APPENDIX P: BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT

17 ROBERTS ROAD, EASTERN CREEK

SSD-10330 Proposed Data Centre
Biodiversity Development Assessment Report

Prepared for:

Canberra Data Centres Pty Ltd
PO Box 304
JERRABOMBERRA NSW 2619

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BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Canberra Data Centres Pty Ltd (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
610.18883-R05-v2.0	11 November 2019	Fiona Iolini and David Martin	Jeremy Pepper and Fiona Iolini	Jeremy Pepper

EXECUTIVE SUMMARY

SLR was engaged by Urbis to prepare a Biodiversity Development Assessment Report (BDAR) in accordance the NSW Biodiversity Assessment Method (BAM) for the proposed State Significant Development Application (SSDA) for a new data centre at 17 Roberts Road, Eastern Creek. Due to the limited biodiversity values of the site a BDAR waiver request was submitted to the Department of Planning Industry and the Environment (DPIE), however, this was rejected and a full BDAR assessment is required.

This project is deemed to be state significant development and therefore the project will be determined under Section 4.12(8) of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act) and Schedule 2 of the Environmental Planning and Assessment Regulation 2000.

One native plant community, PCT 835 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, was recorded and approximately 0.04 hectares (ha) mapped within the north western corner of the site. This vegetation constitutes the River-flat Eucalypt Forest of the New South Wales North coast, Sydney Basin and South East Corner Bioregions, which is listed as endangered under the NSW Biodiversity Conservation Act 2016 (BC Act).

The patch of PCT 835 in the north western corner of the site is in moderate to good condition and represents the only native plant community, and therefore the only vegetation zone, within the Project Site. One BAM plot has been collected by an accredited assessor within this vegetation zone, returning a vegetation integrity score of 27.4. The remaining majority (14.4ha) of the site comprises developed land and planted non-native vegetation.

The assessment reveals that the proposed development will require the removal of the 0.04ha patch of PCT 835 or River-flat Eucalypt Forest that is listed as endangered under the BC Act. This impact has been assessed in accordance with the BAM, resulting in an offset requirement of one ecosystem credit for PCT 835. At the time of writing, the offset obligation will require the purchase and retirement of one ecosystem credit or payment of $19,993.96 (ex GST) into the Biodiversity Conservation Fund.

No threatened species or their habitats have been recorded within the Project Site and therefore no species credits are required.

No impact avoidance measures are possible for the proposed development. Mitigation measures have been presented to reduce the potential for indirect impacts on biodiversity values adjacent or downstream of the Project Site.

The proposed development is not likely to have a significant impact on any matters of national environmental significance listed under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

CONTENTS

CONTENTS

CONTENTS

DOCUMENT REFERENCES

TABLES

FIGURES

PHOTOS

CONTENTS

APPENDICES

1 INTRODUCTION

This section introduces the proposal and provides the context of the BDAR. The proposal, landscape context, key features of the Project Site and report objectives are detailed below.

1.1 Background

The NSW Environmental Planning and Assessment Act 1979 (EP&A Act) forms the legal and policy platform for proposal assessment and approval in NSW and aims to 'encourage the proper management, development and conservation of natural and artificial resources'. All development in NSW is assessed in accordance with the provisions of the EP&A Act and Schedule 2 of the Environmental Planning and Assessment Regulation 2000 (EP&A Regulation).

The NSW Biodiversity Conservation Act 2016 (BC Act), the NSW Biodiversity Conservation Regulation 2017 (BC Regulation) and amendments to the NSW Local Land Services Act 2013 (LLS Act) commenced on 25 August 2017. In accordance with the BC Act, the BAM and entry into the Biodiversity Offsets Scheme (BOS) is applicable to certain development activities based on specific criteria. Preparation of a BDAR is required for a development application that meets any of the following criteria:

- Part 4 development activities deemed to be 'State Significant' under the EP&A Act;
- Development activities that have the potential to impact Areas of Outstanding Biodiversity Value (AOBV) as listed under Part 3 of the BC Act;
- Local developments that have the potential to cause a significant impact on a threatened species, population or ecological community, listed under Schedules 1 and 2 of the BC Act, as determined by application of a five-part-test of significance in accordance with Section 7.3 of the BC Act;
- Development activities that have the potential to impact areas mapped as having 'high biodiversity value' as indicated by the NSW Biodiversity Values Map (BV Map); and
- Development activities that involve clearing of native vegetation that exceeds the Biodiversity Offset Scheme thresholds (BOS thresholds) as determined by the BC Regulation.

This project is deemed to be state significant development and therefore the project will be determined under Section 4.12(8) of the EP&A Act and Schedule 2 EP&A Regulation. Project State Environmental Assessment Requirements (SEARs) have been issued, which request the preparation of a BDAR to be submitted along with the Project Application. The Project Site and locality do not contain any AOBV, and there are no areas of 'high biodiversity value' within the site, as indicated by the BV Map (viewed October 2019).

Due to limited biodiversity values of the site a BDAR waiver request was submitted to DPIE, however, this was rejected and a full BDAR assessment is required.

1.2 The Project Site

The site (hereafter referred to as the 'Project Site') is formally described as Lot 2 DP 1159804, has an approximate area of 14.52ha, and is situated within Blacktown Local Government Area (LGA). The Site is part of the Eastern Creek Business Park and is bordered by Roberts Road in the west, Capicure Drive in the north, a transmission line easement in the south and a vacant lot in the east (see Figure 1).

The site is generally surrounded by industrial and infrastructure land uses. A Sydney Water Supply canal runs parallel to the southern boundary and Reedy Creek and associated riparian vegetation is located 50 metres (m) to the southeast of the site. The TransGrid Sydney West Bulk Supply Substation is located 500m to the west of the site and consequently several large transmission lines traverse the surrounding land.

The site currently comprises existing buildings, roads, grassed areas and some lightly vegetated areas along the site's boundaries, as depicted in Figure 2. The site was formerly used for the extraction of shale resource (Development Consent No 005475 Blacktown City Council 1986) and has been rehabilitated including areas of planted vegetation. Subsequent development consent was granted for the data storage and distribution centre located in the eastern portion of the site (Project reference: 10_0142 Department of Planning 2010).

Due to the historical uses of the site there are limited areas of biodiversity value. The site is predominately cleared of native vegetation and much of the original soil materials have been removed or modified. There are no watercourses or other special features representing items of biodiversity value present within the site.

1.3 Report Objectives

This BDAR has been prepared in accordance the NSW BAM (OEH 2017a) and aims to:

- Describe the biodiversity values, as defined under the BC Act, of the Project Site.
- To assess potential impacts of the proposal on biodiversity values, including prescribed impacts and serious and irreversible impacts (SAIIs), in terms of biodiversity credits (i.e. ecosystem credits and species credits) as per the BAM Ancillary Rules (OEH 2017b).
- Recommend mitigation and environmental management measures to avoid and/or minimise adverse impacts on biodiversity values.
- Determine whether a biodiversity offset is required, as per the requirements of the BAM.

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Source: Nearmap (September 2019)

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Project Site and Locality

FIGURE 1

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Aerial Image of the Project Site

FIGURE 2

1.4 The Project

The SSDA proposes the construction of a new Data Centre and ancillary office space to expand the operation of the existing Data Centre to the east of the site. The proposed Data Centre includes three large warehouse buildings and ancillary office space and will deliver economic benefits and employment generation for Western Sydney and the Greater Sydney Region.

The SSDA seeks consent for site preparation works comprising:

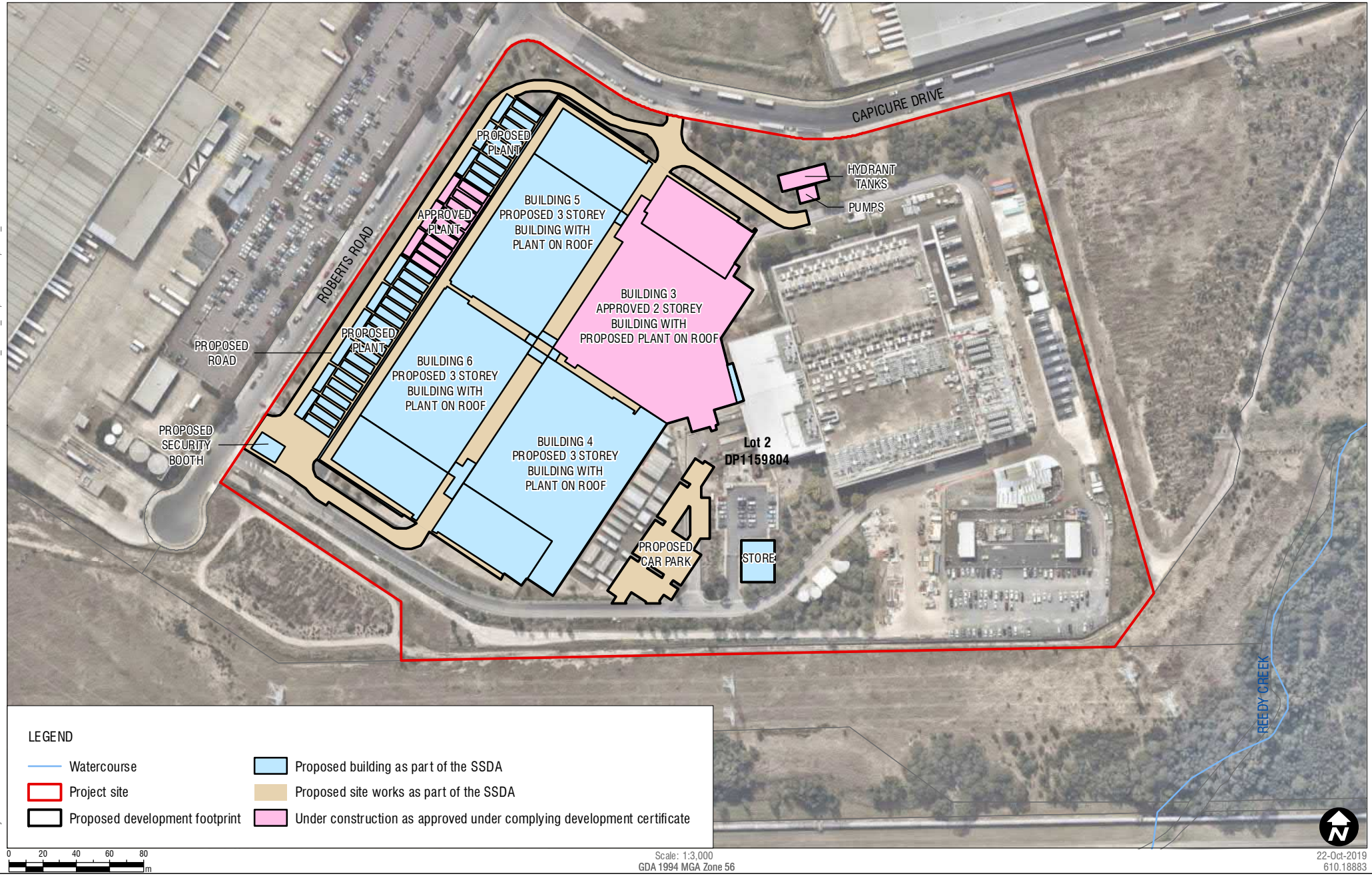
- Site preparation and mobilisation including clearing of land and importation of fill material;
- Bulk and detail earthworks and support structures;
- Estate stormwater management including construction of detention basins;
- Construction of site access and estate internal roads;
- Service and infrastructure augmentation;
- Perimeter fencing;
- Retaining wall;
- Removal of trees and
- Environmental protection and management measures.

Additionally, the SSDA includes staged construction of buildings for a Data Centre with 24 hour/day, seven day/week operation as follows:

- Construction of three 3 storey warehouse facilities (E4, E5, E6) including ancillary office spaces;
- Additional rooftop plant and equipment for Building E3 in associated with Data Centre use;
- Fit out of buildings;
- Construction of a store room;
- Security booth;
- Generator within generator enclosures;
- Landscaping works; and
- Construction of hardstand, loading area and a new car park.

An existing Data Centre with associated office building and plant is located to the east of the site. This Data Centre is to be retained and does not form part of this SSDA. Building 3 is currently under construction under a series of Complying Development Certificates. These comprise of Early Works, Base Build, Fit Out and installation of 12 generators. These works do not form part of the SSDA scope. Additional rooftop plant and equipment for Building 3 forms part of the proposed SSDA scope. The proposal also does not involve the installation of any form of signage to the façade of the building.

The layout of the proposed development is presented in Figure 3.



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Proposed Development Footprint

FIGURE 3

2 METHODOLOGY

This chapter describes the methods undertaken to identify biodiversity values within the Project Site in accordance with Stage 1 of the BAM.

2.1 Licenses and Personnel

SLR Ecology currently holds a NSW National Parks and Wildlife Services and NSW Office of Environment and Heritage Scientific Licence (licence number SL100176), as well as a Department of Primary Industries Animal Ethics Approval, which authorises field staff to trap, capture, harm, hold and release animals protected under the BC Act. The roles and qualifications of all staff responsible for preparation of this BDAR are listed in Table 1.

Table 1 Staff Roles and Qualifications

Staff Name & Title	Qualifications	Role
Jeremy Pepper Principal Ecologist	Bachelor of Science (Hons Class 1) University of NSW 1996 Cert II Bushland Regeneration, TAFE NSW Cert III Horticulture (Arboriculture), TAFE NSW BAM accredited assessor (#BAAS17104)	Project management, report review
Fiona Iolini Associate Ecologist	Bachelor of Environmental Science and Management, University of Newcastle 2007 Certificate of Native Plant Identification, Sydney University 2008 Cert III Conservation and Land Management, TAFE NSW 2015 BAM accredited assessor (#BAAS19042)	Field assessment, BAM calculations, report preparation
David Martin Project Ecologist	Master of Science (MSc), The University of Melbourne Bachelor of Environmental Science and Management, The University of Newcastle	Field assessment, report preparation
Emily Mitchell CAD/GIS Technician	Bachelor of Development Studies (2008 – University of Newcastle) Cert IV Spatial Information Services, TAFE NSW	GIS data management and figure preparation

2.2 Information Sources

Existing information on the flora and fauna of the Project Site and the locality, including relevant threatened biota was also obtained from the following resources:

- Regional vegetation mapping: Remnant Vegetation of the Western Cumberland Subregion (OEH 2013).
- The BioNet Atlas of NSW (OEH 2019a) for previous records of threatened species, populations and communities (as listed under the BC Act) within a 10 kilometre (km) radius, centred on the Project Site.
- The Protected Matters Search Tool, (DEE 2019a) involving a search for matters of national environmental significance within a 10km radius, centred on the site.
- The Species Profile and Threats Database (SPRAT) (DEE 2019b).
- The BioNet Vegetation Classification Database (OEH 2019b).
- The Threatened Species Profiles (OEH 2019c).
- Relevant published literature on threatened biota (see References).

2.3 Field Assessment

A preliminary field assessment was undertaken by SLR Associate Ecologist Fiona Iolini and SLR Project Ecologist David Martin on 15th July 2019, followed by a supplementary field assessment by Fiona to gather BAM plot data on the 15th October 2019. Methods utilised during the field surveys are described in the following sections. The assessment was undertaken in accordance with the BAM (OEH 2017a) and with reference to the NSW Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (DEC 2004).

2.3.1 Vegetation Assessment

Plant community types (PCTs) were identified based on site data collected via plot/transects, supplemented with random meanders, for dominant flora species present within each structural layer (i.e. canopy, shrub and ground layers) and comparison to descriptions of PCTs in the BioNet Vegetation Classification. Planted non-native vegetation was identified based on structure and species composition. Boundaries of PCTs were marked on an aerial image of the site and later digitised using geographical information system (GIS) software.

Identification of threatened ecological communities, as listed under the BC Act, was completed for each PCT through comparison of site floristic data, landscape position, soil landscape, geology and local government area against identification criteria listed in the Final Determination of the NSW Scientific Committee for relevant threatened communities, as well as online threatened community profiles published by OEH.

The vegetation condition of each PCT was defined as 'moderate to good' or 'low' based on the definitions presented in Table 2. Vegetation condition was then used to delineate vegetation zones as per Section 5.3.1 of the BAM (OEH 2017a).

Table 2 Vegetation Condition Definitions

Vegetation Condition	Definition#
Moderate - Good	Vegetation retaining the species complement and structural characteristics of the pre-European equivalent. Vegetation retaining a native canopy and has a native understorey of greater than 50% cover. This condition class can include derived native grasslands and can have minor weed incursions with some patches being subject to grazing.
Low	Vegetation within which the understorey is generally dominated by exotic species being greater than 50% exotic cover, with canopy absent or canopy foliage cover below benchmark. The shrub layer is generally absent and weed invasion is generally significant.

Note: vegetation condition classes are not defined in the BAM

Following delineation of vegetation zones within the Project Site, a plot-based floristic vegetation survey was conducted by the author (Accredited Assessor F Iolini). One 20m by 50m (1000m^2) plot/transect ('BAM plot') was sampled containing a nested 20m by 20m (400m^2) floristic plot.

The BAM plot was positioned randomly to sample an area that was most representative of the floristic characteristics of the vegetation zone. In the case of the sample site the small size of the vegetation patch meant that the BAM plot encompassed the entirety of the patch, as well as areas of non-native vegetation surrounding the patch. The number of BAM plots sampled in each vegetation zone was based on the requirements of the BAM (OEH 2017a), which are presented in Table 3.

Table 3 BAM Plots Required and Completed per Vegetation Zone

Zone	Zone Name	Zone Area	BAM Category#	Plots Required	Plots Completed
1	PCT 835 Mod-good	0.04ha	<2ha	1	1

Based on Table 4 in the BAM (OEH 2017a)

Vegetation integrity was determined using data collected from the BAM plot by examining the vegetation composition, structure and function attributes as follows:

- The assessment of vegetation composition was based on the number of native plant species (richness) observed within the 400m² plot.
- The assessment of vegetation structure was based on the percentage of foliage cover for each plant growth form group within the 400m² plot.
- The assessment of vegetation function was based on an assessment of the following attributes within the 1000m² plot: number of large trees, tree regeneration, tree stem size class, total length of fallen logs, litter cover (i.e. assessed using five 1m² quadrats along the 50m transect), high threat exotic vegetation cover and hollow bearing trees.

For a more detailed description of how vegetation integrity was calculated, refer to the BAM (OEH 2017a). Plant identification and nomenclature was based on species descriptions presented within PlantNET - The NSW Plant Information Network System of Royal Botanic Gardens and Domain Trust, Sydney (RBGDT 2019).

2.3.2 Threatened Flora Surveys

Targeted threatened flora surveys were conducted in accordance with the NSW Guide to Surveying Threatened Plants (OEH 2016) for species identified during the desktop review and BAM assessment. Two surveys were conducted, one on the 15th July 2019 and another on the 15th of October 2019. The surveys consisted of a random meander followed by parallel field traverses (i.e. 10m apart) in suitable habitats. Additionally, due to the small patch size, the entire patch was thoroughly searched during the BAM plot survey. This methodology is consistent with the survey effort required to adequately detect threatened herb, shrubs and trees in woodland habitat.

Targeted threatened flora surveys were conducted for candidate species credit species. Threatened flora species identified as requiring targeted surveys were determined based on previous records and habitat suitability, in accordance with Section 6.4 of the BAM (OEH 2017a). Species that were targeted all had a low likelihood of occurrence within the Project Site due to limited habitat connectivity, the highly degraded nature of habitat and the general limited availability of habitat.

Surveys included targeted searches for the following threatened plant species: Netted Bottle Brush Callistemon linearifolius, White-flowered Wax Plant Cynanchum elegans, Camden White Gum Eucalyptus benthamii, Marsdenia viridiflora subsp. viridiflora (endangered population), Tadgell's Bluebell Wahlenbergia multicaulis (endangered population), Tall Knotweed Persicaria elatior, Hairy Geebung Persoonia hirsuta, Austral Pillwort Pilularia novae-hollandiae, Brown Pomaderris Pomaderris brunnea and Hibbertia sp. Bankstown. A likelihood of occurrence assessment for these species is presented in Appendix A.

2.3.3 Fauna Surveys and Habitat Assessment

Opportunistic and incidental observations of fauna species were recorded at all times during the field surveys. These included opportunistic observation of fauna activity such as scats, tracks, burrows or other traces. Given the limited native vegetation and habitat clearing involved, no specific survey methods were used to target threatened fauna species. For example, no AnaBat analysis, call playback or trapping of fauna species was conducted. A likelihood of occurrence assessment for threatened fauna species is presented in Appendix A.

The locations of any important habitat features, such as microbat roosting habitat, hollow-bearing trees and nests/burrows were captured with a handheld GPS unit and photographed where appropriate. Searches for potential habitat of threatened fauna species included but were not limited to koala feed trees, foraging trees for threatened arboreal fauna, hollow-bearing trees, potential roosts for microchiropteran bats and terrestrial refugia such as woody debris and logs.

2.4 Likelihood of Occurrence

Following collation of database records and species and community profiles, a 'likelihood of occurrence' assessment was prepared with reference to the broad habitats contained within the Project Site. The likelihood of threatened species occurring in the Project Site was assessed based on presence of records from the locality, species distribution and habitat preferences, and the quality of potential habitat present, as defined in Table 4.

Table 4 Likelihood of Occurrence for Threatened Species

Likelihood	Criteria
Present	The species was observed in the Project Site during the current survey.
High	It is highly likely that a species inhabits the Project Site and is dependent on identified suitable habitat (i.e. for breeding or important life cycle periods such as winter flowering resources), has been recorded recently in the locality (10km) and is known or likely to maintain resident populations in the site. Also includes species known or likely to visit the Project Site during regular seasonal movements or migration.
Moderate	Potential habitat is present in the Project Site. Species unlikely to maintain sedentary populations; however, may seasonally use resources within the site opportunistically or during migration. The species is unlikely to be dependent (i.e. for breeding or important life cycle periods such as winter flowering resources) on habitat within the Project Site or habitat is in a modified or degraded state. Includes cryptic flowering flora species that were not seasonally targeted by surveys and that have not been recorded.
Low	It is unlikely that the species inhabits the Project Site and the species has not been recorded recently in the locality (10km). It may be an occasional visitor, but similar habitat to that present on the site is widely distributed in the local area, meaning that the species is not dependent (i.e. for breeding or important life cycle periods such as winter flowering resources) on available habitat. Specific habitat is not present in the site or the species are non-cryptic perennial flora species that were specifically targeted by surveys and not recorded.
None	Suitable habitat is absent.

2.5 Biodiversity Credit Calculations

Biodiversity credits required to offset impacts of the proposal were calculated using the BAM Calculator[1] in accordance with the Biodiversity Offsets Scheme. These calculations were performed by SLR Associate Ecologist Fiona Iolini (BAM Accredited Assessor - BAAS19042) in October 2019.

2.5.1 Ecosystem Credit Species and Candidate Threatened Species

A discussion of 'ecosystem credit species' and 'candidate threatened species' (i.e. species credit species) as returned by the BAM (OEH 2017a) is presented in Section 3.6. The section states the recommended survey period for detecting each species, whether each species was detected during the field survey and whether the proposal is likely to impact each species (i.e. based on habitat suitability).

Although surveys did not coincide with the detectability of all species, the BAM states:

> 'that a candidate species credit species will be considered unlikely to occur on the Project Site if after carrying out a field assessment of the habitat constraints or microhabitats on the subject land, the assessor determines that the habitat is substantially degraded such that the species is unlikely to utilise the subject land'.

It has been determined that targeted surveys for most of the listed candidate threatened species are not required for the current assessment due to a lack of habitat present within the Project Site or due to a lack of foreseeable impacts due to avoidance and mitigation measures as detailed in Section 4.

For a more detailed description of how biodiversity credits are calculated, refer to the BAM (OEH 2017a).

2.5.2 Survey Limitations and Assumptions

The Project Site occurs within a modified environment, consisting of surrounding industrial areas. Ecological features are generally restricted to Reedy Creek and small patches of native vegetation throughout the locality.

Given the minor scale of direct impacts associated with the proposed development (i.e. minimal vegetation removal), the current ecological survey was designed to provide an overall assessment of the ecological values within the Project Site. Given the duration and timing of the field surveys, it is likely that some of the species that may occur within the Project Site (i.e. permanently, seasonally or transiently) were not detected. It was beyond the scope of the survey to carry out detailed fauna surveys such as fauna trapping, however, a detailed habitat assessment was conducted to inform the 'likelihood of occurrence' of threatened species known or predicted to occur within the locality.

Site conditions (including the presence of threatened species of flora and fauna) may change after the date of this report. SLR does not accept responsibility arising from, or in connection with, any change to the site conditions. SLR is also not responsible for updating this report if the site conditions change.

[1] App last updated: 04/07/2019 (Version: 1.2.4.00); BAM data last updated: 17/10/2019 (Version: 16).

3 STAGE 1 – BIODIVERSITY ASSESSMENT

This chapter describes the biodiversity values of the site and landscape context, in accordance with Stage 1 of the BAM.

3.1 Landscape Features

3.1.1 Overview

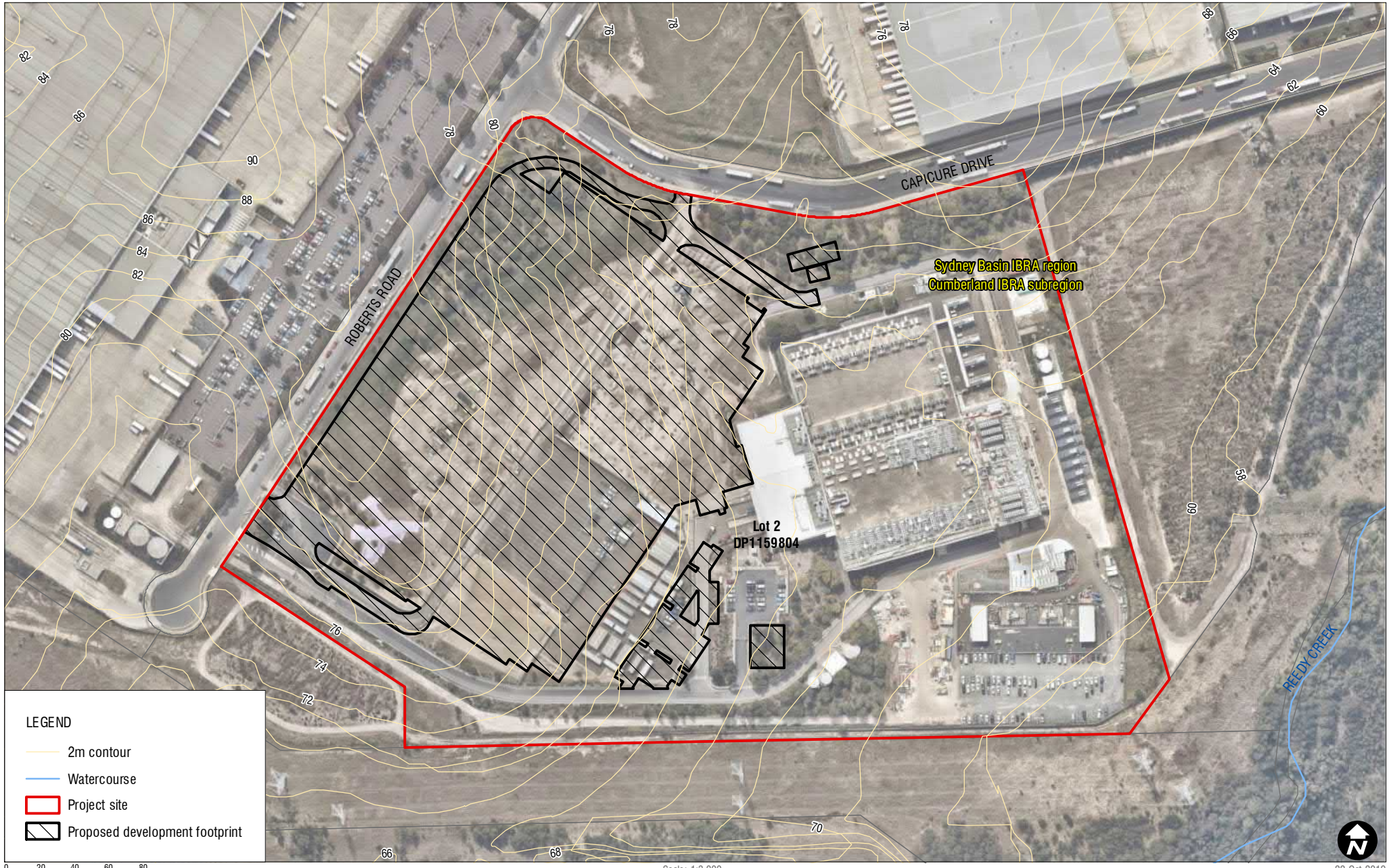
Chapter 4 of the BAM (Section 4.2.1.3) requires the following landscape features to be described in the BDAR and shown on the Site Map and the Location Map:

- The IBRA bioregions and IBRA subregions.
- Rivers, streams and estuaries (classified according to stream order and including riparian buffers).
- Important and local wetlands on, adjacent and downstream of the site.
- Habitat connectivity identifying the area/s of connectivity joining different areas of habitat that intersect with the subject land and the areas of habitat that are connected.
- Karst, caves, crevices, cliffs and areas of geological significance.
- Areas of outstanding biodiversity value that have been identified under the BC Act.
- Additional features required to be assessed by the SEARs for a major project.

Landscape features, as applicable to the Project Site, are summarised in Table 5 and shown in the Site Map (Figure 4) and the Location Map (Figure 5). Further details regarding landscape features are provided in the following sub-sections.

Table 5 Landscape Features and Information

Landscape Feature	Name and Comment	BDAR Section
IBRA Region	Sydney Basin	3.1.1
IBRA Sub Region	Cumberland	3.1.1
NSW (Mitchell) Landscape	Cumberland Plain	3.1.1
Native vegetation extent	Small area present on site	3.1.2
Cleared areas	Present on site	3.2
Rivers, streams and estuaries	None	3.1.4
Important and local wetlands	None	3.1.4
Habitat connectivity	Negligible or zero	3.1.3
Karst, caves, crevices, cliffs and areas of geological significance	None	3.1.5
Areas of outstanding biodiversity value	None	3.1.5
Additional features in SEARs	None	3.1.5



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Source: Nearmap (September 2019)

Data source: Interim Biogeographic Regionalisation for Australia (Subregions - States and Territories) v.7 (Department of Environment, 2012)

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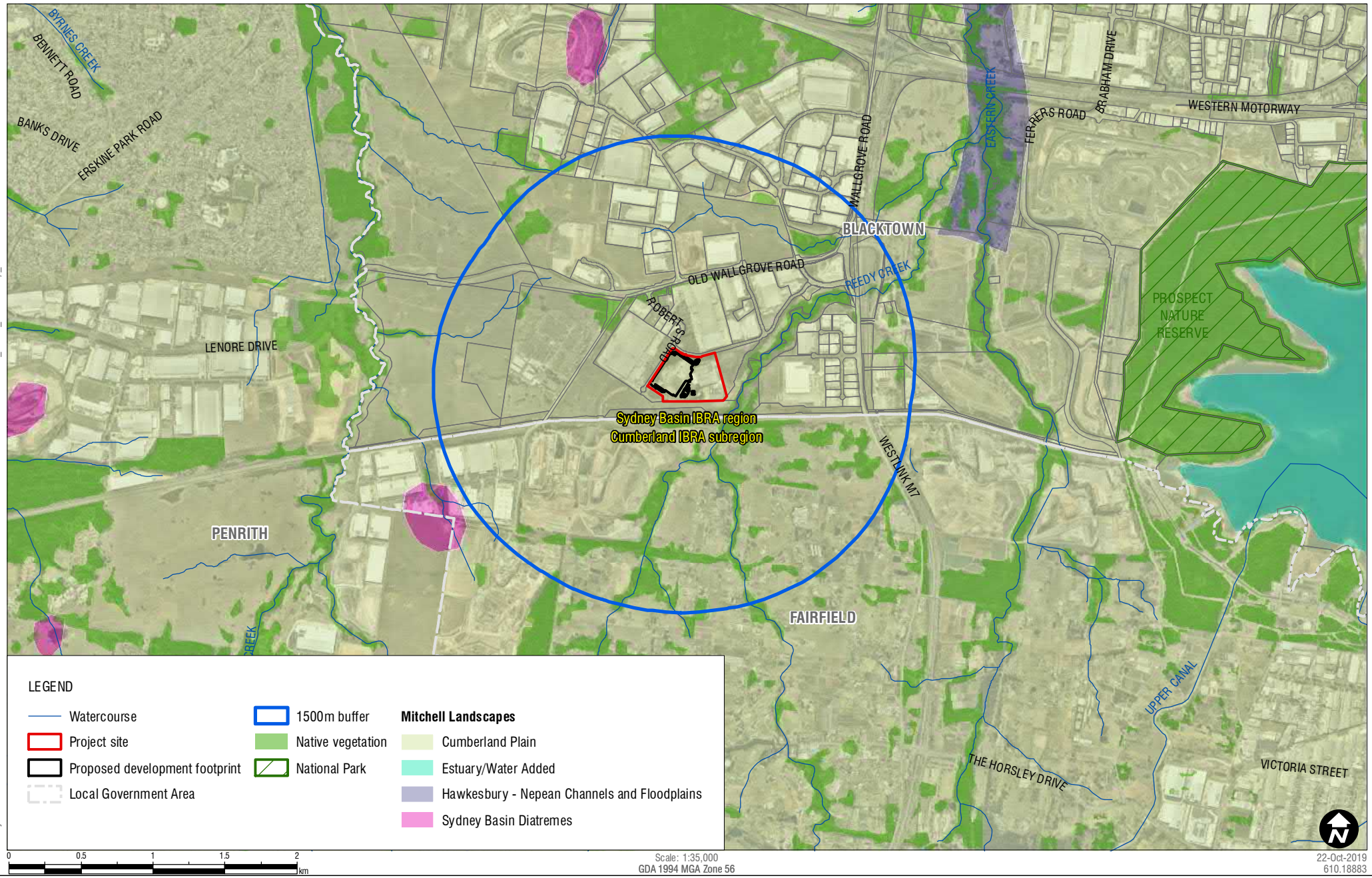
Site Map

FIGURE 4



Source: Nearmap (September 2019)

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Data source: Remnant Vegetation of the western Cumberland subregion (OEH, 2013)
The Native Vegetation of the Sydney Metropolitan Area v.3.1 (OEH 2016)
NSW (Mitchell) Landscapes v.3.1 (OEH, 2008)
Interim Biogeographic Regionalisation for Australia (Subregions - States and Territories) v.7 (Department of Environment, 2012)

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Location Map

FIGURE 5

3.1.2 Native Vegetation Extent

Vegetation clearing has occurred within the Project Site and within the wider landscape (1,500m) buffer, for agriculture, residential, commercial and light industrial development, as well as infrastructure (Westlink - M7 Motorway) and resource extraction (quarries). Native vegetation in the locality consists mainly of vegetated corridors along watercourses, roads and property boundaries, with some larger patches of remnant vegetation on private property and within the Prospect Nature Reserve to the east.

