;*

This question is not relevant as River-flat Eucalypt Forest and Swamp Oak Floodplain Forest are communities.

3. *In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*

    a) *is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction;*

    b) *is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction;*

The local occurrence of River-flat Eucalypt Forest (ie within a 5 km radius of the site) covers approximately 270 ha, while Swamp Oak Floodplain Forest covers approximately 95 ha (OEH 2013). The local occurrence contains some larger patches of the two floodplain communities, but mostly occurs in a highly fragmented state along the Georges River and its tributaries, surrounded by residential and industrial land.

The removal of 0.41 ha of River Flat Eucalypt forest and 0.15 ha of Swamp Oak Floodplain forest and represents a loss of 0.15% and 0.16% of each respective community within the locality (5 ha radius). This is a very small proportion of the community and will have a negligible impact on the extent of the community.

4. *In relation to the habitat of a threatened species, population or ecological community:*

    a) *the extent to which habitat is likely to be removed or modified as a result of the action proposed;*

    b) *whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action;*

    c) *the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality;*

Only small areas of the EECs (up to 0.15% of River Flat Eucalypt Forest and 0.16% of Swamp Oak Floodplain Forest) will be removed. The existing vegetation currently occurs in a highly fragmented landscape and the removal of small areas of the EECs are unlikely to significantly change this.

The small areas of River Flat Eucalypt Forest and Swamp Oak Floodplain Forest to be removed are not considered important for the long-term survival of the communities in the locality. They are highly disturbed and very poor example of the community type, composed of an almost entirely exotic ground cover.

5. *Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly);*

Critical habitat has not been declared for River Flat Eucalypt Forest and Swamp Oak Floodplain Forest. Therefore, the proposed development will not have an adverse effect on critical habitat.

6. *Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan; and*

River Flat Eucalypt Forest and Swamp Oak Floodplain Forest do not have recovery plans. Management objectives for the communities aim to maximise the extent of occurrence and condition across NSW. Any removal of small patches of EEC within the study area will not reduce the occurrence or condition of the ecological community in the locality.

7. *Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.*

A key threatening process relevant to the removal of the trees is “the clearing of native vegetation”. The removal of the small areas of River Flat Eucalypt Forest and Swamp Oak Floodplain Forest classifies as the clearing of native vegetation, as the works will remove parts of one or more strata layers of vegetation in these areas.

Conclusion

The removal of up to 0.15% of River Flat Eucalypt Forest and 0.16% of Swamp Oak Floodplain Forest within the project area will not have a significant impact on the EECs in the locality as the proposed clearing is of low magnitude, and represent a small proportion of the EECs within the locality; and the remnant patch of floodplain EECs are not considered to be important and are highly disturbed.

D.1.2 Threatened microbat species

The following species are all listed as vulnerable under the TSC Act. They have the potential to occur within the study area given that they are highly mobile and records exist within the locality.

a. Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*)

The Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*) is a very widespread species occurring over most of mainland Australia. It forages for insects over the forest canopy, but lower in more open country (OEH 2016). It occurs in most habitats types, with and without trees, and appears to defend an aerial territory. This species has been recorded approximately 150 m west of the study area. Tree hollows are the preferred roosting habitat for this species and there is a low likelihood that the species will roost in the study area as no suitable hollows were identified. The species may forage over vegetated areas of the study area and over adjacent water bodies.

b. Southern Myotis (*Myotis macropus*)

The Southern Myotis (*Myotis macropus*) 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 100km inland, except along major rivers. The species generally roosts in groups of 10-15 close to water: in caves, mine shafts, hollow-bearing trees, stormwater channels, buildings, under bridges and in dense foliage (OEH 2016). The species forages over streams and pools catching insects and small fish by raking their feet across the water surface. There are few records of this species within the locality (Bionet 2016), the closest record being 4.6 km to the south-east. Potential foraging habitat exists immediately adjacent to the study area within the drain; with less optimal foraging habitat over the Georges River and the artificial pond. This species may roost in dense foliage and therefore has the potential to roost within vegetated portions of the study area.

c. Eastern Bentwing Bat (Miniopterus schreibersii oceanensis)

