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Biodiversity Development Assessment Report

For State Significant Development Application (SSD 18_9354) for Proposed JORDAN SPRINGS PUBLIC SCHOOL, Lot 22 // DP1194338, 14 -28 Cullen Avenue, Jordan Springs, NSW 2747 – Revision 2

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Environmental Planning
Ecological Assessments
Bushfire Hazard Management
Project Management

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PROJECT NAME	Biodiversity Development Assessment Report (BDAR) – For State Significant Development Application (SSD 18_9354) for Proposed JORDAN SPRINGS PUBLIC SCHOOL – Revision 2
PROJECT ADDRESS	Lot 22 // DP1194338, 14-28 Cullen Ave, Jordan Springs, NSW 2747
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Glossary and abbreviations

Acronym	Description
BAM	Biodiversity Assessment Methodology
BC Act	NSW *Biodiversity Conservation Act 2016*
BC Reg	*Biodiversity Conservation Regulation 2017*
BCT	Biodiversity Conservation Trust
BDAR	Biodiversity Development Assessment Report
CEMP	Construction Environmental Management Plan
DoEE	Commonwealth Department of the Environment and Energy
DPE	NSW Department of Planning and Environment
EEC	Endangered Ecological Community
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
ha	hectare(s)
HTE	High Threat Exotic
IBRA	Interim Bioregionalisation of Australia
km	kilometre
LGA	Local Government Area
LLS Act	*Local Land Services Act 2013*
masl	Metres above sea level
NSW	New South Wales
OEH	NSW Office of Environment and Heritage
PCT	Plant community type, as defined by OEH (2018)
SAII	Serious and Irreversible Impacts
SEARs	Secretary's Environmental Assessment Requirements
SSD	State Significant Development
TEC	Threatened Ecological Community, listed as vulnerable, endangered or critically endangered under either the BC Act and/or EPBC Act

1. Introduction

1.1 Overview

This Biodiversity Development Assessment Report (BDAR) has been prepared by Bruce Mullins of *Ecoplanning Pty Ltd* and Brendan Pratt of *Alphitonia Pty Ltd* on behalf of the Schools Infrastructure NSW (the Applicant). It accompanies an Environmental Impact Statement (EIS) in support of State Significant Development Application (SSD 18_9354) for the new Jordan Springs Public School at 14-28 Cullen Avenue, Jordan Springs (the site).

The new school will cater for approximately 1,000 primary school students and 70 full-time staff upon completion. The proposal seeks consent for:

- Construction of a 2-storey library, administration and staff building (Block A) comprising:
  - School administrative spaces including reception;
  - Library with reading nooks, makers space and research pods;
  - Staff rooms and offices;
  - Special programs rooms;
  - Amenities;
  - Canteen;
  - Interview rooms; and
  - Presentation spaces.
- Construction of three 2-storey learning hubs containing 42 homebases comprising:
  - Collaborative learning spaces;
  - Learning studios;
  - Covered outdoor learning spaces;
  - Practical activity areas; and
  - Amenities.
- Construction of a single storey assembly hall (Block C) with a performance stage and integrated covered outdoor learning area (COLA). The assembly hall will have OOSH facilities and store room areas;
- Associated site landscaping and open space including associated fences throughout and sporting facilities;
- Pick-up and drop-off zone from Cullen Avenue;
- Pedestrian access points along both Cullen Avenue and Lakeside Parade;
- Construction of an at-grade carpark containing 62 spaces accessible from Lakeside Parade and 2 spaces accessible from Cullen Avenue;

- School signage to the front entrance; and
- New substation fronting Cullen Avenue.

All proposed school buildings will be connected by a double storey covered walkway providing integrated covered outdoor learning areas (COLAs).

The proposed development is shown in **Figure 1.2**. Remnant vegetation has been cleared from the subject land, however, some native vegetation was present in the grassland dominated by exotic species. The subject land does not feature on the Biodiversity Values Map (**Figure 1.3**).

The purpose **of this** BDAR **is to** address the SEARs issued by the Department of Planning and Environment (DPE) in accordance with the Biodiversity Assessment Methodology (BAM) and documented in a BDAR in the form required by Section 6.12 of the *Biodiversity Conservation Act 2016* (BC Act) and Section 6.8 of the *Biodiversity Conservation Regulation 2017* (BC Reg). This BDAR has been prepared by Bruce Mullins, an Accredited Assessor (BAAS17024) under the BC Reg, and is consistent with the BAM (OEH 2017a).

Sources of information for this report included:

- NSW Planning Portal (NSW Dept. of Planning and Environment 2018)
- BioNet Atlas of NSW Wildlife (NSW Office of Environment and Heritage 2018a)
- The Native Vegetation of the Sydney Metropolitan Area (OEH 2013)
- Southeast NSW Native Vegetation Classification and Mapping (Tozer et al. 2006)
- SIX Maps (LPI 2018)

1.2 Location and site identification

The proposed development (the 'subject land') will be constructed within Lot 22 // DP 1194338, 14-28 Cullen Avenue, Jordan Springs, NSW, 2747 (the 'school boundary'). The subject land for this BDAR covers a total area of approximately 3 ha and is within Lot 22 // DP 1194338 (**Figure 1.1**). The subject land is situated in the Penrith Local Government Area (LGA). The subject land is composed of cleared land.

The subject land is in a relatively new and developing housing estate. A drainage swale has been created east of the subject land, which directs water in a stormwater detection wetland that is bound by Lakeside Parade (**Figure 1.2**). The school boundary is bounded by Cullen Ave to the south, Lakeside Parade to the west, residences to the north and the drainage swale to the east. The subject land has been cleared as part of the establishment of the Jordan Springs Estate.

1.3 Response to SEARs

The BDAR is required by the Secretary's Environmental Assessment Requirements (SEARs) for SSD 18_9354. This table identifies the SEARs and relevant reference within this report.

Table 1.1: SEARs and Relevant Reference

SEARs Item	Report Reference
17. Flora and Fauna Assessment **Engage a suitably qualified person to assess and document the flora and fauna impacts related to the proposal.**	This report in its entirety, and specifically section 1.1, paragraphs 1 and 5.

Note: Notwithstanding these requirements, the Biodiversity Conservation Act 2016 requires that State Significant Development Applications be accompanied by a Biodiversity Development Assessment Report.	

