

FINAL REPORT

REVISION 2

***Technical Studies:
Flora & Fauna
Survey
for the Proposed
Redevelopment of
Alexandria Park
Community School,
Alexandria***

Prepared for
**TKD Architects on behalf of
NSW Department of Education**

**Draft: 11 August 2017
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EXECUTIVE SUMMARY

Background

This Flora & Fauna Survey Report has been prepared by UBM Ecological Consultants on behalf of the NSW Department of Education (the 'Applicant'). It accompanies an Environmental Impact Statement (EIS) prepared in support of State Significant Development Application SSD 17_8373 for the redevelopment of 'Alexandria Park Community School' at 7-11 Park Road, Alexandria (the 'Site').

The redevelopment of the Alexandria Park Community School ('the School') will address issues of capacity for schools in the inner city areas of Sydney and is also driven by the population growth resulting from the large number of residential developments that are transforming the former industrial precincts of Zetland, Waterloo and Alexandria.

The new school has been briefed to accommodate up to 1,000 primary school students and up to 1,200 secondary school students on one campus in an integrated and fully connected school building.

Delivery of the project will be undertaken in sequential phases to maintain an operational school on the Park Road Campus and will involve enabling works separate to this application followed by three main construction phases for the new building and external works.

Advice received from Redgum Horticultural (2017) indicates that 60 trees are to be removed and 56 trees are to be retained within the School and adjacent road reserve (*Figure 1-4*).

Results

Plant Communities: There are no naturally-occurring native plant communities at APCS or in the adjacent Alexandria Park, the site having formerly been sandhills that were levelled in the late 19th Century. A number of native and exotic specimen trees have been planted in the School over a period of up to 50 years.

Flora: A total of 70 plant species were recorded at APCS, predominantly comprising planted species in gardens. Open lawns comprised introduced turf species, plus commonly-occurring turf weeds, while managed garden beds planted with horticultural species were found within the School. A list of all species recorded during the survey is included in *Appendix 1*.

No (0) threatened flora species or populations were observed at APCS or the immediate locality.

Two (2) target weed species were identified within the School: one (1) WoNS and Biosecurity Listed species, *Asparagus aethiopicus* (Ground Asparagus), and one (1) regional Priority Weed, *Cestrum parqui* (Green Cestrum) (*Table 2-2*).

Fauna: By the completion of the recent field survey (August 2017), eight (8) native species and two (2) introduced species were detected within, adjacent to, or flying over the School. No (0) threatened and/or migratory species listed under the *EPBC* and/or *TSC Acts* were recorded during the fauna survey. Native fauna species recorded during the survey are all urban-tolerant species, typical of highly modified urban habitats.



Although no (0) threatened and/or migratory fauna are considered likely to use the available resources in the School, the Grey-headed Flying-fox, Powerful Owl, and Long-nosed Bandicoot have been observed in the Locality. The School grounds are considered poor quality and/or non-critical habitat for these species, and the current Proposal is unlikely to significantly impact them.

The School is situated within a highly fragmented urban landscape (*Figure 3-2*), and is therefore subject to a high level of disturbance. There are two (2) broad habitat types within the School - Maintained (Open) Parkland and Urban Infrastructure, both of which are considered to be of Low fauna conservation value.

Recommendations:

In considering the Proposal to redevelop APCS, UBM recommends that:

- Wherever possible, mature canopy trees and plantings in close proximity to the development footprint should be retained, and where feasible, incorporated into the final project design.
- Appropriate tree protection measures should be in place prior to construction works commencing for all trees identified for retention (*e.g.* wooden tree guards, exclusion fencing).
- Where trees are unavoidably impacted, supplementary trees and shrubs should be planted post construction (*e.g.* site landscaping).
- Fauna habitat variety should be maintained and enhanced where possible. Increasing floristic diversity through plantings of shrub and tree species around the school would be highly beneficial, especially locally occurring native plants that produce nectar, pollen and fruits, including winter-flowering canopy trees, and patches of dense vegetation cover.
- Immediately prior to the removal of vegetation and debris, a pre-clearance survey should be undertaken by a qualified Fauna Spotter/Catcher to identify and relocate fauna that may be disturbed, injured or killed during clearing (*e.g.* nesting birds).
- If an unexpected threatened species is found during construction, all work must stop, and the Council notified immediately. Work is not to resume until an Assessment of Significance has been conducted for the threatened species and it is determined that an impact is not likely to occur.

By adopting the recommendations identified in this Report, the impacts on the native flora and fauna species known to utilise the resources of the School and Locality generally, will be minimised.

Plates – Front Cover:

Plate 1 – Landscape plantings within the School

Plate 2 – Flowering Canopy trees within the School.

Plate 3 – Existing Community Garden

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Certification

I, Judith Rawling Managing Director of UBM Ecological Consultants Pty Ltd hereby state that the Flora and Fauna Surveys undertaken to inform the Redevelopment Proposal for Alexandria Park Community School, Alexandria, have been prepared in consideration of the schedules and requirements of the NSW *Threatened Species Conservation Act 1995* and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. Note that as of late August 2017, the TSC Act will be repealed by the *Biodiversity Conservation Act 2015*.

Survey methods conform to the '*Threatened Species and Regional Biodiversity Survey and Assessment Guidelines*' (DECC 2007). Reference has also been made to the *Sydney Local Environmental Plan 2012*, and to other relevant plans and policies.

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Disclaimer

The preparation of this Report has been in accordance with the brief provided by the Client TKD Architects and has relied upon the data and results collected at or under the times and conditions specified in the Report. All findings, conclusions or recommendations contained within the Report are based only on the aforementioned circumstances.

The Report has been prepared for use by the Client and no responsibility for its use by other parties is accepted by UBM Ecological Consultants Pty Ltd.

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Definition of Terms

DECCW – NSW Department of Environment, Climate Change and Water (now the Office of Environment & Heritage under the Department of Premier and Cabinet)

DoE – The NSW Department of Education

DoE (Australia) – Commonwealth Department of Environment

Direct Impacts are those that directly affect the habitat and individuals. They include, but are not limited to, death through predation, trampling, poisoning of the animal/plant itself and the removal of suitable habitat.

Indirect Impacts occur when project-related activities affect species, populations or ecological communities in a manner other than direct loss. Indirect impacts can include loss of individuals through starvation, exposure, predation by domestic and/or feral animals, loss of breeding opportunities, loss of shade/shelter, deleterious hydrological changes, increased soil salinity, erosion, inhibition of nitrogen fixation, weed invasion, fertiliser drift, or increased human activity within or directly adjacent to sensitive habitat areas.

Ecological Community – an assemblage of species with six (6) types of properties, composition; structure; habitat; distribution; interactions between their component species, and ecological processes and function (Keith 2009); and occupying a particular area at a particular time.

EEC – Endangered Ecological Community – as determined by the NSW Scientific Committee and described as—a community facing a risk of extinction in the immediate future, as listed under State and/or Commonwealth threatened species legislation. **CEEC** – being a critically endangered entity.

EPBC Act – Commonwealth *Environment Protection & Biodiversity Conservation Act 1999*

Habitat – an area or areas occupied, or periodically or occasionally occupied by a species, population or ecological community, and including any biotic or abiotic components present.

LGA – Local Government Area

Locality – generally, an area within 1-2 kilometres of the Subject Property

NPWS – National Parks & Wildlife Unit of the Office of Environment & Heritage

OEH – Office of Environment & Heritage under the NSW Department of Premier and Cabinet

SCIVI – *Southeast NSW Native Vegetation Classification and Mapping*, by Tozer *et al.* 2010 for former NSW Department of Environment and Climate Change (DECCW)¹.

SSD – State Significant Development

¹ **Reference:** Tozer, M.G., Turner, K., Simpson, C., Keith, D.A., Beukers, P., MacKenzie, B., Tindall, D. & Pennay, C. (2010). Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tableland, in *Cunninghamia* 11 (3)



SEPP – State Environment Planning Policy

Subject Property – ‘Alexandria Park Community School’, ‘APCS’, and ‘the School’

Target Weeds - are those listed as Weeds of National Significance (National), listed under the Biosecurity Legislation (State), Priority weeds in the Greater Sydney Local Control Area (Regional, and key environmental weeds that have potential to degrade the ecosystem, presenting a risk to biosecurity.

TSC Act – NSW *Threatened Species Conservation Act 1995*

UBM – UBM Ecological Consultants Pty Ltd: formerly trading as Urban Bushland Management Consultants (UBMC)

Vegetation Community – described as an assemblage of native flora species known to occur in association with each other as a result of topography, soil landscape and rainfall.

WoNS – Weed of National Significance (Commonwealth Listing)



1 INTRODUCTION

1.1 Background Information

This Flora & Fauna Survey Report has been prepared by UBM Ecological Consultants on behalf of the NSW Department of Education (the 'Applicant'). It accompanies an Environmental Impact Statement (EIS) prepared in support of State Significant Development Application SSD 17_8373 for the redevelopment of 'Alexandria Park Community School' at 7-11 Park Road, Alexandria (the 'Site').

The School, was formed in 2003 by the amalgamation of Redfern, Waterloo and Alexandria Public Schools and Cleveland High School. The School caters for both primary and secondary school students. In 2010, there were 363 students enrolled, and by 2016 that number had almost doubled to 671 (My School 2016). Teaching facilities are currently both permanent and temporary classroom buildings.

The redevelopment of the Alexandria Park Community School ('the School' or 'APCS') will address issues of capacity for schools in the inner city areas of Sydney and is also driven by the population growth resulting from the large number of residential developments that are transforming the former industrial precincts of Zetland, Waterloo and Alexandria.

The new school has been briefed to accommodate up to 1,000 primary school students and up to 1,200 secondary school students on one campus in an integrated and fully connected school building.

Delivery of the project will be undertaken in sequential phases to maintain an operational school on the Park Road Campus and will involve enabling works separate to this application followed by three main construction phases for the new building and external works.

Alexandria Park is immediately adjacent to APCS and is an historic park gazetted in 1882. The suburb of Alexandria was formerly sand dunes and hills prior to levelling to accommodate industrial development in 1860s. The landscaping, entry gates and grounds of Alexandria Park are listed heritage items under Schedule 5 of the *Sydney Local Environmental plan 2012*.

The local positioning of the School (Subject Property) is shown on *Figure 1-1*.

Aerial imagery of APCS is shown on *Figure 1-2*.

The purpose of this Report is to provide an assessment of the Proposal as described in *Section 1.2* and detailed within the EIS.