The Eastern Bentwing Bat (*Miniopterus schreibersii oceanensis*) is listed as a vulnerable species under the TSC Act. The species typically forages above the canopy of forested areas and also in more open areas such as grasslands (OEH 2016). They roost in caves but will also use abandoned mines and road culverts as alternative roosting habitat. This closest record of this species to the study area is 2.5 km to the north-west. Given that there are no caves or other suitable man-made structures, the species is unlikely to roost within the study area. Potential foraging habitat exists within the vegetated areas of the study area.

d. Eastern Freetail-bat (Mormopterus norfolkensis)

The Eastern Freetail-bat (*Mormopterus norfolkensis*) typically occurs in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. The species roosts in tree hollows preferentially; however it will also roost beneath bark or in man-made structures. The species is unlikely to roost within the study area but potential foraging habitat exists within the vegetated areas of the study area. The closest record of this species is 1 km south of the study area.

e. Greater Broad-nosed Bat (*Scoteanax rueppellii*)

The Greater Broad-nosed Bat (*Scoteanax rueppellii*) utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest (OEH 2016). Tree hollows are typically used for roosting, however exfoliating bark and building are occasionally used. This species may forage within the vegetated areas area of the study area, although is not expected to roost in the study area. The closest record of this species is 2 km to the south-west of the study area.

f. Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)

The Eastern False Pipistrelle (*Falsistrellus tasmaniensis*) prefers mesic habitats with a canopy of tall Eucalypt forest. The species hunts flying insects just above or below the tree canopy and typically roosts in tree hollows. The species has also been recorded roosting in buildings and under loose bark. This species has been recorded approximately 1.9 km south of the study area and may forage within River Flat Eucalypt Forest within the study area.

1. *In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction;*

The project will not remove any potential breeding habitat for threatened microbats due to the absence of suitable structures and therefore is unlikely to impact on the lifecycle of these species. The proposal will remove 0.59 ha of potential foraging habitat for threatened microbats. These species are highly mobile and there are much larger higher quality areas of foraging habitat adjacent to the study area. The lifecycle of these species are unlikely to be threatened by the proposal.

2. *In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction;*

This question refers to endangered populations, therefore is not relevant to this assessment.

3. *In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*

    a) *is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction;*

    b) *is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction;*

This question refers to EECs, therefore is not relevant to this assessment.

4. *In relation to the habitat of a threatened species, population or ecological community:*

    a) *the extent to which habitat is likely to be removed or modified as a result of the action proposed;*

    b) *whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action;*

    c) *the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality;*

The project will remove 0.59 ha of potential foraging habitat for threatened microbats. No breeding habitat will be removed as these features are absent from the disturbance area. All of the waterbodies adjacent to the study area will remain after the project is completed and there will be no loss of water over which the bats can forage.

The vegetated foraging habitat within the study area occurs in small patches and is poorly linked to other vegetation. The removal of this sub-optimal habitat will not cause any significant increase in fragmentation considering the lack of linkages currently present. Any gaps between vegetation will be limited to distances in which the species can cross, given their highly mobile nature.

The vegetated habitat within the study area consists of regenerating forest with a lack of tree hollow or accumulations of exfoliating bark, which could be used as roosting sites for microbats. The communities present are highly disturbed with an exotic understory and mid stratum (where present), which is likely to reduce the amount and diversity of invertebrate prey available to microbats. The habitat to be removed has no significant importance to these species, as larger and more optimal foraging and roosting habitat is present in the locality.

5. *Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly);*

Critical habitat has not been declared for these threatened microbats, therefore, the proposed development will not have an adverse effect on critical habitat.

6. *Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan; and*

There are currently no recovery or threat abatement plans for these threatened microbats. Priority actions for these species focus on monitoring the breeding success of maternity colonies to determine the viability of regional populations, identifying the types of winter roots used by species and regular censuses of maternity colonies and other key roosts. Given that only potential foraging habitat and suboptimal roosting habitat for the Southern Myotis, will be cleared, the project does not interfere with these actions.

Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The KTP 'clearing of native vegetation' is most relevant to microbats and has been identified as a threat to the vulnerable species. Vegetation clearance within the study area is restricted to disturbed vegetation communities, with no remnant vegetation present within the study area. The total amount of native vegetation clearance is limited to 0.59 ha which is likely to have a negligible impact on microbats.