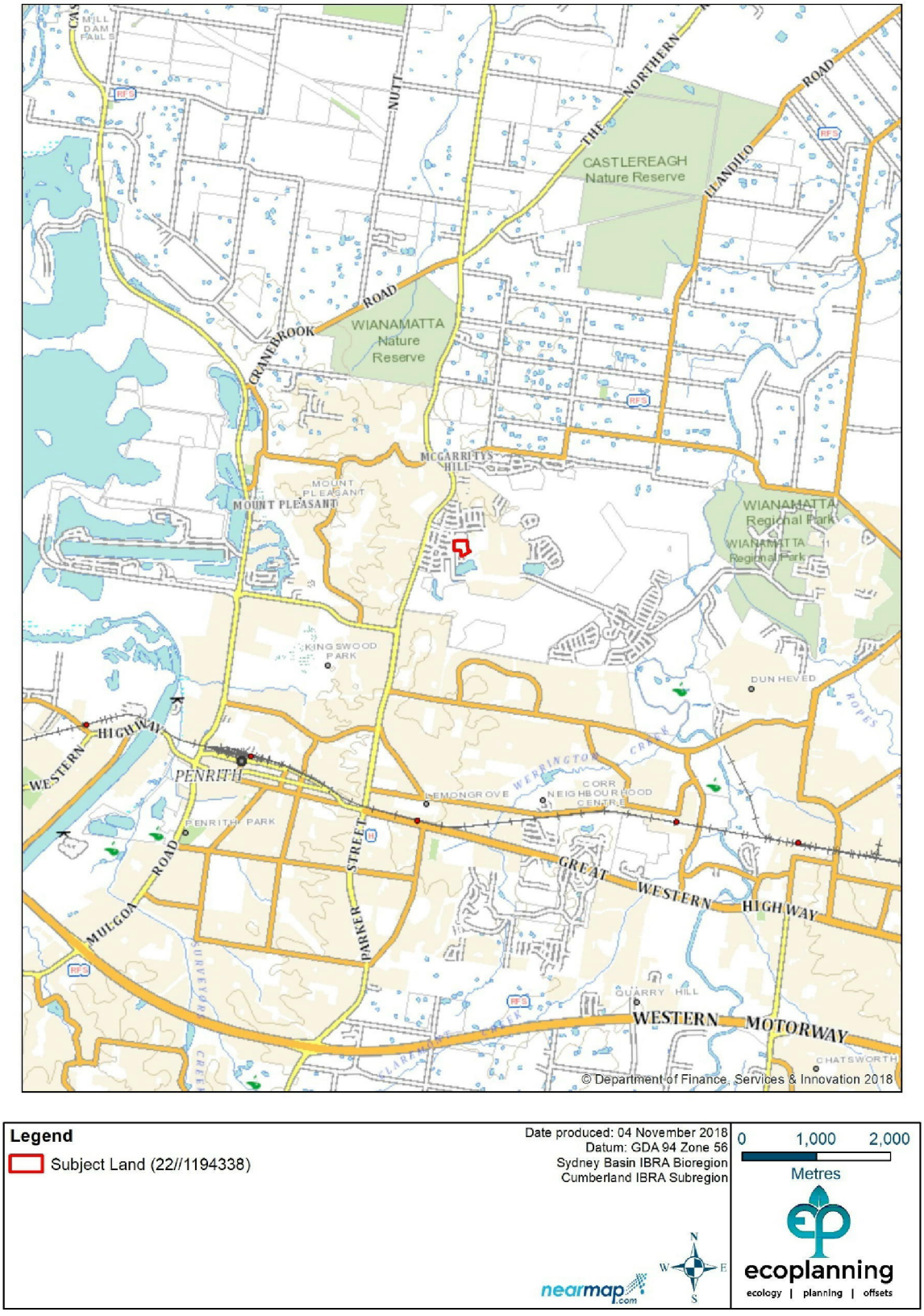

Figure 1.1: Subject land location

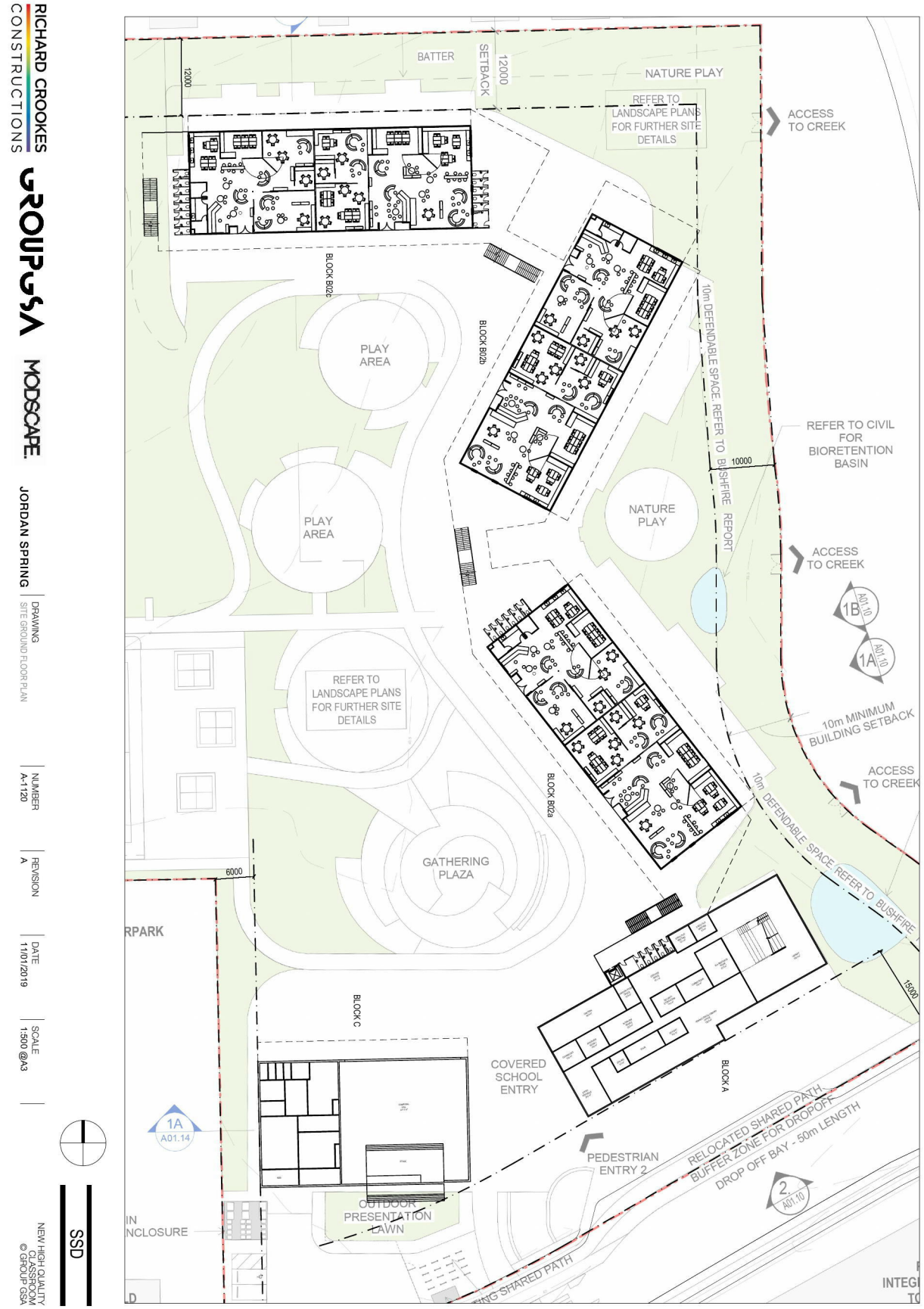

Figure 1.2: Site Ground Floor Plan.

Figure 1.3: Environmentally Significant Land in the subject land (LEP 2009).

2. Landscape context

2.1 Identify landscape features

In accordance with the BAM, a number of features are assessed within and surrounding the subject land. Provided below are details related to IBRA bioregion and subregion and NSW landscape regions (Mitchell Landscapes). Other features, such as rivers, streams, estuaries and wetlands, habitat connectivity, karst areas or areas of outstanding biodiversity value are addressed, where appropriate. The landscape features are presented in both the Site Map (**Figure 2.1**) and Location Map (**Figure 2.2**) as per section 4.2 of the BAM.

2.1.1 IBRA bioregions and IBRA subregions

Interim Biogeographic Regionalisation of Australia (IBRA) regions represent a landscape based approach to classifying the land surface, including attributes of climate, geomorphology, landform, lithology, and characteristic flora and fauna species present. The subject land is located entirely within the Cumberland Plain subregion (version 7) and within the NSW Sydney Basin IBRA region (version 7).

2.1.2 NSW landscape regions (Mitchell Landscapes)

The subject land occurs in the '*Cumberland Plain'* NSW Mitchell Landscape (Mitchell Landscapes V3.1). The '*Hawkesbury – Nepean Terrace Gravels'* landscape also occurs within the 1,500 m buffer (**Figure 2.2**).

The '*Cumberland Plain*' Mitchell Landscape was entered into the BAM calculator due to it being the dominant Mitchell Landscape within the subject land.

2.1.3 Other features

Rivers, streams and estuaries

No drainage lines are mapped within the subject land, although an unnamed drainage line flows north to south just east of the school boundary into a constructed wetland bound by Lakeside Parade. The drainage line is likely to have been constructed to accommodate and disperse stormwater in the Jordan Springs estate. It is not connected to a natural watercourse. Therefore, it is considered a first order watercourse. While there are no mapped watercourses within the subject land, runoff from the subject land would flow into the unnamed drainage line.

The riparian buffer associated with unnamed drainage line does not intersect with the school boundary (**Figure 2.1**).

Local and important wetlands

No important wetlands, as defined by the BAM, are within the subject land or buffer area.

A constructed wetland occurs south of the subject land and Cullen Ave, and is bound by Lakeside Parade (**Figure 2.2**).

Habitat connectivity

The is no vegetation communities or habitat within the subject land (**Figure 2.2**).

Areas of geological significance and soil hazard features

The subject land does not incorporate areas of geological significance or any soil hazard features.

Areas of outstanding biodiversity value

The subject land does not include any areas of outstanding biodiversity value as defined under the BC Act.

2.2 Determining site context

2.2.1 Assessing native vegetation cover

A layer of native vegetation cover is required for a 1,500 m buffer around the subject land to determine the context of the site. The extent of native vegetation on the subject land and immediate surrounds was mapped using the Native Vegetation of the Sydney Metropolitan Area (OEH 2013) as a base, with edits made to the layer where obvious changes to vegetation extent had occurred (**Figure 2.2**).

The total area of the 1,500 m buffer around the subject land is 818 ha, with the area of vegetation mapped within the buffer being 266 ha. This is a native vegetation cover of 32.5% (30-70% class as defined in s4.3.2 of the BAM) and this value was entered into the BAM calculator.