Figure 1-1: Local Positioning of the Proposed School Redevelopment at Alexandria Park

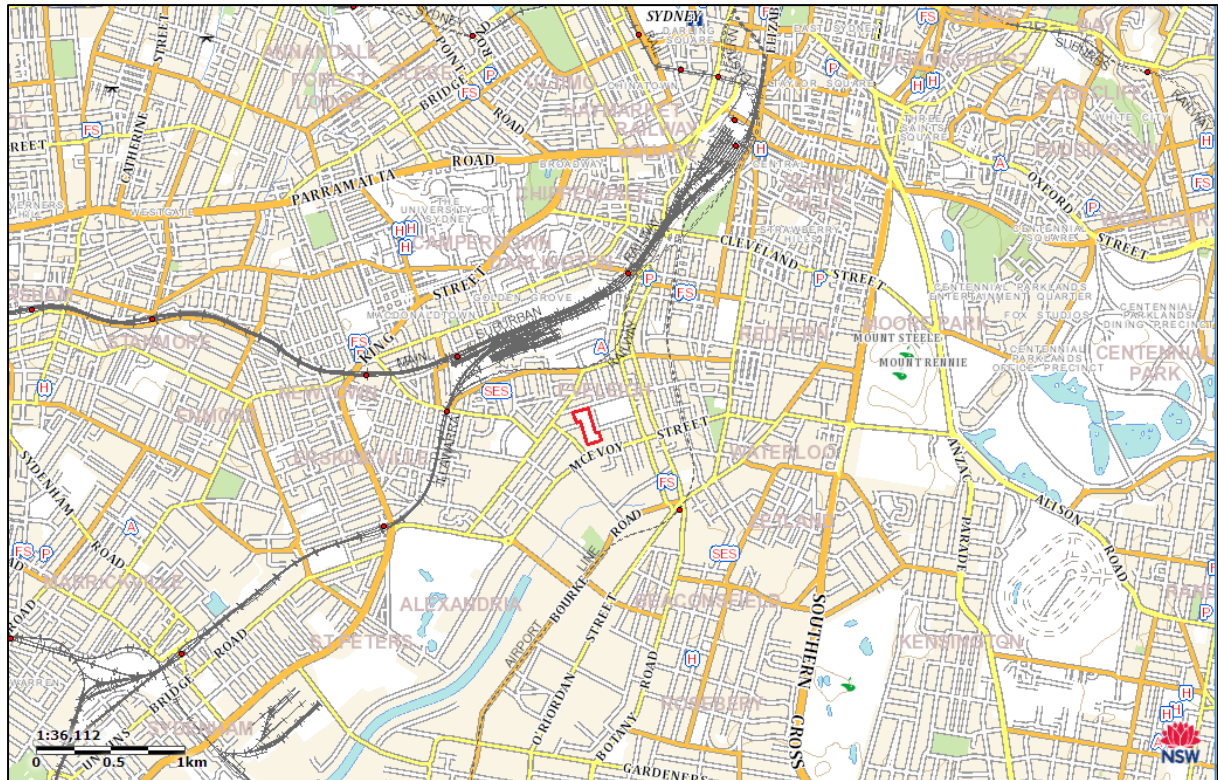
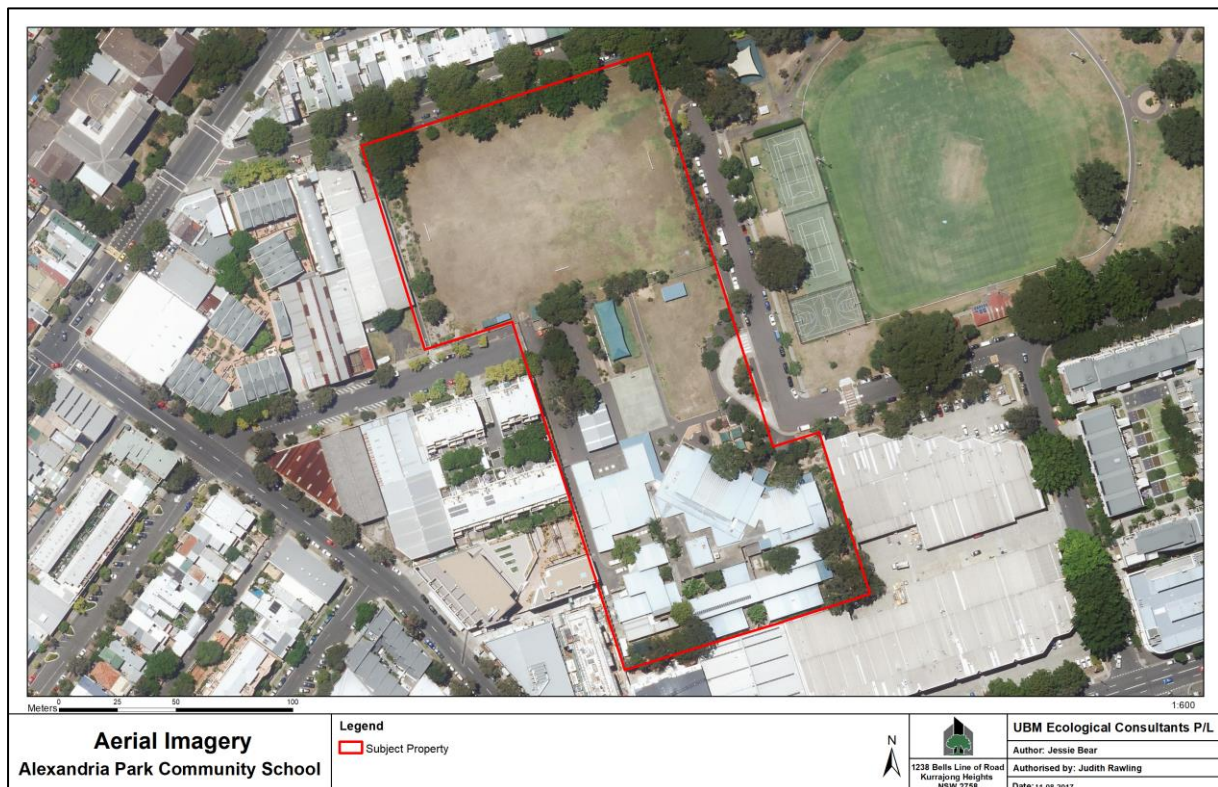


Figure 1-2: Aerial Imagery of the Proposed School Redevelopment at Alexandria Park

Note: Aerial imagery is sourced from LPI Web Map Service (2015), pop-up school is not depicted.





1.2 The Proposed Development Works

Delivery of the project will be undertaken in sequential phases to maintain an operational school on the Park Road Campus and will involve enabling works separate to this application followed by three main construction phases for the new building and external works (*Figure 1-3*). These phases are defined as follows:

- Enabling Works – Construction of 2 temporary demountable schools on Buckland Street side of the school (not part of this application);
- Phase 1 – Demolition of the existing Park Road building and construction of the southern part of the new building, including new COLA and associated external works;
- Phase 2 – Demolition of Pop up School 1 and construction of the remaining part of the new building, carpark and two outdoor sport courts;
- Phase 3 – Demolition of Pop up School 2 and construction of the new synthetic sports field and completion of the entry forecourt.

Specifically, this project includes:

- Demolition of all existing buildings on-site, including the temporary pop-up schools;
- Remediation of specific areas of the site containing contaminated fill;
- Construction of multiple school buildings of up to five stories, arranged along the western and southern parts of the site comprising:
 - Classroom home bases;
 - Collaborative learning spaces;
 - Specialist learning hubs;
 - Learning support spaces;
 - Offices for teachers and administrative staff;
 - Library; and
 - Student canteen.
- Construction of a sports hall and multiple outdoor sports courts;
- An all-weather multipurpose synthetic sports field;
- Informal play spaces and Covered Outdoor Learning Space or COLA;
- A community centre;
- A pre-school for 39 children;
- Site landscaping including green links, community garden and open space;
- Construction of a new on-site car park and associated vehicular access point off Belmont Street; and
- Augmentation and construction of ancillary infrastructure and utilities as required.



Arboricultural Impact

An *Arboricultural Impact Assessment and Tree Management Plan* for the School has been undertaken by Redgum Horticultural (2017). The arboricultural report addresses 116 trees within the School and adjacent road reserve. It recommends the removal of 60 trees, and the retention of 56 trees. For further details and recommendations for tree management, refer to Redgum (amended December 2017).

UBM understands that a site Landscape Plan has not yet been completed. However, as Redgum states, as part of the Landscape Plan, where appropriate, the tree cover on the site will be enhanced by planting with advanced specimen/s of appropriate tree species for the space available above and below ground being soil volumes available and to prevent future conflict between trees and built structures. UBM concurs with this recommendation.



EXISTING SITE PLAN DECEMBER 2017

1:500

PROPOSED SITE PLAN.

1:500

NOT FOR CONSTRUCTION

ALEXANDRIA PARK COMMUNITY SCHOOL

EXISTING AND PROPOSED SITE PLANS

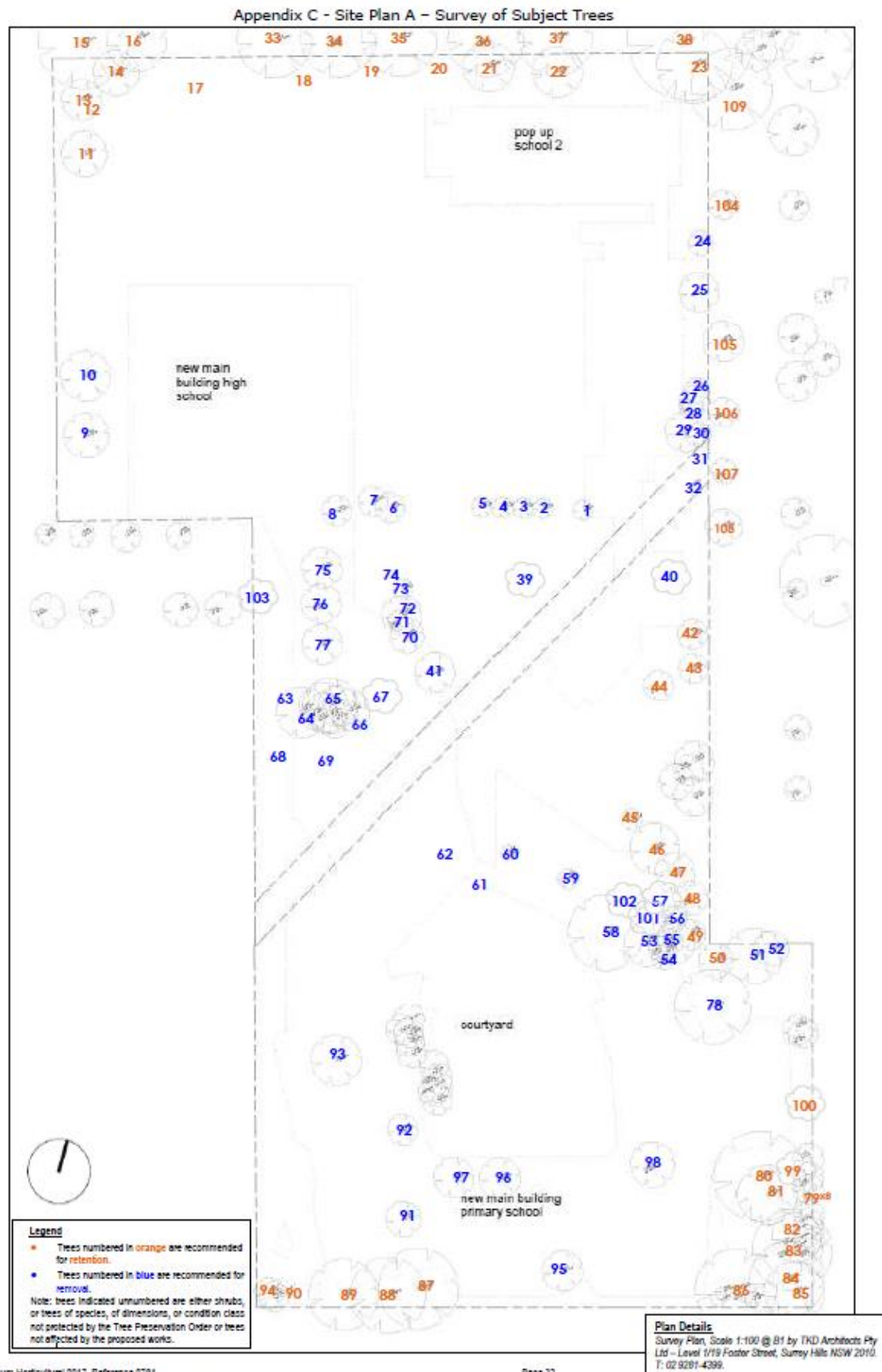
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Figure 1-4: Impacted trees within the proposed Alexandria Park Community School redevelopment footprint (Redgum 2017)





1.3 Scope of Works

The project brief provided by TKD Architects is as follows:

- Provide a flora and fauna survey, analysis and recommendations in a report to be submitted to the City of Sydney and in support of the proposed community school redevelopment.
- Identify all requirements of the Council relating to Flora and Fauna (from LEP, DCP, etc.) that need to be included when submitting a Development Application, and ensure that the report addresses these requirements. Identify these requirements in the report.
- Carry out the flora and fauna survey, analysis and recommendations in accordance with the relevant statutory requirements, including the NSW *Environmental Planning and Assessment Act 1979*, Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999*, *Biosecurity Act 2015* and *Regulation 2016* and NSW *Threatened Species Conservation Act 1995*².
- The Flora and Fauna Investigation shall include a literature review, field survey and identification of any threatened species. Determine whether any native vegetation which occurs on the site constitutes a native vegetation community. Identify the type, and map the extent of the vegetation community/s present on the site in accordance with statutory requirements. Describe the process used and include a plant species list.
- Determine whether the site contains known or potential habitat for any Threatened or Migratory species or populations listed under the Threatened Species Conservation Act 1995 or the Environment Protection and Biodiversity Conservation Act 1999.
- Undertake a sufficient level of survey for Threatened or Migratory species or populations on the site and describe and justify the suitability of the survey methods employed. Describe the occurrence or likely occurrence of any Threatened or Migratory species or populations on the site, including the extent of known or potential habitat.
- Describe the impact of the proposed development on Threatened or Migratory species, populations and ecological communities or their habitats, and assess the significance of the impacts in accordance with statutory requirements. Provide recommendations in relation to the impacts of the proposed development on biodiversity and identify any areas of the site that are required to be protected.
- Provide advice as to whether the proposed development complies with other relevant environmental legislation and development controls in relation to its impact on biodiversity.
- Immediately after completing field survey work, identify and advise the Architect of any issues or areas of the site that would impact or limit the development of the site. Liaise with the Architect to determine preferred concepts for locating buildings on the site that can be supported.
- Submit a draft report based on the schematic design drawings to be confirmed by the Architect. The schematic design drawings will be further developed. Allow for updating of the draft report based upon the final design to be issued by Aconex. All reports are to be submitted as PDF documents.

² Shortly to be replaced by the *Biodiversity Conservation Act 2015*



1.4 Site Definition

1.4.1 Location and Setting

APCS is located in the suburb of Alexandria, approximately 2.8 km south from Sydney CBD, and 4 km north-east of Sydney Airport. APCS is bounded to the north by Buckland Street, to the west and south by mixed use development, while Park Road and Alexandria Park and its sporting facilities lies to the east. Access to the School is by the turning circle off Park Road (*Table 1-1*).

The location of temporary School 2 is primarily maintained parkland (a playing field), while the remaining areas subject to development contain existing school facilities including temporary buildings, an oval and play area.

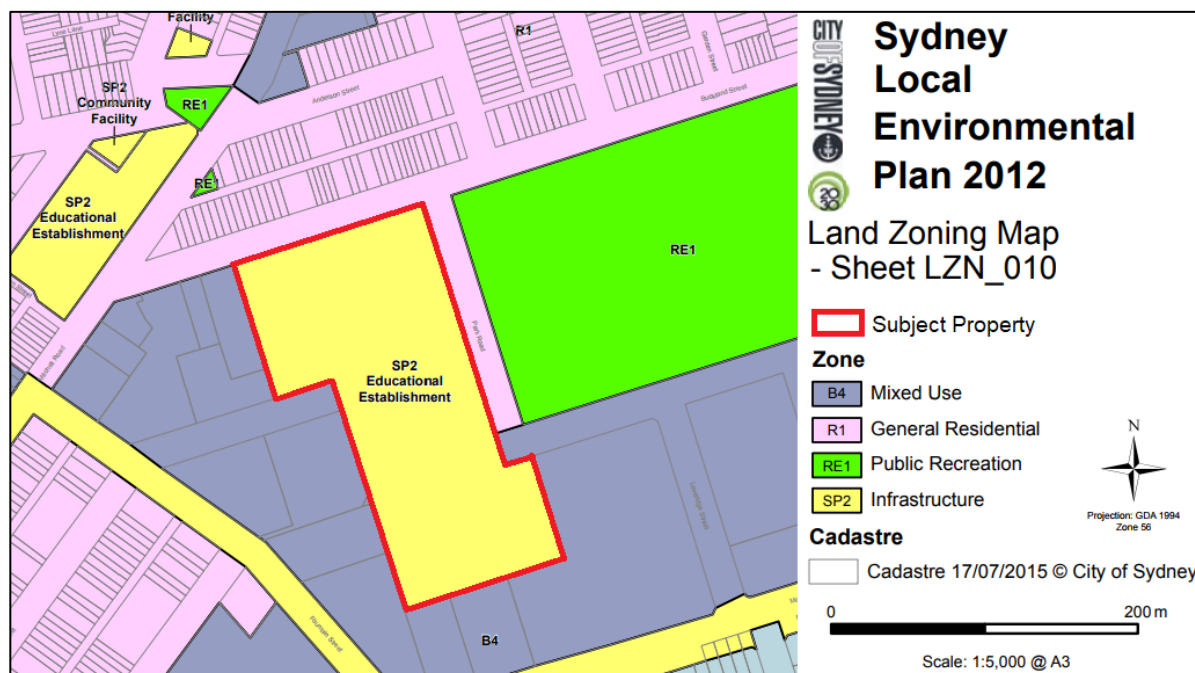
The suburb of Alexandria was established in 1863. It is highly urbanised and densely populated. Local land uses are predominantly residential housing, flats, multistorey commercial business office facilities and transport infrastructure, punctuated by occasional open parklands and commercial activities.

Table 1-1: Site Definition

TITLE INFORMATION	Department of Education, APCS dual campus.
LOCATION	Adjacent west to Alexandria Park, Alexandria
TOTAL AREA	Approximately 2.75 ha
TOPOGRAPHIC MAP	Botany Bay 9130-3S
CO-ORDINATES	Lat.: -33.900931; Long: 151.195982
CATCHMENT/SUB-CATCHMENT	Port Jackson/ Georges River Catchment.
OWNERSHIP	APCS is owned by the Department of Education.
LOCAL GOVERNMENT AREA	Sydney City Council.
LAND ZONING	APCS is zoned SP2 Educational Establishment under the <i>Sydney Local Environmental Plan 2012</i> (<i>Figure 1-5</i>)
CURRENT LAND USE	Primary and secondary educational facility.



Figure 1-5: Land Zoning of Alexandria Park Community School



1.4.2 Physical Environment

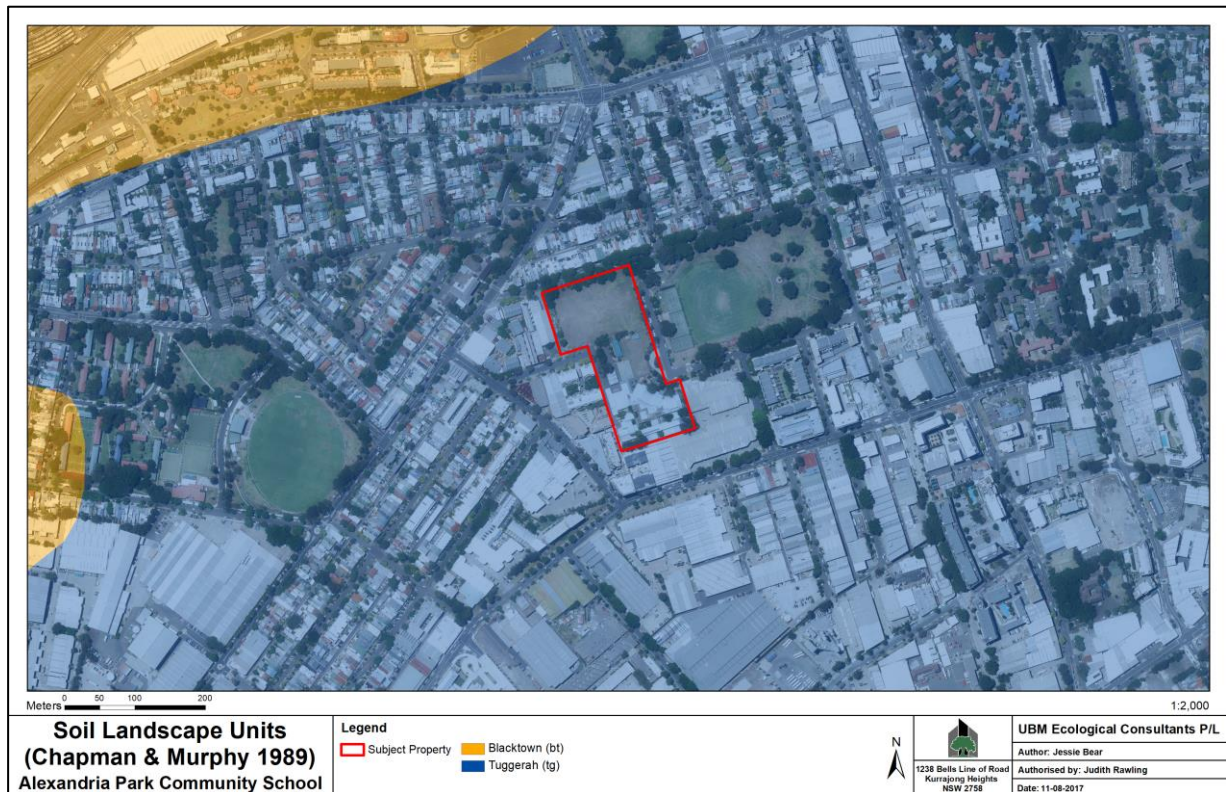
The physical characteristics of the land in the School are summarised in *Table 1-2* below.

Table 1-2: Physical Features of the School & Environs

FEATURE	DESCRIPTION
SOIL LANDSCAPE UNITS	The School occurs on Tuggerah SLU (gently undulating to rolling coastal dunes) according to Chapman and Murphy (1989) (<i>Figure 1-6</i>). However, following industrial development in the area in 1860, the removal of the sandhills to create Alexandria Park, and the use of the surrounding area as a municipal tip for 13 years (City of Sydney 2016), it is noted that this soil landscape is highly disturbed.
TOPOGRAHY & SOILS	The School is flat to slightly undulating, and the soils have been highly modified by past and current land uses. There is a community garden in operation at the School.
LOCAL HYDROLOGY	The School is located ~350 metres north of the canal known as Sheas Creek, which flows south west into Alexandria Canal, eventually joining Cooks River and Botany Bay.
CLIMATIC DETAILS	The mean daily maximum temperature is 26.6°C, with the highest temperatures recorded in January and February. The mean daily minimum temperature is 7.2°C, with the lowest temperatures recorded in July. Mean annual rainfall is 1085.8 mm; with June (124.2 mm) recording the highest and March (117.1 mm) recording the second highest mean rainfall. September, October and July recorded the driest months on average since 1929 (Meteorological Station #066037 Sydney Airport AMO, BOM 2016).



Figure 1-6: Soil Landscape of APCS & Environs (Chapman & Murphy 1989)



1.4.3 Biological Environment

Vegetation Communities

The landscape of the Inner Sydney Region has been extensively cleared of its original vegetation, so much so that no recognisable remnant native vegetation community remains within the School or nearby in the locality.

Regional-scale vegetation mapping by Tozer *et al.* (2010) for the former Department of Environment Climate Change & Water ('DECCW')³ describes the School and its surrounds as 'cleared'.