Conclusion:

The proposed development will not have a significant impact on threatened microbats as:

- no important roost sites will be impacted;
- a small area of potential foraging habitat will be removed, however there are larger areas of higher quality foraging habitat close to the study area which will not be impacted; and
- no breeding habitat will be removed.

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29 August 2024

Ian Stendara
A/Coordinator, Strategic Planning
Liverpool City Council
52 Scott Street
Liverpool NSW 2170

Re: Georges Cove Village Planning Proposal - Updated Ecological Impact Assessment

Dear Ian,

1 Introduction

Planning Proposal PP-2024-963 for Lot 1 at 146 Newbridge Road, Moorebank, has been endorsed by Liverpool City Council and was referred to the Department of Planning, Housing and Infrastructure (the Department) for Gateway determination.

The planning proposal seeks to amend the Liverpool Local Environmental Plan 2008 to allow for a retail premises of 4,000 m² at Lot 1, 146 Newbridge Road Moorebank ('Georges Cove Village').

Gateway Determination (Department Ref: PP-2024-963) provides that the planning proposal should proceed, subject to a number of conditions.

Condition 1 of the Gateway Determination states that the planning proposal is to be updated to include an updated Ecological Impact Assessment. This document addresses that requirement.

2 The site and environmental assessments

The subject site for the planning proposal is identified as Lot 1, comprising approximately 1.72 hectares (refer to Figure 2.1).