The only native vegetation within the Project Site consists of the 0.04ha patch of River-flat Eucalypt Forest in the sites north western corner. Most of the vegetation (approximately 3ha) within the Project Site consists of planted non-native vegetation situated along the site boundaries. Therefore, from the Project Site total area of 14.52ha, less than one percent (0.04ha) of the site constitutes native vegetation and 99% (14.48ha) is non-native vegetation and disturbed land.

According to regional scale vegetation mapping by OEH (2013), the extent of native vegetation within the 1,500m buffer and the site, which comprises a total area of 872.21ha, is 83.89ha. Accordingly, the native vegetation cover in the landscape context is approximately 9.6%; this percent cover value has been entered into the BAM Calculator and corresponds to the cover class of 0-10% cover. The extent of native vegetation cover in the landscape buffer is shown in the Location Map (Figure 5) and a breakdown of the native plant communities mapped within the landscape buffer is listed below in Table 6.

Table 6 Native Plant Communities within the Landscape Buffer

Vegetation Type	PCT	Area (ha)
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain	849	26.32
Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain,	835	37.84
Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain	850	19.73
	Total	83.89

Source: OEH (2013)

3.1.3 Connectivity Features

The Project Site is surrounded by predominantly cleared land associated with mixed agriculture and livestock, infrastructure (roads and motorways), resource extraction (quarries) and development (residential, commercial and light industrial) (see Figure 1). Despite the highly cleared nature of the local area (9.6% extant native vegetation), remnant vegetated corridors exist throughout the landscape, primarily alongside waterways (including Reedy Creek), roads and property boundaries. The vegetation within these corridors are likely a mix of planted natives/non-natives and remnants of the natural vegetation that once occurred in the area. Much of the areas of native vegetation are likely to be in moderate to good condition.

Within the Project Site native vegetation includes one small patch of regrowth native vegetation in the sites north western corner. Other areas of vegetation comprise mostly non-endemic native species planted as part of mine site rehabilitation. The vegetation alongside Reedy Creek likely constitutes part of a larger corridor connecting local remnant vegetation patches with the Prospect Nature Reserve, approximately three kilometres (km) to the east of the site. However, Reedy Creek falls outside the Project Site and no direct or indirect impacts on this corridor will occur as part of this proposed development. Direct and Indirect impacts are addressed in Sections 4.2 and 4.3.

3.1.4 Rivers, Streams and Wetlands

No mapped waterways or wetlands occur within the Project Site. The nearest waterway/wetland is Reedy Creek approximately 100m to the east of the Project Site. Beyond this, Prospect Reservoir lies approximately 3km to the sites east; however the site is outside the catchment of this wetland.

3.1.5 Other Notable Landscape Features

The Project Site contains no other notable landscape features relevant to this assessment. These include those listed below:

- Wetlands (including important wetlands) – there are no wetlands within the site.
- Areas of geological significance and soil hazard features.
- Karst, caves, crevices, cliffs or areas of geological significance.
- Areas of Outstanding Biodiversity Value (AOBV) as listed under the BC Act.
- Additional features identified in the SEARs.

3.2 Floristic Data

3.2.1 Native Plant Species

A total of 28 native plant species have been identified within the Project Site during the current field assessment. A complete list of all plant species observed on the site is presented in Appendix B. Native plant species recorded on site comprise the following plant groups: five forbs, ten grass or grass-like species (including tussocks, sedges and rushes), four shrubs and eight trees.

For Vegetation Zone 1 (PCT 835 Mod-good) the following plant types were recorded within the plot and entered in the BAM Calculator: one native tree, one shrub, seven grass or grass-like species, five forbs, zero ferns and zero other species. All BAM Plot data is presented in Appendix C.

3.2.2 Weeds and High Threat Exotics

Of the exotic plant species identified during the assessment, seven are identified as High Threat Exotics (HTEs) according to the OEH High Threat Weeds List (OEH 2019d). These comprise the following species: Fireweed Senecio madagascariensis, Chinese Tallowood Triadica sebifera, Kikuyu Cenchrus clandestinus, Rhodes Grass Chloris gayana, African Lovegrass Eragrostis curvula, Paspalum Paspalum dilatatum and African Boxthorn Lycium ferocissimum.

For vegetation zone 1 (PCT 835 Mod-good) the total cover of HTEs recorded and entered in the BAM Calculator is 32.2% (Appendix C).

3.3 Plant Community Types

3.3.1 Regional Vegetation Mapping

According to available regional scale vegetation mapping data (OEH 2013), the site is not mapped as containing native vegetation (see Figure 6). The nearest areas of native vegetation include:

- PCT 835 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain located mainly along Reedy Creek to the east of the site; and
- PCT 849 Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain and PCT 850 Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain mapped as discrete patches throughout the business park including a small patch of PCT 850 approximately 50m to the south of the site.

3.3.2 Site Vegetation Mapping

Field surveys conducted by SLR in 2019 in accordance with the BAM have revealed that there is one small patch of native vegetation present in the north western corner of the Project Site. This patch represents 0.04ha of PCT 835 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain that is in moderate to good condition. This PCT is associated with River-flat Eucalypt Forest of the New South Wales North coast, Sydney Basin and South East Corner Bioregions which is an endangered ecological community listed under the BC Act.

The profile of PCT 835 from the BioNet Vegetation Information Classification is provided in Appendix D. Summaries of the characteristics of this vegetation zone (based on data collected from the Project Site according to the BAM, as well as the VIS profile data, are presented in Table 7. A revised vegetation map showing the extent of this plant community type (PCT) within the Project Site is presented in Figure 7.

Table 7 PCT 835 Details

Vegetation Community	Floristic Structure and Composition
Vegetation Formation	KF-CH9 - Forested Wetlands
Vegetation Class	Coastal Floodplain Wetlands
Regional Vegetation Equivalent	Cumberland River-flat Forest
PCT Equivalent	PCT 835 – Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain
PCT Scientific Name	Eucalyptus tereticornis, Angophora floribunda, E. amplifolia subsp. amplifolia / Acacia parramattensis, Bursaria spinosa subsp. spinosa, Sigesbeckia orientalis / Microlaena stipoides var. stipoides, Oplismenus aemulus, Dichondra repens, Entolasia marginata.
Conservation Status	Associated with: River-flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions, an Endangered Ecological Community (EEC) listed under the NSW BC Act. Not listed under the EPBC Act.
Cleared Status	93%

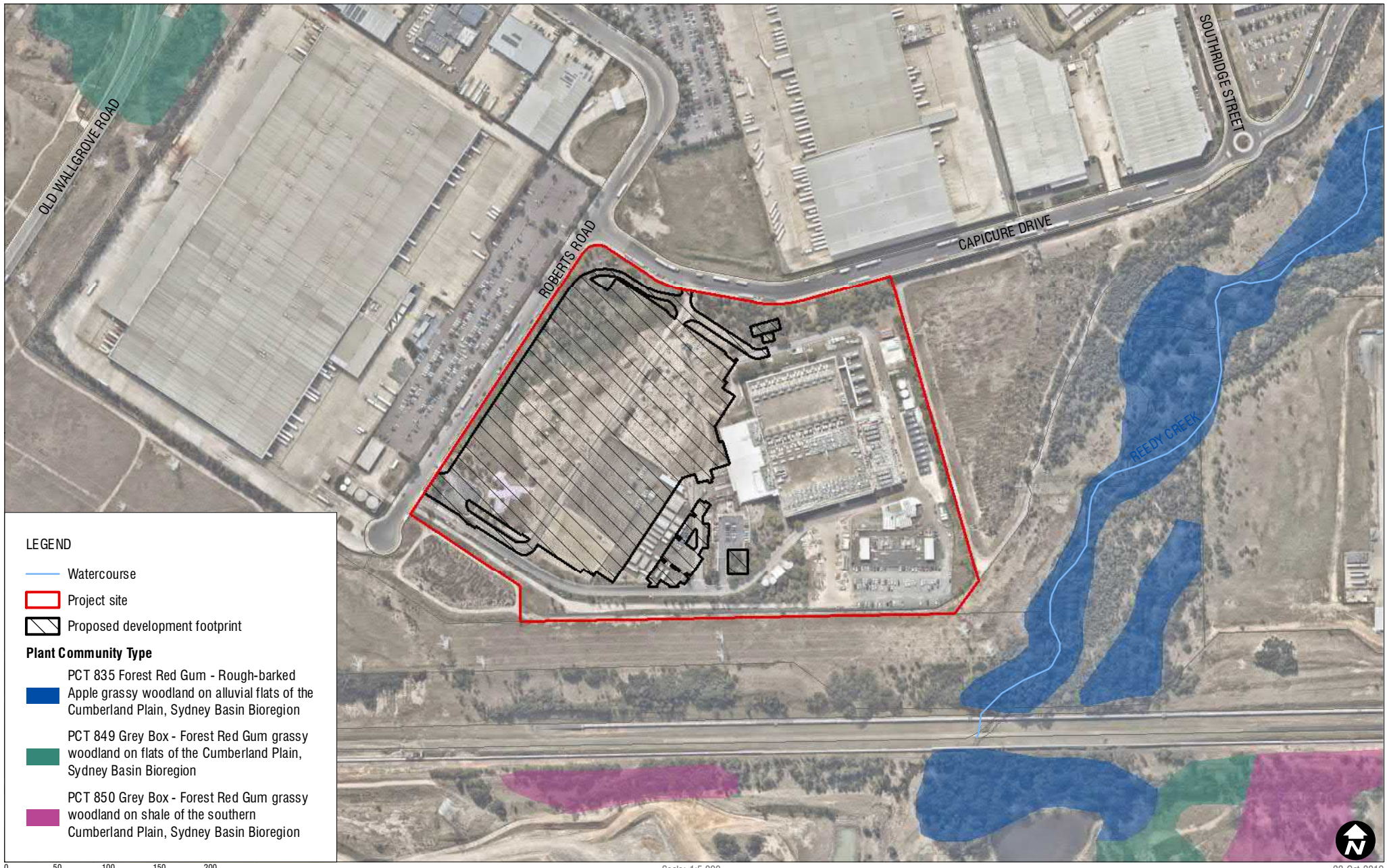
Vegetation Community	Floristic Structure and Composition
Typical Vegetation Structure	Open eucalypt forest with canopy typically including Angophora floribunda, or A. subvelutina one or both of; Eucalyptus tereticornis and E. amplifolia. Understorey characterized by occasional sparse to open small tree stratum of paperbark and wattles. A sparse lower shrub layer featuring Bursaria spinosa at most sites, and ground layer characterized by an abundant cover of grasses with small herbs and ferns.
Floristic Composition	PCT 835 within the Project Site is dominated by Angophora floribunda. The native middle layer is virtually absent but included two specimens of Bursaria spinosa. The groundcover is dominated by native and exotic grasses and herbs including the following key species: Cenchrus clandestinus, Dichondra repens, Cynodon dactylon, Vicia sativa and Plantago lanceolata.
Soil Type and Geology	A mix of Blacktown and Disturbed soil landscapes as a result of history of quarrying on site. Friable black loam to clay loam over Wianamatta Group shales.
Disturbance	Extensively cleared originally for agriculture and quarrying, now development.
BAM Plot Sampled	P01

3.3.3 Plant Community Type Justifications

According to the BioNet Vegetation Classification (OEH 2019b) the vegetation within the Project Site is commensurate with PCT 835. The diversity and percentage coverage of native species within the Project Site was relatively low within this community as evidenced by the data collected from the BAM plot compared with benchmark values for PCT 835. This is likely to be due to the disturbance caused by historical land uses including site clearing and mining.

Justification for the identification of PCT 835 includes the following:

- The vegetation is a native plant community within the Sydney Basin Bioregion and the Cumberland subregion.
- The vegetation is commensurate with a Coastal Floodplain Wetlands vegetation class, as indicated by the inclusion canopy species such as Rough-barked Apple Angophora floribunda, low representation of shrub cover and groundcover comprising mainly grass (and other non-grass) species.
- Whilst the vegetation is not mapped as PCT 835, the patch lies within approximately 500m of a large area of vegetation mapped as PCT 835 alongside Reedy Creek, east of the Project Site.
- The canopy of the community is dominated by one of the key indicator species Rough-barked Apple Angophora floribunda.
- The vegetation includes understorey species characteristic of PCT 835, including: characteristic shrub layer species, Blackthorn Bursaria spinosa, and characteristic ground cover species such as Kidney Weed Dichondra repens and Weeping Grass Microlaena stipoides.



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Source: Nearmap (September 2019); Remnant Vegetation of the western Cumberland subregion, 2013 update VIS_ID 4207

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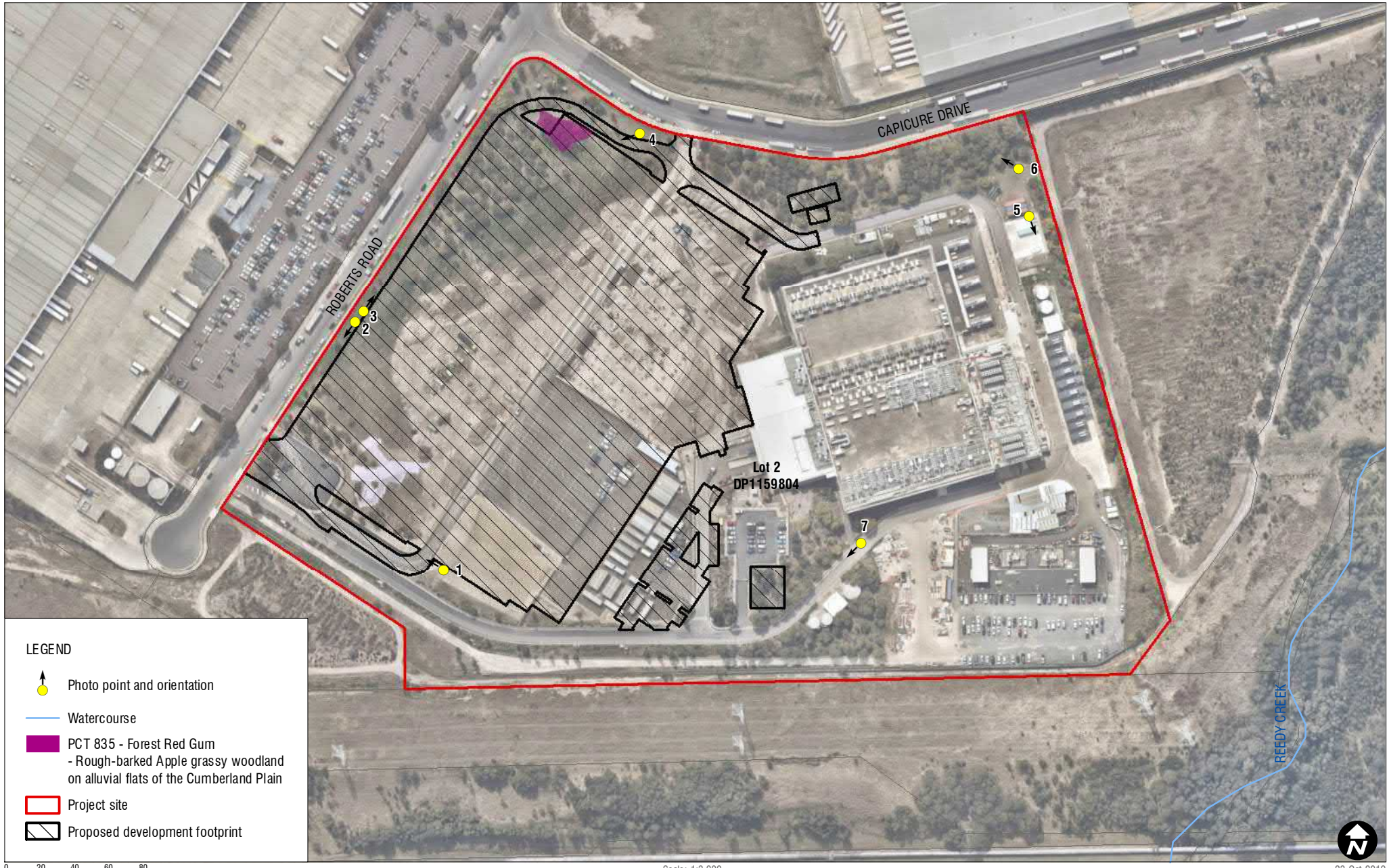
Regional Vegetation Mapping for the western Cumberland subregion (OEH, 2013)

FIGURE 6



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Source: Nearmap (September 2019)

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Plant Community Types mapped within the Project Site

FIGURE 7

3.3.4 Biodiversity Risk Weighting

The BAM uses a biodiversity risk weighting to evaluate the ecological risks of threatened entities from the biodiversity offsets scheme. The biodiversity risk weighting is comprised of two components:

- 'Sensitivity to loss' – this considers the increased threat posed to an entity from offsetting the loss of habitat or population.
- 'Sensitivity to potential gain' – this considers the ability of a species to respond to improvements in habitat condition at an offset site.

PCT 835 is commensurate with an endangered ecological community listed under the BC Act. In accordance with the BAM, this community therefore has a 'high sensitivity to loss' and a 'high sensitivity to potential gain'. The risk weighting for PCT 835 in the BAM Calculator is 2.00.

3.3.5 Vegetation Integrity Assessment

The native plant community (PCT 835) recorded on the Project Site was incorporated into one vegetation zone based on a broad 'moderate to good' condition state, in accordance with Section 5.3.1 of the BAM. The distribution and extent of vegetation zones (including BAM plot location) within the site is displayed in Figure 8. The approximate area (ha) of Vegetation Zone 1 and the number of BAM plots required to sample the vegetation in accordance with Section 5 of the BAM is presented in Table 8.

Vegetation Zone 1 consists of a small patch dominated by Rough-barked Apple Angophora floribunda, growing to approximately 15 m (see Photo 1 and Photo 2). The middle layer is virtually absent and the groundlayer comprises Kikuyu Cenchrus clandestinus, Kidney Weed Dichondra repens, Lambs Tongue Plantago lanceolata and a number of other native and non-native groundcover species.

In accordance with the BAM, patch size area was calculated for each vegetation zone and assigned to a vegetation zone as a class, being < 5 ha, 5–24 ha, 25–100 ha or ≥ 100 ha as per Section 5.3.2 of the BAM. Details for the patch size associated with vegetation Zone 1 is presented in Table 9. The vegetation integrity scores for each vegetation zone, as appear in the BAM Calculator, are presented in Table 10.

Table 8 BAM Plots Completed per Vegetation Zone

Zone	Veg Zone	PCT Name	Area (ha)	Plots Required	Plots Completed
1	835 Mod-good	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain	0.04	1	1

Table 9 Vegetation Patch Size

Zone	Veg Zone	Patch No.	Area (ha)	Patch Size Class (ha)
1	835 Mod-good	Patch 1	0.04 ha	< 5 ha

Table 10 Vegetation Integrity Calculations

Zone	Veg Zone Name	Area (A)	Composition Condition Score	Structure Condition Score	Function Condition Score	Vegetation Integrity Score
1	835 Mod-good	0.04	46.4	20.7	21.4	27.4

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Source: Nearmap (September 2019)

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Vegetation Zones and Plot Locations within the Project Site

FIGURE 8

Photo 1 Vegetation Zone 1 PCT 835, facing southeast from 0m along transect

Photo 2 Vegetation Zone 1 PCT 835, facing northwest from 50m along transect

3.4 Threatened Ecological Communities

Twenty-eight threatened ecological communities have been detected within a 10km radius of the Project Site (Appendix A). One of these threatened ecological communities (TECs) was identified within the Project Site: the 0.04 ha of PCT 835 is commensurate with the TEC River-flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions ('River-flat Eucalypt Forest'), which is listed as endangered under Schedule 2 the BC Act. The following sources were consulting to make this decision:

- The BioNet Vegetation Classification profile, which lists River-flat Eucalypt Forest TEC (see Appendix D).
- The Final Determination for the listing of River-flat Eucalypt Forest as an endangered ecological community (NSW Scientific Committee 2004).
- The River-flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregion – profile (OEH 2019c).

The main indicators that suggest that the vegetation on the site is commensurate with the definition of River-flat Eucalypt Forest are:

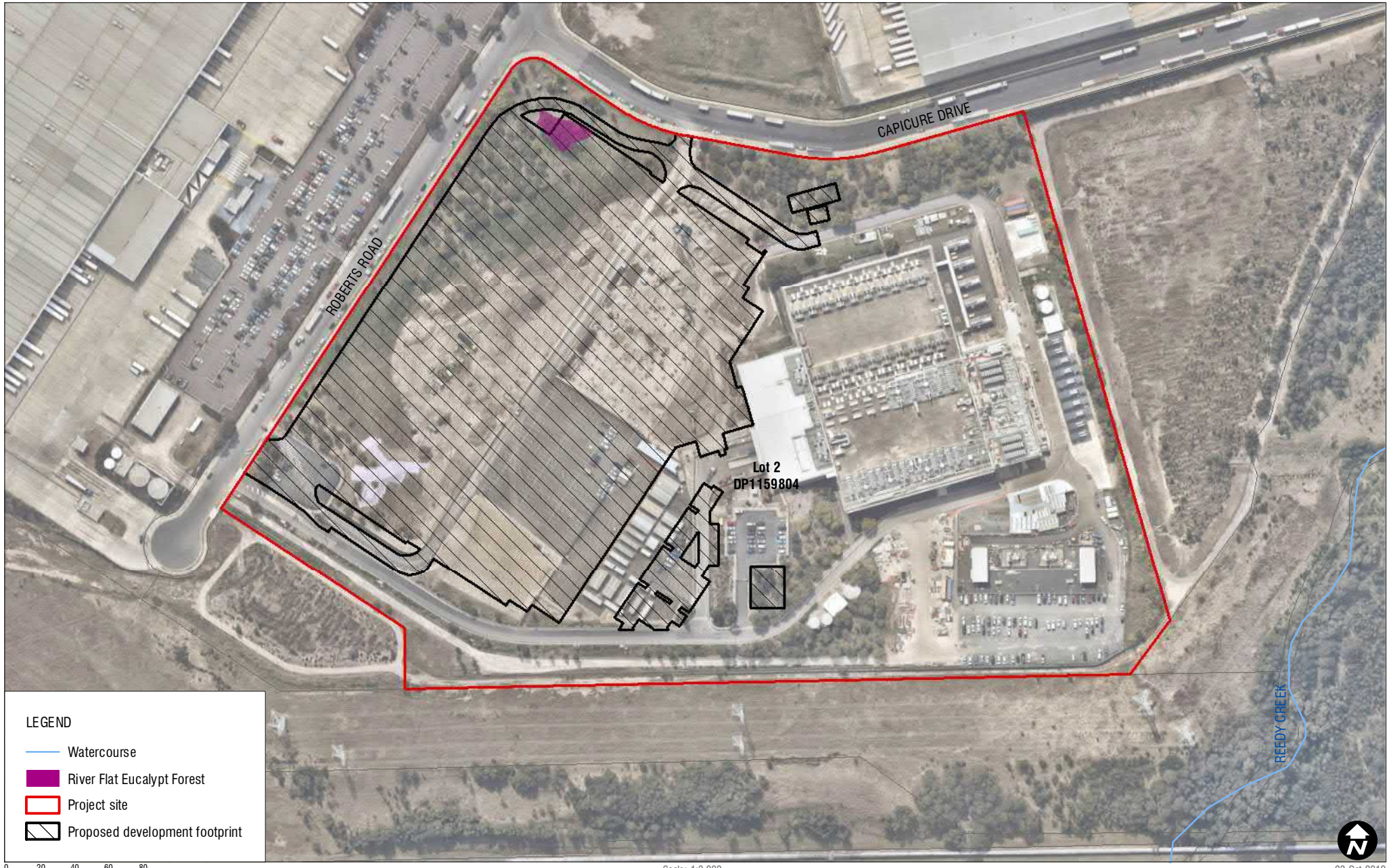
- The location of the site within the Sydney basin IBRA region and Cumberland IBRA subregion.
- The site is located on a river flat in an upper part of a coastal floodplain, with the vegetation situated within a drainage line on site.
- The site is associated with clay loam soils, with no saline influence.
- The site consists of an open forest dominated by Rough-barked Apple Angophora floribunda, with a sparse shrub and ground layer that is of species characteristic of the River-flat Eucalypt Forest community including Bursaria spinosa, Dichondra repens, Microlaena stipoides, Lomandra filiformis, L. longifolia, Imperata cylindrica, Themeda australis and Einadia hastata.

Although the vegetation lacks the diverse floristic characteristics of better quality sites, the Final Determination (NSW Scientific Committee 2004) for the community states "The species composition of a site will be influenced by the size of the site, recent rainfall or drought conditions and by its disturbance (including fire, grazing, flooding and land clearing) history. The number and relative abundance of species will change with time since fire, flooding or significant rainfall, and may also change in response to changes in grazing regimes. At any one time, above-ground individuals of some species may be absent, but the species may be represented below ground in the soil seed banks or as dormant structures".

Based on the vegetation condition definitions presented above, the River-flat Eucalypt Forest vegetation within the Project Site is moderate to good condition. Further information pertaining to the classification of the community and its conservation status is presented in Table 11. The extent of TEC within the Project Site is presented in Figure 9 .

Table 11 PCT 835 - Structural Information and Conservation Status

Vegetation Formation	Class	Plant Community Type	Percent cleared	Associated TEC	Listing Status (BC Act)
Forested Wetlands	Coastal Floodplain Wetland	835 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain	93	River-flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions	Endangered Ecological Community



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Source: Nearmap (September 2019)

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Threatened Ecological Communities within the Project Site

FIGURE 9

3.5 Fauna Species and Habitat

A total of six fauna species were identified during the assessment, comprising four species of birds (none exotic) and two mammals (one exotic), all of which are common and widespread species that are often recorded in urban areas of the Western Sydney region. A complete list of fauna species identified during the assessment is presented in Appendix E.

During the site assessment habitat features important for occupancy of native fauna species were surveyed for, including the following:

- Aquatic habitat, including watercourses and dams, which is required for both aquatic and amphibious species.
- Hollow-bearing trees, which are important for nesting birds and arboreal mammals.
- High native flora diversity, which is important for insects, foraging birds and mammals.
- Complex vegetation structure, which generally encourages occupancy of a diversity of fauna groups.
- Soft substrates, which are important for burrowing species such as reptiles and terrestrial mammals.
- Ground habitat features such as dense leaf litter, habitat logs or exfoliating rock. These features are generally important for terrestrial fauna diversity.

None of these habitat features were present on the site, probably as a result of historic and recent use of the land. The available habitat for native fauna species within the Project Site is therefore restricted to the patches of planted non-native vegetation and a small, isolated, patch of River-flat Eucalypt Forest. Fauna species with the greatest potential to utilise the site are likely to be highly mobile species, namely bat and bird species, which may temporarily perch or forage above or within the tree canopy of these vegetated areas and throughout the surrounding cleared parts of the site.

Locally occurring bird species, such as those recorded in the locality and on the site during field assessment (Appendix E), might forage on blossom, nectar and/or fruits produced by the trees on site. As a result of the small size and isolation of the River-flat Eucalypt Forest patch, and its landscape context within a predominantly cleared landscape, the site is likely to constitute only a minor foraging resource for locally occurring species. However, despite the small size of the proposed clearing, it is expected that the whole patch, along with its habitat values will be removed.

Microchiropteran bat ('micro-bat') species could also potentially forage on site, however the site contains no suitable roosting or breeding sites including; fissures in bark, caves and overhangs, or cavities within existing buildings, culverts and pipes.

3.6 Threatened Species (BC Act)

This section describes the threatened species predicted to occur within the Project Site, based on the field survey results, the outputs of desktop assessment and the outputs of the BAM Credit Calculator, in accordance with Section 6 of the BAM. The following sections describe 'ecosystem credit species' and 'species credit species' separately, in accordance with Section 6 of the BAM.

3.6.1 Desktop Results (BioNet)

A search of the Bionet Atlas (dated 15/10/2019) returned a total of 4,568 records of 62 species, comprising 22 threatened plant species, 40 threatened fauna species and two threatened populations within a 10km radius of the centre of the Project Site (see Appendix A). A map showing the locations of previous records of threatened species of flora and fauna is provided in Figure 10 and Figure 11 (respectively).

Based on the habitats recorded at the site, all of the species and populations were assessed as having a low likelihood of occurrence on the site. A detailed assessment of the likelihood of occurrence of all threatened species and endangered populations previously recorded in the locality and predicted to occur in the BAM Calculator is provided in Appendix A.

3.6.2 Threatened Species Survey Results

No threatened species were within the Project Site during the current survey or during previous surveys. Review of habitat descriptions of the predicted species provided in the Threatened Species Data Collection (OEH 2019a) reveal that the habitats present on the site are degraded to the extent that the site is unlikely to provide suitable habitat for any threatened plant species.

In regard to threatened fauna species, individuals of mobile species, notably micro-bats and some forest and woodland bird species, could occur on the site on a transient or seasonal basis, but only temporarily as part of their foraging, migration or dispersal activities. The site does not contain sufficiently large, good condition or intact habitats to support viable local populations of any threatened species considering the small size of the patch, the highly modified nature of the habitats and the surrounding land use.

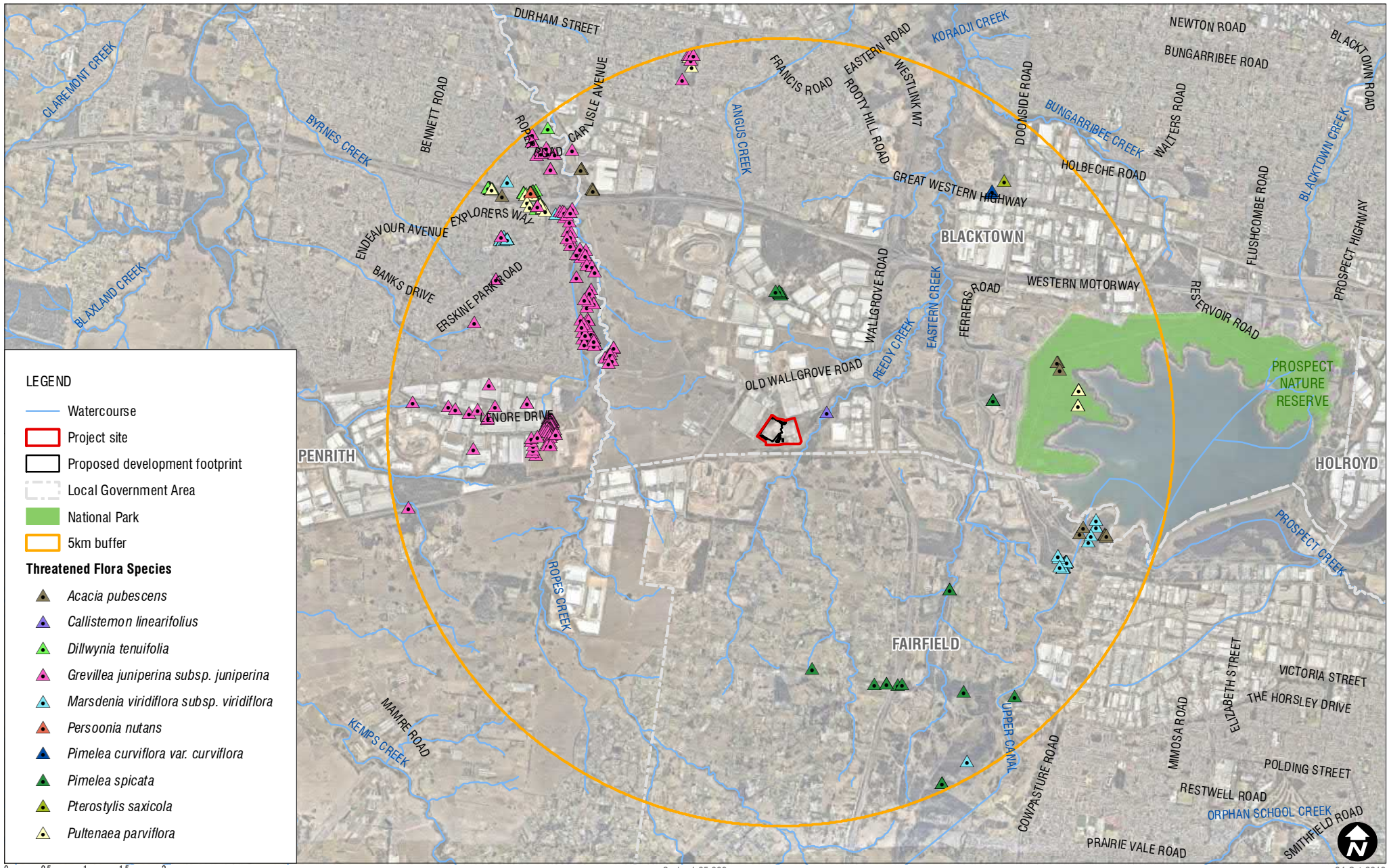
3.6.3 Ecosystem Credit Species

No ecosystem credit species were excluded from the BAM Credit Calculator to determine the offset obligation for the removal of PCT 835 from the site. The Predicted Threatened Species Report from the BAM Credit Calculator is provided in Appendix F.