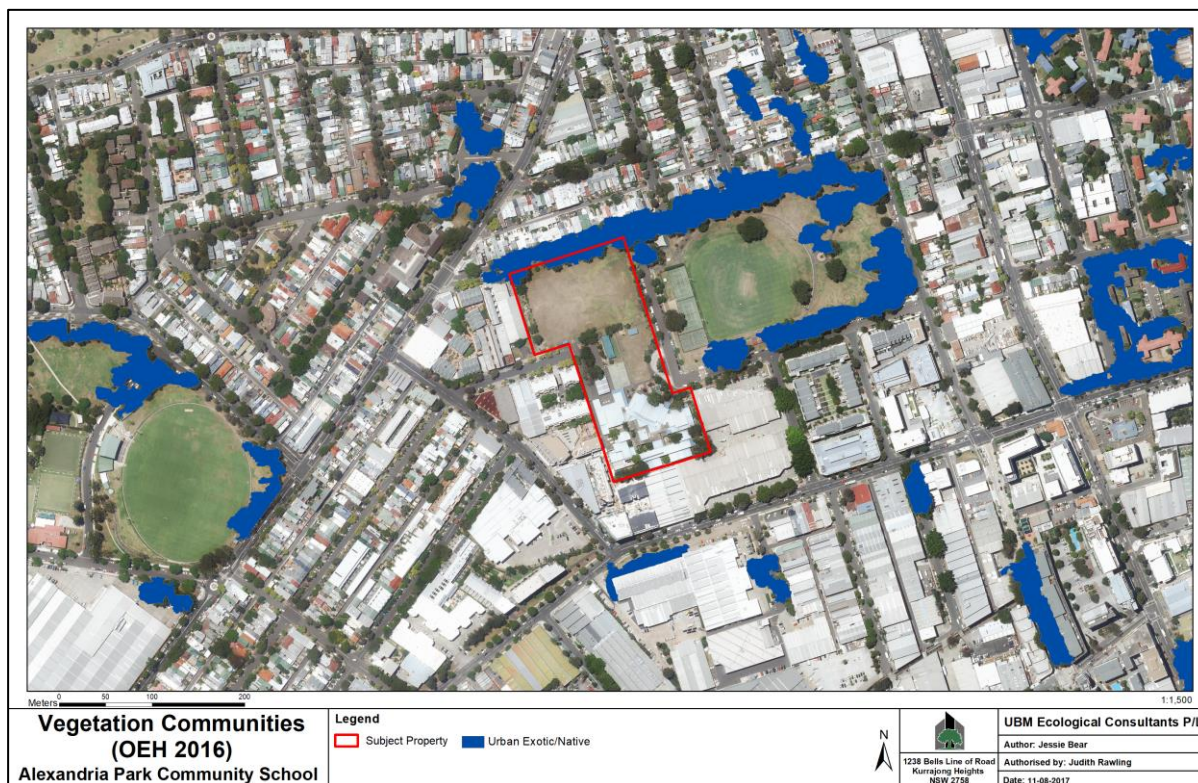
Regional-scale vegetation mapping by the Office of Environment & Heritage (OEH 2016) identifies Urban Exotic/Native as the only vegetation type mapped in or near the School (*Figure 1-7*).

Vegetation mapping is usually based on local geology and soil type with limited ground-truthing, so on occasion detailed site surveys will modify vegetation community designations. In this case, most of the vegetation within the School campus has been planted, presumably after the School was constructed in 2003. The only exception to this are the large Fig Trees on the northern boundary (Buckland Street), which are likely to be up to 50 years old. See *Section 2.2* for the results of flora field investigations undertaken by UBM in August 2017.

³ DECCW is now the Office of Environment & Heritage (OEH) within the Department of Premier & Cabinet



Figure 1-7: Vegetation Communities for the Locality (OEH 2016)



1.5 Legislative Context

Comments and assessments within this Report are based on the requirements of the *Environmental Planning and Assessment Act 1979* – with consideration given to the principals of Ecologically Sustainable Development, *NSW Threatened Species Conservation Act 1995*, and the *Commonwealth Environmental Protection and Biodiversity Conservation Act 1999*.

Table 1-3 provides a summary of policies, local planning and legislative requirements applicable to APCS and the current Proposal.

Table 1-3: Summary of Policies, Local Planning & Legislative Requirements

GOVT. LEVEL	RELEVANT POLICY /LEGISLATION	RELEVANCE TO SUBJECT PROPERTY
LOCAL	<i>Sydney Local Environmental Plan 2012</i>	Under the Schedule 5 of the SLEP 2012, Alexandria Park gates, landscaping and grounds are listed as items of Environmental Heritage.
STATE	<i>Threatened Species Conservation (TSC) Act 1995 (shortly to be replaced by the Biodiversity Conservation Act 2015)</i>	No (0) Threatened Ecological Communities (TECs) occur within the School. No (0) fauna species listed under the TSC Act were recorded.



GOVT. LEVEL	RELEVANT POLICY /LEGISLATION	RELEVANCE TO SUBJECT PROPERTY
	<i>Biosecurity Act 2015 and Biosecurity Regulation 2017</i>	Two (2) Target weeds were recorded at the School (Table 2-2)
	<i>Environment Planning and Assessment Act 1979</i>	This proposal is a State Significant Development Application (SSD 17_8373). A SSD application is assessed under section 79c of the <i>EP&A Act</i> .
COMMONWEALTH	<i>Environment Protection & Biodiversity Conservation (EPBC) Act 1999</i>	No (0) threatened vegetation communities, flora species or populations listed under the <i>EPBC Act</i> were recorded. No (0) fauna species listed under the <i>EPBC Act</i> were recorded.

1.6 Assessment of Significance

The *TSC Act* aims to conserve threatened species, populations, ecological communities and their habitats; to promote their recovery; and manage the processes that threaten or endanger them. Threatened species are listed under Schedules 1 and 2 of the *Act*, while communities considered 'at risk of extinction' are listed as endangered ecological communities ('EECs') under Part 3, Schedule 1.

Under the terms of the legislation, Local Government must assess the impacts of any proposed activity that might adversely impact on an EEC or any threatened species or populations, and where these are likely to occur, must identify strategies to minimise any such impacts. Further, development on adjoining land may also have a significant impact on the bushland's natural values, so that such activities must be carefully assessed by the Consent Authority prior to granting development consent.

Under Section 5A of the *EP&A Act*, any development activity impacting on a species, population or ecological community listed under the *TSC Act* requires the application of an "Assessment of Significance". As well, listings under the Commonwealth *EPBC Act* require are subject to a similar Assessment process under its *Significant Impact Guidelines* (Department of the Environment & Heritage 2006).

An Assessment of Significance (commonly called 'the Seven-part Test') is designed to determine "whether there is likely to be a significant effect on threatened species, populations, ecological communities or their habitats" (as listed on the Schedules of the NSW *TSC Act*), and consequently, to determine whether a Species Impact Statement is required.

In order to determine whether further studies are required, a search of the relevant ecological databases is required in order to identify those ecological communities, threatened species or populations known for the Locality and Region. This is followed by a comprehensive site survey to determine the presence, or potential presence of any threatened entities.

The field investigations undertaken provide the required ecological studies. Results of those investigations are presented in *Section 2.2* (flora) and *Section 3.2* (fauna) of this Report. The decision



whether or not to apply the Seven-part Test has been made with respect to the outcomes of these investigations.

For Alexandria Park Community School, no Assessments of Significance have been undertaken as there were no threatened entities recorded during the recent field investigations, and none are considered likely to occur.



2 FLORA ASSESSMENT

The flora assessment was undertaken to determine the ecological communities occurring within and adjacent to the Subject Property and to describe the current status of the indigenous vascular vegetation present. The conservation value of the vegetation in the National, State and regional context has been considered in relation to vegetation community types and flora species present.

2.1 Methods

2.1.1 Literature Review

During the preparation of this Report, relevant databases and other studies were accessed, including previous studies and investigations for the Locality.

The main documents referenced were:

- *Native Vegetation of the Sydney Metropolitan Area* (OEH 2016); and
- NSW Office of Environment & Heritage Atlas of New South Wales Wildlife Database (Bionet) (OEH 2017): record search area 10 km x 10 km centred on the School – parameters: North: -33.85 West: 151.14 East: 151.24 South: -33.95– was used to identify previous recordings of flora species of conservation significance within the Region.
- Redgum Horticultural (December 2017). *Report A): Arboricultural Impact Assessment and B). Tree Management Plan (Trees to be Retained and Protected). Alexandria Park Community School 7-11 Park Road, Alexandria NSW.*

2.1.2 Flora Field Survey

A general flora survey was undertaken on the 4th of August 2017 by Field Botanist Yogesh Nair. The survey conducted covered all vegetated parts of the School to establish a flora species list and identify the locations and extent of the vegetation types existing within the School. Approximately five (5) hours were spent surveying the vegetation including identifying flora to species level.

Desktop research undertaken prior to the field survey provided a list of three (3) flora species listed as threatened under the *EPBC Act* (1999) and/or *TSC Act* (1995) recorded in the last 10 years within a 10 km x 10 km area centered on the School.

During the recent field surveys (August 2017), all observed flora species were recorded with details of soil, geology, landscape position and vegetation type. A threatened species search was undertaken concurrently with the general flora survey.

For flora, nomenclature follows that of the online version of the Flora of NSW (PlantNET 2017) and Robinson (2003).



2.1.3 Limitations

The surveys were undertaken during late winter (*i.e.* August 2017). Identification was based on both floristic and vegetative characteristics, so there was no obvious floristic limitation.

Seasonal factors and/or short-term surveys are expected to affect the detection of some species that may be inconspicuous or absent from the above-ground population during particular times of the year, and can only be detected only at certain periods during the year. This is particularly true for many terrestrial orchids. These common limitations to biodiversity studies can lead to false absences being recorded. Other species can be difficult to locate (especially in areas of long grass) unless they are actively growing with new growth or have flowers present.

Available data was utilised from NSW Bionet database to supplement the flora data from field surveys to provide a better indication of threatened species may occur within the School based on occurrence records within 5 km, the habitat requirements and the vegetation community associations.

For these reasons, it should be recognised that it may be impossible to rule out species absence for some species during field surveys. Survey results can often be improved when required by extending the time allowed to provide an investigation in all seasons. However, given the land use as a School, and previous clearing of vegetation and disturbance of soils during previous construction activities, it is deemed unlikely that further surveys would not locate any significant native flora species and it is considered that the time allocated to field survey was adequate for purposes.

2.2 Survey Results

2.2.1 Overview

The School is surrounded by established industrial and residential development to the west, residential development to the north, Alexandria Park to the east, and industrial development to south.

Regional mapping of the soil landscape by OEH (2017) indicates that the School lies on the Tuggerah SLU. The Tuggerah SLU is characterised by “...*gently undulating to rolling coastal dune fields. Local relief to 20 m, slope gradients generally 1-10%, but occasionally up to 35%. North— south oriented dunes with convex narrow crests, moderately inclined slopes and broad gently inclined concave swales. Extensively cleared open-forest and eucalypt/apple woodland.*” and described as “...*extreme wind erosion hazard, non-cohesive, highly permeable soil, very low soil fertility, localised flooding and permanently high-water tables*” (Chapman & Murphy 1989). It is likely that the original topsoil on the School grounds has been extensively disturbed due to previous vegetation clearing, ground levelling and construction, consequently, the topography of the School is now flat.

The vegetation in the School is predominantly part of the landscaping, presumably since the School was established in 2003. While much of the planted flora in the School are ‘generally native’ species, the structure and species composition of the existing flora are not representative of the original vegetation community that may have existed in the Locality before any anthropogenic developments.



2.2.2 Vegetation Communities

Regional- mapping scale mapping by the OEH (2016) indicate the occurrence one (1) vegetation type at the School (*Figure 1-7*):

- Urban/Exotic vegetation

Local scale vegetation mapping undertaken by Benson and Howell (1994) indicates the occurrence of two (2) vegetation types within the School; Coastal Dune Forest (9t) and Coastal Dune Heath (21b). The two vegetation types are characterised by the following sub-units:

- Coastal Dune Forest
 - Open forest – *Eucalyptus botryoides* - *Eucalyptus pilularis* - *Angophora costata*
- Coastal Dune Heath
 - Open Heath – *Banksia aemula*
 - Open scrub – *Monotoca elliptica*

It is apparent from the field investigation undertaken that Open Forest and/or Open Heath/Scrub vegetation types described by Benson and Howell (1994) that is likely to have originally existed over the School and Locality has been subject to extensive clearing and development. Due to clearing of the original vegetation, mapping and classification of the vegetation present at the school by OEH (2016), was found to be sufficiently accurate and has been applied in this case.