2.2.2 Assessing patch size

Patch size is defined by the BAM as *'an area of native vegetation that:*

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

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

In assessing patch size, stands of native vegetation within 100 m of each other (where in a moderate to good condition) but which are separated by hard barriers including permanent, artificial structures, wide roads or other barriers, have been treated as separate patches. These highly modified breaks in vegetation connectivity would significantly alter ecological function of these areas of native vegetation such that these areas warrant recognition as separate patches.

Patch size was calculated for the vegetation on the development site using the field validated map of vegetation types identified and the updated native vegetation extent data layer prepared for the 1,500 m buffer (based on OEH 2016b). Patch size is required to be assessed as one of four classes per vegetation zone mapped, being <5 ha, 5-24 ha, 25-100 ha or >100 ha.

Patch size is defined as 'native vegetation' (OEH 2016b). As the entire subject land consists of only exotic grassland, there is no native vegetation and the patch size is zero (**Figure 2.2**). Therefore, the "patch" has been assigned the lowest patch class of <5 ha.

Figure 2.1: Site map.

Figure 2.2: Location map.

3. Native vegetation

3.1 Plant community types (PCTs) and threatened ecological communities

3.1.1 Previous vegetation mapping

Desktop assessment indicates the subject land contained Shale Plains Woodland (PCT 849 – Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion) (OEH 2013 and Tozer et al. 2006) (**Figure 3.1** and **Figure 3.2**). Many of the vegetation polygons mapped by OEH (2013 and Tozer et al (2006) have been removed to construct the Jordan Springs Estate.

The vegetation community identified by OEH (2013) and Tozer et al (2006) within the subject land has been removed leaving an exotic grassland (**Figure 3.3**). This community does not conform to any threatened ecological community.

3.1.2 Field assessment of vegetation communities

Assessment and mapping of Plant Community Types (PCTs) was undertaken on 17 October 2018 by Bruce Mullins, Angela Bibby and Daniel Clarke. The subject land was traversed to identify the vegetation structure and dominant species. The entire distribution of each patch of vegetation was traversed to sample any spatial variation within each polygon, identify boundaries between vegetation communities and to identify and map vegetation zones (variation in the broad condition state of vegetation polygons) in accordance with the BAM.

Based upon inspection of the subject land, vegetation communities present were identified, and their boundaries were mapped. The floristics of each of these vegetation communities were then sampled within 20 x 20 m plot-based floristic vegetation surveys, consistent with Section 5.2.1.9 of the BAM. These are also the location of vegetation integrity plots in accordance with Section 5.3 of the BAM. The location of floristic vegetation plots were based upon randomly sampled areas of the vegetation community, whilst ensuring that the plot-based surveys included representative areas within each community and avoided, where possible, edge effects (i.e. located close to edges of vegetation extent). The identification of PCTs was in accordance with the NSW PCT classification as described in the BioNet Vegetation Classification. Determination of the most appropriate PCTs for vegetation communities within the subject land used the BioNet Vegetation Classification database to identify PCT types which matched the geographic distribution (based upon IBRA subregions), vegetation formation and floristics of vegetation within the subject land.

It is noted that the identification of vegetation communities and PCTs was complicated by the fact that field observations were of disturbed and previously cleared stands of vegetation, where the only vegetation present was regrowth. Based on this, even though some native vegetation was present on site, the vegetation was determined to be exotic grassland (**Figure 3.3**).

Figure 3.1: Vegetation types (OEH, 2013).

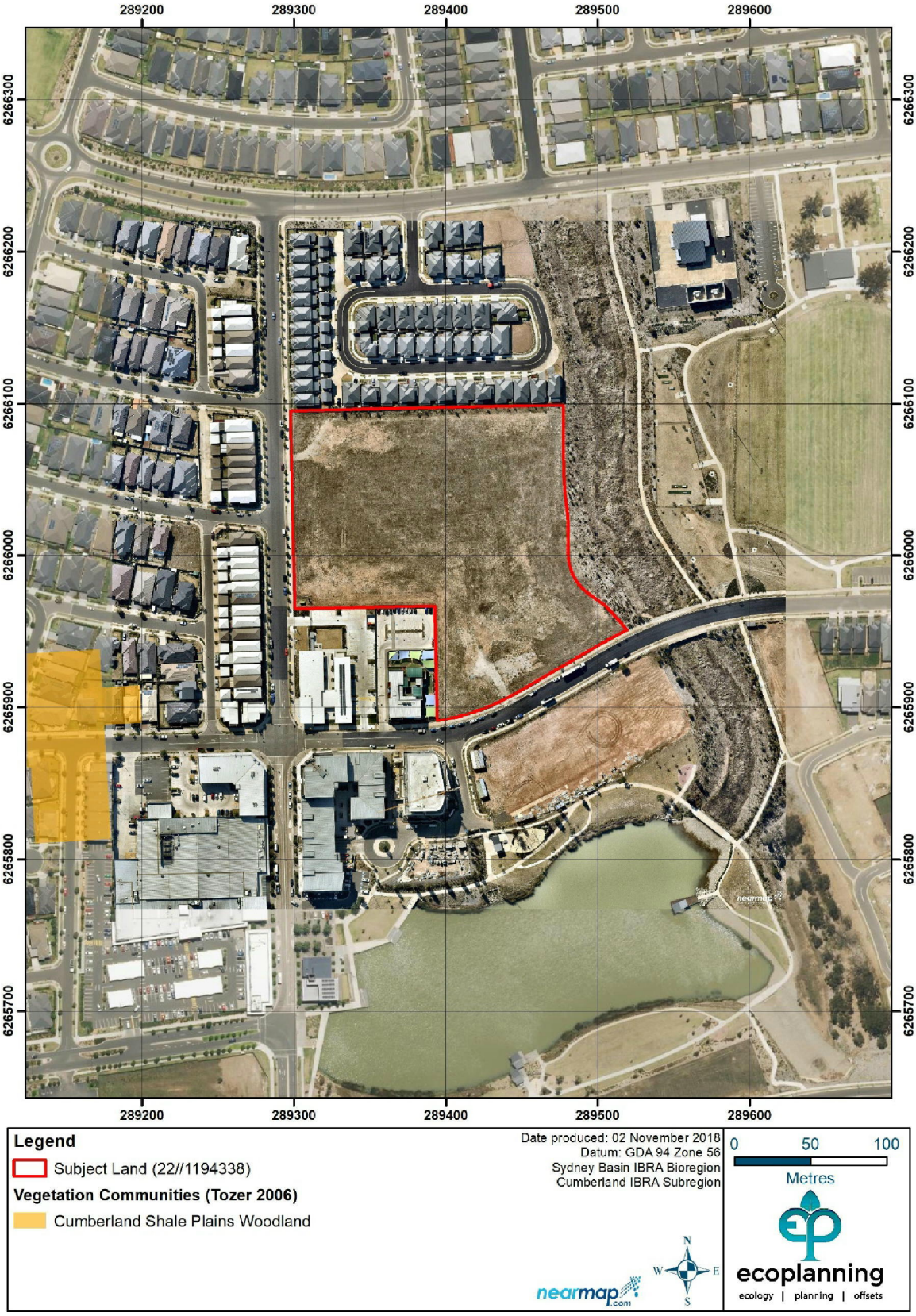

Figure 3.2: Vegetation types (Tozer et al. 2006).

Figure 3.3: Field results and validated vegetation (Ecoplanning, 2018).

3.1.3 Exotic 'grassland'

Exotic grassland, which was the only vegetation type within the subject land, was not assigned to a native vegetation community or an equivalent PCT. Vegetation on the subject land had previously been removed to bare earth during the construction of the Jordan Springs estate. Vegetation on site has either regrown from seed since clearing or as part of a hydro-mulch spread across the site to stabilise the soil. The exotic grassland is dominated by exotic grasses and herbaceous weeds (**Figure 3.4**), including *Paspalum dilatatum* (Paspalum), *Eragrostis curvula* (African Lovegrass), *Lotus angustissima* (Slender Birds-foot Trefoil), *Lysimachia arvense* (Scarlet Pimpernel).

Acacia decurrens (Black Wattle) was recorded on site as a single seedling, less than 30 cm tall. *Acacia decurrens* readily colonises disturbed areas. The native herb species *Plantago debilis* and *Plantago varia* were present on site.