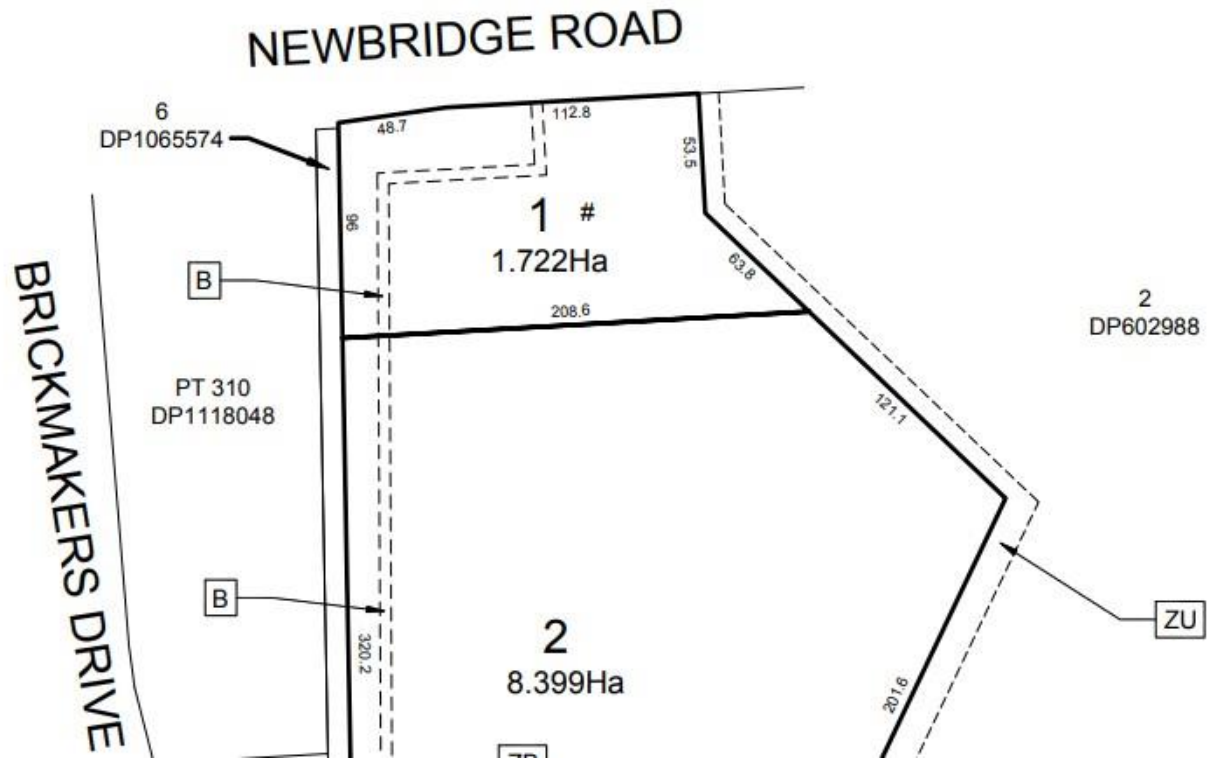

Figure 2.1 The subject site

For context, it is important to note that the overall 'Georges Cove' development site (now Lot 1 and 2, above) was originally the site of a landfill, subsequently acquired and operated by Benedict Industries for the purpose of sand extraction and then a waste recycling facility, prior to its redevelopment.

The redevelopment of the 'Georges Cove' development site was supported by a number of technical studies, including an Ecological Impact Assessment Report. Some technical reports therefore consider a much larger area than Lot 1, as is the case for the original Ecological Impact Assessment Report.

This letter provides an update to the ecological impact assessment for Lot 1. Since this time, Lot 2 has been cleared for residential development so is not considered here (Figure 2.2).

Figure 2.2 Overall site - 2024

3 Ecological Impact Assessment Update

3.1 Former assessment findings

The current Lots 1 and 2 were originally the subject of a flora and fauna assessment (Total Earth Care 2006), which was prepared to support a (successful) rezoning application. The assessment included site surveys and classification of ecological constraints within an area which includes the current land the subject of the planning proposal. This assessment was subsequently updated in 2011 and assessed the conservation significance of biodiversity values at the site and provided an indication of the potential constraints to the development of the (then) proposed marina.

The ecological assessment was further updated by EMM in 2016. The study noted that "the majority of the study area [which included the area the subject of the current planning proposal] is cleared with bare sand and gravel, owing to its prior use for sand and gravel extraction and subsequent use as a recycling facility. Vegetation is largely limited to the northern and western peripheries of the study area and consists of disturbed regenerating communities.".

The EMM Ecological Impact Assessment Report (EMM 2016) identified that one plant community type (PCT) 1232 was present on the land the subject of the current planning proposal (i.e. Lot 1).

PCT 1232 Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion, was found to occur in the north-east corner of the site. The total area of this PCT was 0.15 ha (refer to Figure 3.1).

EMM (2016) found that the dominant Swamp Oak canopy and landscape position of this vegetation community met the scientific determination for the Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and

South East Corner bioregions Endangered Ecological Community (EEC) listing. The understory was noted to comprise almost entirely exotic species, however this did not preclude this community being considered as an EEC.

The EMM report found that the vegetation within the study area was highly fragmented and was unlikely to provide any important linkages for flora and fauna within the landscape so the removal of small patches of vegetation would be unlikely to significantly change connectively within the landscape.

The report also found that there was a low likelihood of threatened flora occurring within the study area and no threatened species were recorded. Locally recorded threatened fauna were also found to be unlikely to be impacted by the project and that any occurrence of species was likely to be transient.