Urban Exotic/Native Vegetation:

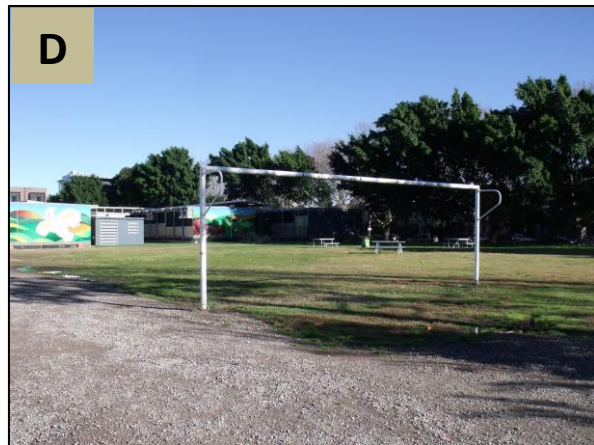
The existing native vegetation in the School consists predominantly of planted trees on the perimeter and landscaped garden beds. The mature Fig trees (*Ficus* sp.) on Buckland Street are considered remnant on the site, and are likely associated with the heritage landscaping of the suburb of Alexandria and Alexandria Park. The planted native vegetation (mainly young trees) are located along the School boundary fences and contains a variety of native vines, shrubs, small/large trees. The most common trees found were *Eucalyptus botryoides*, *Eucalyptus saligna* and *Eucalyptus sideroxylon*.

Common weed species include a range of exotic grasses, vines, herbaceous and woody weeds in some parts of the School, with varying levels of infestation.



Plates: Views of vegetation at the School

Description: A & B: Existing Community Garden. C: Trees planted along Park Road boundary. D: Playing fields with 'pop up' school to rear



2.2.3 Flora Species

A total of 70 flora species were recorded in the School. No (0) threatened plant species were recorded during the flora survey by UBM (2017).

A list of species recorded during the survey is included in *Appendix 1*, detailing all species recorded within patches of native vegetation, and all planted species recorded on the School Campus. The patches of native vegetation surveyed in the School were mostly revegetated.

Note: The flora species list presented in *Appendix 1* is not meant to be a list of all species occurring in the School, but represents those species identified while searching for rare or threatened flora.



Table 2-1: Flora Species of Conservation Significance Occurring within the Region

Legislative Classification: E1/E = Endangered Species; and V = Vulnerable Species.

* Habitat requirements were generally extracted from OEH (2012-2016), with other references used being identified in the bibliography.

~ Within a 10 km² area centered on the School (parameters north: -33.85, west: 151.14, east: 151.24, south: -33.95).

SCIENTIFIC NAME & COMMON NAME	LEGAL STATUS		^No# of Records	HABITAT REQUIREMENTS*	LIKELY PRESENCE IN THE SCHOOL
	TSC ACT	EPBC ACT			
<i>Doryanthes palmeri</i> Giant Spear Lily	V		1	The Giant Spear Lily is a large, succulent, rosette shaped herb. It grows on exposed rocky outcrops in infertile soils, and in a narrow band of vegetation along the cliff-tops, ledges and faces in montane heath next to subtropical rainforest, warm temperate rainforest or wet eucalypt forest (OEH 2012).	Unlikely – not appropriate habitat.
<i>Acacia terminalis</i> <i>subsp. terminalis</i> Sunshine Wattle	E1	E	1	An erect shrub with sparse foliage growing up to 2m tall. This rare species occurs in scrub and open Eucalypt woodland or forest the near-coastal areas of the northern shores of Sydney harbour to Botany Bay in NSW. It usually flowers in March - July (Plantnet n.d.).	Possible – no individuals recorded during this survey.
<i>Syzygium paniculatum</i> Magenta Lilly Pilly	E	V	14	Only found in NSW in a narrow, linear coastal strip from Upper Lansdowne to Conjola State Forest, and occurs on gravels, sands, silts, and clays north of Sydney (OEH 2014). Popular as a landscaping tree in urban parks and gardens.	Possible – no individuals recorded during this survey.

2.2.4 Threatened Plant Species, Population or Communities

No (0) threatened Plant species, populations or communities, were recorded within the School during this survey. No (0) threatened flora species are considered likely to occur within the School. Therefore, no (0) Assessments of Significance are required for flora issues.

2.2.5 Introduced Species & Weeds

Target weeds include Weeds of National Significance (National), Biosecurity listed (State), Priority (Regional) and keystone environmental weeds.

Under the *Biosecurity Act 2015* and *Biosecurity Regulation 2017*, all plants are ‘...regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.’

Biosecurity Matter weeds are listed in the *Act* and *Regulation* and attract specific Biosecurity Duties and/or Control Orders at a State level. In addition, there is a list of Priority Weeds that threaten Biosecurity for the Greater Sydney Region.



Two (2) target weed species were identified within the School: One (1) WoNS and Biosecurity Listed species, *Asparagus aethiopicus* (Ground Asparagus), and one (1) regional Priority Weed, *Cestrum parqui* (Green Cestrum) (Table 2-2).

A number of exotic herbaceous annuals and grasses were also recorded. *Appendix 1* provides a list of flora species recorded within the School.

Horticultural species are generally confined to garden beds and plantings within the landscaping design. As the focus of this ecological survey was the identification of native species likely to be impacted under the development, the list provided in *Appendix 1* only represents introduced species observed when undertaking searches for native plants, particularly those listed as Endangered, Vulnerable or Near Threatened species under the legislation.

Table 2-2: Target Weeds Recorded in the School (UBM 2017)

WEED NAME	PRIORITY WEED DUTY	WoNS	BIOSECURITY LEGISLATION
<i>Asparagus aethiopicus</i> (Ground asparagus)	Mandatory Measure: Must not be imported into the State or sold	✓	✓ (Regulation)
<i>Cestrum parqui</i> (Green Cestrum)	Regional Recommended Measure: Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land. The plant should not be bought, sold, grown, carried or released into the environment.	-	-



3 FAUNA ASSESSMENT

3.1 Fauna Methods

A fauna survey and habitat assessment was undertaken by Fauna Ecologist Kiarrah Smith (BZool, BScConsWldBioHons), on the 1st and 4th August 2017 (*Table 3-1*). These field investigations aimed to assess the species richness of fauna utilising the available resources in the School; investigate the range of fauna habitats present, and determine the potential for local threatened and/or migratory fauna species to occur within the School.

The fauna survey incorporated a range of techniques designed to target species from all fauna groups that would be expected to occur within the School (*Table 3-5*). Observations of fauna utilising adjacent habitat were also recorded, along with opportunistic sightings.

The condition and structure of fauna habitats present were identified, and a consideration of their potential to support locally occurring populations of threatened fauna was determined. Any previous reports and databases were reviewed and drawn upon. A GPS (*GPSmap 62s*, Garmin) was used to record habitat features and the placement of one (1) *AnaBat Express* (Titley Electronics) (*Figure 3-1*).

Table 3-1: Fauna Survey Effort

*Observations from Meteorological Station #066037 - Sydney Airport (BOM 2017).

DATE	START TIME	SURVEY PERIOD	WEATHER CONDITIONS*				ACTIVITY
			TEMP.	WIND	CLOUD	RAIN	
01/08/17	11:10 AM	1 hour	9.2°C – 15.9°C	20 – 30 km/hr	Partial	7.4	Initial habitat assessment; bird survey; herpetofauna and fauna trace search
01/08/17 – 04/08/17	3 nights	Nights only	6.5°C – 18.1°C	9 – 30 km/hr	Variable	24.6 mm	Ultrasonic bat detection (<i>AnaBat Express</i> , Titley Electronics).
04/08/17	8:30 AM	1 hour	10.4°C – 18.5°C	24 km/hr	Partial	12.2 mm	Supplementary habitat assessment; bird survey; herpetofauna and fauna trace search

Table 3-2: Fauna Survey Methods

Note: All methods modified from survey guidelines for threatened species (DEWHA 2010a; DEWHA 2010b; DSEWPaC 2011a; DSEWPaC 2011b).

METHOD	TARGET	DESCRIPTION
Anabat	Microbats	One (1) stationary ultrasonic bat call recorder (<i>AnaBat Express</i> , Titley Electronics) positioned where predicted 'fly-ways' exist, recording at night.
Area Search	All Fauna	Randomly traverse the School; stopping or moving to investigate sightings, calls or signs of fauna presence, which include: Scats; scratches; sap-feeding scars; diggings; nests; dreys; bones; hair; shed skins; tracks; burrows; orts (chewed cones) and feeding pellets. Signs verified with reference to Triggs (2004).



METHOD	TARGET	DESCRIPTION
Point Survey	Birds	Conducted for varying lengths of time at several habitat-determined positions. Birds identified visually and/or by their characteristic calls (Morcombe & Stewart 2014; Pizzey & Knight 2013).
Visual & Hand Search	Herpetofauna	Carefully turn over rocks, logs and large debris (replacing these on site after inspection); search through leaf litter and vegetation. Concentrating on woody debris, urban refuse and around the base of trees.

3.1.1 Survey Limitations

Surveys carried across all seasons over a period of several years are needed to identify all species present in an area, especially as some species are only present at certain times of the year (*e.g.* migratory birds), while others are cryptic or may require specific weather patterns and seasonal conditions for optimum levels of detection. For example, a number of amphibians and microbats are known to hibernate and/or decrease their activity levels during winter.

Due to time and budget constraints relating to the current project, it was not possible to survey the School during all seasons. Therefore, the list of fauna species recorded by the current field surveys (*Appendix 2*) should not be regarded as being fully comprehensive, but rather as providing an indication of the species present at the time of the survey (August 2017). The limitations associated with seasonality were minimised by maximising survey effort through a combination of active diurnal searches, deployment of monitoring equipment, and desktop research.

Furthermore, knowledge of the habitat requirements and associations of animals recorded at the School can help predict the full range of fauna potentially present therein. For example, if a hollow-associated owl is detected, then there is the potential that, if previously recorded in the vicinity of the School, other owl species with similar nesting requirements may also be present.