The native species *Cynodon dactylon* (Couch) was present and was the dominant species in each plot. *Cynodon dactylon* is a cosmopolitan species, and been modified as a horticultural plant widely. There is debate and doubt over the status of *C. dactylon* within Australia (Langdon 1954), with the species having been recorded as an introduced species as early as 1802-1804 by R. Brown (Groves 2002), although some authors recognise both indigenous and introduced populations within Sydney (Harden 1993 in Groves 2002) and Australia (Jessop et al. 2006). Within the subject land *Cynodon dactylon* commonly occurred with an array of other introduced species within the subject land, suggesting that it is an introduced species. For this reason, these grassland areas have been mapped as 'exotic grassland' and no PCT has been assigned for this vegetation zone.

Figure 3.4: Cleared land 'exotic grassland' in the subject land.

3.2 Vegetation zones

3.2.1 Condition classes, subcategories and areas

The vegetation identified within the subject land was classified into vegetation zones for credit calculation purposes. The vegetation zones are based on the condition descriptions above with the area of each vegetation zones shown in **Table 3.1**. **Figure 3.5** shows the spatial arrangement of the vegetation zones within the subject land and associated vegetation integrity survey plots.

3.2.2 Vegetation integrity survey plots

Two vegetation integrity survey plots were completed on the subject land, with all being used to meet the requirements of the BAM (see **Appendix A** for data captured) (**Figure 3.5**). The number of plots surveyed within the vegetation zone is consistent with the requirements as outlined within Table 4 of the BAM (**Table 3.1**).

Table 3.1: Vegetation integrity survey plots.

Veg zone number	Plant community type	Condition class	Area impacted (ha)	Veg integrity plots required	Veg integrity plots undertaken
1	N/A	Exotic grassland	3.0	2	2*

3.2.3 Current and future vegetation integrity scores

While the 'exotic grassland' vegetation zone was not assigned to a native PCT, the data collected from the two plots surveyed within this vegetation zone was entered into the BAM Calculator as a zone of PCT 849 (the most likely PCT prior to previous vegetation clearing across this vegetation zone) in order to calculate a vegetation integrity score for this vegetation zone. As the area of 'exotic grassland' within the subject land is 3 ha, two vegetation integrity plots were required for a vegetation zone of this size.

The vegetation integrity scores for the exotic grassland are provided in **Table 3.2**. The vegetation integrity score for the exotic grassland is 4/100. This constitutes a highly degraded community and is below the threshold for requiring offset as per Section 3.1.1.3 of the BAM.

A future vegetation integrity score was allocated to the vegetation zone. The project would involve complete clearing of all vegetation in the subject land and the default future vegetation integrity score of 0 was applied.

Table 3.2: Vegetation integrity scores.

Veg zone number	Plant community type	Condition class	Area impacted (ha)	Veg integrity score – before development	Veg integrity score – after development
1	Exotic grassland	Exotic grasslands	3.0	4.0	NA

Figure 3.5: Vegetation zones and vegetation integrity survey plot locations.

4. Threatened species

Section 6 of the BAM details the process for determining the habitat suitability for threatened species.

Under the BAM, threatened species are separated into two classes, 'ecosystem' and 'species' credit species. Those threatened species where the likelihood of occurrence of a species or elements of the species' habitat can be predicted by vegetation surrogates and landscape features, or for which a targeted survey has a low probability of detection, are identified as 'ecosystem' credit species. Targeted surveys are not required for ecosystem species and potential impacts to these species are assessed in conjunction with impacts to PCTs.

Threatened species where the likelihood of occurrence of a species or elements of suitable habitat for the species cannot be confidently predicted by vegetation surrogates and landscape features and can be reliably detected by survey are identified as 'species' credit species. A targeted survey or an expert report is required to confirm the presence or absence of these species on the subject land.

For some threatened species, they are identified as both ecosystem and species credit species, with different aspects of the habitat and life cycle representing different credit types. Commonly, threatened fauna species may have foraging habitat as an ecosystem credit, while their breeding habitat represents a species credit.

The following sections outline the process for determining the habitat suitability for threatened species within the subject lands, and the results of targeted surveys for candidate threatened species.

4.1 Identifying threatened species for assessment

Threatened species that require assessment are initially identified based upon the following criteria:

- the distribution of the species includes the IBRA subregion in which the subject land (Cumberland IBRA subregion).
- the subject land is within any geographic constraints of the distribution of the species within the IBRA subregion.
- the species is associated with any of the PCTs identified within the subject land
- the native vegetation cover within an assessment area including a 1,500 m buffer around the subject land is equal to or greater than the minimum required for the species.
- the patch size that each vegetation zone is part of is equal to or greater than the minimum required for that species.
- the species is identified as an ecosystem or species credit species in the Threatened Biodiversity Data Collection.

The process for identifying threatened species which meet the above criteria is completed through the BAM Calculator. The PCTs identified within the subject land, patch sizes and native vegetation cover, as outlined in **Section 3**, were entered into the BAM Calculator and a preliminary list of threatened species were identified.

4.1.1 Geographic and habitat features

Selected ecosystem credit species and species credit species are predicted following assessment of geographic and habitat features in the credit calculator, such as site location (IBRA subregion),

PCTs and condition, patch size and the area of surrounding vegetation within the buffer. Some species require further assessment of habitat constraints and/or geographic limitations before being confirmed as an ecosystem credit species or candidate species for assessment. **Table 4.1** and **Table 4.2** outlines the questions asked for these species, and whether the species is confirmed as a candidate species.

Table 4.1: Assessment of habitat constraints and geographic limitations of ecosystem credit species.

Scientific Name / Common Name	Habitat constraints	Geographic limitations	Maintained as an ecosystem credit species
Botaurus poiciloptilus Australasian Bittern	1. Waterbodies 2. Brackish or freshwater wetlands	-	No
Ixobrychus flavicollis Black Bittern	1. Waterbodies 2. Land within 40 m of freshwater and estuarine wetlands, in areas of permanent water and dense vegetation	-	No

Table 4.2: Assessment of habitat constraints and geographic limitations of species credit species.

Scientific Name / Common Name	Habitat constraints	Geographic limitations	Maintained as candidate species
Burhinus grallarius Bush Stone-curlew	1. Fallen/standing dead timber including logs	-	No
Chalinolobus dwyeri Large-eared Pied Bat	1. Cliffs 2. Within 2 km of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels	-	No. There are no caves in the subject land. It is unlikely that there are any habitat constraints within 2 km of the subject land.
Litoria aurea Green and Golden Bell Frog	1. Semi-permanent/ephemeral wet areas 2. Within 1 km of wet areas | Swamps 3. Within 1 km of swamp | Waterbodies 4. Within 1 km of waterbody	-	Yes

Scientific Name / Common Name	Habitat constraints	Geographic limitations	Maintained as candidate species
Marsdenia viridiflora subsp. *viridiflora* - endangered population Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	-	Those LGAs named in the population's listing	Yes
Myotis macropus Southern Myotis	1. Hollow bearing trees 2. Within 200 m of riparian zone 3. Bridges, caves or artificial structures within 200 m of riparian zone	-	Yes
Wahlenbergia multicaulis - endangered population Tadgell's Bluebell in the local government areas of Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield	1. Other 2. Land situated in damp, disturbed sites	-	No.

4.1.2 Ecosystem credit species

The ecosystem credit species predicted on site are provided in **Table 4.3**. The habitat and geographic constraints were initially assessed for the ecosystem credit species. Two species, Australasian Bittern (*Botaurus poiciloptilus*) and Black Bittern (*Ixobrychus flavicollis*) were removed from the list due to the habitat constraints assigned to these species not occurring in the subject land. Additionally, areas of exotic grassland were not considered as habitat for any ecosystem credit species.

Table 4.3: Ecosystem credit species predicted on site.