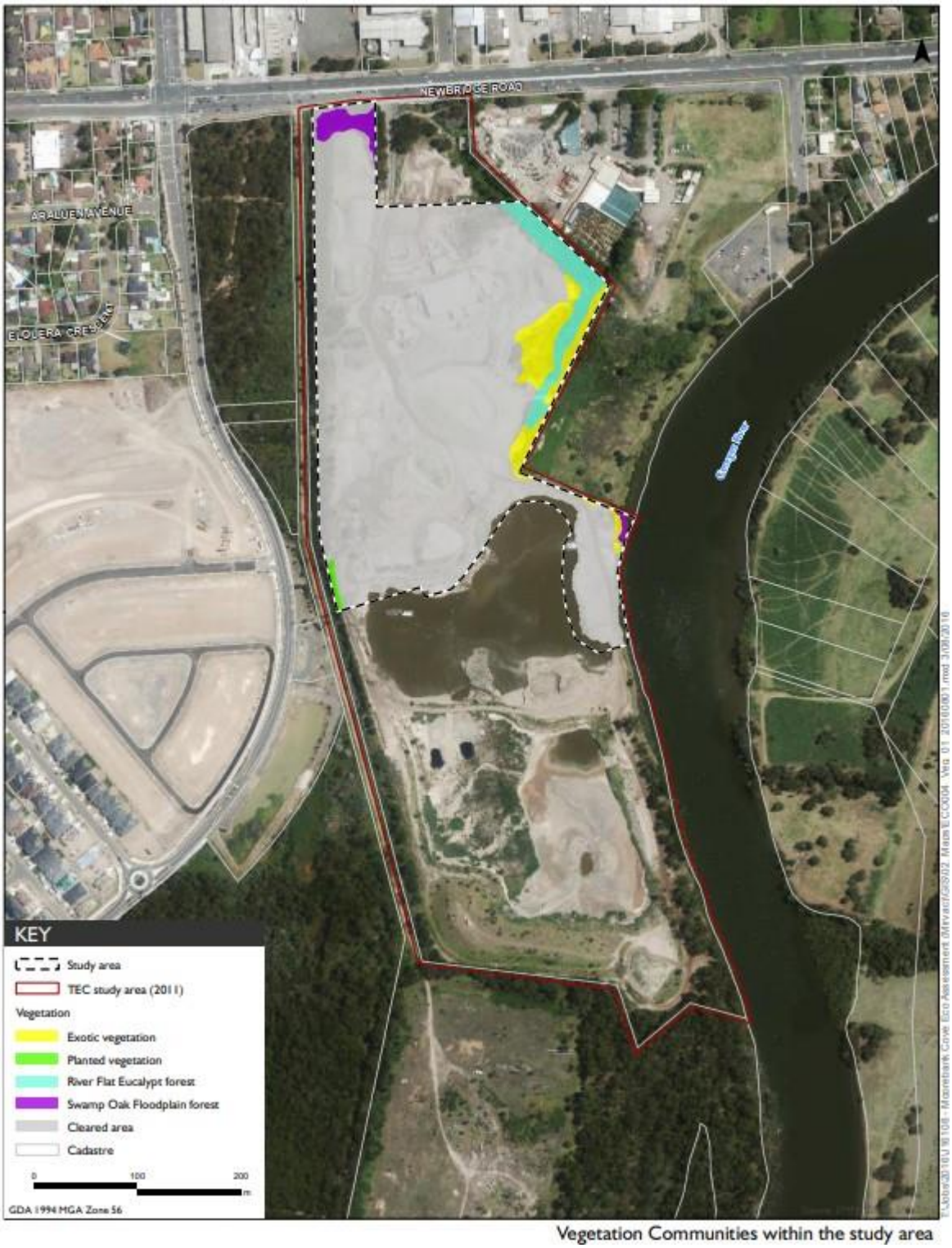

Figure 3.1 Vegetation communities

3.2 Contemporary findings

3.2.1 Threatened species

A search of the NSW BioNet Atlas (27 August 2024) found no record of threatened species on or near the site.

The nearest record of a threatened species is approximately 2 km south-east of the site (Tadgell's Bluebell *Wahlenbergia multicaulis*) and the development facilitated by the planning proposal is unlikely to have any impact on that flora species.

3.2.2 Vegetation and habitat

As can be seen in the 2024 aerial photograph (Figure 3.2), the site has been cleared and there is no vegetation present in the area previously identified as supporting PCT 1232.

Current photographs (August 2024) of the land the subject of the planning proposal are provided at Photograph 3.1 and Photograph 3.2.

3.2.3 Summary

The habitat and vegetation considered in the 2016 assessment is no longer present.

Therefore, the findings of the earlier ecological impact assessment now overstate the potential impacts of developing the site.

Notwithstanding the absence of habitat and vegetation, the 2016 assessment found that the clearance of the EEC that was (then) present within the study area represented a negligible impact. The basis of that finding was the small area of vegetated land to be impacted and the poor condition of the communities affected.

The ecological impact of development on the site is therefore lower than previously assessed and remains negligible.

Figure 3.2 Planning proposal land - 2024

Photograph 3.1 North-west corner of the site

Photo: Brett Jarvis (27 August 2024)

Photograph 3.2 Site adjacent to Newbridge Road

Photo: Brett Jarvis (27 August 2024)

4 Closing

I trust this provides Council with suitable advice regarding the current status of the site and the likely ecological impacts associated with the planning proposal.

Yours sincerely

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