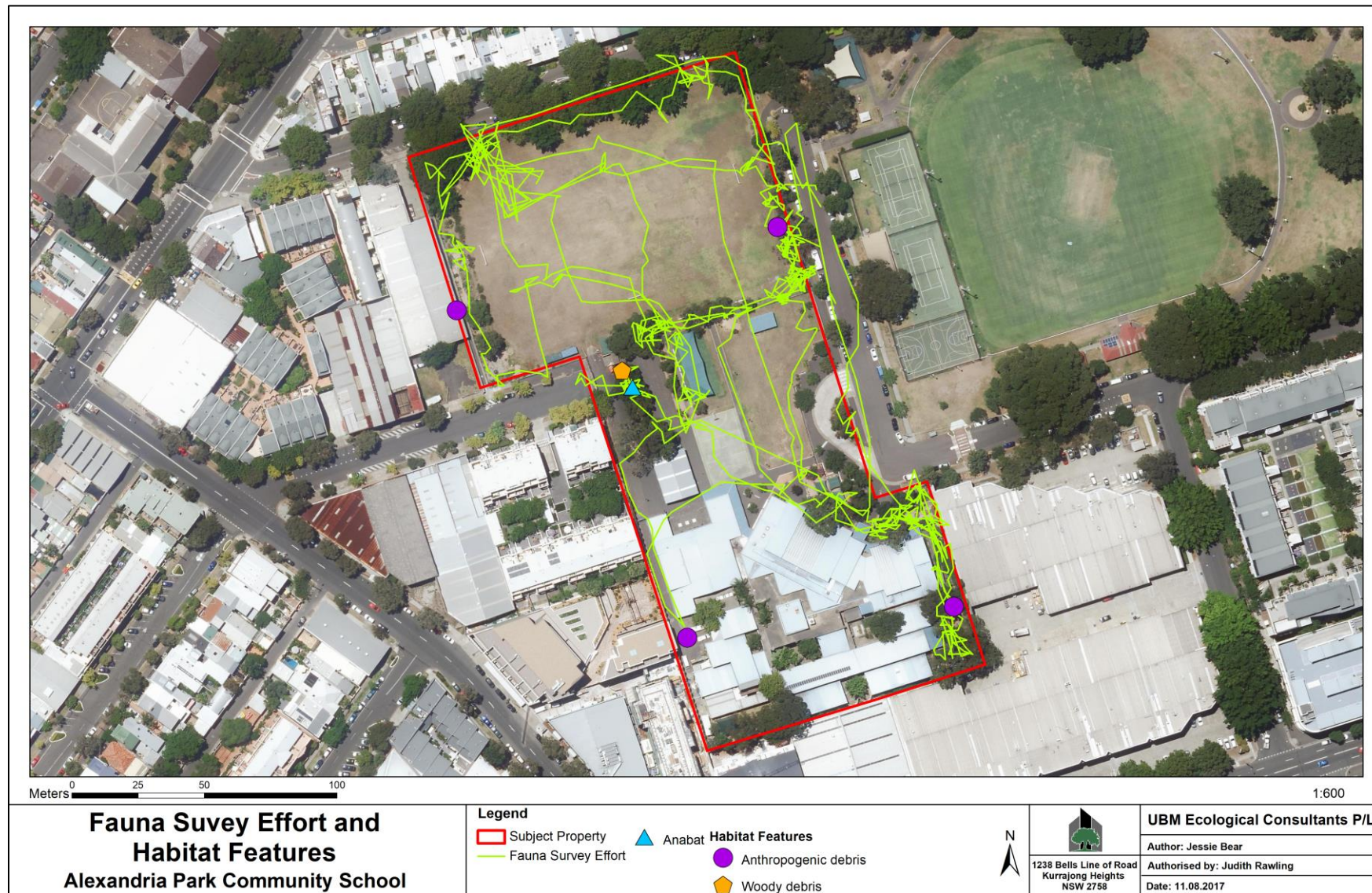
Finally, due to the limitations of detecting hollows, crevices, nests and dreys viewed from the ground additional habitat trees may be present that were not observed during the current field investigations.

3.1.2 Data Analysis

Data recorded by the Anabat was assessed by Fauna Ecologist Amanda Lo Cascio using AnalookW (Version 4.1z) with reference to the Pennay *et al.* (2004) and Reinhold *et al.* (2001). Note that some bat species overlap in both call frequency and structure, making identification problematic in some cases. The degree of confidence or reliability associated with call identifications will depend on the quality of the recordings as well as the activity of the bat at the time of recording and flight direction. In some instances, a particular species may be identified with confidence, while at other times identification will be less certain (Pennay *et al.* 2004).



Figure 3-1: Fauna Survey Effort and Habitat Features (UBM August 2017)





3.2 Fauna Results

3.2.1 Connectivity

Habitat connectivity is vital in promoting the movement of individuals and the exchange of genetic material amongst native flora and fauna. Natural habitat linkages are used in different ways by different species (Gleeson & Gleeson 2012) depending on their mobility and habitat requirements.

The School is situated within a highly fragmented urban landscape (*Figure 3-2*), and is therefore subject to a high level of anthropogenic disturbance, with very poor habitat connectivity owing to the abundance of busy roads, buildings and fences, as well as a lack of mid-storey vegetation to provide refuge from aggressive and predatory species (*e.g.* Noisy Miners [*Manorina melanocephala*] and Ravens [*Corvus coronoides*]).

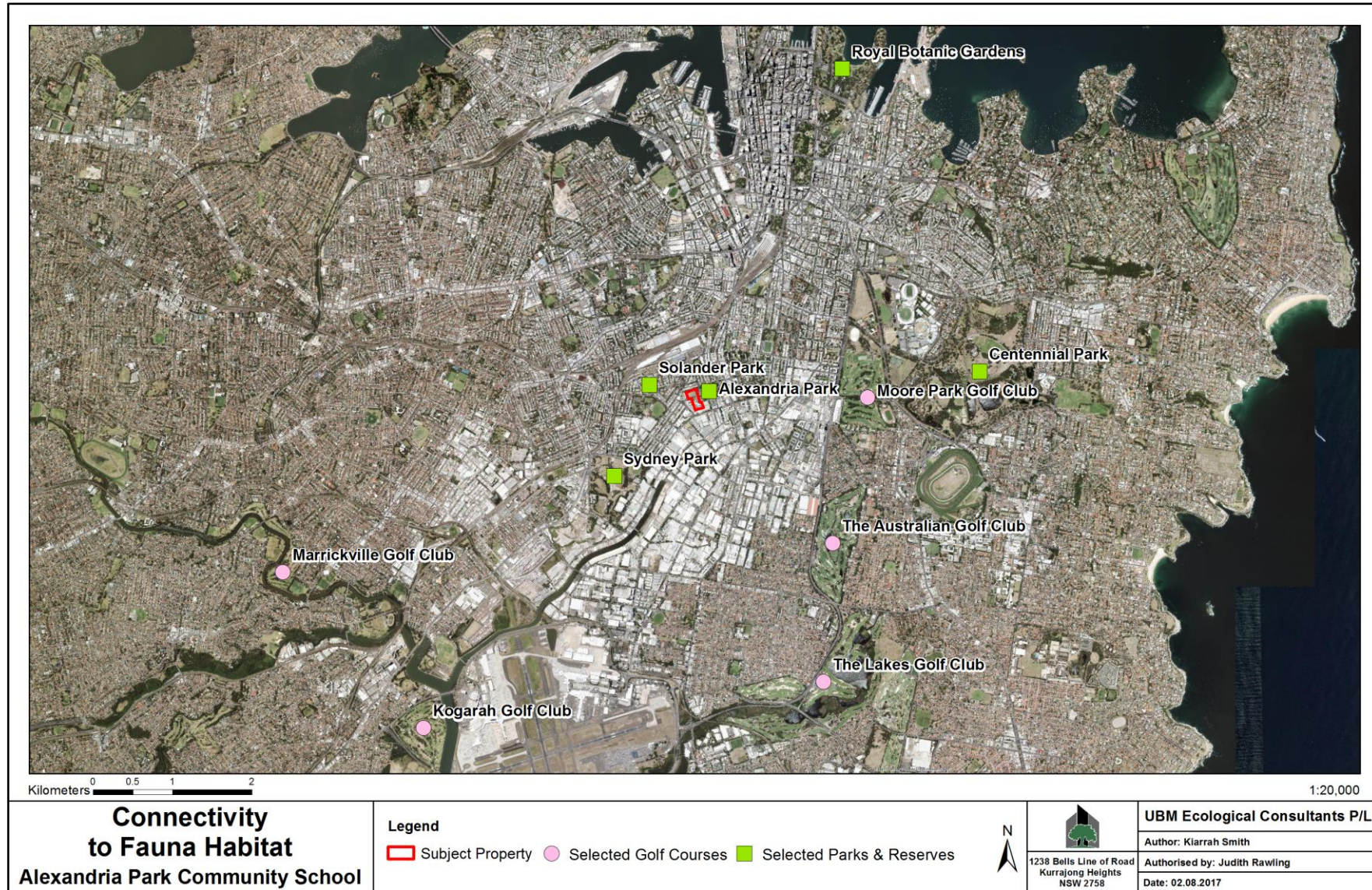
Nonetheless, there is some connectivity for highly mobile fauna via the planted trees on suburban streets and in parks and gardens. Such scattered canopy trees are likely to act as ‘stepping stones’, facilitating the movement of primarily large, highly mobile and urban-tolerant species. The School is mapped as a ‘Supporting Site’ within the corridor for ‘Potential Habitat Linkages’ identified by City of Sydney (Urban Ecology Action Plan).

The adjacent Alexandria Park is one of several Council parks and reserves in the Region, which vary in size from the expansive Centennial Park, to the small patch that is Solander Park. These parks and reserves generally comprise maintained grass areas with stands of trees in patches, and along road edges. The Royal Botanic Gardens (located ~4 km north of the School), and Golf courses in the Region, offer a similar habitat structure and contribute to broad-scale habitat connectivity for highly mobile fauna, which may include threatened microbats, the Vulnerable Grey-headed Flying-fox (*Pteropus poliocephalus*) and Powerful Owls (*Ninox strenua*).

Vegetation within the School should be retained wherever possible to provide local resources (primarily foraging habitat and rest sites) for fauna moving through an otherwise highly urbanised matrix.



Figure 3-2: Connectivity of the School





3.2.2 Fauna Habitat Assessment

Two (2) broad habitat types available for use by native fauna were recorded in the School:

1. Maintained Parkland
2. Urban Infrastructure

The following descriptions outline the habitat features and fauna conservation value of each of these habitat types:

Maintained Parkland

Fauna Conservation Value: Low

Maintained Parkland consists of mown grass and planted gardens (including trees, shrubs and groundcovers) within the School. Gardens provide potential perching, nesting, sheltering and foraging habitat for birds, bats, arboreal mammals and reptiles (*Plates*). Insects shelter beneath exfoliating bark and are attracted to the flowers and fruits of these trees; in turn, the insects are consumed by insectivorous birds and microbats. No (0) hollow-bearing trees suitable for nesting birds were observed within the School grounds, though exfoliating bark may provide crevices for small herpetofauna and microbats.

The mown grass provides little cover or structure, but does offer foraging opportunities for insectivorous and scavenging birds (there is some human litter present), as well as microbats. Several native birds, possums, and the threatened Grey-headed Flying-fox (*Pteropus poliocephalus*), are known to consume the fruit and nectar of fig trees, flowering *Eucalypts* species, and horticultural plantings, which are present within the School. In turn, these animals are potential prey for Powerful Owls.

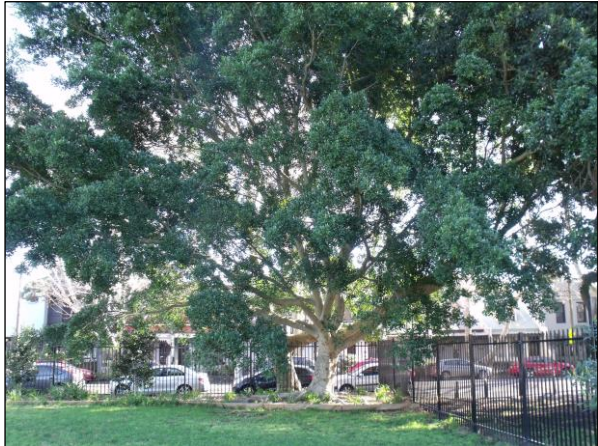
The Maintained Parkland is surrounded by busy roads and large buildings, creating significant edge effects and human disturbance including noise, light and trampling associated with school uses. Noisy Miners were common within the School and are known to aggressively exclude other native bird species, especially in such modified habitats: This process is listed as a Key Threatening Process under Schedule 3 of the *TSC Act*.

Overall the Maintained Parkland is considered to be of Low fauna conservation value, but may be utilised opportunistically for foraging and/or resting by highly mobile threatened fauna moving through the Region (refer to *Section 3.2.1*).



Plates: Maintained Parkland

Top Row: Maintained Parkland garden, including fig trees along the borders of the School. **Bottom Left:** Mown lawn adjacent to the High School demountables. **Bottom Right:** Exfoliating bark offering shelter to small fauna.



Urban Infrastructure

Fauna Conservation Value: Low

Urban Infrastructure includes all buildings and sheds within the School, including those that are to be demolished as part of the Proposal. These structures are abundant in the Region and provide artificial shelter and basking habitat for small reptiles. Additionally, there is potential roosting habitat for microbats in the manmade structures within the School. Due to the artificial nature of Urban Infrastructure, this habitat type is considered to be of Low fauna conservation value.