Scientific Name / Common Name	NSW listing status*	National listing status*
Anthochaera phrygia Regent Honeyeater (Foraging)	CE	CE
Artamus cyanopterus cyanopterus Dusky Woodswallow	V	-
Callocephalon fimbriatum Gang-gang Cockatoo (Foraging)	V	-
Chthonicola sagittata Speckled Warbler	V	-
Circus assimilis Spotted Harrier	V	-
Climacteris picumnus victoriae Brown Treecreeper (eastern subspecies)	V	-
Daphoenositta chrysoptera Varied Sittella	V	-
Dasyurus maculatus Spotted-tailed Quoll	V	E
Glossopsitta pusilla Little Lorikeet	V	-
Grantiella picta Painted Honeyeater	V	V
Haliaeetus leucogaster White-bellied Sea-Eagle (Foraging)	V	-
Hieraaetus morphnoides Little Eagle (Foraging)	V	-
Lathamus discolor Swift Parrot (Foraging)	E	CE
Lophoictinia isura Square-tailed Kite (Foraging)	V	-
Melanodryas cucullata cucullata Hooded Robin (south-eastern form)	V	-
Miniopterus australis Little Bentwing-bat (Foraging)	V	-
Miniopterus schreibersii oceanensis Eastern Bentwing-bat (Foraging)	V	-
Mormopterus norfolkensis Eastern Freetail-bat	V	-

Scientific Name / Common Name	NSW listing status*	National listing status*
Neophema pulchella Turquoise Parrot	V	-
Ninox strenua Powerful Owl (Foraging)	V	-
Petroica boodang Scarlet Robin	V	-
Petroica phoenicea Flame Robin	V	-
Phascolarctos cinereus Koala (Foraging)	V	V
Pteropus poliocephalus Grey-headed Flying-fox (Foraging)	V	V
Saccolaimus flaviventris Yellow-bellied Sheathtail-bat	V	-
Stagonopleura guttata Diamond Firetail	V	-
Tyto novaehollandiae Masked Owl (Foraging)	V	-

* CE- Critically Endangered; E- Endangered, V- Vulnerable

4.2 Identify candidate species

In accordance with Section 6.4.1.17 of the BAM, a predicted candidate species can be considered unlikely to occur within the subject land (or specific vegetation zones) where habitat is substantially degraded such that the species is unlikely to use the area, or where an expert report identifies that the species is unlikely to be present within the subject land (or a vegetation zone within the subject land). A predicted candidate species credit species that is not considered to have suitable habitat on the subject land (or specific vegetation zones) in accordance with Section 6.4.1.17 of the BAM does not require further assessment on the subject land (or specific vegetation zones). The reasons for determining that a predicted species credit species is unlikely to have suitable habitat on the subject land (or specific vegetation zones) must be documented.

As discussed in **Section 3**, much of the vegetation within the subject land has been previously cleared for the construction of Jordan Springs Estate and consists of exotic vegetation. To inform an assessment of how habitat degradation has impacted candidate threatened species a search of the Atlas of NSW Wildlife (OEH 2018a) was undertaken (**Appendix B**). The search identified all records from the last 20 years within a 5 km radius around the subject land. The likelihood of occurrence of candidate threatened species was assessed by:

- review of location and date of recent (<5 years) and historical (>5-20 years) records
- review of available habitat within the subject land and surrounding areas
- review of the scientific literature pertaining to each species and population
- applying expert knowledge of each species

The potential for each threatened species, population and/or migratory species to occur was then considered following review of location and date of records of threatened species, available habitat within the subject land, and the condition of such habitat. **Table 4.4** outlines the predicted candidate species which were deemed to not have suitable habitat within the subject land, including justification for this decision.

Table 4.4: Candidate species for which the subject land is not considered suitable habitat.

Species	Justification*
FLORA	
Acacia bynoeana Bynoe's Wattle	The site is highly disturbed and degraded. Further the species does not occur on soil types and associated vegetation communities on the subject land.
Acacia pubescens Downy Wattle	The site is highly disturbed and degraded. Further the species does not occur on soil types and associated vegetation communities on the subject land.
Caladenia tessellata Thick-lip Spider Orchid	The site is highly disturbed and degraded. Further the species does not occur on soil types and associated vegetation communities on the subject land.
Cynanchum elegans White-flowered Wax Plant	The site is highly disturbed and degraded. Remnant native vegetation has been cleared from the site to establish Jordan Springs.
Dillwynia tenuifolia	This species is known to occur in the area. However, the subject land is highly disturbed and degraded. Remnant native vegetation has been cleared from the subject land to establish Jordan Springs.
Eucalyptus benthamii (Camden White Gum)	Unsuitable habitat within the subject land, the species requires a combination of deep alluvial sands and a flooding regime that permits seedling establishment. Not recorded during the last 20 years within 5 km of the subject land.
Grevillea juniperina subsp. *juniperina*	This species is known to occur in the area. However, the subject land is highly disturbed and degraded. Remnant native vegetation has been cleared from the subject land to establish Jordan Springs.
Marsdenia viridiflora subsp. *viridiflora*	This species is known to occur in the area. However, the subject land is highly disturbed and degraded. Remnant native vegetation has been cleared from the subject land to establish Jordan Springs.
Persoonia bargoensis	The site is highly disturbed and degraded. Remnant native vegetation has been cleared from the subject land to establish Jordan Springs.
Pimelea curviflora	This species is known to occur in the area. However, the subject land is highly disturbed and degraded. Remnant native vegetation has been cleared from the subject land to establish Jordan Springs.
Pimelea spicata	This species is known to occur in the area. However, the subject land is highly disturbed and degraded. Remnant native vegetation has been cleared from the subject land to establish Jordan Springs.
Pultenaea pedunculata Matted Bush-pea	The site is highly disturbed and degraded. Remnant native vegetation has been cleared from the subject land to establish Jordan Springs.
Pterostylis saxicola	The site is highly disturbed and degraded. Further the species does not occur on soil types and associated vegetation communities on the subject land.
Thesium australe *Austral Toadflax*	The site is highly disturbed and degraded. Remnant native vegetation has been cleared from the subject land to establish Jordan Springs.
FAUNA	

Species	Justification*
Anthochaera phrygia (Regent Honeyeater) (Breeding)	No suitable breeding habitat within the subject land. There are only three known key breeding regions remaining: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region. In NSW, the distribution is very patchy and mainly confined to the two main breeding areas and surrounding fragmented woodlands.
Burhinus grallarius Bush Stone Curlew	The site is highly disturbed and degraded removing trees, shrubs and woody debris that are important habitat features.
Callocephalon fimbriatum (Gang-gang Cockatoo) (Breeding)	No suitable breeding habitat within the subject land. In spring and summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. Favours old growth forest and woodland attributes for nesting and roosting. Nests are located in hollows that are 10 cm in diameter or larger and at least 9 m above the ground in eucalypts. No hollow bearing trees were identified in the subject land.
Cercartetus nanus (Eastern Pygmy-possum)	Unsuitable and degraded habitat within the subject land. This species is found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred.
Chalinolobus dwyeri Large-eared Pied Bat	The subject land is not within 2 km of rocky areas containing cliff lines, caves, overhangs, escarpments, outcrops or crevices.
Haliaeetus leucogaster (White-bellied Sea-Eagle) (Breeding)	No suitable breeding habitat within the subject land. Breeding habitat for this species consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat (characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea). Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts'. Nests are large structures built from sticks and lined with leaves or grass.
Hieraaetus morphnoides (Little Eagle) (Breeding)	No suitable breeding habitat within the subject land. Breeding habitat for this species is tall living trees within a remnant patch, where pairs build a large stick nest in winter. The vegetation in the subject site does not form part of a remnant patch of vegetation and consists exclusively of planted native vegetation.
Lathamus discolor (Swift Parrot) (Breeding)	No suitable breeding habitat within the subject land. This species breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland.
Litoria aurea (Green and Golden Bell Frog)	The subject land is within 1 km of a waterbody and wet areas, including a constructed wetland, which is situated approximately 100 m to the south (**Figure 2.2**). However, the subject land is substantially degraded and does not provide suitable habitat for the species. No marshes, dams, or watercourses with vegetation such as bulrushes (*Typha* spp.) or spike-rushes (*Eleocharis* spp.) where identified in the subject land. Furthermore, the vegetation in the subject land is heavily managed and regularly mown and contained no habitat, such as coarse woody debris or dense vegetation cover.
Lophoictinia isura (Square-tailed Kite) (Breeding)	Habitat within the subject land is unsuitable and degraded for breeding. This species nests on horizontal branches in mature living trees, especially eucalypts, often near water, and they need extensive areas of forest or woodland surrounding or nearby (Birdlife 2018).
Meridolum corneovirens (Cumberland Plain Land Snail)	Unsuitable and degraded habitat within the subject land. This species lives under litter or bark, leaves and logs, or shelters in loose soil around grass

Species	Justification*
	clumps. The groundlayer in the subject land is heavily managed by regular mowing and is devoid of coarse woody debris and litter accumulation.
Miniopterus australis (Little Bentwing-bat) (Breeding)	No suitable breeding habitat within the subject land. Only five nursery sites /maternity colonies are known in Australia. In NSW, the largest maternity colony is in close association with a large maternity colony of Eastern Bentwing-bat (*Miniopterus schreibersii*) and appears to depend on the large colony to provide the high temperatures needed to rear its young.
Miniopterus schreibersii oceanensis (Eastern Bentwing-bat) (Breeding)	No suitable breeding habitat within the subject land. The species forms discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes.
Myotis macropus Southern Myotis	The southern end of the subject land occurs approximately 100 m from a constructed wetland, and a constructed ephemeral drainage lines directs water into the constructed wetland. All trees have been removed from the subject land for the development of Jordan Springs. Therefore, the species is not likely to occur on the subject land.
Ninox strenua (Powerful Owl) (Breeding)	This species nests in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old. While the female and young are in the nest hollow the male Powerful Owl roosts nearby (10-200 m) guarding them, often choosing a dense "grove" of trees that provide concealment from other birds that harass him. No hollow bearing trees were identified in the subject land.
Petaurus norfolcensis (Squirrel Glider)	No suitable habitat within the subject land. Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Require abundant tree hollows for refuge and nest sites.
Phascolarctos cinereus (Koala) (Breeding)	Habitat within the subject land is unsuitable and degraded for Koala breeding habitat. The Koala has a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. Inhabit eucalypt woodlands and forests. The subject land has been fragmented and isolated from any nearby records by previous vegetation clearing and urban and industrial development.
Pteropus poliocephalus Grey-headed Flying-fox	All trees have been removed from the subject land, and there are no known camps in proximity to the subject land.
Tyto novaehollandiae (Masked Owl) (Breeding)	No suitable breeding habitat within the subject land. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting.