3.6.4 Candidate Species Credit Species

A total of 22 candidate threatened species (i.e. species that generate species credits) are determined to be relevant to the Project Site according to the BAM Credit Calculator (see BAM Candidate Species Report in Appendix F). Given that the Project Site exists within a highly disturbed environment, consisting of patches of planted vegetation and a small patch of River-flat Eucalypt Forest surrounded by mostly exotic grassland, the habitat is considered unsuitable for all Candidate Species Credit Species resulting in no Species Credit Species requiring survey.

Threatened fauna species with the greatest potential to utilise the site are highly mobile species including bat and bird species. Threatened micro-bat species could also potentially forage on site and potentially utilise cavities within existing buildings or underneath peeling bark on trees in the locality. However, these habitats are not considered to be important to the long-term survival of these species within the locality and will not be impacted by the proposal. Furthermore, whilst River-flat Eucalypt Forests are known to provide habitat for a number of threatened species including; Grey-headed Flying Fox Pteropus poliocephalus, Squirrel Glider Petaurus norfolcensis, Yellow-bellied Glider Petaurus australis, and White-bellied Sea-eagle Haliaeetus leucogaster, the low floristic diversity, small patch size, and isolation within a highly disturbed landscape reduces habitat suitability for these species. There are no waterways associated with this patch of vegetation reducing the habitat potential for threatened amphibian species.



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Source: Nearmap (September 2019)

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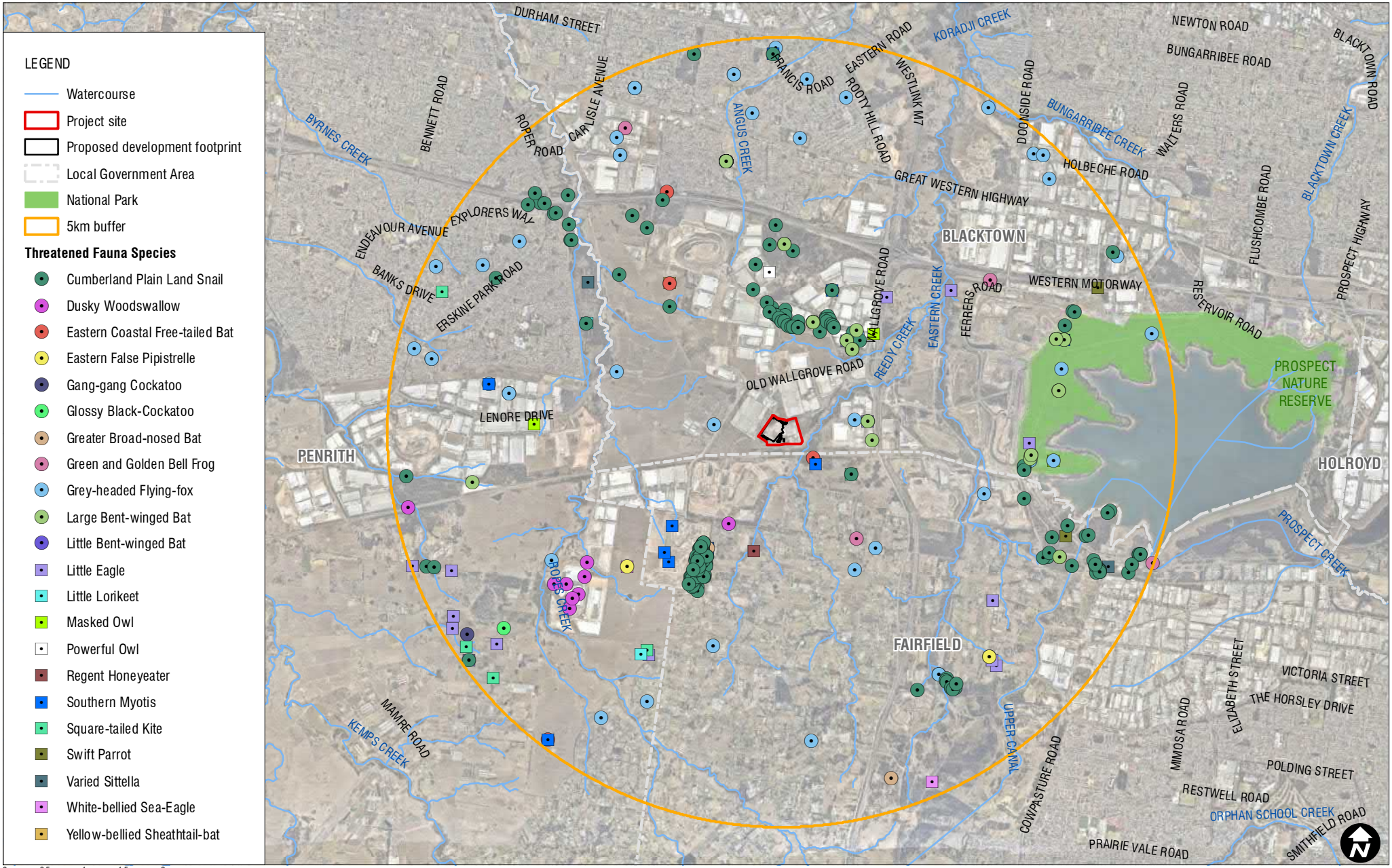
Previous Records of Threatened Flora Species within the Locality (NSW Wildlife Atlas)

FIGURE 10



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Previous Records of Threatened Fauna Species within the Locality (NSW Wildlife Atlas)

FIGURE 11

3.7 Threatened Populations (BC Act)

Two endangered populations; Marsdenia viridiflora subsp. viridiflora population in Bankstown and Dillwynia tenuifolia Kemps Creek population are known within a 10 km radius of the Project Site. Marsdenia viridiflora subsp. viridiflora is a four metre high climber that is known to grow in vine thickets and open shale forest and recorded from Prospect, Bankstown, Smithfield, Cabramatta Creek and St Marys (OEH 2019c). The Dillwynia tenuifolia is a low-spreading pea-flower shrub known to grow in shrubby heath with the endangered population occurring in the area bounded by Western Road, Elizabeth Drive, Devonshire Road and Cross Street, Kemps Creek in the Liverpool Local Government Area (OEH 2019c). These habitats are not present within the Project Site and the species were not found on site during the site assessment.

A description of threatened populations and their habitats as well as an assessment of their likelihood of occurrence on the Project Site is included in Appendix A.

3.8 Prescribed Biodiversity Values

With reference to Section 6.7 of the BAM, the Project Site does not contain any of the 'prescribed biodiversity values' identified in that section, as follows:

- Karst, caves, crevices and cliffs.
- Occurrences of rock.
- Human made structures (deemed to be habitat for a threatened species or ecological community).
- Watercourses or hydrological processes that interact with rivers and streams.
- The proposed development is not for a wind farm.

Further discussion of potential impacts on prescribed biodiversity values is provided in Section 4.4.

3.9 EPBC Act Protected Matters

A search of the Protected Matters Search Tool (dated 28/10/19) reveals that 62 matters of national environmental significance listed under the EPBC Act are predicted to occur within the locality of the site (see Appendix G). Relevant matters of national environmental significance which are predicted to occur in the locality comprise:

- threatened species;
- migratory species; and
- listed ecological communities.

A brief discussion of the above three matters is provided below.

No other matters of national environmental significance exist or are predicted to occur in the locality, including World heritage properties, National heritage places, Wetlands of International Importance (Ramsar) or Commonwealth marine areas. The Great Barrier Reef Marine Park, nuclear actions (including uranium mining) and water resources, in relation to coal seam gas development and large coal mining developments, are not relevant to the project.

3.9.1 Listed Threatened Species

A total of 41 threatened species listed under the EPBC Act are predicted to occur in the locality of the site. No EPBC Act listed species were recorded on the site during the surveys conducted on the 15th July 2019 or the 15th October 2019.

Due to the lack of suitable habitats or resources, the small size and condition of available habitats, no EPBC Act listed threatened species are likely to occur on the Project Site. Moreover, the Project Site would not constitute 'important habitat', as defined in the EPBC Act Significant Impact Guidelines 1.1 (DEWHA 2013) for any EPBC Act listed species. This is mainly due to a lack of native vegetation and habitat features including those described in Section 3.3. Further details on habitat requirements and likelihood of occurrence on the site of relevant EPBC Act listed threatened species is provided in Appendix A.

3.9.2 Listed Migratory Species

A total of 15 migratory species (and/or their habitats) listed under the EPBC Act are predicted to occur within the locality of the Site. The migratory species predicted to occur comprise, marine species, terrestrial species and wetland species, as follows:

- Migratory Marine Birds - one species, the Fork-tailed Swift, is a seasonal migrant, is always on the wing and could occur in flight above the site.
- Migratory Terrestrial Species – six species. Species such as the Satin Flycatcher and Rufous Fantail are nomadic throughout their ranges and utilise eucalypt dominated forest and woodland (and other) habitats during their dispersal and foraging movements. It is theoretically possible, therefore, that individuals of one or more of these species could occur on the site, but only on a transient or temporary basis. The Site would not represent important habitat for any such species, given their large ranges and the relatively small and marginal patch of potential habitat on the site.
- Migratory Wetland Species – eight species of wetland birds, none of which are relevant to the site as there is no wetland habitat within the site boundaries.

In accordance with the above points, the site of the proposed Eastern Creek Data Centre development is not considered to represent important habitat for any listed migratory species and would represent only marginal resting or foraging habit for a narrow selection of terrestrial migratory species.

3.9.3 Threatened Ecological Communities

A total of six threatened ecological communities listed under the EPBC Act are predicted to occur in the locality. None of these communities are of potential relevance to the Project Site as the only native vegetation mapped within the site is a 0.04ha patch of PCT 835 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain in the northern corner of the site (see location in Figure 9). This community, whilst equivalent to NSW listed TEC River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions, it is not associated with any EPBC Act listed TECs.

Accordingly, the Project Site does not contain an EPBC Act listed threatened community.

4 STAGE 2 – IMPACT ASSESSMENT

This chapter details the potential impacts of the proposed development on biodiversity values, in accordance with Stage 2 of the BAM.

4.1 Avoidance of Impacts on Biodiversity Values

Consideration has been given to avoiding and minimising impacts to biodiversity throughout each phase of the project to date, in accordance with Section 8 of the BAM. Due to the operational and design requirements for the project, there is no opportunity to avoid impacts on the biodiversity values of the site, being the small patch of PCT 835 in the north western corner.

In relation to the recommendations for avoiding and minimising impacts on native vegetation and habitat during project planning, as per Section 8.1 of the BAM:

- The location of the project – the location of the proposed facility is driven by its integration into a larger project, being an extension of the existing data centre to the east and access via the existing road network. In this regard, the proposed location of the CDC Data Centre is the optimal location for the proposed development in the context of the wider project site. Any other location alternatives would not be suitable. Additionally, the site is located on land zoned for industrial purposes within an existing industrial precinct at Eastern Creek on land that is the site of a former quarry, with minimal native vegetation (other than planted species and self-sown trees and shrubs that have established on rehabilitated land) present.
- Designing the project – the object of retaining the area of native vegetation recorded within the site revealed several complications from the design engineer, as listed below:
  - the corner of the plant area platform would cut into the existing surface around 4m depth at this location;
  - the proposed internal road would encroach slightly on the existing substation easement so the road will need to push slightly towards the vegetation zone as the design develops; and
  - there will be a substantial amount of cut/fill to form the road, pavement and drainage, plus trenching for other services.

On this basis of the above considerations, the patch of vegetation could not be retained and still allow the engineering and design requirements of the facility to be achieved.

In relation to the recommendations for avoiding and minimising prescribed biodiversity impacts during project planning (as per Section 8.2 of the BAM); there are no prescribed biodiversity values on the Project Site and hence no impacts on prescribed biodiversity values.

4.2 Direct Impacts

4.2.1 Impacts on Native Vegetation

A large portion of the Project Site will be cleared and developed as part of the proposed development, with earthworks and cut and fill required across the site to achieve design levels. All native vegetation within the Project Site will be removed. Impacts have been calculated in the BAM Calculator on this basis. A summary of the impacts of vegetation removal within each vegetation zone is presented in Table 12. The impacts on native vegetation summarised in terms of vegetation integrity loss are provided in the BAM Credit Summary Report in Appendix F and summarised in Table 13.

Table 12 Vegetation Impact Summary

Zone	Vegetation Zone	BC Act	TEC	Area removed (ha)	Area retained (ha)
1	PCT 835 Mod-good	Endangered	River-flat Eucalypt Forest	0.04	0.00

Table 13 Vegetation Integrity Calculations

Zone	Veg Zone Name	Area (ha)	Vegetation Integrity Loss	Sensitivity to gain	Risk Weighting	SAII[#]
1	PCT 835 Mod-good	0.04	27.4	High	2.0	No

Serious and irreversible impact entity

4.2.2 Impacts on Fauna Habitat

Impacts on fauna habitat within the Project Site will be in general limited in extent and involve loss of a relatively small and isolated patch of River-flat Eucalypt Forest as well as a larger area of previously mined land that has been planted with a mix of introduced and native tree species and exotic lawn. Impacts on fauna habitat will comprise:

- removal of a small number of early mature native forest trees, being Rough-barked Apples that exist within the small forest/woodland patch;
- removal of a selection of introduced and native trees, that are predominately the invasive Golden Wreath Wattle Acacia saligna that were planted as part of previous mine rehabilitation; and
- removal of grassy ground cover layer in the woodland patch and across the remainder of the site.

The loss of a small number of mature native trees, including myrtaceous species, will result is the loss of perching and resting sites, as well as foraging resources (such as blossom and nectar in flowering trees) for locally occurring forest bird species and micro-bats.

The open disturbed parts of the site could represent foraging and hunting space for local raptors, such as the Nankeen Kestrel and Australian Hobby, which might prey on small rodents (e.g. Black Rat or house mouse), insects and small birds on the site. However, the site would represent only a small fraction of the foraging territory available to local species and its removal would have no measurable impact on their foraging behaviour or life cycles.

No hollow-bearing trees, nests, burrows, water resources or other important habitat features for native fauna will be removed. Hence removal of the native vegetation from the site will not impose adverse effects on hollow dependent native arboreal fauna, particularly birds and micro-bats. None of the habitat features within the Project Site are considered to be important to the long-term survival of fauna species within the locality. The removal of marginal foraging habitat is therefore considered to be negligible.

4.2.3 Impacts on Threatened Species Habitat

Threatened fauna species with the greatest potential to utilise the site are highly mobile species including bat and bird species. Threatened micro-bat species could potentially forage on site and potentially utilise cavities within existing buildings, culverts and pipes in the locality; although no man-made structures will be impacted. None of the habitat features within the Project Site are considered to be important to the long-term survival of threatened fauna species within the locality. The removal of marginal foraging habitat for these species is therefore considered to be negligible.

4.2.4 Impacts on Threatened Ecological Communities

Construction of the proposed development will require the removal of approximately 0.04 ha of River-flat Eucalypt Forest EEC. This impact has been addressed in the BAM Calculator as part of the removal of the Forest Red Gum - Rough-barked Apple grassy woodland vegetation in Zone 1 (PCT 835 Mod-good).

4.3 Indirect Impacts

No native vegetation or habitat is to be retained within the Project Site and no vegetation or habitat currently exists adjacent to the site. Construction and operation of the Project therefore, will have no indirect effects on any native vegetation or fauna habitats within or adjacent to the site.

Potential indirect impacts to native vegetation and habitat may occur during the construction and operational phase of the project. Such impacts may include the following:

- Increased traffic and visitation within the Project Site may facilitate the spread of weeds that could further degrade offsite native vegetation.
- Pollution such as chemical spills from construction machinery may have adverse effects on native vegetation, fauna and downstream waterways (i.e. Reedy Creek occurs approximately 50-100 m to the southeast, although there are no natural watercourses within the site).
- Ground disturbance by machinery during the construction phase may create dust and facilitate the movement of water-borne sediment. Sedimentation could adversely affect the downstream riparian vegetation and habitats.
- Increased noise by vehicles, machinery and increased human visitation may disrupt the natural behaviour of fauna species (if and where present) during the construction phase.
- Light spill from artificial lighting during the construction phase or operational phase may adversely affect the natural behaviour of nocturnal fauna species such as arboreal mammals, large forest owls and foraging microbats.

Mitigation measures are presented below to reduce the potential for these impacts.

4.4 Prescribed Biodiversity Impacts

Prescribed biodiversity values are identified in Section 3.8 of this BDAR. In relation to potential impacts on habitat of threatened species or ecological communities associated with prescribed biodiversity values, as defined under Clause 6.1 of the BC Regulation:

- The site does not contain the following fauna habitat features:
  - karst, caves, crevices, cliffs and other geological features of significance;
  - "rocks" per se, being natural rock formations and rock outcrops;
  - human-made structures, although present these features will not be impacted as part of the development and therefore there would be no impact on potential fauna habitats, such as potential roost sites for micro-bats; and
  - non-native vegetation is present on the site; however, the planted trees and groundcovers recorded on the site are not likely to be of any importance to the survival of any threatened biota in the locality.
- The native vegetation on the site is isolated in the landscape, is not contiguous with any other vegetation on adjoining or nearby lands and hence not relevant to the connectivity of habitat for threatened species that could facilitate the "movement of those species across their range".
- The development site is not relevant to the movement of threatened species through the landscape such that it would make any meaningfully contribution to the maintenance of their lifecycles.
- The development site contains no watercourses and therefore is of no relevance to "water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities".
- The proposed development does not involve wind turbines (and hence potential strikes on protected animals).
- It is not conceivable that any threatened ground-dwelling fauna would exist on the site; hence, the risk of vehicle strikes on threatened species of animals or on animals that are part of a threatened ecological community is negligible.

4.5 Impacts on EPBC Act Protected Matters

No matters of national environmental significance listed under the EPBC Act are likely to occur or are of relevance to the site. Consequently, the proposed development is not likely to have a 'significant impact' on any matters of national environmental significance listed under the EPBC Act. Referral of the proposed development to the Commonwealth Department of the Environment and Energy for consideration pursuant to the EPBC Act is therefore not warranted.

4.6 Mitigation and Management of Impacts on Biodiversity Values

This chapter recommends a selection of measures that are designed to reduce the risk or severity of potential indirect impacts on biodiversity values, in accordance with Section 9.3 of the BAM.

4.6.1 Construction Impacts

Mitigation and management measures to minimise construction impacts are identified in Table 14.

Table 14 Mitigation and Management Measures during Construction

Measure	Description
Landscape and Screen Planting	The proposal incorporates landscape planting around the periphery of the site and building and incorporates planting of Rough-barked Apple Angophora floribunda. More detail on landscape planting, including screen planting to soften visual impacts, is provided in the Project Landscape Masterplan (Terras Landscape Architects 2019).
Erosion Control	Mitigation measures to reduce soil erosion and pollutant run-off during construction would be included in a standard erosion and sedimentation control plan, which would include the following: • Installation of erosion and sediment control measures prior to any works. • Regular inspection of erosion and sediment control measures, particularly following rainfall events, to ensure their ongoing functionality. • Management of excavated materials to prevent sediment transfer. • Stockpiling of materials in flat cleared areas, away from site boundaries, remaining vegetation and adjacent to native vegetation, but instead use areas that are already cleared/ disturbed. • Undertake maintenance of silt fences and other mitigation measures to isolate runoff.
Dust Control	Specific measures to minimise the generation of dust and associated impacts on adjacent natural environments should include: • Setting maximum speed limits for all traffic within the Project Site to limit dust generation. • Use of a water tanker or similar to spray unpaved access tracks during the construction phase where required. • Application of dust suppressants or covers on soil stockpiles.
Chemical Spills	Specific measures to minimise the potential for chemical spills and associated impacts on adjacent natural environments should include the following: • All chemicals must be kept in clearly marked bunded areas. • Regularly inspect vehicles and mechanical plant for leakage of fuel or oil. • No re-fuelling of vehicles, washing of vehicles or maintenance of vehicles and plant to be undertaken within 20 m of natural drainage lines.
Weed Management	High Threat Exotic species were identified within the Project Site (see Section 3.2.2). Measures to prevent the spread of weeds should include the following weed hygiene procedures: • All vehicles, equipment, footwear and clothing should be clean and free of weed propagules prior to entering the Project Site. • Any weeds that are removed during the construction phase should be disposed of appropriately.
Vegetation Clearing	The following recommendations are to be implemented during vegetation clearing: • Areas of vegetation outside the development footprint are to be clearly demarcated with high visibility tape to prevent accidental clearing during the construction phase. • Vegetation should be cleared in a way that will allow fauna species living in the clearing site (if any) sufficient time to move out of the area without additional human intervention. • No clearing should occur during the early evening or at night, when nocturnal fauna species are most likely to be active. • The direction of clearing should also ensure that fauna species are directed away from threats such as roads, developed areas or disturbed areas.

Measure	Description
Fauna Impacts	The following recommendations apply to the management of fauna species during construction: • Should any injured fauna species be found during the construction period, construction must stop immediately so that the injured animal can be taken to a vet or wildlife carer. All handling of fauna species should be conducted by a qualified ecologist or wildlife carer. • During vegetation clearing, animals that are injured or displaced are to be captured and relocated (by a qualified ecologist or wildlife carer) to nearby bushland (subject to landowner approval), or trees containing wildlife shall be sectioned and dismantled before relocating the animals. • Nocturnal fauna species, such as gliders and possums, if captured and rescued during vegetation clearing, are to be secured in suitable enclosures and kept in a quiet, dark and cool environment until they can be released into suitable habitat after dark.

4.6.2 Operational Impacts

Mitigation and management measures to minimise construction impacts are identified in Table 15 .

Table 15 Mitigation and Management Measures during Operation

Measure	Description
Landscape Planting	Maintenance of landscape planting, as proposed, should be ongoing to ensure tree canopies remain healthy and thereby provide the visual screening purpose for which they were planted.
Artificial Lighting	Artificial lighting has the potential to disrupt the natural behaviour of nocturnal fauna species such as arboreal mammals, large forest owls and microbats. To reduce potential impacts to individuals of any locally occurring species, artificial lighting should be reduced where possible within the Project Site. Lights should be turned off at night (where not required for security) and any essential lighting should be fitted with directional shades to avoid light spill into adjoining areas.
Adaptive Management	Section 9.4 of the BAM states that adaptive management such as monitoring programs are required for projects where uncertain impacts such as impacts to karst, caves, crevices, cliffs, subsidence or wind turbine strikes may occur. No uncertain impacts have been identified for the current proposal that would require implementation of an adaptive management strategy.

4.7 Offsetting of Impacts

4.7.1 Impacts Not Requiring Further Assessment

The majority of the vegetated portions of the site contain non-endemic vegetation that was planted as part of mine site rehabilitation. Due to the introduced nature of these areas there is no potential for native vegetation or threatened species habitat, aside from some highly mobile threatened species of bats and birds. As noted in Section 10.4.1 of the BAM, the assessor is not required to assess areas of land on the Project Site “without native vegetation” but must still assess these areas for the potential presence of threatened species. No species credit species have been recorded within the site and predicted threatened species (i.e. ecosystem credits) have been assessed as part of the impacts on Veg Zone 1 PCT 835 Mod-good.

4.7.2 Impacts Requiring an Offset

The BAM (OEH 2017a) establishes a framework to offset impacts on biodiversity from development through the BOS. Section 10.3.1 of the BAM sets out the thresholds for impacts on native vegetation that require offsetting based on vegetation integrity scores. The vegetation integrity score for Vegetation Zone 1 (PCT 835 Mod-good), which represents a form of the River-flat Eucalypt Forest endangered ecological community, is > 15 and therefore the removal of 0.04 ha of this vegetation requires an offset.

The reduction in vegetation integrity score as a result of the impact of the proposed development and the corresponding thresholds for offsets are listed in Table 16.

Table 16 Vegetation Integrity Calculations

Zone	Veg Zone Name	Area (ha)	Vegetation Integrity Loss	BAM VI Threshold#	Offset Required	Credits
1	835 Mod-good	0.04	27.4	> 15 for EEC or CEEC	Yes	1

See Section 10.3 of the BAM for offsetting thresholds for impacts on native vegetation and threatened species

The extent of vegetation to be removed is presented in Figure 12.

No species credit species (or their specific habitat constraints) were recorded on the Project Site as part of the current and previous investigations. Accordingly, no species polygons have been created for species credits and no species credits are generated in the BAM Calculator by the removal of vegetation and habitat associated with construction of the proposed development.

4.7.3 Impacts Not Requiring an Offset

The planted vegetation across the remainder of the site comprises introduced Golden Wreath Wattle Acacia saligna and eucalypts with a predominately introduced groundcover. These areas do not constitute native vegetation and do not require and offset.

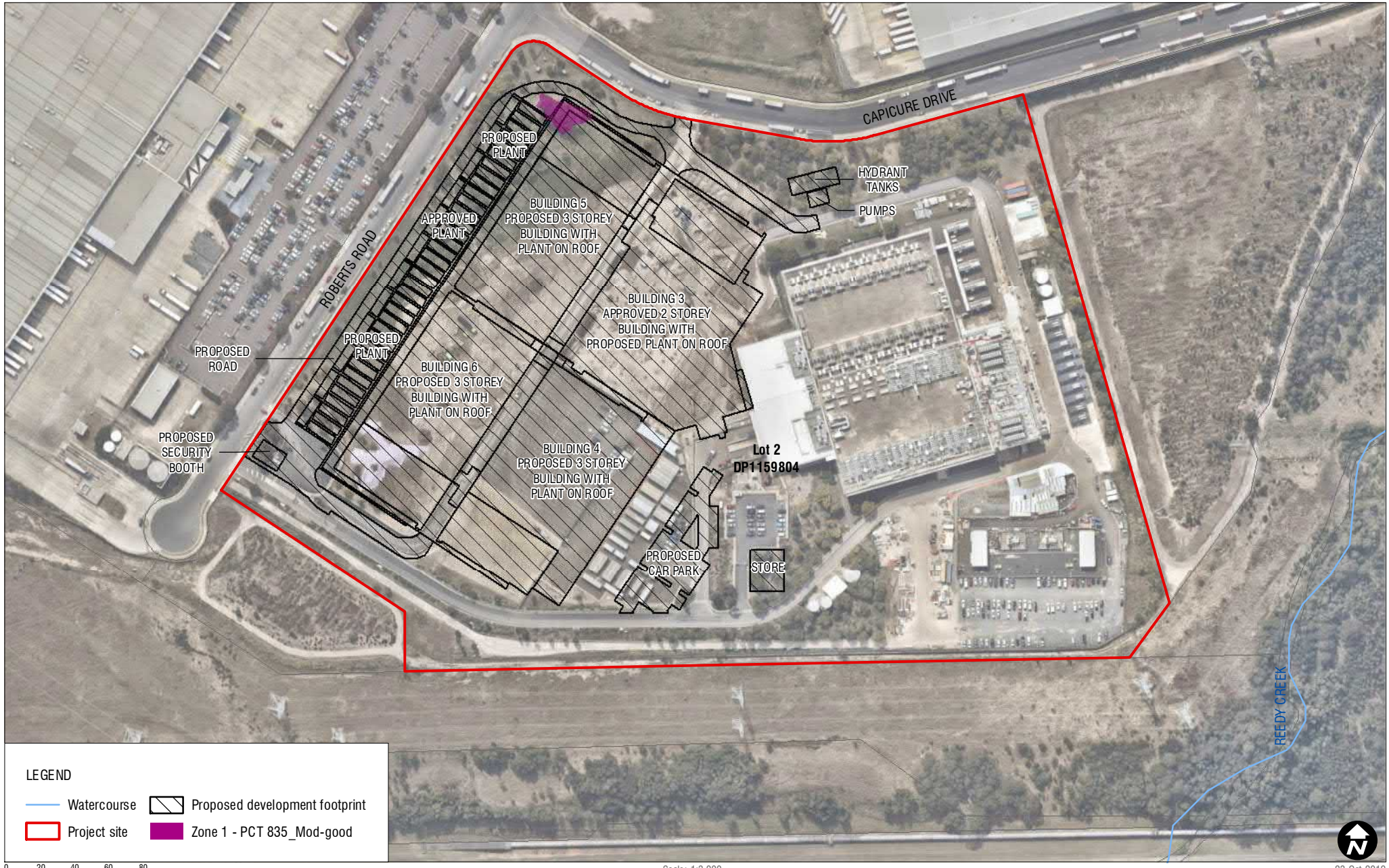
4.7.4 Offset Calculations

The BAM Calculator[2] was used to determine the offset obligation for the removal of 0.04 ha of moderate to good condition PCT 835 as presented in Table 17. No species credits are required to meet the project offset obligation. Purchase and retirement of ecosystem credits for the development must be conducted in accordance with the Ancillary rules: Reasonable steps to seek like-for-like biodiversity credits for the purpose of applying the variation rules (OEH 2017b), published under clause 6.5 of the BC Regulation.

Table 17 Ecosystem Credits for Plant Community Types

Zone	Veg Zone Name	PCT	Vegetation Integrity Loss	Ecosystem Credits
1	PCT 835 Mod-good	835 Forest Red Gum - Rough-barked Apple grassy woodland	27.4	1

[2] App last updated: 04/07/2019 (Version: 1.2.4.00); BAM data last updated: 17/10/2019 (Version: 16).



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Scale: 1:3,000
GDA 1994 MGA Zone 56

23-Oct-2019
610.18883

Source: Nearmap (September 2019)

Sheet Size : A4

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Impacts on Native Vegetation Zones

FIGURE 12

4.7.5 Fund Payment Calculation

Offset obligations can also be met by direct payment into the Biodiversity Conservation Fund. Calculations to determine the final credit price for this offset obligation, which are taken directly from the BAM Calculator, are presented in Table 18 . The Biodiversity payment summary report for this BAM assessment is provided in Appendix F.

Table 18 Offset Requirement - Ecosystem Credits and Credit Pricing

PCT Name	Price Per Credit	No. Ecosystem Credits	Total Price
835 – Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain	$ 19,993.96	1	$19,993.96
		GST 10 %	$1,999.40
		Total	$21,993.36

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6 DEFINITIONS

The following terms are defined for the purposes of the Biodiversity Assessment Method:

Table 19 Terms and Definitions of the BAM

BAM Term	Definition
Accredited person	Has the same meaning as in the BC Act, referred to in the Biodiversity Assessment Method as 'assessor'.
Ancillary rules	Has the same meaning as set out in clause 6.5 of the NSW Biodiversity Conservation Regulation 2017.
Annual probability of decline in vegetation and habitat condition	An estimate of the average probability of decline of each attribute through clearing, stochastic factors or ongoing degrading actions (firewood removal, weed invasion, livestock grazing).
Areas of geological significance	Geological features such as karst, caves, crevices, cliffs.
Assessment area surrounding the subject land	The area of land in the 1500 m buffer zone around a Project Site, or land to be biodiversity certified or a biodiversity stewardship site, that is determined in accordance with Subsection 4.3.2 of the Biodiversity Assessment Method.
Assessor	The person accredited under the NSW Biodiversity Conservation Act 2016 referred to in Subsection 2.1.2 of the Biodiversity Assessment Method and who has been engaged by the proponent
Averted loss	The gain in vegetation and habitat condition that arises from managing the proposed land as an offset compared to the probable future vegetation condition if the land was to be left unmanaged (see Annual probability of decline).
Avoid	Measures taken by a proponent such as careful site selection or actions taken through the design, planning, construction and operational phases of the development to completely avoid impacts on biodiversity values, or certain areas of biodiversity. Refer to the biodiversity assessment method for operational guidance.
BAM	The Biodiversity Assessment Method.
BC Act	The NSW Biodiversity Conservation Act 2016.
BC Regulation	The NSW Biodiversity Conservation Regulation 2017.
Benchmark data	For a PCT, vegetation class or vegetation formation benchmark data is contained in the BioNet Vegetation Classification. A local reference site may also be used to establish benchmark data for a PCT that may be used in a BAM assessment.
Benchmarks	The quantitative measures that represent the 'best-attainable' condition, which acknowledges that native vegetation within the contemporary landscape has been subject to both natural and human-induced disturbance. Benchmarks are defined for specified variables for each PCT. Vegetation with relatively little evidence of modification generally has minimal timber harvesting (few stumps, coppicing, cut logs), minimal firewood collection, minimal exotic weed cover, minimal grazing and trampling by introduced or overabundant native herbivores, minimal soil disturbance, minimal canopy dieback, no evidence of recent fire or flood, is not subject to high frequency burning, and has evidence of recruitment of native species.
Biodiversity Assessment Method (BAM)	Is established under Section 6.7 of the NSW Biodiversity Conservation Act 2016 (BC Act). The BAM is established for the purpose of assessing certain impacts on threatened species and threatened ecological communities (TECs), and their habitats, and the impact on biodiversity values, where required under the BC Act, Local Land Services Act 2013 or the State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017.
Biodiversity certification	Has the same meaning as in the NSW Biodiversity Conservation Act 2016.