Plates: Urban Infrastructure

Left: High School demountables. **Right:** Primary School building.



3.2.3 Records of all Fauna in the Region

A database search of the Region within a 10 km x 10 km area centred on the School (parameters North: -33.85 West: 151.14 East: 151.24 South: -33.95) identified records for 335 species in the Region, including 25 introduced species (*Table 3-3*) (OEH 2017).

Table 3-3: Fauna Recorded in the Region

CLASS	COMMON NAME	NATIVE SPECIES	INTRODUCED SPECIES	TOTAL
Actinopterygii	Fish	1	2	3
Amphibia	Frogs	12	1	13
Aves	Birds	229	13	242
Insecta	Insects	1	0	1
Mammalia	Mammals	34	8	42
Reptilia	Reptiles	33	1	34
TOTAL		310	25	335

3.2.4 Fauna Recorded in the Current Survey

By the completion of the recent field survey (August 2017), eight (8) native bird species were detected within, adjacent to, or flying over the School. One (1) introduced bird species was recorded, along with domestic dogs (*Canis lupus familiaris*). The Anabat produced 264 call sequence files, however none of these contained recognisable bat calls; therefore, no (0) microbat species were identified. The Anabat temperature logs recorded a maximum of 23.25°C and minimum of 7.75 °C, and the weather was windy and rainy for the duration of the survey (BOM 2017). Generally, surveys for microbats should not be conducted on cold, windy, rainy nights, so that recording a false absence can be avoided (DEWHA 2010b). Due to the time constraints of this Project, it was necessary to survey at this time.

No (0) threatened and/or migratory species listed under the *EPBC* and/or *TSC Acts* were recorded during the fauna survey. **Note:** All native fauna are protected under the *National Parks and Wildlife Act 1974*. A full list of species detected in the School is presented in *Appendix 2*.



Plates: Observed Fauna

Left: A Rock Dove (*Columba livia*) and an Australian Magpie (*Cracticus tibicen*) within the School;
Right: Two (2) Crested Pigeons (*Ocyphaps lophotes*) foraging in the lawns.



3.2.5 Threatened Fauna Assessment

Of those native species occurring in a 10 x 10 km square area centered on the School in the last 10 years (OEH 2017), 17 are listed as threatened and/or migratory species under the *EPBC* and/or *TSC* Acts. An Assessment of the potential for these listed-fauna to use the School, is provided in *Table 3-5*, using the Assessment criteria detailed in *Table 3-4*.

Assessments were generally based on the habitat requirements described by OEH (various dates), DOE (2017), NSW Scientific Committee and Commonwealth Threatened Species Scientific Committee (various dates) with other references used being identified in the Bibliography. When considering the likely impacts of the Proposal upon the Local and Regional presence of listed species presented in *Table 3-5*, the Assessment Criteria provided under Section 5A of the NSW *Environmental Planning and Assessment Act 1979* have been referred to and drawn upon.

No (0) threatened and/or migratory species listed under the *EPBC* and/or *TSC* Acts were recorded during the fauna survey.

The Grey-headed Flying-fox, Powerful Owl, and Long-nosed Bandicoot have been recorded in the Locality and may utilise the resources of the School opportunistically. However, the School is considered poor quality and/or non-critical habitat for these species, and the current Proposal is unlikely to significantly impact them. See *Table 3-5* for further details on the potential for these species to use the School, likely impacts and assessment considerations.



Table 3-4: Assessment Criteria for Listed Fauna Species' Potential to Use the School

CRITERIA FOR UTILISATION	
UNLIKELY	<p>Species considered unlikely to occur/use the School fit one or more of the following criteria:</p> <ul style="list-style-type: none"> ▪ species not recorded in the field survey; ▪ species not recorded previously in the School or Region (within 5 km of the School); ▪ species with a known distribution or range outside of the School; and/or ▪ Species that rely on habitats and habitat features that do not occur in the School.
POSSIBLE	<p>Species considered possibly to occur/use the School fit one or more of the following criteria:</p> <ul style="list-style-type: none"> ▪ Species with occasional records (within the last ten [10] years) of occurring within the Region (within 5 km of the School); ▪ Species with preferred habitat or habitat features occur on the School, however they occur in poor or modified condition or extremely limited; and/or ▪ Species that may use or occur in habitats within the School opportunistically <i>i.e.</i> seasonally, however unlikely to be present on the property permanently and hence have no immediate impact on nesting/roosting or feeding habitat.
LIKELY	<p>Species considered likely to occur/use the School fit one or more of the following criteria:</p> <ul style="list-style-type: none"> ▪ Species that have frequent and recent (within the last ten [10] years) incidence of previous records on the School and/or Region (within 5 km of the School); ▪ Species that preferentially use habitat and/or habitat features that occur within the School and which are abundant and/or in good condition; ▪ Species with resident populations known to occur in the School; and/or ▪ Species are known to frequently use habitat or habitat features within the School or Region (within 5 km of the School) and/or are highly likely to visit the School, in particular, during seasonal dispersal or migration.
CONFIRMED	<p>A species identified within the School during the fauna field survey conducted in August 2017 or by another recent fauna field survey conducted by an independent consultant and/or qualified Ecologist/Environmental Representative.</p>

**Table 3-5: Threatened Fauna Assessment**

Legislative Classification: CE = Critically Endangered; E1/E = Endangered Species; V = Vulnerable; B = Bonn Convention; C = CAMBA Migratory; J = JAMBA Migratory; K = KAMBA Migratory.

Species listed under the Sensitive Species Data Policy may have their locations denatured: 3 = rounded to 0.01°; 2 = rounded to 0.1°.

^ Within the last 10 years in a 10 x 10 km area centered on the School (Parameters North: -33.85 West: 151.14 East: 151.24 South: -33.95). Search conducted 27th July 2017.

Note: Assessments were generally based on the habitat requirements described by OEH (various dates), DOE (2017), NSW Scientific Committee and Commonwealth Threatened Species Scientific Committee (various dates) with other references used being identified in the Bibliography.

COMMON & SCIENTIFIC NAME	STATUS		RECORDS IN THE REGION^			POTENTIAL TO USE SCHOOL, LIKELY IMPACTS & ASSESSMENT CONSIDERATIONS
	TSC ACT	EPBC ACT	WITHIN 5 KM	WITHIN 1 KM	MOST RECENT	
FROGS (1)						
Green and Golden Bell Frog <i>Litoria aurea</i>	E1	V	106	-	Jan 2017	Unlikely: There is no suitable aquatic habitat within the School. Recent records for this species are centered around Kogarah Golf Course, ~4.9 km south-west of the School. No further assessment required.
REPTILES (1)						
Leatherback Turtle <i>Dermochelys coriacea</i>	E1	E	1	-	Apr 2016	Unlikely: There is no suitable marine habitat within the School. No further assessment required.
BIRDS (10)						
Freckled Duck <i>Stricktonetta naevosa</i>	V	-	1	-	Jun 2013	Unlikely: There is no suitable aquatic habitat within the School. No further assessment required.
Fork-tailed Swift <i>Apus pacificus</i>	-	C,J,K	1	-	Aug 2010	Unlikely: Forages aerially, taking insect prey on the wing. Does not breed in Australia. May be observed flying over the School (though recent records in the Region are very rare). The Proposal is unlikely to impact this species. No further assessment required.
Bush Stone-curlew <i>Burhinus grallarius</i>	E1	-	3	-	Jan 2011	Unlikely: There is no suitable forest or woodland habitat within the School. No further assessment required.



COMMON & SCIENTIFIC NAME	STATUS		RECORDS IN THE REGION ^A			POTENTIAL TO USE SCHOOL, LIKELY IMPACTS & ASSESSMENT CONSIDERATIONS
	TSC ACT	EPBC ACT	WITHIN 5 KM	WITHIN 1 KM	MOST RECENT	
Pacific Golden Plover <i>Pluvialis fulva</i>	-	B,C,J,K	1	-	Dec 2014	Unlikely: There is no suitable coastal or wetland habitat within the School. No further assessment required.
Sharp-tailed Sandpiper <i>Calidris acuminata</i>	-	B,C,J,K	4	-	Dec 2015	Unlikely: There is no suitable wetland habitat within the School. No further assessment required.
Curlew Sandpiper <i>Calidris ferruginea</i>	E1	CE,B,C,J,K	1	-	Aug 2013	Unlikely: There is no suitable littoral or estuarine habitat within the School. No further assessment required.
Latham's Snipe <i>Gallinago hardwickii</i>	-	B,J,K	6	-	Mar 2016	Unlikely: There is no suitable wetland habitat within the School. No further assessment required.
Bar-tailed Godwit <i>Limosa lapponica</i>	-	B,C,J,K	5	-	Oct 2011	Unlikely: There is no suitable coastal or wetland habitat within the School. No further assessment required.
Glossy Black-Cockatoo <i>Calyptorhynchus lathami</i>	V,2	-	1	-	Aug 2010	Unlikely: There is no suitable forest or woodland habitat within the School. No further assessment required.
Powerful Owl <i>Ninox strenua</i>	V,3	-	39	2	Nov 2015	Possible: Requires large territories of forest and woodland that are lacking from the Region. However, this species has been recently recorded in the Locality – they are highly mobile and may opportunistically hunt and/or rest in urban habitats, such as that within the School. Even so, the Proposal is not expected to significantly impact this species given that: The availability of prey (urban-tolerant small mammals) is unlikely to be affected, and the available habitat is subject to a high level of anthropogenic disturbance and otherwise widespread in the Locality. No further assessment required.
MAMMALS (5)						
Long-nosed Bandicoot <i>Perameles nasuta</i> (population in inner western Sydney)	E2	-	15	-	Jul 2015	Possible: NPWS detected one individual by camera trap in Alexandria Park Community Garden in 2011, and an injured juvenile was found in the neighboring Alexandria Park in 2012 (Urban Ecology Strategic Action Plan). No characteristic diggings were observed during the current survey and there have been no further reports of this species in the Locality (pers. comm).



COMMON & SCIENTIFIC NAME	STATUS		RECORDS IN THE REGION ^A			POTENTIAL TO USE SCHOOL, LIKELY IMPACTS & ASSESSMENT CONSIDERATIONS
	TSC ACT	EPBC ACT	WITHIN 5 KM	WITHIN 1 KM	MOST RECENT	
						school and community garden staff). It is likely that those individuals previously recorded in the Locality represent unsuccessful juvenile dispersals to an area of poor quality habitat. It is noted that the adjacent Alexandria Park is a permanent off-leash area for domestic dogs, which may predate Bandicoots in the Locality. Given the above points, the Proposal is not expected to significantly impact this species. No further assessment required.
Grey-headed Flying-fox <i>Pteropus poliocephalus</i>	V	V	127	2	Sep 2016	Possible: No Flying-fox camps were identified within the School, but this species has recently been recorded in the Locality. The closest known camp is located ~3.5 km east of the School at Centennial Park; last surveyed in February 2017 with a population of 16,000–49,999 individuals (CSIRO & DOE 2017). This highly mobile species may be observed flying over the School and may opportunistically forage therein when canopy trees are in flower. However, the School is not considered critical foraging habitat for this species, and similar habitat is otherwise widespread in the Locality. As such, the Proposal is not expected to significantly impact this species. No further assessment required.
Eastern Bentwing-bat <i>Miniopterus schreibersii oceanensis</i>	V	-	16	-	Feb 2017	Unlikely: There are no maternity caves, forests or wetlands within the School. Although this species may roost in man-made structures, the School is isolated from suitable habitat by urban infrastructure and a high level of anthropogenic disturbance. No further assessment required.
Southern Myotis <i>Myotis macropus</i>	V	-	3	-	Nov 2015	Unlikely: Although this species may roost in man-made structures, the School lacks waterbodies suitable for foraging and is isolated from suitable habitat by urban infrastructure and a high level of anthropogenic disturbance. No further assessment required.
Australian Fur-seal <i>Arctocephalus pusillus doriferus</i>	V	-	1	-	Sep 2009	Unlikely: There is no suitable coastal or marine habitat within the School. No further assessment required.