* Unless otherwise stated, habitat information is sourced from OEH (2018b)

Based upon the assessment of available habitat for predicted candidate species within the subject land, there are no predicted candidate species for the subject land.

4.3 Determine presence or absence of a candidate species credit species

Given the disturbed nature of the subject land and broader area, there are no confirmed candidate species, therefore, targeted surveys for species credit species were not required undertaken in accordance within Section 6.5 of the BAM.

4.4 Field survey and results

4.4.1 Field survey

A field survey was undertaken on 17 October 2018 by Ecoplanning ecologists Bruce Mullins and Angela Bibby, and (subcontractor) Daniel Clarke (**Figure 4.1**). The field survey included a general flora and fauna habitat and vegetation community assessment and the completion of two vegetation integrity plots in accordance with the BAM (OEH 2017a) (**Figure 4.1**). Weather conditions on the day were mild and overcast (**Table 4.5**).

Table 4.5: Daily weather observation at Bankstown Airport (6 km to the east of the subject land).

Date	Temp (ºC)		Rainfall (mm)	Max wind	
	Min	Max		Direction	Speed (km/h)
17/10/18	17.0	24.5	0.0	NE	35

Fauna and fauna habitat

Opportunistic fauna survey was undertaken for birds, amphibians, reptiles and mammals, which included opportunistic observations along with signs of direct and indirect occupancy (i.e. scats, owl pellets, fur, bones, tracks, bark scratches, foliage chew marks and chewed cones of *Allocasuarina* spp. or *Pinus* spp. as well as some of the other cultivars known to be used by native fauna).

Fauna habitat searches were conducted for potential foraging, roosting, breeding or nesting habitat of nocturnal and diurnal species. This includes inspection for the presence of tree hollows, stags, bird nests, possum dreys, decorticating bark, rock shelters, rock outcrops/crevices, mature / old growth trees, food trees (*Banksia* spp., *Allocasuarina* spp., and winter-flowering eucalypts), culverts, dens, dams, riparian areas and refuge habitats of man-made structures.

4.4.2 Field survey results

Flora species

A total of 36 flora species were identified in the subject land during the field survey, of which ten were native and 26 were exotic (**Appendix C**). A total of four high threat exotic (HTE) species were recorded in the subject land. Nomenclature follows the Flora of NSW (Harden 1990-2002) and updates provided in PlantNET (RBGDT 2018). No threatened flora species were identified in the subject land.

Figure 4.1: Survey effort.

Fauna habitat

The subject land contains minimal fauna habitat (**Table 4.6**). The site has been subject to considerable disturbance, removing remnant vegetation. Exotic grasses and forbs are dominate the subject land. The subject land provides habitat for species common the urban environments, including the bird species recorded in the subject land during field survey (**Appendix C**). No hollow bearing trees, or substantial fauna habitat in the form of coarse woody debris were identified in the subject land.

Table 4.6: Key fauna habitat features present across the subject land.

Habitat features	Fauna species
Open grassland	Birds and reptiles

Fauna species

The field survey undertaken for this report recorded a total of three fauna species, all of which were birds (**Appendix C**). No threatened fauna species were identified in the subject land.

5. Avoiding and minimising impacts on biodiversity values

5.1 Avoiding and minimising impacts on native vegetation and habitat during project planning

Avoiding impacts to the native vegetation within the subject land was, in this case, not feasible or necessary. The proposed development will require the construction of a new school and will impact land previous cleared and on which now grows an exotic grassland (3.0 ha). The small amount of vegetation that will be impacted in the subject land consists of a mixture of exotic and native planted vegetation, although there is a much higher cover of exotic vegetation. The vegetation occurs in a degraded condition and has been subject to past vegetation clearing and disturbances.

5.2 Avoiding and minimising prescribed biodiversity impacts during project planning

As described in **Section 2.1.3**, no prescribed biodiversity impacts are anticipated from the proposed development.

6. Assessing and offsetting impacts

6.1 Assessment of impacts

6.1.1 Assessing impacts to native vegetation and habitat

The proposed school will clear 3.0 ha of exotic grassland within the subject land. This vegetation does not resemble a PCT, however, it is considered that PCT 849 was originally on the subject land. The clearing and subsequent development of the subject land would represent a permanent impact, or loss, of this native vegetation and habitat.

6.1.2 Assessing indirect impacts on native vegetation and habitat

It is difficult to quantify indirect impacts associated with the project, but these may include impacts such as noise and/or erosion associated with the construction phase of the project. The location of the subject lands adjacent to existing residential and commercial development, and supporting highly modified native vegetation is unlikely to have inadvertent impacts on nearby areas of native vegetation and habitat. Given the highly modified nature of the subject land and broader locality, the project is unlikely to reduce viability of any native vegetation or habitat due to edge effects, noise dust or light spill, or disturbance to breeding habitats.

Measures to mitigate and manage indirect impacts are discussed in **Section 6.3**.

6.2 Assessing prescribed biodiversity impacts

As described in **Section 2.1.3**, no prescribed biodiversity impacts are anticipated from the proposed development.

6.3 Mitigating and managing impacts on biodiversity values

As described above, the impact will be incurred to exotic 'grassland'. While the subject land does not contain vegetation or habitat features of value, some measures will be implemented to reduce impacts where possible, such as a Construction Environmental Management Plan (CEMP). Details are provided below.

6.3.1 Construction Environmental Management Plan (CEMP)

To avoid potential indirect offsite impact during construction, an appropriate erosion and sedimentation control plan should be in place following best practice protocols such as Landcom (2004). It is recommended that this is included in a site specific CEMP, prior to any construction works taking place.

The CEMP will be required to span the pre, during and post-construction period.

6.4 Adaptive management for uncertain impacts

Excluding the need for a CEMP, no additional adaptive management measures are proposed.

6.5 Thresholds for the assessment and offsetting of impacts of development

6.5.1 Serious and Irreversible impacts

The *Guidance to assist a decision-maker to determine a serious and irreversible impact* (OEH 2017b) was used to determine whether or not an impact on biodiversity values is likely to be a SAII. The guide (OEH 2017b) lists in Appendix 3 the ecological communities that have potential to meet the SAII principles and criteria. As the vegetation on site is highly disturbed, impact to this vegetation is not identified as a potential SAII in accordance with Appendix 3.

6.5.2 Impacts which require an offset

Section 10.3.1 of the BAM outlines that the following vegetation zones require offsets:

- vegetation zones that have a vegetation integrity score ≥15 where the PCT is representative of an endangered or critically endangered ecological community.
- a vegetation zone that has a vegetation integrity score of ≥17 where the PCT is associated with threatened species habitat or is a vulnerable ecological community.
- a vegetation zone that has a vegetation integrity score ≥20.

Impacts incurred to exotic vegetation (formerly PCT 849) will not require offsets under the BAM.

6.5.3 Impacts that do not require further assessment

As described in Section 3.1.1.3 of the BAM, impacts to non-native vegetation communities, including exotic 'grassland' were not considered beyond Section 5.4 or for Section 6.2 (including 6.2.1.4) of the BAM and did not require an offset (**Table 6.1**). Hence, they have not been assessed here.

Table 6.1: Vegetation which does not require offsets.

Vegetation	Condition class	Area impacted (ha)	Vegetation integrity score
Exotic grassland	Exotic grasslands	3.0	4

7. Final credit calculations

7.1 Credit calculations and classes

7.1.1 Ecosystem credits

No ecosystem credits are required to offset the development.

7.1.2 Species credits

No species credits are required to offset the development.