BAM Term	Definition
Biodiversity Certification Assessment Report (BCAR)	Has the same meaning as in the NSW Biodiversity Conservation Act 2016.
Biodiversity credit report	The report produced by the Credit Calculator that sets out, the number and class of biodiversity credits required to offset the remaining adverse impacts on biodiversity values at a Project Site, or on land to be biodiversity certified, or that sets out the number and class of biodiversity credits that are created at a biodiversity stewardship site.
Biodiversity Development Assessment Report (BDAR)	Has the same meaning as in the BC Act.
Biodiversity offsets	Management actions that are undertaken to achieve a gain in biodiversity values on areas of land in order to compensate for losses to biodiversity values from the impacts of development.
Biodiversity stewardship agreement	Has the same meaning as in the NSW Biodiversity Conservation Act 2016.
Biodiversity stewardship site	Has the same meaning as in the NSW Biodiversity Conservation Act 2016.
Biodiversity Stewardship Site Assessment Report (BSSAR)	The report that must be prepared in accordance with the Biodiversity Assessment Method and submitted as part of an application for a biodiversity stewardship agreement.
Biodiversity values	Has the same meaning as clause 1.5(2) of the NSW Biodiversity Conservation Act 2016.
Biodiversity values map	Is established according to clause 7.3 of the NSW Biodiversity Conservation Regulation 2017. Development within an area identified on the map requires assessment using the BAM.
BioNet Atlas	The OEH database of flora and fauna records (formerly known as the NSW Wildlife Atlas). The Atlas contains records of plants, mammals, birds, reptiles, amphibians, some fungi, some invertebrates (such as insects and snails listed under the TSC Act) and some fish.
Bionet Vegetation Classification	The master vegetation community-level classification for use in vegetation mapping programs and regulatory biodiversity impact assessment frameworks in NSW. The BioNet Vegetation Classification is published by OEH and available at www.environment.nsw.gov.au/research/Visclassification.htm.
Broad condition state	Areas of the same PCT that are in relatively homogenous condition. Broad condition is used for stratifying areas of the same PCT into a vegetation zone for the purpose of determining the vegetation integrity score.
Certified more appropriate local data	Has the same meaning as set out in Subsection 2.2.2 of the Biodiversity Assessment Method.
Change in vegetation integrity score for a biodiversity stewardship site	The difference (gain) between the estimated vegetation integrity score without management at a biodiversity stewardship site and the predicted future vegetation integrity score with management at a biodiversity stewardship site.
Class of biodiversity credit	As defined in Section 11.3 of the Biodiversity Assessment Method.
Clearing site	The site proposed to be cleared of native vegetation where approval is sought under Part 5A of the Local Land Services Act 2013 or the State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017.
Clonal species	Flora species that propagate asexually at a site or have a limited degree of sexual reproduction, either within or between sites. Modes of asexual reproduction will include vegetative reproduction such as by rhizomes, root suckers or bulb replication.
Connectivity	The measure of the degree to which an area(s) of native vegetation is linked with other areas of vegetation.

BAM Term	Definition
Credit Calculator	The computer program that provides decision support to assessors and proponents by applying the BAM, in particular by using the data required to be entered and the equations in Appendix 6 and Appendix 9 of the Biodiversity Assessment Method to calculate the number and class of biodiversity credits required to offset the impacts of a development or created at a biodiversity stewardship site.
Critically endangered ecological community (CEEC)	An ecological community specified as critically endangered in Schedule 2 of the BC Act and/or listed under Part 13, Division 1, Subdivision A of the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).
Crown cover	The vertical projection of the periphery of tree crowns within a designated area.
Derived vegetation	PCTs that have changed to an alternative stable state as a consequence of land management practices since European settlement. Derived communities can have one or more structural components of the vegetation entirely removed or severely reduced (e.g. Over-storey of grassy woodland) or have developed new structural components where they were previously absent (e.g. Shrubby mid-storey in an open woodland system).
Development footprint	The area of land that is directly impacted on by a proposed development, including access roads, and areas used to store construction materials. The term development footprint is also taken to include clearing footprint except where the reference is to a small area development or a major project development.
Ecosystem credits	A measurement of the value of threatened ecological communities, threatened species habitat for species that can be reliably predicted to occur with a PCT and PCTs generally. Ecosystem credits measure the loss in biodiversity values at a Project Site and the gain in biodiversity values at a biodiversity stewardship site.
Endangered ecological community (EEC)	An ecological community specified as endangered in Schedule 2 of the BC Act, or listed under the EPBC Act.
Environment Agency Head	Has the same meaning as in the BC Act.
EP&A Act	The NSW Environmental Planning and Assessment Act 1979.
EPBC Act	The Commonwealth Environment Protection and Biodiversity Conservation Act 1999.
Ephemeral flora species	Flora species where the abundance of the species above ground fluctuates in response to the plant life history in combination with environmental conditions and/or disturbance regimes. Fluctuations in abundance may be short-term (seasonal) or long-term (yearly to decadal). Many ephemeral species persist underground through unfavourable conditions via soil seed banks or dormant vegetative organs (bulbs, tubers, rootstocks).
Estuarine area	A semi-enclosed body of water having an open or intermittently open connection with the ocean, in which water levels do not vary with the ocean tide (when closed to the sea) or vary in a predictable, periodic way in response to the ocean tide at the entrance (when open to the sea).
Expert	A person who has the relevant experience and/or qualifications to provide expert opinion in relation to the biodiversity values to which an expert report relates.
Foliage cover	The percentage of a plot area that would be covered by a vertical projection of the foliage and branches and trunk of a plant, or plants or a growth form group. Foliage cover can also be referred to as percent foliage cover.
Gain	The gain in biodiversity values at a biodiversity stewardship site, over time from undertaking management actions at a biodiversity stewardship site. Gain in biodiversity values is the basis for creating biodiversity credits at the biodiversity stewardship site.
Grassland	Native vegetation classified in the vegetation formation 'Grasslands' in Keith (2004). Grasslands are generally dominated by large perennial tussock grasses, lack of woody plants, the presence of broad-leaved herbs in inter-tussock spaces, and their ecological association with fertile, heavy clay soils on flat topography in regions with low to moderate rainfall.
Growth form	The form that is characteristic of a particular flora species at maturity. Growth forms are set out in Appendix 4 of the BAM.

BAM Term	Definition
Habitat	An area or areas occupied, or periodically or occasionally occupied, by a species or ecological community, including any biotic or abiotic component.
Habitat component	The component of habitat that is used by a threatened species for either: breeding, foraging or shelter.
Habitat surrogates	Measures of habitat that predict the occurrence of threatened species and communities: IBRA subregion, PCT, percent vegetation cover and vegetation condition.
Herbfield	Native vegetation which predominantly does not contain an over-storey or mid-storey and where the ground cover is dominated by non-grass species.
High threat exotic plant cover	Plant cover composed of vascular plants not native to Australia that if not controlled will invade and out-compete native plant species. Also referred to as high threat weeds.
Hollow bearing tree	A living or dead tree that has at least one hollow. A tree is considered to contain a hollow if: (a) the entrance can be seen; (b) the entrance width is at least 5 cm; (c) the hollow appears to have depth (i.e. you cannot see solid wood beyond the entrance); (d) the hollow is at least 1 m above the ground. Trees must be examined from all angles.
IBRA region	A bioregion identified under the Interim Biogeographic Regionalisation for Australia (IBRA) system 3, which divides Australia into bioregions on the basis of their dominant landscape-scale attributes.
IBRA subregion	A subregion of a bioregion identified under the IBRA system.
Impact assessment	An assessment of the impact or likely impact of a development on biodiversity values which is prepared in accordance with the BAM.
Impacts on biodiversity values	Loss in biodiversity values from direct or indirect impacts of development in accordance with Chapters 8, 1 and 10.
Important wetland means	A wetland that is listed in the Directory of Important Wetlands of Australia (DIWA) from time to time, and the actual location on the ground that corresponds to a SEPP 14 Coastal wetland.
Individual	In relation to organisms, a single, mature organism that is a threatened species, or any additional threatened species listed under Part 13 of the EPBC Act.
Intact vegetation	Vegetation where all tree, shrub, grass and/or forb structural growth form groups expected for a plant community type are present.
Intrinsic rate of increase (ir)	An estimate of the rate of gain for an attribute at a biodiversity stewardship site from actions undertaken as part of the management plan. The intrinsic rate of increase is specified for an attribute according to the formation of the PCT being assessed (see Appendix 8 of the BAM).
Landscape attributes	In relation to a Project Site or a biodiversity stewardship site, native vegetation cover, vegetation connectivity, patch size and the strategic location of a biodiversity stewardship site.
Large tree benchmark	Is the largest stem size class for a PCT as determined by the benchmark for the PCT.
Life cycle	The series of stages of reproduction, growth, development, aging and death of an organism.
Life form	The form that is characteristic of a particular species at maturity. In the BAM, life form has the same meaning as growth form for flora species.
Linear shaped development	Development that is generally narrow in width and extends across the landscape for a distance greater than 3.5 kilometres in length.
Litter cover	The percentage ground cover of all plant material that has detached from a living plant, including leaves, seeds, twigs, branchlets and branches (<10 cm in diameter).
Local population	The population that occurs in the study area. In cases where multiple populations occur in the study area or a population occupies part of the study area, impacts on each subpopulation must be assessed separately.
Local wetland	Any wetland that is not identified as an important wetland (refer to definition of Important wetland).
Loss of biodiversity	The loss of biodiversity values from a Project Site, native vegetation clearing site or land where biodiversity certification is conferred.
Major project	State Significant Development and State Significant Infrastructure.

BAM Term	Definition
Minimise	A process applied throughout the development planning and design life cycle which seeks to reduce the residual impacts of development on biodiversity values.
Mitchell landscape	Landscapes with relatively homogeneous geomorphology, soils and broad vegetation types, mapped at a scale of 1:250,000.
Multiple fragmentation impact development	Developments such as wind farms and coal seam gas extraction that require multiple extraction points (wells) or turbines and a network of associated development including roads, tracks, gathering systems/flow lines, transmission lines.
Native ground cover	All native vegetation below 1 m in height, including all such species native to NSW (i.e. Not confined to species indigenous to the area).
Native ground cover (grasses)	Native ground cover composed specifically of native grasses.
Native ground cover (other)	Native ground cover composed specifically of non-woody native vegetation (vascular plants only) <1 m in height that is not grass (e.g. herbs, ferns).
Native ground cover (shrubs)	Native ground cover composed specifically of native woody vegetation <1 m in height.
Native mid-storey cover	All vegetation between the over-storey stratum and a height of 1 m (typically tall shrubs, under-storey trees and tree regeneration) and including all species native to NSW (i.e. Native species not local to the area can contribute to mid-storey structure).
Native over-storey cover	The tallest woody stratum present (including emergent) above 1 m and including all species native to NSW (i.e. native species not local to the area can contribute to over-storey structure). In a woodland community, the over-storey stratum is the tree layer, and in a shrubland community the over-storey stratum is the tallest shrub layer. Some vegetation types (e.g. grasslands) may not have an over-storey stratum.
Native plant species richness	The number of different native vascular plant species that are characteristic of a PCT.
Native vegetation	Has the same meaning as in Section 1.6 of the BC Act.
Native vegetation cover	The percentages of native vegetation cover on the subject land and the surrounding buffer area. Cover estimates are based on the cover of native woody and non-woody vegetation relative to the approximate benchmarks for the PCT, taking into account vegetation condition and extent. Native over-storey vegetation is used to determine the percent cover in woody vegetation types, and native ground cover is used to assess cover in non-woody vegetation types.
Number of trees with hollows	A count of the number of living and dead trees that are hollow bearing.
Offset rules	Are those established by the BC Regulation.
Onsite measures	Measures and strategies that are taken or are proposed to be taken at a Project Site to avoid and minimise the direct and indirect impacts of the development on biodiversity values.
Operational Manual	The Operational Manual published from time to time by OEH, which is a guide to assist assessors when using the BAM.
Patch size	An area of intact native vegetation that: a) occurs on the Project 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 Project Site or biodiversity stewardship site.
PCT classification system	The system of classifying native vegetation approved by the NSW Plant Community Type Control Panel and described in the BioNet Vegetation Classification.
Percent cleared value	The percentage of a PCT that has been cleared as a proportion of its pre-1750 extent, as identified in the BioNet Vegetation Classification.
Plant community type (PCT)	A NSW plant community type identified using the PCT classification system.

BAM Term	Definition
Plot	An area within a vegetation zone in which site attributes are assessed.
Population	A group of organisms, all of the same species, occupying a particular area.
Probability of reaching benchmark	The probability of a specific attribute or growth form group reaching benchmark conditions in the vegetation zone at the end of the management timeframe.
Project Site	An area of land that is subject to a proposed development that is under the EP&A Act. The term Project Site is also taken to include clearing site except where the reference is to a small area development or a major project development.
Proponent	A person who intends to apply for consent or approval to carry out development, clearing, biodiversity certification or for approval for infrastructure.
Reference sites	The relatively unmodified sites that are assessed to obtain local benchmark information when benchmarks in the Vegetation Benchmarks Database are too broad or otherwise incorrect for the PCT and/or local situation. Benchmarks can also be obtained from published sources.
Regeneration	The proportion of over-storey species characteristic of the PCT that are naturally regenerating and have a diameter at breast height <5 cm within a vegetation zone.
Residual impact	An impact on biodiversity values after all reasonable measures have been taken to avoid and minimise the impacts of development. Under the BAM, an offset requirement is calculated for the remaining impacts on biodiversity values.
Retirement of credits	The retirement of biodiversity credits from a biobank site or a biodiversity stewardship site secured by a biodiversity stewardship agreement.
Riparian buffer	An area of land determined according to Appendix 3 of the BAM.
Risk of extinction	The likelihood that the local population or CEEC or EEC will become extinct either in the short term or in the long term as a result of direct or indirect impacts on the viability of that population or CEEC or EEC.
SAII Entity	Candidate species and communities which are sensitive to serious and irreversible impacts.
SEPP 14 Coastal wetland	A wetland to which State Environmental Planning Policy No 14 – Coastal Wetlands applies or an area that is identified as a coastal wetland within the meaning of the term coastal wetlands and littoral rainforests area for the purposes of Coastal Management Act 2016.
Site attributes	The matters assessed to determine vegetation integrity. They include: native plant species richness, native over-storey cover, native mid-storey cover, native ground cover (grasses), native ground cover (shrubs), native ground cover (other), exotic plant cover (as a percentage of total ground and mid-storey cover), number of trees with hollows, proportion of over-storey species occurring as regeneration, and total length of fallen logs.
Site-based development	A development other than a linear shaped development, or a multiple fragmentation impact development.
Site context	The value given to landscape attributes of a Project Site or biodiversity stewardship site after an assessment undertaken in accordance with Section 4.3.
Species credit species	Are threatened species or components of species habitat that are identified in the Threatened Species Data Collection as requiring assessment for species credits.
Species credits	The class of biodiversity credits created or required for the impact on threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates. Species that require species credits are listed in the threatened biodiversity data collection.
State Significant Development	Has the meaning given by Division 4.1 of Part 4 of the EP&A Act.
State Significant Infrastructure	Has the meaning given by Part 5.1 of the EP&A Act.
Stream order	Has the same meaning as in Appendix 3.

BAM Term	Definition
Subject land	Is land to which the BAM is applied in Stage 1 to assess the biodiversity values of the land. It includes land that may be a Project Site, clearing site, proposed for biodiversity certification or land that is proposed for a biodiversity stewardship agreement.
Threat status class	The extent to which a species or ecological community is threatened with extinction, or the extent to which a PCT is estimated to have been cleared (see Percent cleared value).
Threatened Biodiversity Data Collection	Part of the BioNet database, published by OEH and accessible from the BioNET website at www.bionet.nsw.gov.au.
Threatened ecological community (TEC)	Means a critically endangered ecological community, an endangered ecological community or a vulnerable ecological community listed in Schedule 2 of the BC Act.
Threatened species	Critically endangered, endangered or vulnerable threatened species as defined by Schedule 1 of the BC Act, or any additional threatened species listed under Part 13 of the EPBC Act as critically endangered, endangered or vulnerable.
Threatened species survey	A targeted survey for threatened species undertaken in accordance with Section 6.5.
Threatened species survey guidelines	Survey methods or guidelines published by OEH from time to time at www.environment.nsw.gov.au/topics/animals-and-plants/threatenedspecies/about-threatened-species/surveys-and-assessments.
Total length of fallen logs	The total length of logs present in a vegetation zone that are at least 10cm in diameter and at least 0.5m long.
Transect	A line or narrow belt along which environmental data is collected.
Upland Swamp Policy	The document entitled Addendum to NSW Biodiversity Offsets Policy for Major Projects: Upland swamps impacted by longwall mining subsidence as in force on the day when the BAM is published until such time as the Environment Agency Head publishes any further document for the purpose of it being adopted by the BAM as the Upland Swamp Policy.
Vegetation Benchmarks Database	A database of benchmarks for vegetation classes and some PCTs. The Vegetation Benchmarks Database is published by OEH and is part of the BioNet Vegetation Classification. It is available at www.environment.nsw.gov.au/research/Visclassification.htm.
Vegetation class	A level of classification of vegetation communities defined in Keith (2004)4. There are 99 vegetation classes in NSW.
Vegetation formation	A broad level of vegetation classification as defined in Keith (2004)4. There are 16 vegetation formations and sub-formations in NSW.
Vegetation integrity	The condition of native vegetation assessed for each vegetation zone against the benchmark for the PCT.
Vegetation integrity score	The quantitative measure of vegetation condition calculated in accordance with Equation 15 or Equation 16.
Vegetation zone	A relatively homogenous area of native vegetation on a Project Site, land to be biodiversity certified or a biodiversity stewardship site that is the same PCT and broad condition state.
Viability	The capacity of a species to successfully complete each stage of its life cycle under normal conditions so as to retain long-term population densities.
Vulnerable ecological community (VEC)	An ecological community specified as vulnerable in Schedule 2 of the BC Act and/or listed under Part 13, Division 1, Subdivision A of the EPBC Act.
Wetland	An area of land that is wet by surface water or ground water, or both, for long enough periods that the plants and animals in it are adapted to, and depend on, moist conditions for at least part of their life cycle. Wetlands may exhibit wet and dry phases and may be wet permanently, cyclically or intermittently with fresh, brackish or saline water (see also important wetland and local wetland).
Woody native vegetation	Native vegetation that contains an over-storey and/or mid-storey that predominantly consists of trees and/or shrubs.

APPENDIX A

Threatened Species Likelihood of Occurrence

Table A1 Key to Likelihood of Occurrence Table

Symbol	Description
Status	The “threatened species” or “endangered ecological community” listing in the Biodiversity Conservation Act 2016
V	Species listed as “Vulnerable”
E1	Species listed as “Endangered”
E4A	Species listed as “Critically Endangered”
E2	An “Endangered Population”
E	An EEC listed as “Endangered”
CE	An EEC listed as “Critically Endangered”
Status	The “threatened species” or “endangered ecological community” listing in the Environment Protection and Biodiversity Conservation Act 1999
V	Species listed as “Vulnerable”
E	Species listed as “Endangered”
CE	Species listed as “Critically Endangered”
M	Species listed as “Migratory””
MR	Species listed as “Marine”
LoO	Likelihood or Occurrence - the probability of a threatened species occurring on the site
P	Present or recorded on the Project Site
H	High likelihood of occurrence
M	Moderate likelihood of occurrence
L	Low likelihood of occurrence
N	No potential relevance
Source	Data Source
BAM	Sourced from the BAM tool
Bionet	Sourced from OEH Wildlife Atlas
PMST	Sourced from Protected Matters Search Tool
SLR	Sourced from SLR field data and reports
NOTES	
	The table below is based on data obtained from the recently reformed Atlas of NSW Wildlife website http://www.bionet.nsw.gov.au/, and the following notes accompany this dataset. Data from the BioNet Atlas website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1Â°; ^^ rounded to 0.01Â°). Copyright the State of NSW through the Office of Environment and Heritage. Search criteria : Licensed Report of all Valid Records of Threatened (listed on TSC Act 1995) or Commonwealth listed Entities in selected area [North: -32.68 West: 151.25 East: 151.45 South: -32.88] returned a total of 4,236 records of 60 species. Report generated on 16/09/2019 4:54 PM

Table A2 Likelihood of Occurrence

Species Name	BC Act	EPBC Act	Key Information	Likelihood of Occurrence	Records	Source	BAM
Threatened Flora							
Acacia bynoeana Bynoe's Wattle	E1	V	The species is endemic to central eastern NSW, currently known from only 30 locations, many of only 1-5 plants. Grows mainly in heath/ dry sclerophyll forest on sandy soils, prefers open, sometimes slightly disturbed sites such as trail margins, road edges, and in recently burnt open patches.	L – Lack of suitable habitat Not recorded on Project Site.	-	PMST	
Acacia pubescens Downy Wattle	V	V	Distribution is concentrated around the Bankstown-Fairfield-Rookwood area and the Pitt Town area, with outliers occurring at Barden Ridge, Oakdale and Mountain Lagoon. Occurs in open woodland and forest, in a variety of plant communities, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland.	L – Lack of suitable habitat Not recorded on Project Site.	241	BioNet PMST	
Allocasuarina glareicola	E1	E	A smooth –barked, slender shrub to 2 m high. The species grows in Castlereagh woodland on tertiary, alluvial gravel with yellow clayey subsoil and lateritic soil.	L – Lack of suitable habitat (Castlereagh woodland) Not recorded on Project Site.	1	BioNet PMST	
Callistemon linearifolius Netted Bottle Brush	V,3		This shrub grows up to 3-4 m tall, with red flowers that are clustered into the typical "bottlebrushes". The species grows in dry sclerophyll forest on the coast and adjacent ranges.	L – Lack of suitable forest habitat. Not recorded on Project Site.	2	BioNet BAM	Candidate Species
Cynanchum elegans White-flowered Wax Plant	E1	E	The species occurs north of Sydney, in the Baulkham Hills, Hawkesbury and Hornsby LGAs, may also occur in the western part of Gosford LGA. Habitat for the species includes Hawkesbury sandstone, commonly amongst rocky outcrops and boulders in sheltered forests on mid- to lower slopes and valleys.	L – Lack of rocky outcrops, sheltered forests on Hawkesbury sandstone habitat Not recorded on Project Site	1	BioNet PMST BAM	Candidate Species
Dillwynia tenuifolia	V	-	Low spreading pea-flower shrub to one metre high. The core distribution is the Cumberland Plain from Windsor and Penrith east to Dean Park near Colebee. The species occurs in dry sclerophyll woodland with tertiary alluvium soils.	L – Lack of suitable habitat and soils highly disturbed. Not recorded on Project Site.	789	BioNet	

Species Name	BC Act	EPBC Act	Key Information	Likelihood of Occurrence	Records	Source	BAM
Diuris aequalis Buttercup Doubletail	E1	V	Terrestrial orchid recorded in Kanangra-Boyd National Park, Gurnang State Forest, towards Wombeyan Caves, the Taralga - Goulburn area, and the ranges between Braidwood, Tarago and Bungendore. Habitat includes forest, low open woodland with grassy understorey and secondary grassland on the higher parts of the Southern and Central Tablelands (especially on the Great Dividing Range). Flowering occurs between mid-October and mid-November in the southern part of its range, and between mid-November and early December in the populations north of the Abercrombie River.	L – Lack of low open woodland with grassy understorey habitat No records of species within 5 km of Site. Not recorded on Project Site.	1	BioNet	
Eucalyptus benthamii Camden White Gum	V	V	A tall tree with smooth, white bark and numerous flaky ribbons this species occurs on the alluvial flats of the Nepean River and its tributaries. The species requires a combination of deep alluvial sands and a flooding regime that permits seedling establishment.	L – Lack of suitable habitat, flooding regime. Not recorded on Project Site.	-	BAM	Candidate Species
Eucalyptus nicholii Narrow-leaved Black Peppermint	V	V	This species is sparsely distributed but widespread on the New England Tablelands from Nundle to north of Tenterfield, being most common in central portions of its range. Typically grows in dry grassy woodland, on shallow soils of slopes and ridges. Found primarily on infertile soils derived from granite or metasedimentary rock.	N – Not present on Project Site and outside of natural distribution of species. No records within 5 km of the Project Site, those within 10 km are likely planted specimens.	2	BioNet	
Eucalyptus scoparia Wallangarra White Gum	E1	-	Small Smooth-barked eucalypt. Natural distribution is restricted to the border of NSW and QLD and records around Sydney are likely to be of horticultural origin.	L – Not present on Project Site and well outside of natural distribution of species. No records within 5 km of site. The one record with 10 km of the Project Site is likely of horticultural origin.	1	BioNet	
Genoplesium bauera Yellow Gnat-orchid	E1	E	A fleshy, brittle, yellowish-green or reddish terrestrial orchid approximately 6-15 cm high. The species is distributed between Ulladulla and Port Stephens. Habitat for the species includes dry sclerophyll forest and moss gardens over sandstone.	L – Lack of suitable sandstone habitat and soils highly disturbed. Not recorded on Project Site.	-	PMST	
Grevillea juniperina subsp. juniperina Juniper-leaved Grevillea	V	-	Easily identified medium-sized shrub with green prickly leaves. Endemic to Western Sydney. Occurs on reddish clay to sandy soils derived from Wianamatta Shale and Tertiary alluvium. Recorded from Cumberland Plain Woodland, Castlereagh Ironbark Woodland, Castlereagh Scribbly Gum Woodland and Shale/Gravel Transition Forest.	L – Lack of suitable woodland or transition forest habitat and no records within 2 km of Site. Not recorded on Project Site.	1070	BioNet	

Species Name	BC Act	EPBC Act	Key Information	Likelihood of Occurrence	Records	Source	BAM
Grevillea parviflora subsp. parviflora Small-flower Grevillea	V	V	The species distribution is between Moss Vale/Bargo and the lower Hunter Valley, with most occurrences in Appin, Wedderburn, Picton and Bargo. The habitat for the species is broad including heath, shrubby woodland and open forest on light clay or sandy soils, and often in disturbed areas such as on the fringes of tracks.	L – Lack of suitable habitat, no records within 5 km of the site. Not recorded on Project Site.	18	BioNet PMST	
Haloragis exalata subsp. exalata Wingless Raspwort	V	V	A robust, perennial herb distributed from as far north as the Narrabri and south to the Glenelg River in Victoria. Habitat for the species is not well defined. However, it appears to require protected and shaded damp situations in riparian habitats.	L – Lack of suitable habitat, no records within 5 km of the site. Not recorded on Project Site.	-	PMST	
Hibbertia puberula	E1	-	Widespread but uncommon the species inhabits dry sclerophyll woodland communities and heaths. The species distribution extends from Wollemi National Park south to Morton National Park and the south coast near Nowra. Flowering occurs from October to January.	L – Lack of suitable woodland habitat, no records within 5 km of the site. Not recorded on Project Site.	2	BioNet	
Hibbertia sp. Bankstown	E4A	-	Prostrate shrub with spreading, hairless, wiry branches up to 40 cm in length. Currently known to occur in only one population at Bankstown Airport in Sydney's southern suburbs	L – Outside of only known population and no records within 5 km of the site. Not recorded on Project Site.	-	BAM	Candidate Species
Isotoma fluviatilis subsp. fluviatilis		X	A prostrate herb with ovate to oblong leaves. The species is currently known from only two adjacent sites on a single private property at Erskine Park in the Penrith LGA. Previous sightings are all from western Sydney, at Homebush and at Agnes Banks. Known to grow in damp places, on the Cumberland Plain.	L – Outside of only known population and no records within 5 km of the site. Not recorded on Project Site.	7	BioNet	
Micromyrtus minutiflora	E1	V	Dry sclerophyll forest in western part of Cumberland Plain.	L – Lack of suitable habitat, no records within 5 km of the site. Not recorded on Project Site.	6	BioNet PMST	
Persicaria elatior Tall Knotweed		V	Grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance.	L – Lack of suitable wetland habitat, no records within 5 km of the site. Not recorded on Project Site.	-	PMST BAM	Candidate Species
Persoonia hirsuta Hairy Geebung	E1	E	Spreading shrub distinguished by the hairiness of the flowers, branchlets and leaves. The distribution of the species is scattered around Sydney, east to the Blue Mountains and from Singleton in the north to Bargo in the south. The species is found in dry sclerophyll open forest on sandy soils.	L – Lack of suitable habitat, no records <5 km from site. Not recorded.	-	PMST BAM	Candidate Species

Species Name	BC Act	EPBC Act	Key Information	Likelihood of Occurrence	Records	Source	BAM
Persoonia nutans Nodding Geebung	E1,P	E	Shrub to 2.5 m with flat linear leaves and drooping yellow flowers. Occurs in Woodland to dry sclerophyll forest on laterite and alluvial sand.	L – Marginally suitable habitat exists on site; however this is highly disturbed. Species was not recorded on site.	30	BioNet PMST	
Pilularia novae-hollandiae Austral Pillwort	E1,3	-	Semi-aquatic fern with thread like fronds growing to 8 cm. The populations at Lake Cowal and Oolambeyan NP are the only known extant populations in NSW, although the species is obscure and has possibly been overlooked elsewhere. The species grows in shallow swamps and waterways, often among grasses and sedges. It is most often recorded in drying mud as this is when it is most conspicuous.	L – Lack of suitable aquatic habitat, no records within 5 km of the site. Not recorded on Project Site.	1	BioNet BAM	Candidate Species
Pimelea curviflora var. curviflora	V	V	An erect, open shrub generally growing to 40 cm high, but sometimes up to 50 cm high. The species is confined to the coastal area of the Sydney and Illawarra regions of NSW occurring on ridge tops and upper slopes in open forest and woodland on sandy soil derived from sandstone.	L – Lack of suitable ridge top open forest/woodland habitat. Not recorded on Project Site.	3	BioNet PMST	
Pimelea spicata Spiked Rice-flower	E1	E	Small erect or spreading shrub best detected when producing distinctive white/pink tubular flowers from October to May. Occurs on well-structured clay soils particularly in association with Grey Box Cumberland Plain Woodland vegetation types.	L – Lack of suitable Cumberland Woodland habitat Not recorded on Project Site.	251	BioNet PMST	
Pomaderris brunnea Rufous Pomaderris		V	Shrub growing up to 3 m tall with distinctly hairy stems. The species occurs in a very limited area around the Colo, Nepean and Hawkesbury Rivers, including the Bargo area and near Camden. Habitat for this species includes moist woodland or forest on clay and alluvial soils of flood plains and creek lines.	L – marginally suitable habitat present, but highly disturbed, no records within 5 km of the site. Not recorded on Project Site.	-	PMST BAM	Candidate Species
Pterostylis gibbosa Illawarra Greenhood		E	This species of ground-dwelling orchid is known from a small number of populations in the Hunter region, the Illawarra region, and the Shoalhaven region in New South Wales. Habitat for this species includes open forest and woodland on flat or gently sloping land.	L – Outside of Hunter, Illawarra and Shoalhaven regions, no records within 5 km of the site. Not recorded on Project Site.	-	PMST	
Pterostylis saxicola Sydney Plains Greenhood	E1,P,2	E	A ground orchid with reddish brown and green translucent flowers on a slender stem to 35 cm tall. The species is restricted to western Sydney between Freemans Reach in the north and Picton in the south. Most commonly found growing in small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines.	L – Lack of suitable sandstone habitat. Not recorded on Project Site.	1	BioNet PMST	