4 CONCLUSION, DECLARATION & SIGN-OFF

This Ecological Investigation has provided an assessment of the potential ecological impacts that may arise from the works to be undertaken under the Proposal.

Advice received from Redgum Horticultural (2017) indicates that 60 trees are to be removed and 56 trees are to be retained within the School and adjacent road reserve (*Figure 1-4*).

Results

Plant Communities: There are no naturally-occurring native plant communities at APCS or in the adjacent Alexandria Park, the site having formerly been sandhills that were levelled in the late 19th Century. A number of generally native and exotic specimen trees have been planted in the School over a period of up to 50 years.

Flora: A total of 70 plant species were recorded at APCS, predominantly comprising planted species in gardens. Open lawns comprised introduced turf species, plus commonly-occurring turf weeds, while managed garden beds planted with horticultural species were found within the School. A list of all species recorded during the survey is included in *Appendix 1*.

No (0) threatened flora species or populations were observed at APCS or the immediate locality.

Two (2) target weed species were identified within the School: One (1) WoNS and Biosecurity Listed species, *Asparagus aethiopicus* (Ground Asparagus), and one (1) regional Priority Weed, *Cestrum parqui* (Green Cestrum).

Fauna: By the completion of the recent field survey (August 2017), eight (8) native species and two (2) introduced species were detected within, adjacent to, or flying over the School. No (0) threatened and/or migratory species listed under the *EPBC* and/or *TSC Acts* were recorded during the fauna survey. Native fauna species recorded during the survey are all urban-tolerant species, typical of highly modified urban habitats.

Although no (0) threatened and/or migratory fauna are considered likely to use the resources of the School, the Grey-headed Flying-fox, Powerful Owl, and Long-nosed Bandicoot have been observed in the Locality. The School is considered poor quality and/or non-critical habitat for these species, and the current Proposal is unlikely to significantly impact them.

The School is situated within a highly fragmented urban landscape (*Figure 3-2*), and is therefore subject to a high level of disturbance. There are two (2) broad habitat types within the School - Maintained (Open) Parkland and Urban Infrastructure, both of which are considered to be of Low fauna conservation value.

Recommendations:

In considering the Proposal to redevelop APCS, UBM recommends that:

- Wherever possible, mature canopy trees and plantings in close proximity to the development footprint should be retained, and where feasible, incorporated into the final project design.



- Appropriate tree protection measures should be in place prior to construction works commencing for all trees identified for retention (*e.g.* wooden tree guards, exclusion fencing).
- Where trees are unavoidably impacted, supplementary trees and shrubs should be planted post construction (*e.g.* site landscaping).
- Fauna habitat variety should be maintained and enhanced where possible. Increasing floristic diversity through plantings of shrub and tree species around the school would be highly beneficial, especially locally occurring native plants that produce nectar, pollen and fruits, including winter-flowering canopy trees, and patches of dense vegetation cover.
- Immediately prior to the removal of vegetation and debris, a pre-clearance survey should be undertaken by a qualified Fauna Spotter/Catcher to identify and relocate fauna that may be disturbed, injured or killed during clearing (*e.g.* nesting birds).
- If an unexpected threatened species is found during construction, all work must stop, and the Council notified immediately. Work is not to resume until an Assessment of Significance has been conducted for the threatened species and it is determined that an impact is not likely to occur.

By adopting the recommendations identified in this Report, the impacts on the native flora and fauna species known to utilise the resources of the School and Locality generally, will be minimised.



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6 APPENDICES

Appendix 1: List of Flora Species Recorded at APCS, Alexandria (UBM August 2017)

KEY	
Zone:	Indicative frequency of occurrence:
1. Demountable Section	c = common
2. Primary School	u - uncommon
3. Alexandria Community Garden	o = occasional
	* indicates an introduced or non-indigenous species

FAMILY	SCIENTIFIC NAME	COMMON NAME	1	2	3
CANOPY TREES					
Casuarinaceae	<i>Casuarina glauca</i>	Swamp Oak		u	
Moraceae	* <i>Ficus microcarpa</i>	Curtain Fig	o		
	* <i>Ficus benjamina</i>	Weeping Fig	u		
Myrtaceae	<i>Eucalyptus botryoides</i>	Southern Mahogany	o		
	<i>Eucalyptus saligna</i>	Sydney blue gum	o	o	o
	<i>Eucalyptus sideroxylon</i>	Mugga Ironbark	o		o
	* <i>Lophostemon confertus</i>	Qld Bush Box	u		
Platanaceae	* <i>Platanus x hybrida</i>	Plane Tree	o		
SMALL TREES					
Cunoniaceae	<i>Ceratopetalum gummiferum</i>	NSW Christmas-bush	u		
Lamiaceae	<i>Westringia fruticosa</i>	Coastal Rosemary		o	
Lauraceae	* <i>Cinnamomum camphora</i>	Camphor Laurel	u		
Meliaceae	* <i>Melia azedarach</i>	White Cedar	u	o	
Moraceae	* <i>Morus alba</i>	White Mulberry	u		
Myrtaceae	<i>Melaleuca linariifolia</i>	Flax-leaved Paperbark	u		
	<i>Acmena smithii</i>	Lilly Pilly	u	u	
Proteaceae	<i>Callistemon sp.</i>	Bottlebrush	u		u
	<i>Banksia aemula</i>	Old Man Banksia	u		
SHRUBS					
Malvaceae	* <i>Sida rhombifolia</i>	Paddy's Lucerne	o		
Myrtaceae	<i>Backhousia myrtifolia</i>	Grey Myrtle	u		
Phyllanthaceae	<i>Breynia oblongifolia</i>	Coffee Bush	u		
Rhamnaceae	<i>Pomaderris lanigera</i>	Woolly Pomaderris	u		
Rutaceae	<i>Correa alba</i>	White Correa	c		
Sapindaceae	* <i>Cupaniopsis anacardioides</i>	Tuckaroo	o		u
Sapindaceous	<i>Dodonaea triquetra</i>	Large-leaf Hop-bush	u		
Solanaceae	* <i>Cestrum Parqui</i>	Green Cestrum	o		
HERBS - DICOTS					
Asteraceae	* <i>Bidens pilosa</i>	Farmers Friends	o	o	
	* <i>Conyza bonariensis</i>	Fleabane	u	u	o
	* <i>Erigeron karvinskianus</i>	Seaside Daisy			c
	* <i>Gamochaeta purpurea</i>	Purple Cudweed	u		



FAMILY	SCIENTIFIC NAME	COMMON NAME	1	2	3
	* <i>Hypochaeris radicata</i>	Flatweed	o	u	u
	* <i>Sonchus oleraceus</i>	Common Sowthistle	o	u	
Anthericaceae	<i>Dichondra repens</i>	Kidney Weed			o
Apiaceae	<i>Centella asiatica</i>	Indian Pennywort			c
Apocynaceae	* <i>Araujia sericifera</i>	Moth Vine	o		
Commelinaceae	<i>Commelina cyanea</i>	Scurvy Weed	o		u
Dilleniaceae	<i>Hibbertia scandens</i>	Climbing Guinea Flower	c		
Fabaceae	* <i>Trifolium sp.</i>	Clover	o	o	
Malvaceae	* <i>Modiola caroliniana</i>	Modiola	o	u	
	<i>Malva sp.</i>	Tall Mallow	o		
Passifloraceae	* <i>Passiflora edulis</i>	Passionfruit	u		
	* <i>Passiflora sp.</i>	Passionfruit	u		
Phormiaceae	<i>Dianella caerulea</i>	Blue Flax Lily	c		o
Plantaginaceae	* <i>Plantago lanceolata</i>	Lambs Tongue	o	o	u
	<i>Plantago debilis</i>	Plantago			o
Polygonaceae	* <i>Rumex brownii</i>	Swamp Dock	o	u	
Solanaceae	* <i>Solanum nigrum</i>	Black-berry Nightshade	u		u
Urticaceae	* <i>Parietaria judaica</i>	Asthma Weed		o	u
Verbenaceae	* <i>Verbena bonariensis</i>	Purple Top	u		
Vitaceae	<i>Cayratia clematidea</i>	Grape Vine	o	u	
	<i>Cissus antarctica</i>	Kangaroo Vine		o	
HERBS - MONOCOTS					
Alliaceae	* <i>Agapanthus sp.</i>	African Lily		o	c
Anthericaceae	* <i>Chlorophytum sp.</i>	Spider Plant			c
Asparagaceae	* <i>Asparagus aethiopicus</i>	Asparagus Fern	u		
Blechnaceae	<i>Blechnum cartilagineum</i>	Gristle Fern	c		
Cyperaceae	* <i>Cyperus congestus</i>	A sedge	u		
Doryanthaceae	<i>Doryanthes excelsa</i>	Gymea Lily	o	o	o
Iridaceae	* <i>Dietes sp.</i>	Dietes		o	c
Liliaceae	* <i>Clivia miniata</i>	Clivia	u		
Lomandraceae	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush	c	c	o
Lomariopsidaceae	* <i>Nephrolepis cordifolia</i>	Fishbone Fern		c	
Poaceae	* <i>Cynodon dactylon</i>	Common Couch Grass	o	o	
	* <i>Ehrharta erecta</i>	Veldt Grass	o	o	o
	* <i>Bromus sp.</i>	Broome	o	u	u
	* <i>Cenchrus clandestinus</i>	Kikuyu Grass	o	o	
	* <i>Sporobolus sp.</i>	Parramatta Grass	o		
	* <i>Lolium sp.</i>	Ryegrasses	o		
	* <i>Eragrostis curvula</i>	African Love Grass	u		
	* <i>Poa annua</i>	Winter Grass	o	o	
	* <i>Pennisetum sp.</i>	Fountain Grass	o		
	* <i>Hedychium gardnerianum</i>	Ginger Lily	c		o



Appendix 2: List of Fauna Species Recorded at APCS (UBM August 2017)

Observation Type:

A	Stranding/Beaching	H	Hair, feathers or skin	R	Road kill
AR	Acoustic Recording	I	Subfossil/Fossil remains	S	Shot
B	Burnt	K	Dead	T	Trapped or netted
C	Cat kill	M	Miscellaneous	U	Anabat
D	Dog Kill	N	Not located	V	Fox kill
E	Nest/Drey/Roost	O	Observed	W	Heard call
F	Tracks or scratchings	OW	Observed & Heard Calls	X	In scat
FB	Burrow	P	Scat	Y	Bone, teeth, shell
G	Crushed cones	Q	Camera	Z	In raptor/owl pellet

* Introduced species **BOLD = Threatened species** + at least

FAMILY	SCIENTIFIC NAME	COMMON NAME	COUNT (OBS. TYPE)
BIRDS (9)			
Artamidae	<i>Cracticus tibicen</i>	Australian Magpie	1 (O)
Charadriidae	<i>Vanellus miles</i>	Masked Lapwing	1 (OW)
Columbidae	<i>*Columba livia</i>	Rock Dove	6+ (O)
	<i>Ocyphaps lophotes</i>	Crested Pigeon	6+ (OW)
Corvidae	<i>Corvus coronoides</i>	Australian Raven	2+ (OW)
Laridae	<i>Chroicocephalus novaehollandiae</i>	Silver Gull	1 (O)
Meliphagidae	<i>Manorina melanocephala</i>	Noisy Miner	10+ (OW)
Psittacidae	<i>Trichoglossus haematodus</i>	Rainbow Lorikeet	8+ (OW)
Threskiornithidae	<i>Threskiornis molucca</i>	Australian White Ibis	3+ (O)
MAMMALS (1)			
Canidae	<i>*Canis lupus familiaris</i>	Domestic Dog	1 (O)