8. References

Birdlife (2018). Australia's Birds. Online database available at: http://birdlife.org.au/all-about-birds/australias-birds, accessed 28 March 2018.

Commonwealth Department of the Environment and Energy (DoEE 2015). National Flying-fox Monitoring Viewer. Accessed at http://www.environment.gov.au/webgis-framework/apps/ffc-wide/ffc-wide.jsf.

Department of Environment and Conservation (DEC) (NSW) (2004). Natural Resource Management Advisory Series: Note 8: Flying Fox Camps. Available online: http://www.environment.nsw.gov.au/resources/nature/landholderNotes08FlyingFoxCamps.pdf, accessed 28 March 2018.

Groves, R.H. (2002). Robert Brown and the naturalised flora of Australia. Cunninghamia 7(4): 623-629.

Harden, G. J. (ed.) (1990-2002). Flora of New South Wales Volume 1-4, and including revisions and supplements. New South Wales University Press, Sydney.

Jessop, J., Dashorst, G.R.M. & James, F.M. (2006) Grasses of South Australia: An Illustrated Guide to the Native and Naturalised Species. Wakefield Press, Kent Town, South Australia.

Langdon, R.F.N. (1954). The origin and distribution of Cynodon Dactylon (L.) Pers. Department of Botany, University of Queensland Press, Queensland.

NSW Dept. of Planning and Environment (DPE) (2018). NSW Planning Portal. NSW Government. Accessed at: https://www.planningportal.nsw.gov.au/.

NSW Land and Property Information (LPI) (2018). SIX Maps. Accessed at: https://maps.six.nsw.gov.au/.

NSW Office of Environment and Heritage (OEH) (2013). Remnant Vegetation of the western Cumberland subregion, 2013 Update VIS_ID 4207.

NSW Office of Environment and Heritage (NSW OEH) (2017a). Biodiversity Assessment Method. Office of Environment and Heritage for the NSW Government, Sydney.

NSW Office of Environment and Heritage (NSW OEH) (2017b). Guidance to assist a decision-maker to determine a serious and irreversible impact. Office of Environment and Heritage for the NSW Government, Sydney.

NSW Office of Environment and Heritage (NSW OEH) (2018a). BioNet Atlas of NSW Wildlife. Accessed at: http://www.environment.nsw.gov.au/atlaspublicapp/UI_Modules/ATLAS_/AtlasSearch.aspx.

NSW Office of Environment and Heritage (NSW OEH) (2018b). NSW Vegetation Information Sydney (VIS) Classification Database VIS 2.1, logged in as public user at: http://www.environment.nsw.gov.au/NSWVCA20PRapp/LoginPR.aspx?ReturnUrl=%2fNSWVCA20PRapp%2fdefault.aspx.

PlantNET (RBGDT 2018). NSW Flora Online. Accessed at: http://plantnet.rbgsyd.nsw.gov.au/

Simpson, K. and Day, N. (eds) (1993). Field Guide to the Birds of Australia. Viking O'Neil, Victoria.

Tindall, D., Pennay, C., Tozer, M.G., Turner, K., Keith, D.A. (2004). Native vegetation map report series. No. 4. Araluen, Batemans Bay, Braidwood, Burragorang, Goulburn, Jervis Bay, Katoomba, Kiama, Moss Vale, Penrith, Port Hacking, Sydney, Taralga, Ulladulla, Wollongong. NSW Department of Environment and Conservation and NSW Department of Infrastructure, Planning and Natural Resources, Sydney.

Tozer, M.G., Turner, K., Simpson, C.C., Keith, D.A., Beukers, P., Mackenzie, B., Tindall, D. & Pennay, C. (2006). Native Vegetation of Southeast NSW: A Revised Classification and Map for the Coast and Eastern Tablelands. Version 1.0. Department of Environment & Conservation and Department of Natural Resources, Sydney.

van der Ree, R., McDonnell, J., Temby, I., Nelson, J. and Whittingham, E. (2005). The establishment and dynamics of a recently established urban camp of flying foxes (Pteropus poliocephalus) outside their geographic range. Journal of Zoology. 268:177-185. The Zoological Society of London.

Appendix A: Plot data collected

Plot No.	PCT	Area (ha)	Patch size (ha)	Condition class	Zone	Easting	Northing	Bearing
1	NA	1000	3	Exotic Grassland	56	289332	6266025	16
2	NA	1000	3	Exotic Grassland	56	289425	6266015	119

Plot No.	Composition					
	Tree	Shrub	Grass	Forb	Fern	Other
1	0	0	2	3	0	1
2	1	1	2	2	0	1

Plot No.	Structure					
	Tree	Shrub	Grass	Forb	Fern	Other
1	0	0	50.3	3.2	0	0.1
2	0.1	0.1	60.1	2.1	0	0.2

Plot No.	Function										
	Large trees	Hollow trees	Litter cover	Fallen logs	Tree stem 5-10	Tree stem 10-20	Tree stem 20-30	Tree stem 30-50	Tree stem 50-80	Tree regen	High threat exotic
1	0	0	25	0	0	0	0	0	0	0	25.2
2	0	0	9	0	0	0	0	0	0	1	7.1

Appendix B: Likelihood Table

Scientific Name **Common Name**	**Legal status**	**Number of records**	**Closest record and date**	**Most recent and proximity**	**Likelihood of occurrence**	
					Prior to field assessment	**Post field assessment**
KINGDOM: Animalia; CLASS: Aves						
Artamus cyanopterus cyanopterus Dusky Woodswallow	BC Act: V	9	2/06/2014 (2.40 km)	2.40 km (28/03/2014)	Low	Low
Calyptorhynchus lathami Glossy Black-Cockatoo	BC Act: V	18	10/09/2002 (1.94 km)	3.84 km (21/10/2011)	Low	Low
Chthonicola sagittata Speckled Warbler	BC Act: V	10	18/04/2017 (0.92 km)	0.92 km (18/04/2017)	Low	Low
Daphoenositta chrysoptera Varied Sittella	BC Act: V	29	16/05/1996 (2.10 km)	3.85 km (8/07/2017)	Low	Low
Ephippiorhynchus asiaticus Black-necked Stork	BC Act: E1	1	10/05/2006 (4.63 km)	4.63 km (10/05/2006)	Low	Low
Glossopsitta pusilla Little Lorikeet	BC Act: V	6	17/05/2007 (2.45 km)	4.22 km (19/05/2013)	Low	Low
Haliaeetus leucogaster White-bellied Sea-Eagle	BC Act: V EPBC Act: C	2	21/12/2011 (3.40 km)	3.40 km (21/12/2011)	Low	Low
Hieraaetus morphnoides Little Eagle	BC Act: V	3	28/03/2014 (2.40 km)	2.40 km (28/03/2014)	Low	Low
Ixobrychus flavicollis Black Bittern	BC Act: V	1	25/02/2015 (2.70 km)	2.70 km (25/02/2015)	Low	Low
Lathamus discolor Swift Parrot	BC Act: E1 EPBC Act: CE	71	12/05/1998 (3.70 km)	3.91 km (30/04/2012)	Low	Low
Lophoictinia isura Square-tailed Kite	BC Act: V	2	19/02/2017 (0.74 km)	0.74 km (19/02/2017)	Low	Low
Melithreptus gularis gularis Black-chinned Honeyeater (eastern subspecies)	BC Act: V	5	22/04/1995 (4.25 km)	4.25 km (22/04/1995)	Low	Low
Ninox strenua Powerful Owl	BC Act: V	5	13/07/2012 (2.76 km)	3.47 km (5/07/2015)	Low	Low
Petroica boodang Scarlet Robin	BC Act: V	3	2/09/2000 (4.25 km)	4.25 km (2/09/2000)	Low	Low
Stagonopleura guttata Diamond Firetail	BC Act: V	2	28/03/2014 (2.40 km)	2.40 km (28/03/2014)	Low	Low
Tyto tenebricosa Sooty Owl	BC Act: V	1	14/08/2007 (1.82 km)	1.82 km (14/08/2007)	Low	Low