Species Name	BC Act	EPBC Act	Key Information	Likelihood of Occurrence	Records	Source	BAM
Pultenaea parviflora	E1	V	Scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays.	L – Lack of suitable habitat Not recorded on Project Site.	319	BioNet PMST	
Pultenaea pedunculata Matted Bush-pea	E1		Inhabits woodland vegetation but plants have also been found on road batters and coastal cliffs. The species is confined to loamy soils in dry gullies in populations in the Windellama area.	L – Lack of suitable road batter or coastal cliff habitat, no records within 5 km of the site. Not recorded on Project Site.	3	BioNet	
Syzygium paniculatum Magenta Lilly Pilly	E1	V	The species occurs in a narrow coastal strip from Bulahdelah to Conjola State Forest. Rainforest on sandy soils or stabilised Quaternary sand dunes at low altitudes in coastal areas, often in remnant littoral or gallery rainforests Plants produce white flower-clusters at the end of each branch is the preferred habitat for this species. The petals are small accompanied by prominent long stamens.	L – Lack of suitable rainforest habitat, no records within 5 km of the site. Not recorded on Project Site.		PMST	
Thesium austral Austral Toadflax	V	V	The species occurs in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. Habitat for this species includes grassland on coastal headlands or grassland and grassy woodland away from the coast.	L – Marginally suitable habitat, however this is highly disturbed, no records within 5 km of the site. Not recorded on Project Site.		PMST	
Threatened Birds							
Anthochaera phrygia Regent Honeyeater	E4A	CE	In NSW the species is confined to two known breeding areas: the Capertee Valley and Bundarra-Barraba region. Non-breeding flocks are seen occasionally in coastal areas foraging in flowering Spotted Gum and Swamp Mahogany forests. Habitat for the species includes dry open forest and woodlands, particularly Box-Ironbark woodland and riparian forests of River Sheoak, with an abundance of mature trees, high canopy cover and abundance of mistletoes.	L – Outside of known breeding areas and lack of suitable foraging habitat. Not recorded on Project Site.	10	BioNet PMST BAM	Candidate Species Predicted Species
Artamus cyanopterus cyanopterus Dusky Woodswallow	V,P	-	A woodland dependent bird with a wide distribution occurring in a variety of habitats. The Tasmanian breeding population migrates north during the cooler months and can be found in southeast NSW. The species is an aerial forager and prefers woodland habitats.	L – Outside of known breeding areas. Possible marginal aerial foraging habitat above site. Not recorded on Project Site.	26	BioNet BAM	Predicted Species

Species Name	BC Act	EPBC Act	Key Information	Likelihood of Occurrence	Records	Source	BAM
Botaurus poiciloptilus Australasian Bittern	E1	E	The species is widespread but uncommon over most NSW except the northwest. Habitat for the species includes permanent freshwater wetlands with tall dense reed beds particularly Typha spp. and Eleocharis spp, with adjacent shallow, open water for foraging. Roosting occurs during the day amongst dense reeds or rushes and feeding occurs mainly at night.	L – Lack of suitable permanent freshwater wetland habitat. No records within 10 km of site. Not recorded on Project Site.	-	PMST BAM	Predicted Species
Calidris ferruginea Curlew Sandpiper	E1	CE	The species occurs along the entire coast of NSW, particularly in the Hunter Estuary, and freshwater wetlands in the Murray-Darling Basin. Breeds in Siberia and migrates to Australia (as well as Africa and Asia) for the non-breeding period, arriving between August and November, and departing between March and mid-April. It generally occupies littoral and estuarine habitats, and in New South Wales can be found mainly in intertidal mudflats of sheltered coasts.	L – Lack of suitable littoral and estuarine habitat. No records within 10 km of site. Not recorded on Project Site.	-	PMST	
Callocephalon fimbriatum Gang-gang Cockatoo	V,P,3	-	In spring and summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas. May also occur in sub-alpine Snow Gum Eucalyptus pauciflora woodland and occasionally in temperate rainforests.	L – Lack of suitable habitat. Not recorded on Project Site.	8	BioNet	
Calyptorhynchus lathami Glossy Black-Cockatoo	V,P,2	-	Widespread but uncommon from coast to southern tablelands and central western plains. Feeds almost exclusively on the seeds of Allocasuarina spp. Prefers woodland and open forests, rarely away from Allocasuarina spp. Roost in leafy canopy trees, preferably eucalypts, usually <1 km from feeding site. Nests in large (approx. 20 cm) hollows in trees, stumps or limbs, usually in Eucalypts.	L – Lack of suitable habitat, Allocasuarina feed trees and suitable nesting hollows. Not recorded on Project Site.	6	BioNet	
Chthonicola sagittata Speckled Warbler	V,P	-	Within NSW most frequently reported from the hills and tablelands of the Great Dividing Range, rarely from the coast. The species inhabits a wide range of Eucalypt-dominated communities with a grassy understorey, a sparse shrub layer, often on rocky ridges or in gullies. Sedentary and requires large, relatively undisturbed remnants to persist in an area. Forages on the ground for seeds and insects, and nests in a slight hollow in the ground or at the base of low dense plants.	L – Lack of suitable habitat, no records within 5 km of site. Not recorded on Project Site.	3	BioNet BAM	Predicted Species

Species Name	BC Act	EPBC Act	Key Information	Likelihood of Occurrence	Records	Source	BAM
Circus assimilis Spotted Harrier	V,P	-	Occurs in grassy open woodland including Acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands. Builds a stick nest in a tree and lays eggs in spring (or sometimes autumn).	L – Lack of suitable habitat, no records within 5 km of site. Not recorded on Project Site.		BioNet	
Climacteris picumnus victoriae Brown Treecreeper (eastern subspecies)	V	-	Small grey-brown bird with black streaking on the lower breast/belly and black bars on the undertail. Inhabits Box-Gum woodlands and dry open forest of inland slopes and plains. Preferred woodlands dominant by stringybarks or other rough-barked eucalypts. Forages in trees and on the ground. Endemic to eastern Australia, occurring from the coast to inland plains and western slopes of the Great Dividing Range. Nests in tree or stump hollows greater than 6cm.	L – Lack of suitable habitat and nesting hollows, no records within 5 km of site. Not recorded on Project Site.	-	BAM	Predicted Species
Daphoenositta chrysoptera Varied Sittella	V,P	-	Sedentary, occurs across NSW from the coast to the far west. Inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. Sensitive to habitat isolation and loss of structural complexity, and adversely affected by dominance of Noisy Miners. Cleared agricultural land is potentially a barrier to movement. Builds a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years.	L – Lack of suitable mallee and Acacia woodland habitat. Vegetation is also highly isolated and disturbed. Not recorded on Project Site.	32	BioNet	
Dasyornis brachypterus Eastern Bristlebird	-	E	Occurs in three disjunct areas of southeastern Australia: southern Queensland/northern NSW, the Illawarra Region and in the vicinity of the NSW/Victorian border. Habitat for the species is characterised by dense, low vegetation including heath and open woodland with a heathy understorey.	L – Lack of suitable dense low heath habitat, no records within 5 km of site. Not recorded on Project Site.	-	PMST	
Ephippiorhynchus asiaticus Black-necked Stork	E1,P	-	Primarily inhabits permanent freshwater wetlands and surrounding vegetation including swamps, floodplains, watercourses and billabongs, freshwater meadows, wet heathland, farm dams and shallow floodwaters. Will also forage in inter-tidal shorelines, mangrove margins and estuaries. Feeds in shallow, still water. This species breeds during summer, nesting in or near a freshwater swamp.	L – Lack of suitable wetland habitat, no records within 5 km of site. Not recorded on Project Site.	1	BioNet	

Species Name	BC Act	EPBC Act	Key Information	Likelihood of Occurrence	Records	Source	BAM
Falco subniger Black Falcon	V,P	-	Widely, but sparsely, distributed in New South Wales, mostly occurring in inland regions. In New South Wales there is assumed to be a single population that is continuous with a broader continental population, given that falcons are highly mobile, commonly travelling over hundreds of kilometres. The Black Falcon inhabits woodland, shrubland and grassland in the arid and semi-arid zones, especially wooded watercourses and agricultural land with scattered remnant trees.	L – Lack of suitable habitat, no records within 5 km of site. Not recorded on Project Site.	1	BioNet	
Glossopsitta pusilla Little Lorikeet	V,P	-	The species inhabits dry, open eucalypt forests and woodlands of the coast to western slopes of the Great Dividing Range. Occurrence is positively associated with patch size, and with components of habitat complexity including canopy cover, shrub cover, ground cover, logs, fallen branches and litter. Feed primarily on profusely-flowering eucalypts and a variety of other species including melaleucas and mistletoes. On the western slopes and tablelands Eucalyptus albens and E. melliodora are particularly important food sources for pollen and nectar respectively. Mostly nests in small (opening approx. 3cm) hollows in living, smooth-barked eucalypts, especially E. viminalis, E. blakelyi and E. dealbata. Most breeding records are from the western slopes.	L – Lack of suitable nesting hollows, foraging trees and habitat, native vegetation is small and isolated. Not recorded on Project Site.	9	BioNet BAM	Predicted Species
Grantiella picta Painted Honeyeater	-	V	The species is nomadic, occurring in low densities across most of NSW. Highest concentrations and almost all breeding occur on inland slopes of the Great Dividing Range. Habitat for the species includes Boree, Brigalow and Box Gum woodlands and Box-Ironbark forests.	L – Lack of suitable habitat, no records within 5 km of site. Not recorded on Project Site.	-	PMST	
Haliaeetus leucogaster White-bellied Sea-Eagle	V,P	C	The White-bellied Sea-Eagle is found in coastal habitats (especially those close to the sea-shore) and around terrestrial wetlands in tropical and temperate regions of mainland Australia and its offshore islands.	L – Lack of suitable nesting and foraging. Not recorded on Project Site.	11	BioNet BAM	Candidate Species Predicted Species
Hieraaetus morphnoides Little Eagle	V,P		Occurs throughout NSW except most densely forested parts of the Dividing Range escarpment. Occupies habitats rich in prey within open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used. For nest sites it requires a tall living tree within a remnant patch, where pairs build a large stick nest in winter and lay in early spring.	L – Lack of suitable nesting habitat, marginally suitable foraging habitat, however this is highly disturbed. Not recorded on Project Site.	29	BioNet	

Species Name	BC Act	EPBC Act	Key Information	Likelihood of Occurrence	Records	Source	BAM
Hirundapus caudacutus White-throated Needletail	-	V	Widespread in eastern and south-eastern Australia. In Australia, the White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground.	L – Possible aerial foraging habitat above the site however this will not be impacted by the development. Not recorded on Project Site.		PMST	
Ixobrychus flavicollis Black Bittern	V	-	Occurs from southern NSW to Cape York and the Kimberley, and southwest WA. Inhabits terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. May occur in flooded grassland, forest, woodland, rainforest and mangroves as long as there is permanent water. Roosts by day in trees or within reeds on the ground. Nests in branches overhanging water and breeds from December to March.	L – Lack of suitable permanent water habitat, no records within 5 km of site. Not recorded on Project Site.	2	BioNet	
Lathamus discolour Swift Parrot	E1	CE	A migratory species that travels to the mainland from March to October, the species breeds in Tasmania from September to January. Principal over-winter habitat is box-ironbark communities on the inland slopes and plains. Eucalyptus robusta, Corymbia maculata and C. gummifera dominated coastal forests are also important habitat.	L – Lack of suitable over-winter foraging habitat Not recorded on Project Site.	45	BioNet PMST BAM	Candidate Species Predicted Species
Lophoictinia isura Square-tailed Kite	V	-	Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. In arid north-western NSW, has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland. Breeding is from July to February.	L – Lack of suitable timbered watercourse habitat. Not recorded on Project Site.	8	BioNet	
Melanodryas cucullata cucullate Hooded Robin (south-eastern form)	V	-	Widespread, found across Australia, except for the driest deserts and the wetter coastal areas - northern and eastern coastal Queensland and Tasmania. The south-eastern form (subspecies cucullata) is found from Brisbane to Adelaide and throughout much of inland NSW. Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses.	L – Lack of suitable structurally diverse habitat and suitable mature, no records within 5 km of site. Not recorded on Project Site.	-	BAM	Predicted Species

Species Name	BC Act	EPBC Act	Key Information	Likelihood of Occurrence	Records	Source	BAM
Melithreptus gularis gularis Black-chinned Honeyeater (eastern subspecies)	V	-	Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts. Also inhabits open forests of smooth-barked gums, stringybarks, ironbarks, river sheoaks (nesting habitat) and tea-trees. Breeds solitarily or co-operatively, with up to five or six adults, from June to December.	L – Lack of habitat, no records within 5 km of site. Not recorded on Project Site.	1	BioNet	
Neophema pulchella Turquoise Parrot	V	-	Inhabits fringes of eucalypt woodlands, often adjacent to clearings, ridges and farmland creeks. Typically forages on the ground under trees. Distributed from southern Queensland to northern Victoria, extending from the coast to the western slopes of the Great Dividing Range. Nesting occurs from December to August in tree hollows.	L – Lack of suitable woodland habitat and suitable nesting hollows, no records within 5 km of site. Not recorded on Project Site.	1	BioNet	
Ninox connivens Barking Owl	V,P,3		Occurs from coast to inland slopes and plains, though is rare in dense, wet forests east of the Great Dividing Range and sparse in higher parts of the tablelands and in the arid zone. Inhabits eucalypt woodlands, open forest, swamp woodlands, and, especially in inland areas, timber along watercourses. Roosts along creek lines in dense, tall understorey foliage (e.g. in Acacia and Casuarina), or dense eucalypt canopy. Nests in hollows of large, old eucalypts including Eucalyptus camaldulensis, E. albens, E. polyanthemos and E. blakelyi. Birds and mammals important prey during breeding. Territories range from 30 to 200 hectares.	L – Lack of suitable roosting habitat, possible marginal foraging habitat, however no records within 5 km of site. Not recorded on Project Site.	3	BioNet	
Ninox strenua Powerful Owl	V,P,3		Occurs from the coast to the western slopes. Solitary and sedentary species. Inhabits a range of habitats from woodland and open sclerophyll forest to tall open wet forest and rainforest. Prefers large tracts of vegetation. Nests in large tree hollows (> 0.5 m deep), in large eucalypts (dbh 80-240 cm) that are at least 150 years old. Pairs have high fidelity to a small number of hollow-bearing nest trees and defend a large home range of 400 - 1,450 ha. Forages within open and closed woodlands as well as open areas.	L – Lack of preferred large tracts of vegetation habitat and suitable large eucalypts or nest hollows. Not recorded on Project Site.	14	BioNet	
Numenius madagascariensis Eastern Curlew		CE	The eastern curlew is Australia's largest shorebird and a long-haul flyer. It is easily recognisable, with its long, down-curved bill. The species takes an annual migratory flight to Russia and northeastern China to breed, arriving back home to Australia in August.	L – Lack of suitable habitat, no records within 5 km of site. Not recorded on Project Site.		PMST	

Species Name	BC Act	EPBC Act	Key Information	Likelihood of Occurrence	Records	Source	BAM
Pandion cristatus Eastern Osprey			Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water. Breed from July to September in NSW. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea.	L – Lack of suitable habitat, no records within 5 km of site. Not recorded on Project Site.	-	BAM	Candidate Species Predicted Species
Petroica boodang Scarlet Robin	V		Lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. Habitat usually contains abundant logs and fallen timber: these are important components of its habitat. Mainly breed between the months of July and January.	L – Lack of suitable habitat and important habitat features (e.g. fallen logs), no records within 5 km of site. Not recorded on Project Site.	2	BioNet BAM	Predicted Species
Petroica phoenicea Flame Robin	V		Prefers clearings or areas with open understoreys. Occasionally occurs in temperate rainforest, and also in herbfields, heathlands, shrublands and sedgelands at high altitudes. In winter lives in dry forests, open woodlands and in pastures and native grasslands, with or without scattered trees.	L – Lack of suitable habitat, no records within 5 km of site. Not recorded on Project Site.	3	BioNet BAM	Predicted Species
Rostratula australis Australian Painted Snipe	E1	E	Normally found in permanent or ephemeral shallow inland wetlands, either freshwater or brackish. The species nests on the ground amongst tall reed-like vegetation near water. Habitat for the species includes the fringes of swamps, dams and nearby marshy areas with cover of grasses, lignum, low scrub or open timber.	L – Lack of suitable wetland habitat, no records within 5 km of site. Not recorded on Project Site.	1	BioNet PMST	
Stagonopleura guttata Diamond Firetail	V		Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum (Eucalyptus pauciflora) Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland. Groups separate into small colonies to breed, between August and January.	L – Lack of suitable woodland or riparian habitat, no records within 5 km of site. Not recorded on Project Site.	1	BioNet BAM	Predicted Species
Stictonetta naevosa Freckled Duck	V		Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds. Nesting usually occurs between October and December but can take place at other times when conditions are favourable.	L – Lack of suitable wetland habitat, no records within 5 km of site. Not recorded on Project Site.	1	BioNet	

Species Name	BC Act	EPBC Act	Key Information	Likelihood of Occurrence	Records	Source	BAM
Tyto novaehollandiae Masked Owl	V,P,3		Occurs across NSW except NW corner. Most common on the coast. Inhabits dry eucalypt woodlands from sea level to 1100 m. Roosts and breeds in large (>40cm) hollows and sometime caves in moist eucalypt forested gullies. Hunts along the edges of forests and roadsides. Home range between 500 ha and 1000 ha. Prey mostly terrestrial mammals but arboreal species may also be taken.	L – Lack of suitable nesting habitat, marginally suitable foraging habitat on site. Not recorded on Project Site.	7	BioNet	
Threatened Mammals							
Chalinolobus dwyeri Large-eared Pied Bat		V	The species occurs from the coast to the western slopes of the divide. The largest numbers of records are from sandstone escarpment country in the Sydney Basin and Hunter Valley. The species roosts in caves and mines and most commonly recorded from dry sclerophyll forests and woodlands. In southern Sydney appears to be largely restricted to the interface between sandstone escarpments and fertile valleys.	L – Lack of suitable habitat, no records within 5 km of site. Not recorded on Project Site.	-	PMST	
Dasyurus maculatus Spotted-tailed Quoll	V,P	E	Found in eastern NSW, eastern Victoria, south-east and north-eastern Queensland, and Tasmania the species has been recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline	L – Lack of suitable habitat, with vegetation highly disturbed and isolated, no records within 5 km of site. Not recorded on Project Site.	8	BioNet PMST BAM	Predicted Species
Falsistrellus tasmaniensis Eastern False Pipistrelle	V,P		The species occurs on southeast coast and ranges. Prefers tall (>20m) and wet forest with dense understorey. Absent from small remnants, preferring continuous forest but can move through cleared landscapes and may forage in open areas. Roosts include hollow trunks of Eucalypts, underneath bark or in buildings. Forages in gaps and spaces within forest, with large foraging range (12km foraging movements recorded).	L – Lack of suitable tall and wet forest habitat. Not recorded on Project Site.	22	BioNet	
Micronomus norfolkensis Eastern Coastal Free-tailed Bat	V,P		The Eastern Freetail-bat is found along the east coast from south Queensland to southern NSW. Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roost maily in tree hollows but will also roost under bark or in man-made structures.	L – Lack of suitable roosting habitat, possible marginally suitable foraging habitat. Not recorded on Project Site.	63	BioNet BAM	Predicted Species

Species Name	BC Act	EPBC Act	Key Information	Likelihood of Occurrence	Records	Source	BAM
Miniopterus australis Little Bent-winged Bat	V,P		Occurs from Cape York to Sydney. Inhabits rainforests, wet and dry sclerophyll forests, paperbark swamps and vine thickets. Only one maternity cave known in NSW, shared with Eastern Bentwing-bats at Willi Willi, near Kempsey. Outside breeding season roosts in caves, tunnels and mines and has been recorded in a tree hollow on one occasion. Forages for insects beneath the canopy of well-timbered habitats.	L – Lack of suitable roosting sites and well-timbered foraging habitat. Not recorded on Project Site.	9	BioNet BAM	Candidate Species Predicted Species
Miniopterus orianae oceanensis Large Bent-winged Bat	V		Species occur along the east and north-west coasts of Australia. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Maternity caves have very specific temperature and humidity regimes. Hunt in forested areas, catching moths and other flying insects above the tree tops.	L – Lack of suitable forested foraging habitat. Not recorded on Project Site.	86	BioNet BAM	Candidate Species Predicted Species
Myotis macropus Southern Myotis	V,P		Species is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers. Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forage over streams and pools catching insects and small fish by raking their feet across the water surface. In NSW females have one young each year usually in November or December.	L – Lack of suitable foraging habitat (streams and pools). Not recorded on Project Site.	48	BioNet BAM	Candidate Species
Petauroides volans Greater Glider	P	V	The species occurs in eucalypt forests and woodlands along the east coast of Australia from north east Queensland to the Central Highlands of Victoria. Feeds exclusively on eucalypt leaves, buds, flowers and mistletoe. Occupy a relatively small home range with an average size of 1 to 3 ha .	L – Lack of suitable habitat, no records within 5 km of site. Not recorded on Project Site.	1	BioNet PMST	
Petaurus australis Yellow-bellied Glider	V,P		Found along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria. Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Very mobile species known to occupy large home ranges between 20 to 85 ha.	L – Lack of suitable habitat, no records within 5 km of site. Not recorded on Project Site.	2	BioNet	
Petaurus norfolcensis Squirrel Glider	V,P		The species is widely though sparsely distributed in eastern Australia, from northern Queensland to western Victoria. Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey.	L – Lack of suitable habitat, no records within 5 km of site. Not recorded on Project Site.	2	BioNet BAM	Candidate Species

Species Name	BC Act	EPBC Act	Key Information	Likelihood of Occurrence	Records	Source	BAM
Petrogale penicillate Brush-tailed Rock-wallaby		V	Occurring from Shoalhaven to the Queensland border the species is now mostly extinct west of the Great Dividing Range, except in the Warrumbungles and Mt Kaputar. The species inhabits rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges facing north.	L – Lack of suitable rocky escarpment habitat, no records within 5 km of site. Not recorded on Project Site.	-	PMST	
Phascolarctos cinereus Koala	V,P	V	Fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. Inhabit eucalypt woodlands and forests feeding on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species.	L – Lack of suitable feed tree habitat, no records within 5 km of site. Not recorded on Project Site.	9	BioNet PMST BAM	Candidate Species Predicted Species
Pseudomys novaehollandiae New Holland Mouse	-	V	The species occurs in disjunct, coastal populations from Tasmania to Queensland. In NSW it inhabits a variety of coastal habitats including heathland, woodland, dry sclerophyll forest with a dense shrub layer and vegetated sand dunes. Species presence is strongly correlated with understorey vegetation density, and high floristic diversity in regenerating heath.	L – Lack of suitable habitat including high floristic diversity and dense understorey, no records within 5 km of site. Not recorded on Project Site.	-	PMST	
Pteropus poliocephalus Grey-headed Flying-fox	V,P	V	Generally, this species is found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. Inhabit subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy.	L – Lack of suitable habitat, no roosting camps on site. Not recorded on Project Site.	643	BioNet PMST BAM	Candidate Species Predicted Species
Saccolaimus flaviventris Yellow-bellied Sheathtail-bat	V,P		Migrates from tropics to SE Australia in summer. Forages across a range of habitats including those with and without trees, from wet and dry sclerophyll forest, open woodland, Acacia shrubland, mallee, grasslands and desert. Seasonal movements are unknown.	L – Possible marginally suitable foraging habitat, however this is highly disturbed. Not recorded on Project Site.	4	BioNet	

Species Name	BC Act	EPBC Act	Key Information	Likelihood of Occurrence	Records	Source	BAM
Scoteanax rueppellii Greater Broad-nosed Bat	V,P		The species is found mainly in the gullies and river systems that drain the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland. It extends to the coast over much of its range. In NSW it is widespread on the New England Tablelands, however does not occur at altitudes above 500 m. Inhabits a variety of habitats from woodland to wet and dry sclerophyll forests and rainforest, also remnant paddock trees and timber-lined creeks.	L – Possible marginally suitable foraging habitat, however this is highly disturbed. Not recorded on Project Site.	29	BioNet	
Threatened Amphibians							
Heleioporus australiacus Giant Burrowing Frog	V	V	The species occurs along the coast and eastern slopes of the Great Dividing Range south from Wollemi National Park, appearing to exist as 2 populations between Jervis Bay and Eden. Habitat for the species includes sandy soils supporting heath, woodland or open forest. The species breeds in ephemeral to intermittent streams with persistent pools. Only infrequently moves to breeding sites, most commonly found on ridges away from creeks, several hundred metres from water.	L – Lack of suitable habitat including sandy soils, no records within 5 km of site. Not recorded on Project Site.	-	PMST	
Litoria aurea Green and Golden Bell Frog	E1	V	Formerly occurred from Brunswick Heads to Victoria, but >80% populations now extinct. Inhabits marshes, natural and artificial freshwater to brackish wetlands, dams and in stream wetlands. Prefers sites containing cumbungi (Typha spp.) or spike rushes (Eleocharis spp.), which are unshaded and have a grassy area and/or rubble as shelter/refuge habitat nearby. Gambusia holbrooki is a key threat as they feed on green and Golden Bell Frog eggs and tadpoles.	L – Lack of suitable marsh and brackish water habitat. Not recorded on Project Site.	28	BioNet PMST BAM	
Litoria raniformis Growling Grass Frog	E1	V	The species exists only in isolated populations in the Coleambally Irrigation Area. Habitat for the species is usually in or around permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys.	L – Lack of suitable wetland habitat, no records within 5 km of site. Not recorded on Project Site.	-	PMST	
Threatened Fish							
Macquaria australasica Macquarie Perch	-	E	A riverine, schooling species, it prefers clear water and deep, rocky holes with lots of cover. As well as aquatic vegetation, additional cover may comprise of large boulders, debris and overhanging banks. Spawning occurs just above riffles (shallow running water). Populations may survive in impoundments if able to access suitable spawning site.	L – Lack of suitable aquatic habitat. Not recorded on Project Site.		PMST	

Species Name	BC Act	EPBC Act	Key Information	Likelihood of Occurrence	Records	Source	BAM
Prototroctes maraena Australian Grayling	-	V	The Australian Grayling is diadromous, spending part of its lifecycle in freshwater and at least part of the larval and/or juvenile stages in coastal seas. Adults (including pre spawning and spawning adults) inhabit cool, clear, freshwater streams with gravel substrate and areas alternating between pools and riffle zones such as the Tambo River, which is also known to have granite outcrops. The species has been recorded over 100 km upstream from the sea.	L – Lack of suitable aquatic habitat. Not recorded on Project Site.	-	PMST	
Threatened Insects							
Synemon plana Golden Sun Moth	E	CE	Medium-sized, day-flying moth known from 125 extant sites across its range from south-western Victoria to mid-north coast of NSW. Suitable habitat for the Golden Sun Moth includes native temperate grassland and open grassy woodlands dominated by wallaby grass.	L – Lack of suitable native grassland habitat, no records within 5 km of site. Not recorded on Project Site.	-	PMST	
Threatened Gastropods							
Meridolum corneovirens Cumberland Plain Land Snail	E1	-	Lives in small areas on the Cumberland Plain west of Sydney, from Richmond and Windsor south to Picton and from Liverpool west to the Hawkesbury and Nepean Rivers at the base of the Blue Mountains. known from over 100 different locations, but not all are currently occupied, and they are usually isolated from each other as a result of land use patterns. Primarily inhabits Cumberland Plain Woodland (a critically endangered ecological community). This community is a grassy, open woodland with occasional dense patches of shrubs. It is also known from Shale Gravel Transition Forests, Castlereagh Swamp Woodlands and the margins of River-flat Eucalypt Forest, which are also listed communities. Lives under litter of bark, leaves and logs, or shelters in loose soil around grass clumps. Occasionally shelters under rubbish.	L –Marginally suitable River-flat Eucalypt Forest margin habitat exists. However, this is highly disturbed and not remnant. Despite Cumberland Plain Land Snail surveys conducted on site, no signs were recorded.	501	BioNet BAM	
Threatened Populations							
Dillwynia tenuifolia Kemps Creek	E2,V	-	Low spreading pea-flower shrub to one metre high. The core distribution is the Cumberland Plain from Windsor and Penrith east to Dean Park near Colebee. The species occurs in dry sclerophyll woodland with tertiary alluvium soils.	L – Lack of suitable dry sclerophyll woodland habitat. Not recorded on Project Site.	68	BioNet	

Species Name	BC Act	EPBC Act	Key Information	Likelihood of Occurrence	Records	Source	BAM
Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	E2	-	Recent records are from Prospect, Bankstown, Smithfield, Cabramatta Creek and St Marys. Previously known north from Razorback Range. Grows in vine thickets and open shale woodland.	L – Lack of suitable habitat, nearest records are over 4 km from the site. Not recorded on Project Site.	70	BioNet BAM	Candidate Species
Wahlenbergia multicaulis Tadgell's Bluebell in the local government areas of Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield	E2	-	Perennial tuffed herb known from 13 sites in northern and western Sydney. In Western Sydney most sites are closely aligned with the Villawood Soil Series, which is a poorly drained, yellow podsolic extensively permeated with fine, concretionary ironstone (laterite). However, the sites in Hornsby LGA are on the 'Hawkesbury' soil landscape. Found in disturbed sites and grows in a variety of habitats including forest, woodland, scrub, grassland and the edges of watercourses and wetlands. Typically occurs in damp, disturbed sites (with natural or human disturbance of various forms), typically amongst other herbs rather than in the open.	L – Marginally suitable habitat on site. However, site not within appropriate soil landscape. No records within 5 km of site. Not recorded on Project Site.	-	BAM	Candidate Species
Threatened Communities							
Agnes Banks Woodland in the Sydney Basin Bioregion	E4B	E	Low woodland dominated by Eucalyptus sclerophylla and Angophora bakeri with a diverse understorey of sclerophyllous shrubs species including Banksia oblongifolia, Conospermum taxifolium, Leptospermum trinervium, Dillwynia sericea, Monotoca scoparia and Persoonia nutans, and ground stratum species including Lepidosperma urophorum, Platysace ericiodes, Pimelea linifolia, Mitrasacme polymorpha, Trachymene incisa and Stylidium graminifolium. Restricted to small areas of sand dunes overlying Tertiary Alluvium at Agnes Banks on the east bank of the Hawkesbury River in the Penrith LGA.	Absent	K	BioNet	

Species Name	BC Act	EPBC Act	Key Information	Likelihood of Occurrence	Records	Source	BAM
Blue Gum High Forest in the Sydney Basin Bioregion	E4B	CE	Blue Gum High Forest is dominated by a tall canopy of eucalypts that may exceed 30 m in height. Its understorey is typically multi-layered with a midstorey of mesophyllous shrubs and small trees and a diverse ground layer of herbs, ferns and some grasses. Dominated by either Eucalyptus pilularis (Blackbutt) or E. saligna (Sydney Blue Gum). Typically associated with soils derived from Wianamatta Shale (Tozer 2003), though may occur in adjacent areas underlain by Hawkesbury Sandston. Found on the north shore and northern suburbs of Sydney and has been recorded from the LGAs of Lane Cove, Willoughby, Ku-ring-gai, Hornsby, Baulkham Hills, Ryde and Parramatta within the Sydney Basin Bioregion and may occur elsewhere in the Bioregion.	Absent	K	BioNet	
Blue Mountains Shale Cap Forest in the Sydney Basin Bioregion	E3	CE	Blue Mountains Shale Cap Forest is found on deep fertile soils formed on Wianamatta Shale, on moist sheltered sites at lower to middle altitudes of the Blue Mountains and Wollemi areas. Extensive occurrences of shale are at Springwood, Berambing to Kurrajong Heights, Mountain Lagoon and Colo Heights.	Absent	K	BioNet	
Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion	V2	E	Dominated by Eucalyptus parramattensis subsp. parramattensis, Angophora bakeri and E. sclerophylla. Occurs almost exclusively on soils derived from Tertiary alluvium, or on sites located on adjoining shale or Holocene alluvium. Occurs within the LGAs of Bankstown, Blacktown, Campbelltown, Hawkesbury, Liverpool and Penrith (James 1997). The main occurrence of Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion is in the Castlereagh area of the Cumberland Plain, with small patches occurring at Kemps Creek and Longneck Lagoon.	Absent	P	BioNet	
Castlereagh Swamp Woodland Community	E3		Low woodland, often having dense stands of Paperbark trees Melaleuca decora along with other canopy trees, such as Eucalyptus parramattensis. Occurs in western Sydney in the Castlereagh and Holsworthy areas, on deposits from ancient river systems along today's intermittent creeklines, often in poorly drained depressions. There is now only 616 hectares remaining intact, which mainly occurs in the Hawkesbury, Liverpool and Penrith LGAs.	Absent	K	BioNet	

Species Name	BC Act	EPBC Act	Key Information	Likelihood of Occurrence	Records	Source	BAM
Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion	E3	CE	Predominantly open-forest to low woodland structure usually with trees of Eucalyptus fibrosa and Melaleuca decora, sometimes with E. longifolia. Relatively dense shrub stratum is typical, commonly with M. nodosa and Lissanthe strigosa, and to a lesser extent M. decora. Usually occurs on clay soils on Tertiary alluvium, or on shale soils on Wianamatta Shale including the Birrong Soil Landscape and associated shale lowlands. Known to occur in the Auburn, Bankstown, Blacktown, Canterbury, Campbelltown, Fairfield, Hawkesbury, Holroyd, Liverpool, Parramatta, Penrith and Strathfield LGAs.	Absent	K	BioNet	
Cumberland Plain Woodland in the Sydney Basin Bioregion	E4B	CE	Typically comprises an open tree canopy, a near-continuous groundcover dominated by grasses and herbs, sometimes with layers of shrubs and/or small trees. Associated with clay soils derived from Wianamatta Group geology, or more rarely alluvial substrates, on the Cumberland Plain. The community typically occurs on flat to undulating or hilly terrain up to about 350 m elevation but may also occur on locally steep sites and at slightly higher elevations. Restricted to the Sydney Basin bioregion and is currently known to occur within the LGAs of Auburn, Bankstown, Baulkham Hills, Blacktown, Camden, Campbelltown, Fairfield, Hawkesbury, Holroyd, Liverpool, Parramatta, Penrith and Wollondilly, but may occur elsewhere within the bioregion.	Absent	K	BioNet	
Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3		Associated with coastal areas subject to periodic flooding and in which standing fresh water persists for at least part of the year in most years. Typically occurs on silts, muds or humic loams in low-lying parts of floodplains, alluvial flats, depressions, drainage lines, backswamps, lagoons and lakes.	Absent	K	BioNet	
Moist Shale Woodland in the Sydney Basin Bioregion	E3	CE	Similar to CPW. It differs in having a shrub understorey that contains plants from moist habitats. Dominant canopy trees include Eucalyptus tereticornis, E. moluccana, E. crebra and Corymbia maculata. Moist Shale Woodland usually occurs on soils derived from Wianamatta Shale on high country in the southern half of the Cumberland Plain, and occurs mainly in Wollondilly LGA.	Absent	K	BioNet	

Species Name	BC Act	EPBC Act	Key Information	Likelihood of Occurrence	Records	Source	BAM
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3		Occurs on the river flats of the coastal floodplains. It has a tall open tree layer of eucalypts, which may exceed 40 m in height, but can be considerably shorter in regrowth stands or under conditions of lower site quality. While the composition of the tree stratum varies considerably, the most widespread and abundant dominant trees include Eucalyptus tereticornis, E. amplifolia, Angophora floribunda and A. subvelutina.	Present	K	BioNet	
Shale Gravel Transition Forest in the Sydney Basin Bioregion	E3	CE	Open-forest structure, usually with trees of Eucalyptus fibrosa sometimes with E. moluccana and E. tereticornis. Melaleuca decora is frequently present in a small tree stratum. Occurs primarily in areas where shallow deposits of Tertiary alluvium overlie shale soils but may also occur in association with localised concentrations of iron-indurated gravel. Shale Gravel Transition Forest grades into C as alluvial and ironstone influences decline.	Absent	K	BioNet	
Shale Sandstone Transition Forest in the Sydney Basin Bioregion	E4B	CE	Occurs at the edges of the Cumberland Plain, where clay soils from the shale rock intergrade with earthy and sandy soils from sandstone, or where shale caps overlay sandstone. The main tree species include Eucalyptus tereticornis, E. punctata, E. globoidea, E. eugenioides, E. fibrosa and E. crebra. Occurs in the Hawkesbury, Baulkham Hills, Liverpool, Parramatta, Penrith, Campbelltown and Wollondilly LGAs.	Absent	K	BioNet	
Southern Sydney sheltered forest on transitional sandstone soils in the Sydney Basin Bioregion	E3		Primarily associated with the heads and upper slopes of sandstone gullies, which are downslope from residual shale or ironstone caps. Dominant trees include Angophora costata, Eucalyptus piperita and occasionally E. pilularis, particularly around Helensburgh. Corymbia gummifera occurs frequently within the community, although generally at lower abundance than the other eucalypts. Recorded from the LGAs of Campbelltown, Hurstville, Kogarah, Sutherland, Wollondilly and Wollongong.	Absent	K	BioNet	

Species Name	BC Act	EPBC Act	Key Information	Likelihood of Occurrence	Records	Source	BAM
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3	E	Found on the coastal floodplains of NSW. It has a dense to sparse tree layer in which Casuarina glauca is the dominant species northwards from Bermagui. Other trees including Acmena smithii, Glochidion spp. and Melaleuca spp. may be present as subordinate species. Present within Penrith, Fairfield, Liverpool, Bankstown, Wollondilly, Camden, Campbelltown LGAs (+ many more). Associated with grey-black clay-loams and sandy loams, where the groundwater is saline or sub-saline, on waterlogged or periodically inundated flats, drainage lines, lake margins and estuarine fringes associated with coastal floodplains. Generally occurs below 20 m (rarely above 10 m) elevation.	Absent	K	BioNet	
Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3	E	Associated with humic clay loams and sandy loams, on waterlogged or periodically inundated alluvial flats and drainage lines associated with coastal floodplains. Dominant trees include Eucalyptus robusta, Melaleuca quinquenervia and, south from Sydney, E. botryoides and E. longifolia. Generally occurs below 20 m (though sometimes up to 50 m) elevation. Sydney LGAs where this occurs include; Hornsby, Pittwater, Warringah, Manly, Liverpool, Rockdale, Botany Bay, Randwick, Sutherland.	Absent	K	BioNet	
Sydney Freshwater Wetlands in the Sydney Basin Bioregion	E3		Mosaic community with considerable variation due to fluctuating water levels and seasonal conditions. Characteristic vegetation is sedges and aquatics particularly Eleocharis sphacelata, Baumea juncea, B. rubiginosa, B. articulata, Gahnia sieberiana, Ludwigia peploides and Persicaria spp. There may be patches of emergent trees such as Melaleuca quinquenervia and shrubs. Restricted to freshwater swamps in swales and depressions on sand dunes and low nutrient sandplain sites in coastal areas. These areas are generally on the sands of the Warriewood and Tuggerah Soil Landscapes. Occurs in the LGAs of Lake Macquarie, Wyong, Gosford, Pittwater, Warringah, Woollahra, Waverley, Botany, Rockdale, Randwick, Sutherland and Wollongong.	Absent	K	BioNet	
Sydney Turpentine-Ironbark Forest	E4B	CE	Open forest, with dominant canopy trees including Syncarpia glomulifera, Eucalyptus punctata, E. paniculata and E. eugenoides. Remnants mostly occur in the Baulkham Hills, Hornsby, Ku-ring-gai, Parramatta, Ryde, Sutherland and Hurstville LGAs. Not associated with vegetation on site	Absent	K	BioNet	

Species Name	BC Act	EPBC Act	Key Information	Likelihood of Occurrence	Records	Source	BAM
Western Sydney Dry Rainforest in the Sydney Basin Bioregion	E3	CE	A dry vine scrub community of the Cumberland Plain, western Sydney. Very restricted and occurs most commonly in the far southern section of the Cumberland Plain, in the Razorback Range near Picton. Outlying occurrences have been recorded at Grose Vale and Cattai. Restricted to hilly country where it occurs on the sheltered lower slopes and in gullies.	Absent	K	BioNet	

APPENDIX B

Flora Data

Table B1 Flora Data

Species Name	Common Name	Growth Form/Weed Status	Cover	Abundance
Acanthaceae				
Brunoniella australis	Blue Trumpet	Forb	0.2	20
Asteraceae				
Bidens pilosa	Cobblers Peg	Introduced	0	0
Cirsium vulgare	Spear Thistle	Introduced	0.3	10
Conyza bonariensis	Flaxleaf Fleabane	Introduced	0	0
Senecio madagascariensis	Fireweed	High Threat Exotic	0.1	5
Sonchus asper	Prickly Sowthistle	Introduced	0.1	10
Sonchus oleraceus	Common Sowthistle	Introduced	0.1	5
Taraxacum officinale	Dandelion	Introduced	0.1	10
Boraginaceae				
Echium plantagineum	Paterson's Curse	Introduced	0.1	15
Brassicaceae				
Brassica fruticulosa	Twiggy Turnip	Introduced	0.2	50
Casuarinaceae				
Casuarina glauca	Swamp Oak	Tree	0	0
Chenopodiaceae				
Einadia hastata	Berry Saltbush	Forb	0.2	3
Einadia nutans subsp. nutans	Climbing Saltbush	Forb	0.1	1
Convolvulaceae				
Dichondra repens	Kidney Weed	Forb	25	1000
Cyperaceae				
Cyperus gracilis	Slender Flat-sedge	Sedge (Grass & Grass-like)	0.1	50
Elaeocarpaceae				
Elaeocarpus reticulatus	Blueberry Ash	Shrub	0	0
Euphorbiaceae				
Triadica sebifera	Chinese Tallowood	High Threat Exotic	0	0
Fabaceae - Faboideae				
Indigofera australis	Australian Indigo	Shrub	0	0
Lotus angustissimus	Slender Birds-foot Trefoil	Introduced	0	0
Vicia sativa subsp. nigra	Narrow-leaved Vetch	Introduced	0	0
Vicia sativa subsp. sativa	Common Vetch	Introduced	1	100
Fabaceae - Mimosoideae				
Acacia decurrens	Green Wattle	Tree	0	0
Acacia falcata	Sickle Wattle	Shrub	0	0
Acacia parramattensis	Parramatta Wattle	Tree	0	0
Acacia saligna	Golden Wreath Wattle	Introduced	0.4	1
Lomandraceae				
Lomandra filiformis subsp. filiformis	Wattle Mat-rush	Rush (Grass & Grass-like)	0.1	3
Lomandra longifolia	Spiny-headed Mat-rush	Rush (Grass & Grass-like)	0.4	3
Malvaceae				
Abutilon grandifolium	-	Introduced	0	0
Modiola caroliniana	Red-flowered Mallow	Introduced	0.2	40
Sida rhombifolia	Paddy's Lucerne	Introduced	0.4	50
Myrtaceae				
Angophora floribunda	Rough-barked Apple	Tree	25	30
Callistemon sp. cultivar	A Bottlebrush	-	0	0
Corymbia maculata	Spotted Gum	Tree	0	0
Eucalyptus crebra	Narrow-leaved Ironbark	Tree	0	0
Eucalyptus grandis	Flooded Gum	Tree	0	0
Eucalyptus melliodora	Yellow Box	Tree	0	0
Eucalyptus tereticornis	Forest Red Gum	Tree	0	0

Species Name	Common Name	Growth Form/Weed Status	Cover	Abundance
Phormiaceae				
Dianella longifolia	Blueberry Lily	Forb	0.1	1
Dianella sp. cultivar	A Flax-lily	-	0	0
Phytolaccaceae				
Phytolacca octandra	Inkweed	Introduced	0.3	3
Pittosporaceae				
Bursaria spinosa	Blackthorn	Shrub	0.5	2
Plantaginaceae				
Plantago lanceolata	Lamb's Tongues	Introduced	5	1000
Poaceae				
Avena barbata	Bearded Oats	Introduced	0.4	50
Bromus catharticus	Prairie Grass	Introduced	0.1	10
Capillipedium spicigerum	Scented-top Grass	Tussock (Grass & Grass-like)	0	0
Cenchrus clandestinus	Kikuyu	High Threat Exotic	30	1000
Chloris gayana	Rhodes Grass	High Threat Exotic	1	50
Chloris truncata	Windmill Grass	Tussock (Grass & Grass-like)	0	0
Cynodon dactylon	Couch	Other Grass (Grass & Grass-like)	5	1000
Eragrostis curvula	African lovegrass	High Threat Exotic	0	0
Imperata cylindrica	Blady Grass	Tussock (Grass & Grass-like)	0.5	200
Lolium perenne	Perennial Ryegrass	Introduced	0.1	10
Microlaena stipoides	Weeping Grass	Tussock (Grass & Grass-like)	0.2	30
Paspalidium distans	-	Tussock (Grass & Grass-like)	0	0
Paspalum dilatatum	Paspalum	High Threat Exotic	0.1	5
Themeda triandra	Kangaroo Grass	Tussock (Grass & Grass-like)	0.1	1
Polygonaceae				
Rumex crispus	Curled Dock	Introduced	0.1	1
Primulaceae				
Lysimachia arvensis	Scarlet Pimpernel	Introduced	0.1	5
Solanaceae				
Lycium ferocissimum	African Boxthorn	High Threat Exotic	1	2
Verbenaceae				
Verbena bonariensis	Purple Top	Introduced	0.2	20
Verbena quadrangularis	-	Introduced	0.1	2

Status and nomenclature according to PlantNet (RBGTD 2019) where available

Growth form and weed status according to BAM (OEH 2017a)

APPENDIX C

BAM Field Datasheets

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610.18883.

BAM Site – Field Survey Form

Site Sheet no:

		Survey Name	Zone ID	Recorders			
Date	15/10/2019	CDCE-Creek	1	Fiona Iolini			
Zone	Datum	Plot ID	1	Plot dimensions	20 x 50 m	Photo #	1
Easting	Northing	IBRA region	Sydney Basin (Cumberland)	Midline bearing from 0 m	90°E		
150.83751 299856	-33.81664 6256073						
Vegetation Class		Coastal Floodplain Wetlands				Confidence: (H) M L	
Plant Community Type		PCT 835 Forest Red Gum - Rough-barked Apple...		EEC: Y		Confidence: (H) M L	

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	1
	Grasses etc.	7
	Forbs	5
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	25
	Shrubs	0.5
	Grasses etc.	6.4
	Forbs	25.6
	Ferns	0
	Other	0
High Threat Weed cover		32.2

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	0	0
50 – 79 cm	0	0
30 – 49 cm	II	0
20 – 29 cm	𝍸 𝍸 IIII	0
10 – 19 cm	𝍸 𝍸 𝍸	0
5 – 9 cm	III	0
< 5 cm	0	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0m	

Counts apply when the **number of tree stems** within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. **Tree stems must be living.**

For **hollows**, count only the presence of a stem containing hollows. For a **multi-stemmed tree**, only the largest stem is included in the count/estimate. **Stems may be dead and may be shrubs.**

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	5, 75, 2, 0, 1	0, 0, 0, 1, 10	0, 0, 0, 0, 0	0, 0, 0, 0, 0
Average of the 5 subplots	16.6	2.2	0	0

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour	Red/brown	Soil Depth	
Slope		Aspect	E.	Site Drainage	Top of drainage line	Distance to nearest water and type	

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)	3	O	All around patch.
Cultivation (inc. pasture)	2	NR	Kikuyu/couch lawn.
Soil erosion	0		
Firewood / CWD removal	0		
Grazing (identify native/stock)	0		
Fire damage	0		
Storm damage	0		
Weediness	3	R	African Boxthorn, Inkweed + grasses + annual weeds
Other			Fenced off for protection by earthwork downslope

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

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400 m² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	15/10/2019	CDC E.Creek	1	Fiona Iolini

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
(t) (m)	Angophora floribunda	N	25	30	U	
E	Acacia saligna	E	0.4	1	M	✓
E	Lycium ferocissimum	HTE	1	2	M	
(s)	Bursaria spinosa	N	0.5	2	M	Photo
(m) (f)	Dichondra repens	N	25	1000	G	
(r)	Lomandra longifolia	N	0.4	3	G	
(g)	Imperata cylindrica	N	0.5	200	G	
E	Sida rhombifolia	E	0.4	50	G	
E	Brassica fruticulosa	E	0.2	50	G	photo
E	Plantago lanceolata	E	~~0.5~~	1000	G	
E	Modiola caroliniana	E	0.2	40	G	
(d) (m)	Cynodon dactylon	N	5	1000	G	
(v)	Cyperus gracilis	N	0.1	50	G	
E	Paspalum dilatatum	HTE	0.1	5	G	
E	Verbena quadrangularis	E	0.1	2	G	✓
E	Avena barbata	E	0.4	50	G	✓
E	Verbena bonariensis	E	0.2	20	G	
(f)	Einadia hastata	N	0.2	3	G	
E	Senecio madagascariensis	HTE	0.1	5	G	
E	Lolium perenne	E	~~0.1~~	~~10~~	G	✓
E	Phytolacca octandra	E	0.3	3	G	
E	Vicia sativa	E	~~0.1~~ 1.0	100	G	✓
E	Bromus catharticus	E	0.1	10	G	
E	Bidens pilosa	HTE	0.1	10	G	
E	Sonchus ~~oleraceus~~ oleraceus	E	0.1	5	G	photo
E	Cirsium vulgare	E	0.3	10	G	Photo
(r)	Microlaena stipoides	N	0.2	~~3~~ 30	G	
(r)	Lomandra filiformis subsp. filiformis	N	0.1	3	G	✓
E	Sonchus asper	E	0.1	10	G	Photo
E	Taraxacum officinale	E	0.1	10	G	Photo
E	Lysimachia arvensis	E	0.1	5	G	
f	Einadia nutans subsp. nutans	N	0.1	1	G	✓
E	Chloris gayana	HTE	~~0.1~~	50	G	
(f)	Brunoniella australis	N	0.2	20	G	
E	Echium plantagineum	E	0.1	15	G	
E	Cenchrus clandestinum	HTE	30	1000	G	
E	Rumex ~~sp~~ crispus	E	0.1	2	G	photo
f	Dianella longifolia	N	0.1	1	G	photo
(g)	Themeda triandra	N	0.1	1	G	Photo

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

2077 = 28 | 300mm
2078 = 29
2076 = 13
2075 = 11
2079 = 28.5
2073 = 18.5
2074 = 16
2072 = divided (3,1) + (26)
0.40m above ground
2071 = divided at base (8.5) + (6)
2070 = 15
2069 = 19.5
2068 = 23
2067 = 13.5
2066 = 13
2065 = 21
2061 = 19
2062 = 7
2063 = 7
2064 = 36.5
2060 = 18
2059 = divided x3 at base (20.5) + (13) + (19.5)
2053 = 17
2052 = 11.5
2058 = 31
2054 = 17.5
2055 = 25
2056 = 19
2050 = 22
2051 = divided at base (28.5) + (10)
2049 = 28.5
2045 = 17.5
2046 = 24
2047 = 22
2048 = 25

only the largest living stem is counted.

APPENDIX D

Vegetation Information System Profile

VIS Classification - Community Profile Report

Plant Community Type ID (PCT ID): 835

PCT Classification Confidence Level: High

PCT Common Name: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion

PCT Common Usage Name: Cumberland riverflat forest

PCT Scientific Name: *Eucalyptus tereticornis , Angophora floribunda , Eucalyptus amplifolia subsp. amplifolia / Acacia parramattensis , Bursaria spinosa subsp. spinosa , Sigesbeckia orientalis / Microlaena stipoides var. stipoides , Oplismenus aemulus , Dichondra repens , Entolasia marginata*

Data Entry Operator: System ***Data Entry Date:*** 27/06/2011

Last Modified By: MURPHYDY ***Last Modified Date:*** 04/12/2014

Vegetation Description: Cumberland Riverflat Forest (Benson and Howell 1990) is an open eucalypt forest situated on broad alluvial flats of the Hawkesbury and Nepean river systems. It also forms narrower ribbons alongside streams and creeks that drain the Cumberland Plain. Typically the canopy includes one of either rough-barked apple (Angophora floribunda) or broad-leaved apple (Angophora subvelutina) and one or both of forest red gum (Eucalyptus tereticornis) and cabbage gum (Eucalyptus amplifolia). However there are a wide variety of other interesting eucalypts that are highly localised. On the Georges River near Bankstown and on Cabramatta and Prospect creeks blue box (Eucalyptus baueriana) is commonly encountered, sometimes as a smaller tree beneath the canopy. Further north and east Sydney blue gum (Eucalyptus saligna) and blackbutt (Eucalyptus pilularis) occurs. Near Hoxton Park spotted gum (Corymbia maculata) forms a minor component of the canopy. The understorey within this riverflat forest is characterised by an occasional sparse to open small tree stratum of paperbark (Melaleuca spp.) and wattles (Acacia spp.). A sparse lower shrub layer features blackthorn (Bursaria spinosa) at most sites. The ground layer is characterised by an abundant cover of grasses with small herbs and ferns. Cumberland Riverflat Forest occurs at altitudes between one and 160 metres above sea level and with a mean annual rainfall of 750-1000 millimetres. Within the study area the largest remaining areas are situated on the Georges River. Highly disturbed examples occur on Prospect and Orphan School creeks.

Rain fall: Not Assessed

Elevation: Not Assessed

Emergent species: None

Upper Stratum Species: Eucalyptus tereticornis; Angophora floribunda; Eucalyptus amplifolia subsp. amplifolia;

Mid Stratum Species: Acacia parramattensis; Bursaria spinosa subsp. spinosa; Sigesbeckia orientalis;

Ground Stratum Species: Microlaena stipoides var. stipoides; Oplismenus aemulus; Dichondra repens; Entolasia marginata; Solanum prinophyllum; Pratia purpurascens; Desmodium gunnii; Echinopogon ovatus; Commelina cyanea; Veronica plebeia;

Tree Growth Form Species:

Shrub Growth Form Species:

Grass and grasslike Growth Form Species:

Forb Growth Form Species:

Fern Growth Form Species:

Other Growth Form Species:

Diagnostic Species: Not Assessed

Height Class (Walker & Hopkins 1990): Not Assessed

Vegetation Formation: Forested Wetlands;

Vegetation Class: Coastal Floodplain Wetlands;

NSW Landscape Name: Not Assessed

Classification source:

Authority: PADACS - archive

Pre-European Mapped Or Modelled: Not Assessed

Current Extent Mapped Or Modelled: Not Assessed

Adequacy of plot sampling: None ***Number of Plots:*** Not Assessed

IBRA Bioregion: Sydney Basin (>70%);

IBRA Sub-Region: Yengo (Not known); Pittwater (Not known); Cumberland (Not known); Burragorang (Not known); Sydney Cataract (Not known);

LGA: Hawkesbury (Not known); Blue Mountains (Not known); Wollondilly (Not known);

Lithology: Not Assessed

Landform Pattern: Not Assessed

Landform Element: Not Assessed

Pre-European Extent: 36200 ha ?%. Modelled from sound site or polygon data

Pre-European Extent Accuracy: Not Assessed

Pre-European Comments:

Current Extent: Not Assessed

Current Extent Accuracy: Not Assessed

Current Extent Comments:
PCT Percent Cleared: 93.00 ***% accuracy (of PCT % cleared estimate):*** Not Assessed

Variation and Natural Disturbance:
Fire Regime:
PCT associated with TEC: Yes
Associated TEC Names: Listed TSC Act,E: River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Equivalent) largely equivalent to;
Associated TEC Degree of Fit:
Associated TEC Comments:
Citations: (Tindall D. et al., 2004 ; Tozer M. et al., 2010 ; OEH (2013))
Full Reference Details: (853; 854; 947;). Tindall, D., Pennay, C., Tozer, M., Turner, K. and Keith, D., 2004 , Native vegetation map report series No. 4. The Araluen, Batemans Bay, Braidwood, Burragorang, Goulburn, Jervis Bay, Katoomba, Kiama, Moss Vale, Penrith, Port Hacking, Sydney, Taralga; 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 tablelands. Version 1.0; OEH (2013) The Native Vegetation of the Sydney Metropolitan Area Version 2.0 NSW Office of Environment and Heritage Sydney;
Profile source: FOW 33 (Tindall et al. 2004);
PCT Definition Status: Approved

APPENDIX E

Fauna Data

Table E1 Fauna Species List

Species Name	Common Name	Status	Sighting Type
AVES			
Artamidae			
Cracticus tibicen	Australian Magpie	Native	Sighted
Columbidae			
Ocyphaps lophotes	Crested Pigeon	Native	Sighted
Estrildidae			
Neochmia temporalis	Red-browed Finch	Native	Sighted
Maluridae			
Malurus cyaneus	Superb Fairy Wren	Native	Sighted
MAMMALS			
Leporidae			
Oryctolagus cuniculus	European Rabbit	Introduced	Scats
Macropus			
Macropus giganteus	Eastern Grey Kangaroo	Native	Sighted

Status and nomenclature according to BioNet (OEH 2019a)

APPENDIX F

Biodiversity Credit Reports

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id
00017976/BAAS19042/19/00017977

Proposal Name
SSD-10330

BAM data last updated *
17/10/2019

Assessor Name

Assessor Number

BAM Data version *
16

Proponent Name(s)

Report Created
23/10/2019

BAM Case Status
Open

Assessment Revision
0

Assessment Type
Major Projects

Date Finalised
To be finalised

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Potential Serious and Irreversible Impacts

Nil

Nil

Additional Information for Approval

PCTs With Customized Benchmarks

No Changes

BAM Biodiversity Credit Report (Variations)

Predicted Threatened Species Not On Site

No Changes

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	Number of credits to be retired
835-Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	0.0	1.00

835-Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion

Like-for-like credit retirement options

Name of offset trading group	Trading group	HBT	IBRA region
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions This includes PCT's: 686, 828, 835, 839, 941, 971, 1064, 1108, 1109, 1212, 1228, 1232, 1293, 1318, 1326, 1386, 1522, 1556, 1594, 1618, 1646, 1648, 1720, 1794, 1800	-	No	Cumberland,Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Variation options

Formation	Trading group	HBT	IBRA region

	Forested Wetlands	Tier 2 or higher	No	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

No Species Credit Data

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00017976/BAAS19042/19/00017977

Proposal Name
SSD-10330

BAM data last updated *
17/10/2019

Assessor Name

Assessor Number

BAM Data version *
16

Proponent Names

Report Created
23/10/2019

BAM Case Status
Open

Assessment Revision
0

Assessment Type
Major Projects

Date Finalised
To be finalised

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Potential Serious and Irreversible Impacts

Nil

Nil

Additional Information for Approval

PCTs With Customized Benchmarks

No Changes

BAM Biodiversity Credit Report (Like for like)

Predicted Threatened Species Not On Site

No Changes

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	Number of credits to be retired
835-Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	0.0	1.00

835-Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion

Like-for-like credit retirement options

Name of offset trading group	Trading group	HBT	IBRA region
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions This includes PCT's: 686, 828, 835, 839, 941, 971, 1064, 1108, 1109, 1212, 1228, 1232, 1293, 1318, 1326, 1386, 1522, 1556, 1594, 1618, 1646, 1648, 1720, 1794, 1800	-	No	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Like for like)

835-Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion

Species Credit Summary

No Species Credit Data

BAM Candidate Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00017976/BAAS19042/19/00017977	SSD-10330	17/10/2019
Assessor Name	**Report Created**	**BAM Data version ***
	23/10/2019	16
Assessor Number	**Assessment Type**	**BAM Case Status**
	Major Projects	Open
	Assessment Revision	**Date Finalised**
	0	To be finalised

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

List of Species Requiring Survey

Name	Presence	Survey Months

List of Species Not On Site

Name
Callistemon linearifolius Netted Bottle Brush
Cynanchum elegans White-flowered Wax Plant
Eucalyptus benthamii Camden White Gum
Haliaeetus leucogaster White-bellied Sea-Eagle
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
Wahlenbergia multicaulis - endangered population Tadgell's Bluebell in the local government areas of Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield
Lathamus discolor Swift Parrot
Litoria aurea Green and Golden Bell Frog
Meridolum corneovirens Cumberland Plain Land Snail
Miniopterus australis Little Bent-winged Bat
Miniopterus orianae oceanensis Large Bent-winged Bat

Myotis macropus Southern Myotis
Pandion cristatus Eastern Osprey
Persicaria elatior Tall Knotweed
Persoonia hirsuta Hairy Geebung
Petaurus norfolcensis Squirrel Glider
Phascolarctos cinereus Koala
Pilularia novae-hollandiae Austral Pillwort
Pomaderris brunnea Brown Pomaderris
Pteropus poliocephalus Grey-headed Flying-fox
Anthochaera phrygia Regent Honeyeater
Hibbertia sp. Bankstown Hibbertia sp. Bankstown

BAM Credit Summary Report

Proposal Details

Assessment Id
00017976/BAAS19042/19/00017977

Proposal Name
SSD-10330

BAM data last updated *
17/10/2019

Assessor Name

Report Created
23/10/2019

BAM Data version *
16

Assessor Number

BAM Case Status
Open

Date Finalised
To be finalised

Assessment Revision
0

Assessment Type
Major Projects

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	Vegetation integrity loss / gain	Area (ha)	Constant	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Potential SAII	Ecosystem credits

Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion								
1	835_Moderate-Good	27.4	0.0	0.25	High Sensitivity to Potential Gain	2.00		1
							Subtotal	**1**
							Total	**1**

Species credits for threatened species

Vegetation zone name	Habitat condition (HC)	Area (ha) / individual (HL)	Constant	Biodiversity risk weighting	Potential SAII	Species credits

Biodiversity payment summary report

Assessment Id	Payment data version	Assessment Revision	Report created
00017976/BAAS19042/19/00017977	61	0	23/10/2019

Assessor Name	Assessor Number	Proposal Name	BAM Case Status
		SSD-10330	Open

Assessment Type	Date Finalised
Major Projects	To be finalised

PCT list

Include	PCT common name	Credits
Yes	**835 -** Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	1

Species list

Include	Species	Credits

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Biodiversity payment summary report

IBRA sub region	PCT common name	Baseline price	Dynamic coefficient	Market coefficient	Risk premium	Administrative cost	Methodology adjustment factor	Price per credit	No. of ecosystem credits	Final credits price
Cumberland	**835 -** Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion **Note: This PCT has trades recorded**	$ 17,900.39	0.61106780	3.76937200	15.91%	$44.75	1.0000	$ 19,993.96	1	$19,993.96

Subtotal (excl. GST)	**$19,993.96**
GST	**$1,999.40**
Total ecosystem credits (incl. GST)	**$21,993.36**

Species credits for threatened species

Species profile ID	Species	Threat status	Price per credit	Risk premium	Administrative cost	No. of species credits	Final credits price

No species available

Grand total	**$21,993.36**

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00017976/BAAS19042/19/00017977	SSD-10330	17/10/2019
Assessor Name	Report Created	BAM Data version *
	23/10/2019	16
Assessor Number	Assessment Type	BAM Case Status
	Major Projects	Open
	Assessment Revision	Date Finalised
	0	To be finalised

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Threatened species reliably predicted to utilise the site. No surveys are required for these species. Ecosystem credits apply to these species.