Scientific Name **Common Name**	**Legal status**	**Number of records**	**Closest record and date**	**Most recent and proximity**	**Likelihood of occurrence**	
					Prior to field assessment	**Post field assessment**
KINGDOM: Animalia; CLASS: Gastropoda						
Meridolum corneovirens Cumberland Plain Land Snail	BC Act: E1	118	30/06/2011 (0.47 km)	4.17 km (9/05/2018)	Low	Not present
KINGDOM: Animalia; CLASS: Mammalia						
Dasyurus maculatus Spotted-tailed Quoll	BC Act: V EPBC Act: E	2	30/6/2006 (2.43 km)	2.43 km (30/6/2006)	Low	Not present
Falsistrellus tasmaniensis Eastern False Pipistrelle	BC Act: V	7	20/10/2013 (2.50 km)	3.22 km (21/10/2016)	Low	Not present
Miniopterus australis Little Bentwing-bat	BC Act: V	1	10/03/2008 (3.67 km)	3.67 km (10/03/2008)	Low	Not present
Miniopterus schreibersii oceanensis Eastern Bentwing-bat	BC Act: V	74	5/03/2008 (0.70 km)	1.49 km (9/05/2018)	Low	Not present
Mormopterus norfolkensis Eastern Freetail-bat	BC Act: V	17	5/03/2008 (0.70 km)	4.17 km (9/05/2018)	Low	Not present
Myotis macropus Southern Myotis	BC Act: V	38	17/05/2017 (2.45 km)	4.09 km (31/03/2017)	Low	Not present
Petaurus norfolcensis Squirrel Glider	BC Act: V	1	6/08/2009 (2.62 km)	2.62 km (6/08/2009)	Low	Not present
Pteropus poliocephalus Grey-headed Flying-fox	BC Act: V EPBC Act: V	147	25/11/2011 (2.12 km)	4.17 km (9/05/2018)	Low	Not present
Saccolaimus flaviventris Yellow-bellied Sheathtail-bat	BC Act: V	1	12/03/2008 (2.66 km)	2.66 km (12/03/2008)	Low	Not present
Scoteanax rueppellii Greater Broad-nosed Bat	BC Act: V	9	5/03/2008 (1.57 km)	3.22 km (21/10/2016)	Low	Not present
KINGDOM: Plantae						
Acacia bynoeana Bynoe's Wattle	BC Act: E1 EPBC Act: V	40	16/08/2004 (2.68 km)	3.40 km (13/07/2008)	Low	Not present
Allocasuarina glareicola	BC Act: E1 EPBC Act: E	4	9/11/1995 (4.51 km)	4.62 km (4/12/2000)	Low	Not present
Dillwynia tenuifolia	BC Act: V	29116	17/05/2001 (1.93 km)	4.63 km (1/08/2018)	Low	Not present

Scientific Name **Common Name**	**Legal status**	**Number of records**	**Closest record and date**	**Most recent and proximity**	**Likelihood of occurrence**	
					Prior to field assessment	**Post field assessment**
Grevillea juniperina subsp. *juniperina* Juniper-leaved Grevillea	BC Act: V	16583	15/08/1998 (0 km)	4.52 km (1/08/2018)	Low	Not present
Marsdenia viridiflora subsp. *viridiflora* Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	EPBC Act: E2	283	20/01/1999 (1.06 km)	1.66 km (3/02/2016)	Low	Not present
Micromyrtus minutiflora	BC Act: E1 EPBC Act: V	37530	15/08/1998 (0 km)	4.78 km (1/08/2018)	Low	Not present
Persoonia nutans Nodding Geebung	BC Act: E EPBC Act: E1	2269	14/10/2016 (2.58 km)	4.73 km (1/08/2018)	Low	Not present
Pimelea spicata Spiked Rice-flower	BC Act: E EPBC Act: E1	140	30/05/2004 (0.54 km)	1.85 km (22/10/2010)	Low	Not present
Pultenaea parviflora	BC Act: E1 EPBC Act: V	36591	30/06/2011 (0.17 km)	4.81 km (29/06/2017)	Low	Not present
Syzygium paniculatum Magenta Lilly Pilly	BC Act: E1 EPBC Act: V	1	1/02/2018 (3.84 km)	3.84 km (1/02/2018)	Low	Not present

Unless other stated, text is taken from the OEH Threatened Species (http://www.environment.nsw.gov.au/threatenedspecies/); Legal Status codes from the Atlas of NSW Wildlife: V = Vulnerable, E = Endangered, E2 = Endangered Population, E4A = Critically Endangered, C = China and Australia Migratory Bird Agreement (CAMBA), J = Japan and Australia Migratory Bird Agreement (JAMBA); K = Republic of Korea Migratory Bird Agreement (ROKAMBA), BC Act = *Biodiversity Conservation Act 2016,* EPBC Act = Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

Appendix C: Flora and fauna species inventories

Flora

Family	Scientific Name	Common name	Native, Exotic or HTE	BAM Growth Form	Jordan Springs 1		Jordan Springs 2	
					C	A	C	A
Asteraceae	*Aster subulatus*	Wild Aster	Exotic		0.1	100	0.1	500
Asteraceae	*Chondrilla juncea*	Skeleton Weed	Exotic				0.1	1
Asteraceae	*Conyza* sp.	Fleabane	Exotic				0.1	20
Asteraceae	*Cotula australis*	Common Cotula	Native	Forb (FG)	0.1	50		
Asteraceae	*Euchiton involucratus*	Star Cudweed	Native	Forb (FG)		1		
Asteraceae	*Facelis retusa*	Annual Trampweed	Exotic		0.1	1		
Asteraceae	*Gamochaeta coarctata*		Exotic		0.1	50		
Asteraceae	*Hypochaeris albiflora*	White Flatweed	Exotic		0.1	50	0.1	10
Asteraceae	*Hypochaeris radicata*	Catsear	Exotic		0.3	100	0.1	10
Asteraceae	*Senecio madagascariensis*	Fireweed	HTE		0.1	100	0.1	500
Asteraceae	*Sonchus oleraceus*	Common Sowthistle	Exotic		0.1	50	0.1	1
Brassicaceae	*Lepidium bonariense*		Exotic		0.1	1		
Brassicaceae	*Raphanus raphanistrum*	Wild Radish	Exotic				0.2	100
Euphorbiaceae	*Euphorbia drummondii*	Caustic Weed	Native	Forb (FG)			0.1	1
Fabaceae - Faboideae	*Glycine tabacina*		Native	Other (OG)	0.1	1	0.2	100
Fabaceae - Faboideae	*Lotus angustissimus*	Slender Birds-foot Trefoil	Exotic		2	1000	2	500
Fabaceae - Faboideae	*Medicago polymorpha*	Burr Medic	Exotic		0.1	50		
Fabaceae - Faboideae	*Trifolium repens*	White Clover	Exotic		0.1	10	0.2	10
Fabaceae - Faboideae	*Vicia tetrasperma*	Slender Vetch	Exotic		0.1	1		
Fabaceae – Mimosoideae	*Acacia decurrens*	Black Wattle	Native	Tree (TG)			0.1	1
Linaceae	*Linum trigynum*	French Flax	Exotic				0.1	2
Malvaceae	*Modiola caroliniana*	Red-flowered Mallow	Exotic				0.1	2
Malvaceae	*Sida rhombifolia*	Paddy's Lucerne	Exotic				0.1	1
Phyllanthaceae	*Phyllanthus hirtellus*	Thyme Spurge	Native	Shrub (SG)			0.1	1
Plantaginaceae	*Plantago debilis*		Native	Forb (FG)	3	2000		
Plantaginaceae	*Plantago lanceolata*	Lamb's Tongue	Exotic		0.3	100		
Plantaginaceae	*Plantago varia*		Native	Forb (FG)			2	5000
Poaceae	*Aristida ramosa*	Purple Wiregrass	Native	Grass & grasslike (GG)			0.1	10
Poaceae	*Cenchrus clandestinus*	Kikuyu	HTE		0.1	20		

Family	Scientific Name	Common name	Native, Exotic or HTE	BAM Growth Form	Jordan Springs 1		Jordan Springs 2	
					C	A	C	A
Poaceae	*Cynodon dactylon*	Couch	Native/Exotic	Grass & grasslike (GG)	50	1000	60	5000
Poaceae	*Eragrostis curvula*	African Lovegrass	HTE		10	200	2	500
Poaceae	*Lolium perenne*	Perennial Ryegrass	Exotic		0.5	500		
Poaceae	*Paspalum dilatatum*	Paspalum	HTE		15	500	5	1000
Poaceae	*Sporobolus creber*	Prickly Sowthistle	Native		0.3	50		
Primulaceae	*Lysimachia arvensis*	Scarlet Pimpernel	Exotic		1	500	0.5	10
Verbenaceae	*Verbena bonariensis*	Purple Top	Exotic		0.1	1		

Fauna

Class	Family	Scientific name	Common name	Native/ Exotic	Ecoplanning
Aves	Artamidae	*Cracticus tibicen*	Australian Magpie	Native	W
Aves	Psittacidae	*Trichoglossus haematodus*	Rainbow Lorikeet	Native	OW
Aves	Sturnidae	*Sturnus tristis**	Common Myna*	Exotic	O

Observation type = O (seen), W (heard call), OW (seen and heard)