Common Name	Scientific Name	Vegetation Types(s)
Australasian Bittern	Botaurus poiciloptilus	835-Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	835-Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion
Diamond Firetail	Stagonopleura guttata	835-Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion
Dusky Woodswallow	Artamus cyanopterus cyanopterus	835-Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion
Eastern Coastal Free-tailed Bat	Micronomus norfolkensis	835-Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion
Eastern Osprey	Pandion cristatus	835-Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion
Flame Robin	Petroica phoenicea	835-Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion

Grey-headed Flying-fox	Pteropus poliocephalus	835-Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion
Hooded Robin (south-eastern form)	Melanodryas cucullata cucullata	835-Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion
Koala	Phascolarctos cinereus	835-Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion
Large Bent-winged Bat	Miniopterus orianae oceanensis	835-Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion
Little Bent-winged Bat	Miniopterus australis	835-Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion
Little Lorikeet	Glossopsitta pusilla	835-Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion
Regent Honeyeater	Anthochaera phrygia	835-Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion
Scarlet Robin	Petroica boodang	835-Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion
Speckled Warbler	Chthonicola sagittata	835-Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion
Spotted-tailed Quoll	Dasyurus maculatus	835-Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion
Swift Parrot	Lathamus discolor	835-Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion
White-bellied Sea-Eagle	Haliaeetus leucogaster	835-Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion

BAM Vegetation Zones Report

Proposal Details

Assessment Id
00017976/BAAS19042/19/00017977

Assessment name
SSD-10330

BAM data last updated *
17/10/2019

Assessor Name

Report Created
23/10/2019

BAM Data version *
16

Assessor Number

Assessment Type
Major Projects

BAM Case Status
Open

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Assessment Revision
0

Date Finalised
To be finalised

Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones
1	835_Moderate-Good	835-Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	Moderate-Good	0.04	1	

APPENDIX G

Protected Matters Search Report

Australian Government
Department of the Environment and Energy

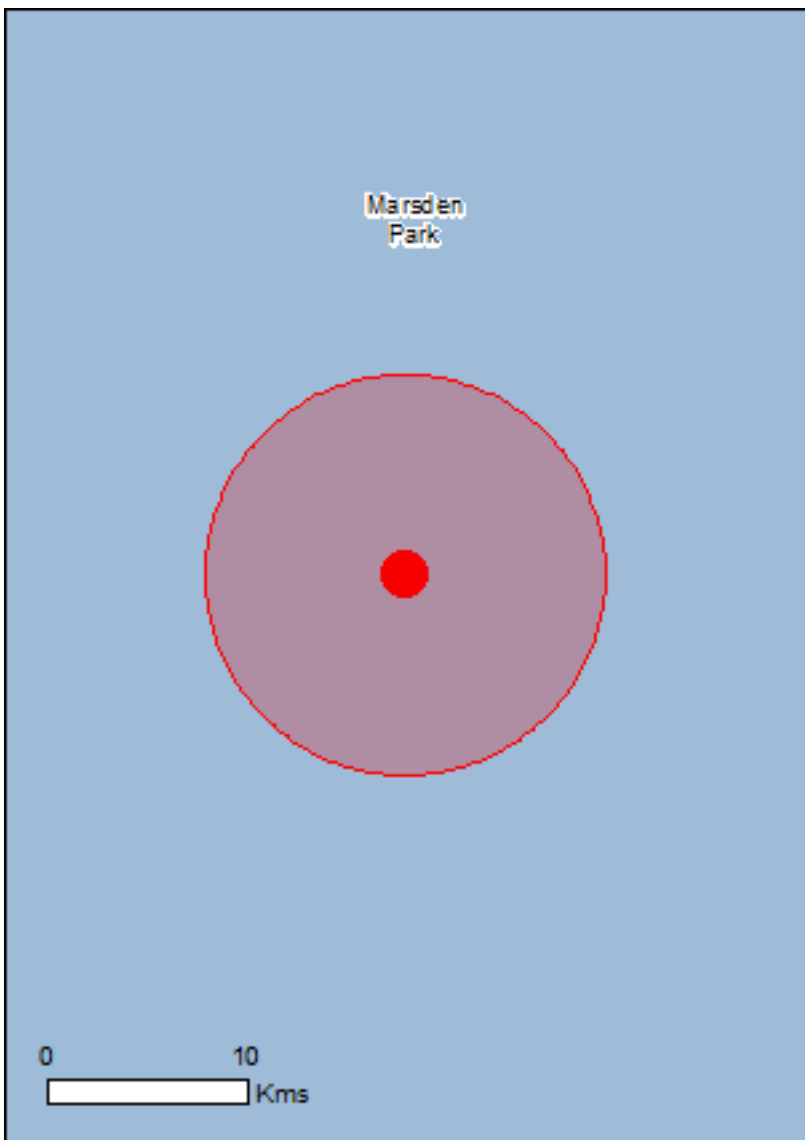
EPBC Act Protected Matters Report

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

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

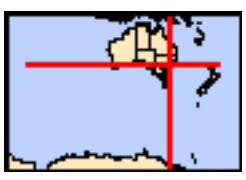
Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 28/10/19 13:45:36



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates
Buffer: 10.0Km



Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	6
Listed Threatened Species:	41
Listed Migratory Species:	15

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	13
Commonwealth Heritage Places:	None
Listed Marine Species:	21
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	2
Regional Forest Agreements:	None
Invasive Species:	50
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

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

Name	Status	Type of Presence
Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion	Endangered	Community likely to occur within area
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community likely to occur within area
Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion	Critically Endangered	Community likely to occur within area
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	Critically Endangered	Community likely to occur within area
Shale Sandstone Transition Forest of the Sydney Basin Bioregion	Critically Endangered	Community may occur within area
Western Sydney Dry Rainforest and Moist Woodland on Shale	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat may occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
[Rostratula australis](#) Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area
Fish		
[Macquaria australasica](#) Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
[Prototroctes maraena](#) Australian Grayling [26179]	Vulnerable	Species or species habitat may occur within area
Frogs		
[Heleioporus australiacus](#) Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat may occur within area
[Litoria aurea](#) Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat known to occur within area
[Litoria raniformis](#) Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog [1828]	Vulnerable	Species or species habitat may occur within area
Insects		
[Synemon plana](#) Golden Sun Moth [25234]	Critically Endangered	Species or species habitat likely to occur within area
Mammals		
[Chalinolobus dwyeri](#) Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
[Dasyurus maculatus maculatus (SE mainland population)](#) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
[Petauroides volans](#) Greater Glider [254]	Vulnerable	Species or species habitat likely to occur within area
[Petrogale penicillata](#) Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area
[Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)](#) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
[Pseudomys novaehollandiae](#) New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat may occur within area
[Pteropus poliocephalus](#) Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area
Plants		
[Acacia bynoeana](#) Bynoe's Wattle, Tiny Wattle [8575]	Vulnerable	Species or species habitat likely to occur within area
[Acacia pubescens](#) Downy Wattle, Hairy Stemmed Wattle [18800]	Vulnerable	Species or species habitat known to occur within area
[Allocasuarina glareicola](#) [21932]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Cynanchum elegans White-flowered Wax Plant [12533]	Endangered	Species or species habitat known to occur within area
Genoplesium baueri Yellow Gnat-orchid [7528]	Endangered	Species or species habitat may occur within area
Grevillea parviflora subsp. parviflora Small-flower Grevillea [64910]	Vulnerable	Species or species habitat known to occur within area
Haloragis exalata subsp. exalata Wingless Raspwort, Square Raspwort [24636]	Vulnerable	Species or species habitat may occur within area
Micromyrtus minutiflora [11485]	Vulnerable	Species or species habitat likely to occur within area
Persicaria elatior Knotweed, Tall Knotweed [5831]	Vulnerable	Species or species habitat may occur within area
Persoonia hirsuta Hairy Geebung, Hairy Persoonia [19006]	Endangered	Species or species habitat likely to occur within area
Persoonia nutans Nodding Geebung [18119]	Endangered	Species or species habitat known to occur within area
Pimelea curviflora var. curviflora [4182]	Vulnerable	Species or species habitat known to occur within area
Pimelea spicata Spiked Rice-flower [20834]	Endangered	Species or species habitat known to occur within area
Pomaderris brunnea Rufous Pomaderris [16845]	Vulnerable	Species or species habitat likely to occur within area
Pterostylis gibbosa Illawarra Greenhood, Rufa Greenhood, Pouched Greenhood [4562]	Endangered	Species or species habitat may occur within area
Pterostylis saxicola Sydney Plains Greenhood [64537]	Endangered	Species or species habitat likely to occur within area
Pultenaea parviflora [19380]	Vulnerable	Species or species habitat known to occur within area
Syzygium paniculatum Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307]	Vulnerable	Species or species habitat likely to occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

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

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Migratory Terrestrial Species		
[Cuculus optatus](#) Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat known to occur within area
[Hirundapus caudacutus](#) White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
[Monarcha melanopsis](#) Black-faced Monarch [609]		Species or species habitat known to occur within area
[Motacilla flava](#) Yellow Wagtail [644]		Species or species habitat likely to occur within area
[Myiagra cyanoleuca](#) Satin Flycatcher [612]		Species or species habitat known to occur within area
[Rhipidura rufifrons](#) Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
[Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat likely to occur within area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area
[Gallinago hardwickii](#) Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
[Numenius madagascariensis](#) Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
[Pandion haliaetus](#) Osprey [952]		Species or species habitat likely to occur within area
[Tringa nebularia](#) Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

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

Name
Commonwealth Land -
Commonwealth Land - Australian Postal Corporation
Commonwealth Land - Australian Telecommunications Commission
Commonwealth Land - Australian Telecommunications Corporation
Commonwealth Land - Commonwealth Scientific & Industrial Research Organisation
Commonwealth Land - Defence Housing Authority
Commonwealth Land - Defence Service Homes Corporation
Commonwealth Land - Deputy Director of War Service Homes
Commonwealth Land - Director of Defence Service Homes
Commonwealth Land - Director of War Service Homes
Commonwealth Land - Telstra Corporation Limited
Defence - 1CAD ORCHARD HILLS KINGSWOOD
Defence - BLACKTOWN TRAINING DEPOT

Listed Marine Species [Resource Information]

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

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur

Name	Threatened	Type of Presence within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Kemps Creek	NSW
Prospect	NSW

Invasive Species	[Resource Information]

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

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Carduelis chloris European Greenfinch [404]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat known to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Dolichandra unguis-cati Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area

Caveat

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

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

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

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

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-33.81829 150.83826

Acknowledgements

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

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

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

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

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APPENDIX Q:
EMERGENCY MANAGEMENT PLAN

Emergency Management Plan (EMMP)

SURFSIDE 2 CDC EMMP V3

Construction
Development
Retirement
Capital

HINDMARSH
Leadership at work

Table of Contents

1. Document Control- Revision History

1.1 MANDATORY REVISION FREQUENCY

In consultation with the Construction Program this Management Plan shall be reviewed at the following nominated project stages.

Period of Review:	Nominate date of review:	Review to be managed by:	Date completed:
Site Establishment	Per Program	Stuart Bell	12/08/2019
Project Reaches 2 Storeys		Stuart Bell	19/05/2020
Fitout of E3		Simon Davis	01/07/2020

In addition to the above milestone reviews, reviews shall be prompted through Compass > SQE Planning Documents whereby documents are reviewed and confirmed without change and re-loaded to Compass, or reviewed, amended and uploaded accordingly so that the document reflects the project needs.

1.2 REVISION STATUS

Where revision is required the Revision Status table below shall be updated.

Date Issued	Revision	Details	Section	Page
August	1	Initial	All	All
May	2	Updates to Appendix A & B	App A & B	11; 13
July	3	Updates to Appendix E	App E	34

1.3 PROJECT SPECIFICS

Company Name:	Hindmarsh Construction Australia Pty Ltd
ABN	15 126 578 176
Project:	Surfside 2 CDC
Project No:	2026 & 2026R
Location:	16 Roberts Road, Eastern Creek
Client:	Canberra Data Centres
Client Contact:	Michael Gunton
Work Description:	Hindmarsh Constructions Australia (HCA) have been engaged by Canberra Data Centres (CDC) to deliver a 2 storey multi-phased data centre at 16 Roberts Road Eastern Creek NSW 2766. The project is highly serviced orientated and comprises the following elements Four new buildings varying in height Stage 1 & 2 offices Carpark and landscaping 150MW capacity Chiller and plant decks (100 No.) Generator facilities (50 No.)

1.4 INDUCTION

This emergency management plan is relevant to all personnel (Hindmarsh employees, contractors, sub-subcontractors and suppliers) performing any work on the CDC project. Workers and Visitors shall be advised of emergency and first aid procedures in accordance with the *Site-Specific Induction* respectively.

All Hindmarsh employees will receive induction training into the purpose and use of this EMMP. It will be acknowledged that they fully understand this EMMP's requirements and their roles / responsibilities associated with it. Acknowledgement and authorisation are recorded via the Acknowledgement Register / Aconex / other documented means.

2. Purpose and Scope of the EMMP

This emergency plan provides:

- Emergency and First Aid Requirement Assessments.
- Possible emergency procedures (ie; Emergency Standing Orders)
- The frequency of testing of the emergency procedures (ie; Emergency Drills).
- Information, training and instruction to relevant workers in relation to implementing the emergency procedures.

In preparing maintaining this emergency plan, HCA considers all relevant matters including:

- The nature of the work being carried out at the workplace
- The nature of the hazards at the workplace
- The size and location of the workplace
- The number and composition of the workers and other persons at the workplace

2.1 REFERENCED PROCEDURES AND DOCUMENTS

Compass documents, procedures and forms supporting this Emergency Management Plan are referenced accordingly throughout this plan and are formatted in *italics.*

3. Emergency Management Roles and Responsibilities

3.1 RESPONSIBILITY AND AUTHORITY

To facilitate effective emergency management, specific responsibilities for implementing and supporting this EMMP have been assigned by title as per below. Please refer to the Appendix B "Emergency Standing Orders" Roles and Responsibilities for project specific allocations.

3.1.1 Chief Emergency Warden (CEW)

CEW Training Requirement:

- hold emergency management training through an accredited Registered Training Organisation;
- hold basic First Aid training; and
- be employed in a supervisory position (eg Project Manager, Site Manager, Site Supervisor, Foreman).

CEW responsibilities:

- Complete Appendix E "HCA Minimum Emergency Equipment Needs Assessment" has been completed and signed off.
- Populate the Firefighting Equipment Register
- Ensure site roles and responsibilities are allocated and noted in Appendix B "Emergency Standing Orders" Roles and Responsibilities.
- Ensure emergency drills are conducted at the frequencies noted in Section 11.1.1.
- Assume CEW responsibilities as per Appendix B "Emergency Standing Orders" Roles and Responsibilities during any site emergency situation.

If the CEW cannot be contacted, then the Emergency Warden (DEW) is to act as the CEW.

3.1.2 Occupational First Aider (OFA)

OFA Training Requirement:

- Occupational First Aid training from a registered RTO.

OFA Responsibilities:

- Complete Appendix D "HCA Minimum First Aid Needs Assessment" has been completed and signed off.
- Populate the First Aid Equipment Register
- Assume OFA responsibilities as per Appendix B "Emergency Standing Orders" Roles and Responsibilities during any injury / illness management situation.

If the OFA cannot be contacted, then the Emergency Warden (DEW) is to act as the OFA.

3.1.3 Emergency Wardens (EW)

Emergency Warden Training Requirement:

- Firefighting training through an RTO;
- Minimum of Provide First Aid training from a registered RTO
- Instruction as per this EMMP.
- Acknowledgement of this EMMP and their roles and responsibilities as per Appendix B "Emergency Standing Orders" Roles and Responsibilities
- Participation in HCA Emergency Drills

Emergency Warden responsibilities:

- As allocated in Appendix B "Emergency Standing Orders" Roles and Responsibilities

3.1.4 First Aid Attendants

First Aid Attendants Training Requirement:

- Minimum of Provide First Aid training from a registered RTO
- Advanced First Aid training from a registered RTO required as per Appendix D

First Aid Attendant responsibilities:

- As allocated in Appendix B "Emergency Standing Orders" Roles and Responsibilities

4. Emergency Preparedness and Response

In order to identify potential incidents, hazards and accompanying emergency response processes, the *Project Risk Assessment* is completed.

The information captured via this process is to be reviewed and used to build this Emergency Management Plan. Emergency situations noted on the *Project Risk Assessment* are to be checked as applicable in Appendix B "Emergency Standing Orders".

The *Emergency Management Procedure* shall be enacted in accordance with the to manage the following defined Critical Incidents:

- Fatalities;
- Serious negative business occurrences;
- Serious management failure, fraud or misconduct;
- Serious perceptual damage to Hindmarsh's reputation;
- An escalating incident of any kind; or
- Any situation declared by the Chief Executive Officer (CEO).

5. Consultation

A coordinated and effective response to any emergency requires an understanding between the different parties involved. Consultation when developing the emergency plan

enables the development of this understanding before an incident occurs. It ensures that the roles, responsibilities, functions and needs of all PCBUs are understood and accurately incorporated into the emergency plan. Once the plan is implemented, consultation during the management of the plan allows all stakeholders to contribute to the testing, monitoring and review, and updating of the plan.

5.1.2 Workers & Other PCBU's

Acknowledging this all workers and other PCBUs are strongly encouraged to forward feedback and suggestions for improvement to HCA for consideration at any time.

Ongoing consultation with workers is actively pursued. For example, workers will be involved in conducting relevant drills in order to test the capability of the plan. Debriefings following these exercises provide participants with an opportunity to indicate the problems encountered and suggest possible solutions.

5.1.3 Community

Consultation with the community results in a two-way flow of issues and ideas. Community consultation not only results in a better-prepared community, but it can often lead to an improved understanding and acceptance of the industry by the wider community. The community shall be consulted as required throughout the emergency planning process.

5.1.4 Public Authorities

In order to ensure emergency preparedness plans are effective and efficient communication occurs with public authorities as required. This communication may cover the following:

- Details of access and egress points for emergency vehicles
- Emergency preparedness plan details
- Safety and Environmental aspects may be discussed with relevant authorities to ensure planned measures / controls are adequate

6. Communication of Emergency Plans and First Aid Requirements

Workers and Visitors shall be advised of emergency and first aid procedures in accordance with the *Site-Specific Induction* and *Safety Guidelines for Visitors Pamphlet* respectively. Information is posted within site sheds to ensure emergency numbers and evacuation points can be easily referenced if required.

7. First Aid Needs Assessment

As per the 'First Aid in the Workplace Code of Practice' Construction sites are classified as high-risk workplaces. This is due to the nature of work, potential injuries and illnesses and the likelihood of occurrence of these injuries and illnesses. With this taken into account the HCA first aid needs assessment will be based on the following:

- Number of workers on the site.
- Distance from available emergency assistance.
- Any exceptional hazards on the site.

In addition to the above, the following is also considered in determining first aid requirements:

- Work rosters should ensure that at least one first aider is available on site
- First aiders should attend refresher courses to ensure competency

A person with a minimum qualification of “Occupational First Aid” is to assess and complete Appendix D “HCA Minimum First Aid Needs Assessment”.

The following steps must be taken to complete Appendix D:

- Assess peak worker numbers on site.
- Assess if remote site. If assessed as a remote site use these requirements regardless of worker numbers.
- Assess any exceptional hazards and note any requirements above the minimum.
- Sign off assessment
- Populate the *First Aid and Emergency Equipment Register > First Aid Equipment Register* in line with the equipment specified by your site assessment
- Nominated HCA worker to complete ongoing checks as per the populated *First Aid and Emergency Equipment Register > First Aid Equipment Register* at monthly intervals.

8. Emergency Equipment Needs Assessment

The nominated site Chief Emergency Warden shall assess and complete Appendix E “HCA Minimum Emergency Equipment Needs Assessment”.

The HCA emergency equipment needs assessment will be based on the following:

- The Project Risk Assessment
- Less than 4 Storeys
- 4 Storeys and Above
- Any exceptional hazards on the site (as listed in the Project Risk assessment).

In addition to the above, the following is also considered in determining emergency requirements:

- All site staff are to be communicated their emergency roles as per Appendix B “Standing Orders” Roles and Responsibilities.

The nominated site Chief Emergency Warden is to assess and complete Appendix E “HCA Minimum Emergency Equipment Needs Assessment”.

The following steps must be taken to complete Appendix E:

- Assess number of storeys as per finished height of building.
- If assessed 4 Storeys and Above, complete HCA Firefighting Capability Checklist.
- Assess any exceptional hazards and note any requirements above the minimum.
- Sign off assessment.
- Complete the *First Aid and Emergency Equipment Register > Fire Fighting Equipment Register* in line with the equipment specified by your site assessment.

9. Number of Personnel

In the event of an emergency every person under Hindmarsh and subcontractor management control must be accounted for. Hindmarsh works collaboratively with other PCBUs to ensure all persons working or visiting the site are accounted for. In the event of an emergency all supervisors (Hindmarsh and Subcontractor) are to account for all persons under their management. Emergency Warden\s are to coordination this confirmation at the muster point.

9.1 EMERGENCY DRILLS – SAFETY AND ENVIRONMENT

Testing of the *Emergency Management Plan* is completed as per Emergency Drill Schedule detailed here. Corrective actions shall be identified and implemented as appropriate where improvement opportunities exist. This ensures emergency preparedness and response procedures / processes are fully effective and efficient. Site safety inspections also note the condition and availability of emergency equipment, exit signs, paths of travel and alarm system inspection.

During tests / drills the following elements are to be verified as inspected, tested and maintained (at regular intervals):

- Emergency equipment (safety and environment)
- Exit signs
- Paths of travel
- Alarm system / air horn / warning alarm

Emergency drills and outcomes will be documented via the *Emergency Drill – Safety & Environment* document.

9.1.1 Emergency Drill Schedule

Drill Date	Type – Select the check box for the scheduled drill type
1 May 2020	☒ Safety ☐ Environmental ☐ Other
1 Aug 2020	☐ Safety ☒ Environmental ☐ Other
1 Sep 2020	☒ Safety ☐ Environmental ☐ Other
1 Oct 2020	☐ Safety ☒ Environmental ☐ Other

10. Document & Record Management

Illness, injuries and incidents information is recorded via the Hindmarsh system Onsite. For record retention requirements please refer to the *WHS Record Retention Timeframes* document

11. Continual Improvement

Hindmarsh strives to continually improve all facets of business, including the effectiveness of its management systems. All employees are encouraged to forward comments and

feedback on all procedures, templates, forms, processes and systems, to ensure the system reflects and supports the highest standard of business.

APPENDIX A – EVACUATION / MUSTER POINTS

EVACUATION / MUSTER POINT

Simon Davis – 0434 233 713
Occupational First Aid / Chief Emergency Warden

Greg Byrne – 0400 592 066
Area Warden

Tarek Stelio – 0405 232 004
Area Warden

David Tauariki – 0409 215 956
Area Warden

Jason McNamee – 0409 215 956
Area Warden

APPENDIX B – EMERGENCY STANDING ORDERS

Surfside 2

Standing Orders

The checked ☒ Standing Orders are applicable to this project.

☒ 1 - Evacuation	☒ 2 - Injury / Incident Management	☒ 3 - Fire Emergency
☒ 4 - Environmental Emergency	☒ 5 - Severe Weather	☒ 6 - Earthquake
☒ 7 - Electric Shock	☒ 8 - Bomb Threat	☒ 9 - Safety Harness Rescue
☒ 10 - Confined Space Rescue	☒ 11 - Electrical / Services Damage	☒ 12 - Excavation Rescue
☒ 13 - Uncontrolled Escape of Gas	☒ 14 - Plant Collision / Rollover	☒ 15 - Crush Injuries from Plant or Materials
☒ 16 - Structure Collapse	☒ 17 – Unexpected Find of Asbestos or known Health Hazard	

HCA SITE SPECIFIC ROLES

HCA SITE SPECIFIC ROLES		
	NAME	CONTACT DETAILS
CHIEF EMERGENCY WARDEN	Simon Davis	0434 233 713
OCCUPATIONAL FIRST AIDER	Simon Davis	0434 233 713
EMERGENCY WARDEN	Greg Byrne	0400 592 006
EMERGENCY WARDEN	Tarek Stelio	0405 232 004
EMERGENCY WARDEN	Jason McNamee	0437 035 674
EMERGENCY WARDEN	Dave Tauariki	0409 215 956
FIRST AID ATTENDANT	Greg Byrne	0400 592 006
FIRST AID ATTENDANT	Tarek Stelio	0405 232 004
FIRST AID ATTENDANT	Jason McNamee	0437 035 674
FIRST AID ATTENDANT	Dave Tauariki	0409 215 956
FIRST AID ATTENDANT	Vincent Farhart	0436 838 306
FIRST AID ATTENDANT	Dean Argiropolous	0414 076 972
FIRST AID ATTENDANT	Rizwan Javed	0436 929 627

HCA SITE SPECIFIC EMERGENCY RESPONSIBILITIES

HCA RESPONSIBILITIES FOR INJURY / INCIDENT MANAGEMENT		
	PRIMARY ROLE	SECONDARY ROLE
Assess emergency	Greg Byrne	Tarek Stelio
Notify emergency services (note: in addition to any first on scene calls)	Greg Byrne	Tarek Stelio
Secure the area around the injured worker	Greg Byrne	Tarek Stelio
Provide First Aid and First Aid support	Greg Byrne	Simon Davis
Instruct Traffic Controllers / Man site entrances/ Meet and greet Emergency Services	Greg Byrne	Tarek Stelio
Organise appropriate emergency equipment (e.g. dog box)	Greg Byrne	Tarek Stelio
Inform Senior Project Manager, Project Manager	Greg Byrne	Tarek Stelio
Inform State SQE Manager	Greg Byrne	Tarek Stelio
Inform State Construction Manager	Greg Byrne	Tarek Stelio
Notify Regulators (e.g. SafeWork SA and/or OTR etc.)	Jim Tzakos	Greg Byrne
Lead Investigation	Jim Tzakos	Greg Byrne
After event Site and /or Team Briefing	Dave Last	Simon Davis

HCA RESONSIBILITIES IN EVACUATION		
	PRIMARY ROLE	SECONDARY ROLE
Assess emergency and activate site siren	C.E.W	Warden
Notify emergency services (note: in addition to any first on scene calls)	C.E.W	Warden
Advise emergency warden/s to commence evacuation shutdown procedures and can nominate Assembly Area if required	C.E.W	Warden
Provide First Aid and First Aid support	C.E.W	Warden
Collect site visitor register and go to muster point	C.E.W	Warden
Inform emergency services of any bulk hazardous substances e.g. Gas cylinders	C.E.W	Warden
Instruct Traffic Controllers to meet emergency services at gate entry to direct or instruct location of emergency	C.E.W	Warden
Check floors for other workers	C.E.W	Warden
Check all areas office, toilets, meeting room area and lunchroom, first aid & other rooms for workers	C.E.W	Warden
Undertake head count – Hindmarsh staff and visitors	C.E.W	Warden
Undertake head count –Subcontractor leading hand/Supervisors and to HCA representative coordinating muster	C.E.W	Warden
Liaise with emergency Services	C.E.W	Warden
Give all Clear to re-enter site	C.E.W	Warden
Inform Senior Project Manager, Project Manager	C.E.W	Warden
Inform State SQE Manager	Stuart Bell	Warden
Inform State Construction Manager	Stuart Bell	Warden
Notify Regulators (e.g. State Safety Regulator, EPA and/or OTR etc.)	Jim Tzakos	Warden
After event Site and/or Team Briefing	David Last	Simon Davis
Lead Investigation	Jim Tzakos	David Last

1 – EVACUATION

Evacuation process as per site induction information.

NOTIFICATION

ALL WORKERS

- Must notify HCA representative immediately. Contact **CEW:** Simon Davis on **0434 233 713** or any other HCA Representative
- May immediately call 000 if you believe it necessary
- May activate audible alarm device / system if you believe it necessary

ACTION

HCA

- CEW / EW assesses the emergency and evacuation required
- Commence evacuation of site by activating **the site siren**
- CEW / EW to coordinate site evacuation as per **HCA ROLES & RESONSIBILITIES IN EVACUATION**

ALL WORKERS

EVACUATE

When you hear **the site siren** evacuate the site calmly and promptly, as follows:

- Leave the site by the safest and shortest possible route.
- Follow directions of, Emergency Wardens and Emergency Service Personnel
- Proceed to the Assembly Area designated for the site.
- Do NOT cluster around doorways or stairs.
- Do NOT hinder Wardens and emergency services in carrying out their duties.
- Do NOT use hoists or lifts during evacuation
- Wait for further directions from the Chief Warden or emergency services.
- Do NOT re-enter the site for any reason until authorised to do so by the relevant emergency services.
- NEVER enter a site when the alarm is sounding

2 – INJURY / INCIDENT MANAGEMENT

NOTIFICATION

ALL WORKERS

- Must notify HCA representative immediately. Contact**: Greg Byrne** on **0400 592 006** or any other HCA Representative
- May immediately call 000 if you believe it necessary
- May activate audible alarm device / system if you believe it necessary

ACTION

HCA

- CEW / EW to assess the emergency
- CEW/ EW to coordinate injury management as per **HCA ROLES & RESPONSIBILITIES FOR INJURY / INCIDENT MANAGEMENT**
- If required commence evacuation of site by activating **the site siren**
- CEW / EW to coordinate site evacuation as per **HCA ROLES & RESONSIBILITIES IN EVACUATION**

ALL WORKERS

EVACUATE

If **the site siren** sounds, follow 1- EVACUATION standing order as communicated in your site induction.

3 – FIRE EMERGENCY

NOTIFICATION

ALL WORKERS

- Must notify HCA representative immediately. Contact **CEW:** Simon Davis on **0434 233 713** or any other HCA Representative
- May immediately call 000 if you believe it necessary
- May activate audible alarm device / system if you believe it necessary

ACTION

HCA

- CEW / EW to assess the emergency
- If it is safe to do so, commence first attack firefighting through the use of a Fire Extinguisher
- If the fire cannot be contained, commence evacuation of site by activating **the site siren**
- CEW / EW to coordinate site evacuation as per **HCA ROLES & RESONSIBILITIES IN EVACUATION**

ALL WORKERS

EVACUATE

If **the site siren** sounds, follow 1- EVACUATION standing order as communicated in your site induction.

4 – ENVIRONMENTAL EMERGENCY

Environmental emergency may include:

- **Spills**
- **Failure of Erosion and Sediment Controls**
- **Contaminated Material Identified on-site**
- **Discovery of an item of aboriginal or heritage significance**

NOTIFICATION

ALL WORKERS

- Must notify HCA representative immediately. Contact **CEW:** Simon Davis on **0434 233 713** or any other HCA Representative
- May immediately call 000 if you believe it necessary
- May activate audible alarm device / system if you believe it necessary

ACTION

HCA

- CEW / EW to assess the emergency
- If safe to do so, stop the source of the emergency and contain the affected area
- If required, commence evacuation of site by activating **the site siren**
- If evacuation required, CEW / EW to coordinate site evacuation as per **HCA ROLES & RESONSIBILITIES IN EVACUATION**
- HCA representative will contact local EPA, Council or other relevant authorities as required by legislation

ALL WORKERS

EVACUATE

If **the site siren** sounds, follow 1- EVACUATION standing order as communicated in your site induction.

5 – SEVERE WEATHER

NOTIFICATION

ALL WORKERS

- Must notify HCA representative immediately. Contact **CEW:** Simon Davis on **0434 233 713** or any other HCA Representative
- May immediately call 000 if you believe it necessary
- May activate audible alarm device / system if you believe it necessary

ACTION

HCA

- Monitor weather conditions via the Bureau of Meteorology (BOM) website
- HCA to discuss possible actions to be taken where a severe weather event is forecast or BOM weather alerts are in place at the daily prestart meeting eg;
    - Secure / tie down loose items
    - Shut down hoist / Crane
    - Shut down exposed plant
    - Shut down exposed work areas
    - Not permit personnel to be working at heights
- If severe weather event occurs, CEW / EW to assess the emergency
- If required, commence evacuation of site by activating **the site siren**
- If evacuation required, CEW / EW to coordinate site evacuation as per **HCA ROLES & RESONSIBILITIES IN EVACUATION**

ALL WORKERS

EVACUATE

If **the site siren** sounds, follow 1- EVACUATION standing order as communicated in your site induction.

6 – EARTHQUAKE

NOTIFICATION

ALL WORKERS

- Must notify HCA representative immediately. Contact **CEW:** Simon Davis on **0434 233 713** or any other HCA Representative
- May immediately call 000 if you believe it necessary
- May activate audible alarm device / system if you believe it necessary

ACTION

HCA

- CEW / EW to assess the emergency. Please note, after an earthquake, aftershock or smaller tremors can be expected.
- Commence evacuation of site by activating **the site siren**
- CEW / EW to coordinate site evacuation as per **HCA ROLES & RESONSIBILITIES IN EVACUATION**
- Isolate site services (electricity, gas and water)
- CEW/ EW to coordinate injury management as per **HCA ROLES & RESPONSIBILITIES FOR INJURY / INCIDENT MANAGEMENT**

ALL WORKERS

EVACUATE

If **the site siren** sounds, follow 1- EVACUATION standing order as communicated in your site induction.

7 – ELECTRIC SHOCK

NOTIFICATION

ALL WORKERS

- Must notify HCA representative immediately. Contact **CEW:** Simon Davis on **0434 233 713** or any other HCA Representative
- May immediately call 000 if you believe it necessary
- May activate audible alarm device / system if you believe it necessary

ACTION

HCA

- CEW / EW to assess the emergency
- Coordinate rescue of injured worker as below:
    - **Shut down / isolate the power. Do Not Touch** the person until the electrical service has been isolated/turned off
    - Physically separate the casualty from the what was the actual source of power (i.e. remove drill from hand)
- CEW/ EW to coordinate injury management as per **HCA ROLES & RESPONSIBILITIES FOR INJURY / INCIDENT MANAGEMENT**
- If required commence evacuation of site by activating **the site siren**
- CEW / EW to coordinate site evacuation as per **HCA ROLES & RESONSIBILITIES IN EVACUATION**

ALL WORKERS

EVACUATE

If **the site siren** sounds, follow 1- EVACUATION standing order as communicated in your site induction.

8 – BOMB THREAT

NOTIFICATION

ALL WORKERS

- Must notify HCA representative immediately. Contact **CEW:** Simon Davis on **0434 233 713** or any other HCA Representative
- May immediately call 000 if you believe it necessary
- May activate audible alarm device / system if you believe it necessary

ACTION

HCA

- **ALWAYS TAKE BOMB THREATS SERIOUSLY**
- **ASK THE CALLER AND RECORD THE FOLLOWING INFORMATION**:
    - Who are you?
    - Where are you?
    - What time is it?
    - Where is the bomb?
    - What does it look like?
    - When will it explode?
    - Why are you doing this?
- Do not hang up phone.
- **RECORD THE FOLLOWING EXTRA INFORMATION ABOUT THE CALL:**
    - The time of the call
    - Sex of the caller (male / female)
    - Adult or child's voice
    - Accents, manner etc
    - Did you recognise the voice
    - Background noises: TV, Radio, music, machinery, planes, trains, cars etc
    - Any other information about the call
- CEW / EW assess the emergency
- Commence evacuation of site by activating **the site siren**
- CEW / EW to coordinate site evacuation as per **HCA ROLES & RESONSIBILITIES IN EVACUATION**

ALL WORKERS

EVACUATE

If **the site siren** sounds, follow 1- EVACUATION standing order as communicated in your site induction.

9 – SAFETY HARNESS RESCUE

CRITICAL NOTE:

SAFETY HARNESS RESCUE IS SPECIALISED, WORKERS USING SAFETY HARNESSES MUST COMPLETE A HCA HARNESS PERMIT. THIS DOCUMENT ENSURES THAT WORKERS USING SAFETY HARNESS IN FALL ARREST HAVE SPECIFIC EMERGENCY RESCUE PROCEDURES IN PLACE FOR THIS ACTIVITY.

NOTIFICATION

ALL WORKERS

- Must notify HCA representative immediately. Contact **CEW:** Simon Davis on **0434 233 713** or any other HCA Representative
- May immediately call 000 if you believe it necessary
- May activate audible alarm device / system if you believe it necessary

ACTION

HCA

- CEW / EW to assess the emergency
- If required assist trained workers with the emergency procedures as outlined within the HCA Harness Permit for this task
- If required CEW/ EW to coordinate injury management as per **HCA ROLES & RESPONSIBILITIES FOR INJURY / INCIDENT MANAGEMENT**
- If required commence evacuation of site by activating **the site siren**
- CEW / EW to coordinate site evacuation as per **HCA ROLES & RESONSIBILITIES IN EVACUATION**

ACTION

WORKERS UNDERTAKING HARNESS USE

- Trained workers to commence emergency rescue procedures as outlined within the HCA Harness Permit for this task

ALL WORKERS

EVACUATE

If **the site siren** sounds, follow 1- EVACUATION standing order as communicated in your site induction.

10 – CONFINED SPACE RESCUE

CRITICAL NOTE:

CONFINED SPACE RESCUE IS SPECIALISED, WORKERS IN CONFINED SPACES MUST COMPLETE A CONFINED SPACE PERMIT. THIS DOCUMENT MUST ENSURE THAT SPECIFIC EMERGENCY RESCUE PROCEDURES ARE IN PLACE FOR THIS ACTIVITY.

NOTIFICATION

ALL WORKERS

- Must notify HCA representative immediately. Contact **CEW:** Simon Davis on **0434 233 713** or any other HCA Representative
- May immediately call 000 if you believe it necessary
- May activate audible alarm device / system if you believe it necessary

ACTION

HCA

- CEW / EW to assess the emergency
- If required assist trained workers with the emergency procedures as outlined within the Confined Space Permit for this task
- If required CEW / EW to coordinate injury management as per **HCA ROLES & RESPONSIBILITIES FOR INJURY / INCIDENT MANAGEMENT**
- If required commence evacuation of site by activating **the site siren**
- CEW / EW to coordinate site evacuation as per **HCA ROLES & RESONSIBILITIES IN EVACUATION**

ACTION

WORKERS UNDERTAKING CONFINED SPACE WORK

- Trained workers to commence emergency rescue procedures as outlined within the Confined Space Permit for this task

ALL WORKERS

EVACUATE

If **the site siren** sounds, follow 1- EVACUATION standing order as communicated in your site induction.

11 – ELECTRICAL SERVICES DAMAGE

NOTIFICATION

ALL WORKERS

- Must notify HCA representative immediately. Contact **CEW:** Simon Davis on **0434 233 713** or any other HCA Representative
- May immediately call 000 if you believe it necessary
- May activate audible alarm device / system if you believe it necessary

ACTION

HCA

- CEW / EW to assess the emergency
- **Shut down / isolate the power**
- If caused by plant, CEW / EW to instruct operator to remain in cab and not touch metal surfaces
- If required commence evacuation of site by activating **the site siren**
- If required CEW / EW to coordinate site evacuation as per **HCA ROLES & RESONSIBILITIES IN EVACUATION**
- If required CEW / EW to coordinate injury management as per **HCA ROLES & RESPONSIBILITIES FOR INJURY / INCIDENT MANAGEMENT**

ALL WORKERS

EVACUATE

If **the site siren** sounds, follow 1- EVACUATION standing order as communicated in your site induction.

12 – EXCAVATION RESCUE

CRITICAL NOTE:

EXCAVATION RESCUE MAY BE SPECIALISED, WORKERS CONDUCTING EXCAVATION MUST COMPLETE A HCA EXCAVATION PERMIT. THIS DOCUMENT ENSURES THAT SPECIFIC EMERGENCY RESCUE PROCEDURES ARE IN PLACE FOR THIS ACTIVITY.

NOTIFICATION

ALL WORKERS

- Must notify HCA representative immediately. Contact **CEW:** Simon Davis on **0434 233 713** or any other HCA Representative
- May immediately call 000 if you believe it necessary
- May activate audible alarm device / system if you believe it necessary

ACTION

HCA

- CEW / EW to assess the emergency
- If required assist trained workers with the emergency procedures as outlined within the HCA Excavation Permit for this task
- If required CEW / EW to coordinate injury management as per **HCA ROLES & RESPONSIBILITIES FOR INJURY / INCIDENT MANAGEMENT**
- If required commence evacuation of site by activating **the site siren**
- CEW / EW to coordinate site evacuation as per **HCA ROLES & RESONSIBILITIES IN EVACUATION**

ACTION

WORKERS UNDERTAKING EXCAVATION

- Trained workers to commence emergency rescue procedures as outlined within the HCA Excavation Permit for this task

ALL WORKERS

EVACUATE

If **the site siren** sounds, follow 1- EVACUATION standing order as communicated in your site induction.

13 – UNCONTROLLED ESCAPE OF GAS

NOTIFICATION

ALL WORKERS

- Must notify HCA representative immediately. Contact **CEW:** Simon Davis on **0434 233 713** or any other HCA Representative
- May immediately call 000 if you believe it necessary
- May activate audible alarm device / system if you believe it necessary

ACTION

HCA

- CEW / EW to assess the emergency

Leak Outside

- Isolate the area with bollards and barrier tape if possible, alternatively strategically place personnel / wardens at any access points keep clear to 30 Metres.
- Shut down any possible sources of ignition within controlled area e.g. Mobile Plant, Vehicles, Electrical Plant at switchboards, pilot lights or gas appliances.
- Consider evacuation of nearby buildings, if buildings are within 30 Metres buffer zone, notify Security of buildings to be evacuated and use exits that are furthest away from leak zone.
- If required commence evacuation of site by activating **the site siren**
- If required CEW / EW to coordinate site evacuation as per **HCA ROLES & RESONSIBILITIES IN EVACUATION**
- If required CEW / EW to coordinate injury management as per **HCA ROLES & RESPONSIBILITIES FOR INJURY / INCIDENT MANAGEMENT**

Leak Inside

- Commence evacuation of site by activating **the site siren**
- CEW / EW to coordinate site evacuation as per **HCA ROLES & RESONSIBILITIES IN EVACUATION**
- If safe to do so, shut down / isolate the gas supply
- If safe to do, shut off / isolate power supply for building
- If required CEW / EW to coordinate injury management as per **HCA ROLES & RESPONSIBILITIES FOR INJURY / INCIDENT MANAGEMENT**

ALL WORKERS

EVACUATE

If **the site siren** sounds, follow 1- EVACUATION standing order as communicated in your site induction.

14 - PLANT COLLISION / ROLLOVER

NOTIFICATION

ALL WORKERS

- Must notify HCA representative immediately. Contact **CEW:** Simon Davis on **0434 233 713** or any other HCA Representative
- May immediately call 000 if you believe it necessary
- May activate audible alarm device / system if you believe it necessary

ACTION

HCA

- CEW / EW to assess the emergency
- If safe to do so, shut down / isolate the plant, do not climb onto or endanger yourself on unstable vehicles / plant
- Isolate the area from other workers
- If suspected crush injuries follow 15 - Crush Injuries From Plant or Materials
- If required CEW / EW to coordinate injury management as per **HCA ROLES & RESPONSIBILITIES FOR INJURY / INCIDENT MANAGEMENT**
- If required commence evacuation of site by activating **the site siren**
- If required CEW / EW to coordinate site evacuation as per **HCA ROLES & RESONSIBILITIES IN EVACUATION**

ALL WORKERS

EVACUATE

If **the site siren** sounds, follow 1- EVACUATION standing order as communicated in your site induction.

15 – CRUSH INJURIES FROM PLANT OR MATERIALS

NOTIFICATION

ALL WORKERS

- Must notify HCA representative immediately. Contact **CEW:** Simon Davis on **0434 233 713** or any other HCA Representative
- May immediately call 000 if you believe it necessary
- May activate audible alarm device / system if you believe it necessary

ACTION

HCA

- CEW / EW to assess the emergency
- Coordinate rescue of injured worker as below:
    - **If required, shut down / isolate the plant**
    - If safe and physically possible, all crushing forces should be removed as soon as possible
- CEW / EW to coordinate injury management as per **HCA ROLES & RESPONSIBILITIES FOR INJURY / INCIDENT MANAGEMENT**
- If required commence evacuation of site by activating **the site siren**
- CEW / EW to coordinate site evacuation as per **HCA ROLES & RESONSIBILITIES IN EVACUATION**

ALL WORKERS

EVACUATE

If **the site siren** sounds, follow 1- EVACUATION standing order as communicated in your site induction.

16 – STRUCTURE COLLAPSE

NOTIFICATION

ALL WORKERS

- Must notify HCA representative immediately. Contact **CEW:** Simon Davis on **0434 233 713** or any other HCA Representative
- May immediately call 000 if you believe it necessary
- May activate audible alarm device / system if you believe it necessary

ACTION

HCA

- CEW / EW to assess the emergency
- Commence evacuation of site by activating **the site siren**
- CEW / EW to coordinate site evacuation as per **HCA ROLES & RESONSIBILITIES IN EVACUATION**
- Coordinate rescue of any trapped workers as below:
    - If safe and physically possible, remove debris from around trapped worker/s
    - If safe, support unstable debris to allow removal of trapped worker/s
- If suspected crush injuries follow 15 - Crush Injuries From Plant or Materials
- CEW / EW to coordinate injury management as per **HCA ROLES & RESPONSIBILITIES FOR INJURY / INCIDENT MANAGEMENT**

ALL WORKERS

EVACUATE

If **the site siren** sounds, follow 1- EVACUATION standing order as communicated in your site induction.

17 – Unexpected Find of Asbestos or known Health Hazard

NOTIFICATION

ALL WORKERS

- Must notify HCA representative immediately. Contact **CEW:** Simon Davis on **0434 233 713** or any other HCA Representative
- May immediately call 000 if you believe it necessary
- May activate audible alarm device / system if you believe it necessary

ACTION

HCA

- CEW / EW to assess the emergency
- Cease work in the area, and adjacent work areas and establish a 10m exclusion and containment zone;
- Communicate the unexpected find and immediate control measures to potentially affected workers and the regulator (for Asbestos Only) and engage Occupational Hygienist.
- If required commence evacuation of site by activating **the site siren**

ALL WORKERS

EVACUATE

If **the site siren** sounds, follow 1- EVACUATION standing order as communicated in your site induction.

APPENDIX C – EMERGENCY TELEPHONE REPORT

WHO WAS CONTACTED?	
☐ 000 ☐ Police ☐ Fire Brigade ☐ Ambulance	
BE PREPARED TO ANSWER:	
1. LOCATION site entry point	Black entry gates at the end of Roberts road
STATE =	NSW
SUBURB =	Eastern Creek
STREET =	17 Roberts Road
Mention any Casualties – Hazards – Your Name & Contact No	
• TYPE OF EMERGENCY	
• CASUALTIES	
• ASSISTANCE REQUIRED	
• HAZARDS	
• TELEPHONE CONTACT NUMBER	(Put site phone Number here)
• NAME OF CONTACT	
ANY INSTRUCTIONS? ☐ NO ☐ YES (List below)	
ESTIMATED TIME OF ARRIVAL:	
DATE:	**TIME:**

REMEMBER, KEEP CALM – SPEAK CLEARLY

APPENDIX D – HCA MINIMUM FIRST AID NEEDS ASSESSMENT

Occupational First Aider to assess as per section 7 guidelines

Equipment Required	SITE ASSESSMENT (Site Worker Numbers / Location of Site) Site Worker Numbers are for the calculated peak worker numbers including Site Office staff. *Remote Site = A Site where medical assistance is > 30 minutes away.*				Site Specific Comments
	0-50 Workers	51-100 Workers	100+ Workers	Remote Site	
Site Numbers Identification (check applicable)	☐	☐	☒	☐	
National Workplace Kit – Portable	1	1	1	1	3 Portable kits
National workplace Kit extra (may be portable or wall mount)	0	1	1	1	2 wall mounted kits
Standalone First Aid Room	0	0	1	1	1 shed on site
Trained First Aiders ("Provide First Aid" course as minimum)	2	3	2 + 1 for every 25 people over 100	1 per 10 workers	6 Trained First Aiders
Trained First Aiders ("Advanced First Aid" course as minimum)	0	1	1	1	
Trained First Aiders ("Occupational" course as minimum)	0	0	1	0	1 Trained Occupational First Aider
Stretcher	1	1	1	1	3 stretchers
Defibrillator	1	1	1	1	1 Defibrillator
Oxy Therapy	0	1	1	1	1 Oxy viva kit
Nurse Call	1	1	1	1	Multiple stations on site
Sharps Container	1	1	1	1	1 sharps container
Eye Wash Capacity (e.g. 15 minutes flush)	1	1	1	1	1 eye wash
Burn Cooling capacity (e.g. 15 minutes running water)	1	1	1	1	1 tap inside first aid shed
Further first Aid Equipment due to exceptional hazards on site as identified in the Project Risk Assessment (add extra lines if required):					
First Aid Equipment assessment completed by *(must be qualified Occupational First Aider):*	**Name:** Simon Davis		**Signature:**		**Date:** 30.08.20
First Aid Equipment register to be checked by *(HCA worker name):*	S.D		**First Aid Kit Contents to be Checked and Stocked by (e.g. HCA or St Johns, St James)**		S.D

APPENDIX E – HCA MINIMUM EMERGENCY EQUIPMENT NEEDS ASSESSMENT

CEW to assess as per section 8 guidelines.

Equipment Required	SITE ASSESSMENT Number of storeys to be assessed as per finished height of building Less Than 4 Storeys	 4 Storeys and Above	Site Specific Comments
Site Numbers Identification (check applicable)	☒	☐	
On Site Emergency Communications System	1	1	
Adequate communication to contact 000	1	1	
Fire Extinguishers	As per fire extinguisher location plan and register	1 at every entry/exit point (minimum 2 per floor)	
Firefighting capability	During construction the requirement for operational hydrants & hose reels is not applicable.	**CEW to complete HCA Firefighting Capability Checklist below**	
Emergency Access and Extraction points (e.g. stretcher stairs, First aid crane-able man-box, internal stair access)	2	2 (1 may be personnel hoist)	
Personnel Hoist	0	1 once Level 4 is reached	
Spill Kit	1	1	
Further Emergency Equipment due to exceptional hazards on site as identified in the Project Risk Assessment (add extra lines if required):			
Emergency Equipment assessment completed by Chief Emergency Warden:	**Name:** Simon Jans	**Signature:**	**Date:** 30.8.20
Emergency Equipment register to be checked by *(HCA worker name)*:	SP.	**Fire Extinguishers inspected at 6 monthly intervals by (e.g. HCA or Subcontractor):**	SP.

HCA Fire Fighting Capability Assessment

Suitable means of fire-fighting must be installed to the degree necessary in a building under construction to allow initial fire attack by construction workers and for the fire brigade to undertake attack on the fire appropriate to-

(a) the fire hazard; and

(b) the height the building has reached during its construction.

Fire extinguishers are to be provided on site, in accordance with the deemed to satisfy provision (a) below. The CEW is to complete the fire extinguisher register for the site and document that the required inspections have been completed.

HCA will take into account, as a minimum standard, the BCA Deemed to satisfy provisions Section E1.9 Fire precautions during construction

(a) Minimum of one fire extinguisher to suit Class A, B and C fires and electrical fires must be provided at all times on each storey adjacent to each required exit or temporary stairway or exit; and

(b) after the building has reached an effective height 12m (4 Storeys) -

(i) The building hydrants and fire hose reels must be operational in at least every storey which is covered by the roof or the floor structure above, except the 2 uppermost storeys.

(ii) Any building booster connections must be installed

If the deemed to satisfy provision above can be met, please sign below

If the deemed to satisfy provision above cannot be met the CEW will complete the below checklist to ensure sufficient firefighting capability during construction.

Checklist for building solutions to assist in meeting the Objective Performance Requirement (where the deemed to satisfy provisions cannot be met):		
No.		**Comment / Action**
1	Advice is sought from the Emergency Services (Local Fire Brigade). *This early engagement is critical to support Fire Brigade firefighting requirements and capabilities specific to the site.*	Less than 4 storeys
2	Hydrant / booster water supply is sourced early in the program, lead times may vary dependent on water authority resources and permit applications.	Existing ring main still in effect
3	Street fire hydrant or hydrants location has been identified and added to Emergency management / evacuation drawing and is clearly accessible to the Fire Brigade appliance (Truck) at all times during construction.	Refer to Evacuation / Muster Point drawing
3(a)	Temporary hydrant booster connection may need to be made available on the building side based on fire brigade advice.	Existing booster is located on onsite

4	Alternate temporary water supply or permanent water supply for hose reels has been established after building reaches 12m. Note: Fire Hose reels must function with appropriate performance (pressure and volume) necessary to allow user safe initial attack on a fire.	Building less than 4 story high with an effective building height of 6.1m
5	Process and procedure is in place for the supply of site fire safety information, the information is current and can be relayed to the fire brigade on arrival for the following: • Site personnel all evacuated and accounted for or there are missing persons known. • Site power supply isolation is known and accessible for crane, plant and equipment power and distribution boards etc. • Hazardous or flammable substances type, location and quantities including gas in cylinders are known. • In the case of any site mains natural gas supply the shut off valve location is known	Chief Emergency Warden to provide information
6	Housekeeping strategies have been developed to minimise accumulation of combustible materials.	Storage cages and locations to be determined by CEW
7	Hot work strategies are in place to eliminate fires as a result of welding, grinding, blowtorch and or oxy acetylene use	Permits are to be issued for any hot works
8	Chief Emergency Warden training is current as per Emergency Management Plan	Yes
9	Emergency (deputy) Warden and area warden training is current as per the Emergency Management Plan. This training may be based on experience, external training or regular fire drill participation.	Yes
10	Expert Judgment (Fire Brigade) for alternative solutions must be documented.	Noted

☒ All actions within this above checklist have been implemented as required.

or

☐ Deemed to satisfy provisions are met.

Name: Simon Sun Signature: Date: 30.08.20.

APPENDIX F – EXTERNAL EMERGENCY CONTACT DETAILS

IN CASE OF ACCIDENT OR EMERGENCY:

Fire	**000**
Ambulance	**000**
Police	**000**
Gas	13 19 09
Electricity	13 13 09
Doctor or Medical Centre	**8834 7730**
Poisons	**13 11 26**
Gas Emergency	**13 19 09**
Electrocution	**13 10 50**
Safety Authority	**13 10 50**
Environmental Protection Authority	**13 11 26**

EMERGENCY PHONE CALL:

STATE:

"I HAVE AN EMERGENCY TO REPORT"

YOUR NAME

THE EMERGENCY IS AT: 17 Roberts road Eastern Creek

TYPE OF EMERGENCY: <type of emergency>

DON'T HANG UP UNTIL ASKED TO DO SO

ANSWER ALL QUESTIONS

CLOSEST HOSPITAL

Name	**Mount Druitt Hospital**
Address	**75 Railway Parade, Mount Druitt, NSW, 2770.**
Telephone Number	**02 9881 1711**
Casualty Access	

CLOSEST MEDICAL CENTRE

Name	**Eastern Creek Medical Centre**
Address	**Shop 12/2a Southridge street Eastern Creek**
Telephone Number	**02 8834 7730**
Casualty Access	

APPENDIX R: WASTE MANAGEMENT PLAN

WASTE MANAGEMENT PLAN

SSD-10330 Eastern Creek Data Centre
17 Roberts Road, Eastern Creek

Prepared for:

Canberra Data Centres Pty Ltd
PO Box 304
JERABOMBERRA NSW 2619

SLR Ref: 610.18883-R04
Version No: -v4.0
May 2020

PREPARED BY

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BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Canberra Data Centres Pty Ltd (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
610.18883-R04-v4.0	12 May 2020	Celine El-Khouri	Andrew Quinn	Andrew Quinn
610.18883-R04-v3.0	18 October 2019	Celine El-Khouri	Andrew Quinn	Andrew Quinn
610.18883-R04-v2.0	4 October 2019	Celine El-Khouri	Sean Sciberras	Sean Sciberras
610.18883-R04-v1.0	28 August 2019	Taylor Parsons	Celine El-Khouri	Andrew Quinn

CONTENTS

CONTENTS

DOCUMENT REFERENCES

TABLES

CONTENTS

FIGURES

APPENDICES

1 Introduction

1.1 Overview

SLR Consulting Australia Pty Ltd (SLR) has been commissioned by Canberra Data Centres Pty Ltd (the Applicant) to prepare this report in accordance with the technical requirements of the Secretary's Environmental Assessment Requirements (SEARs), and in support of the SSD-10330 for the development of a Data Centre at 17 Roberts Road, Eastern Creek (the Project) in the Western Sydney Employment Area (WSEA).

This Waste Management Plan (WMP) applies to the waste generated from the site preparation, construction and operational stages of the Project and has been prepared using architectural drawings supplied by the Applicant and attached in **Appendix A**.

1.2 Objectives

The objectives of this WMP are to:

- Identify potential wastes likely to be generated during the site preparation, construction works and operation of the Project;
- Provide advice on how identified wastes should be handled, identified, processed, disposed of, reused or recycled in accordance with Council requirements, relevant Australian codes and standards and better practice waste minimisation principles;
- Encourage waste avoidance and minimisation through advice on design, ordering and planning; and
- Help implement safe and practical options for waste collection from the Project by Blacktown City Council (Council) or private waste servicing contractors.

1.3 Review of WMP

This WMP is not a static document. It is a working document that requires review and updating to ensure ongoing suitability for the proposed on-going operations at the site.

This WMP will be reviewed and updated:

- To remain consistent with waste and landfill regulations and guidelines;
- If changes are made to site waste and recycling management; or
- To take advantage of new technologies, innovations and methodologies for waste or recycling management.

Copies of the original WMP and its future versions should be retained by the building manager. Changes made to the WMP, as well as the reasons for the changes made, should be documented by the building manager as part of the review process.

2 Glossary and Abbreviations

Table 1 below shows the glossary of terms and their definitions used in this WMP.

Table 1 Glossary

Term	Definition
The Applicant	Canberra Data Centres Pty Ltd
Council	Blacktown City Council
The Department	Department of Planning, Industry and Environment
The Project	The construction of a new Data Centre and ancillary office space to expand the operation of the existing Data Centre to the east of the site.
The Site	Canberra Data Centres Pty Ltd owns the site at 17 Roberts Road, Eastern Creek and is legally known as Lot 2 in Deposited Plan 1159804.

Table 2 below shows the abbreviations and their definitions used in this WMP.

Table 2 Abbreviations

Term	Definition
BDCP	Blacktown Development Control Plan 2015
BLEP	Blacktown Local environmental Plan 2015
EPA	Environment Protection Authority
ENM	Excavated Natural Material
LGA	Local Government Area
NSW	New South Wales
SEARs	Secretary's Environmental Assessment Requirements
SLR	SLR Consulting Australia Pty Ltd
SSD	State Significant Development
WMP	Waste Management Plan
WSEA	Western Sydney Employment Area

3 Project Description

3.1 Site description

The site is located at 17 Roberts Road, Eastern Creek and comprises land known as Lot 2 in Deposited Plan 1159804. The site is identified in **Figure 1**.

Figure 1 Aerial imagery of the Site

Key features of the site are as follows:

- The site is approximately 14.52 ha and is an irregular shape. The site is bound by Roberts Road to the south and Capicure Drive to the north, as shown in **Figure 1**.
- The site is located within the suburb of Eastern Creek, which falls in the Blacktown Local Government Area. The site is located in the Eastern Creek Precinct of WSEA and is surrounded by general and light industrial land uses.
- The majority of the site is cleared, with scattered vegetation around the peripheral of the site.
- Vehicular access to the site is from the local road network available from Roberts Road and Capicure Drive. New internal road will be established as part of the SSDA for internal connection and vehicular access.

Key development features of the site are as listed below. Refer to **Figure 2** for the site plan.

- An existing Data Centre with associated office building and plant is located to the east of the site. This Data Centre is to be retained and does not form part of this SSDA.
- Building 3 is currently under construction under a series of Complying Development Certificates. These comprise of Early Works, Base Build, Fit Out and installation of 12 generators. These works do not form part of the SSDA scope. Additional rooftop plant and equipment for Building 3 forms part of the proposed SSDA scope.

Key features of the locality are:

North: The adjoining land to the north comprises large-scale warehouses, freight and logistics and light industrial activities with ancillary offices, which all form part of the Eastern Creek Business Park.

East: To the east is a parcel of vacant land and landscaped buffer between the light industry use land on the western side of M7 Highway. Western Sydney Park Land and SUEZ Eastern Creek Resource Recovery Park is further to the east of the site, located on the eastern side of M7 Highway.

South: Land immediately to the south is part of the TransGrid Eastern Creek site, which contains multiple high voltage transmission lines. Austral Bricks is located further south.

West: The land to the west of Roberts Road is Australian Personnel Solutions National Service Centre. Further to the west is Old Wallgrove Road and TransGrid Eastern Creek site, containing high voltage transmission lines and substations.

The nearest residential receivers are located in Horsley Park located around 1 km to the south of the site. Other nearby residential areas include Minchinbury to the north of the site beyond the M4 approximately 4 km from the site and Erskine Park to the west, approximately 2.8 km from the site.

3.2 Proposed Construction and Operations

The SSDA proposes the construction of a new Data Centre and ancillary office space to expand the operation of the existing Data Centre to the east of the site. The proposed Data Centre including three large warehouse buildings and ancillary office space, which will deliver economic benefits and employment generation for Western Sydney and the Greater Sydney Region.

Specifically, the SSDA seeks consent for:

- Site preparation works comprising:
    - Site preparation and mobilisation including clearing of land and importation of fill material;
    - Bulk and detail earthworks and support structures;
    - Estate stormwater management including construction of detention basins;
    - Construction of site access and estate internal roads;
    - Service and infrastructure augmentation;
    - Perimeter fencing;
    - Retaining wall;

  - Removal of trees and
  - Environmental protection and management measures.
- Staged construction of buildings for a Data Centre with 24 hour per day, seven day per week operation:
  - Construction of three 3 storey warehouse facilities (E4, E5, E6) including ancillary office spaces;
  - Additional rooftop plant and equipment for Building E3 in associated with Data Centre use;
  - Fit out of buildings;
  - Construction of a store room;
  - Security booth;
  - Generator within generator enclosures;
  - Landscaping works; and
  - Construction of hardstand, loading area and a new car park.

The proposal does not involve the installation of any form of signage to the façade of the building.

Once the construction stage is completed, the Development will continue to operate as a data storage centre. This WMP addresses the waste generated from the proposed buildings only. The waste management of the existing data hall buildings to the east is managed separately by an existing waste management plan. This WMP is prepared for the new four data halls located to the west of the site.

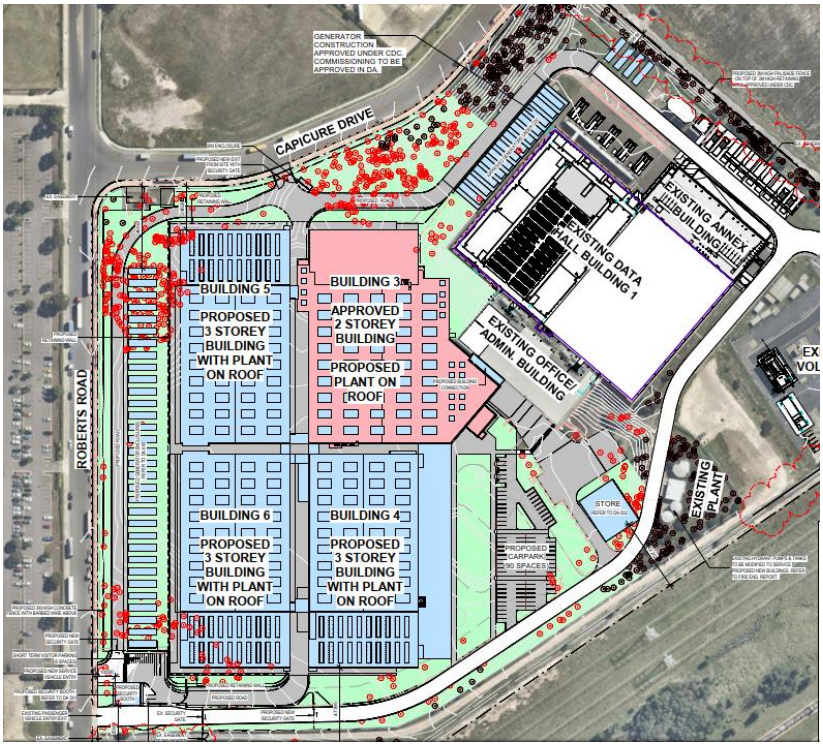


Figure 2 The site plan of the proposed Project[1].

[1] Adapted from EJE Architecture's drawing DA-100 dated 06 May 2020.

4 Better Practice for Waste Management and Recycling

4.1 Waste Management Hierarchy

This WMP has been prepared in line with the waste management hierarchy shown in **Figure 3**. The hierarchy summarises the objectives of the *Waste Avoidance and Resource Recovery Act 2001.*

The waste management hierarchy comprises the following principles, from most to least preferable:

- Waste **avoidance**, prevention or reduction of waste generation. Achievable through better design and purchasing choices.
- Waste **reuse**, reuse without substantially changing the form of the waste.
- Waste **recycling**, treatment of waste that is no longer usable in its current form to produce new products.
- Energy **recovery**, processing of residual waste materials to recover energy.
- Waste **treatment**, reduce potential environmental, health and safety risks.
- Waste **disposal**, in a manner that causes the least harm to the natural environment.

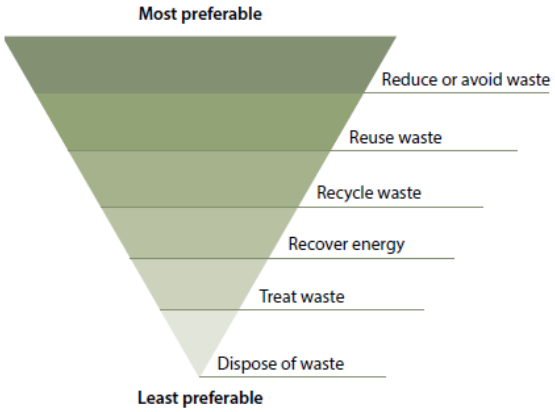


Image from NSW EPA (2014) NSW Waste Avoidance and Resource Recovery Strategy 2014-21.

Figure 3 Waste management hierarchy

4.2 Benefits of Adopting Better Practice

Adopting better practice principles in waste minimisation offers significant benefits for organisations, stakeholders and the wider community. Benefits from better practice waste minimisation include:

- Improved reputation of an organisation due to social and environmental responsibility.
- Lowered consumption of non-renewable resources.
- Reduced environmental impact, for example, pollution from materials manufacturing and waste treatment.
- Reduced expenses from lower waste disposal.
- Providing opportunities for additional revenue streams through beneficial reuse.

5 Waste Legislation and Guidance

The legislation and guidance outlined in **Table 3** below should be referred to during the operation of the Project.

Table 3 Legislation and guidance

Legislation/Guidance	Objectives
Council legislation and guidelines	
Blacktown Development Control Plan 2015	The Blacktown Development Control Plan 2015 (BDCP) applies to all development proposals in the Blacktown local government area that are lodged after 29 July 2015. The BDCP supports provision of the LEP planning controls by providing detailed planning and design guidelines. The BDCP has been prepared in accordance with the Section 74C of the *Environmental Planning and Assessment Act 1979* and the Environmental Planning and Assessment Regulation 2000. The sections incorporated into this WMP are Part E – Development in the Industrial Zones and Part G – Site Waste Management and Minimisation.
Blacktown Local Environmental Plan 2015[2]	The Blacktown Local Environmental Plan 2009 (BLEP) came into force on 14 July 2015 and provides the legal framework of the BDCP, including land use and development permitted in a set zone. The LEP also contains provisions to conserve local heritage and protect sensitive land.
Western Sydney Regional Waste Avoidance and Resource Recovery Strategy 2017-2021[3]	The Western Sydney Regional Waste Avoidance and Resource Recovery Strategy 2017-2021 is Council's strategy that focuses on managing waste and resources for the years up to 2021. Council recognises that a clear pathway is required towards a future of sustainable waste management. The strategy sets out Council's pathway to achieving targets that are in accordance with the NSW Waste Avoidance and Resource Recovery Strategy 2014-21.
Western Sydney Regional Action Plan Community Discussion Paper NSW 2021[4]	The Western Sydney Regional Action Plan 2021 is the supporting document for Council's strategy that sets out clearly defined actions that Council is to undertake. The aim of these actions is to help Council achieve the Western Sydney Regional Waste Avoidance and Resource Recovery Strategy 2017-2021 targets. The action plan includes increasing support to local governments to improve waste and recycling outcomes through joint activities and better information.
The Western Sydney Recycling Directory – Construction and Demolition Waste 2017[5]	The Western Sydney Recycling Directory of Construction and Demolition Waste 2017 features disclosures on the recommended storage and separation techniques of wastes uncovered or generated during construction and demolition activities. It also includes descriptions of broad categories of waste and links and references to recycling directories and environmental and work safety guides. These recommendations are applicable to wider Western Sydney, including Council.
Waste Management Service Charter 2019[6]	Blacktown City Council's Waste Management Service Charter 2019 outlines the waste servicing opportunities Council provides and includes bin standards to enable collection; conditions for multi-unit dwellings; the frequency of the service and the associated responsibilities of recipients. This document applies to commercial and domestic developments, as industrial developments are to be serviced by a private waste contractor.
State and National legislation and guidelines	
Building Code of Australia and relevant Australian Standards	The Building Code of Australia aims to achieve nationally consistent, minimum necessary standards of relevant health and safety, amenity and sustainability objectives efficiently.

[2] https://www.legislation.nsw.gov.au/#/view/EPI/2015/239

[3] https://www.bmcc.nsw.gov.au/sites/default/files/docs/2018-05-29_Enclosure_Item11.PDF

[4] http://www.uws.edu.au/__data/assets/pdf_file/0004/369364/Western_Sydney_Community_Discussion_Paper1.pdf

[5] https://www.blacktown.nsw.gov.au/files/content/public/services/waste/demolition-and-construction-waste/western-sydney-recycling-directory-cd-updated-nov-2017.pdf

[6] https://www.blacktown.nsw.gov.au/files/assets/public/environment/waste/waste-management-service-charter-2019.pdf

Legislation/Guidance	Objectives
Council of Australian Governments National Construction Code 2016	The National Construction Code 2016 sets the minimum requirements for the design, construction and performance of buildings throughout Australia.
NSW EPA's Better Practice Guidelines for Waste Management and Recycling in Commercial and Industrial Facilities 2012	These better practice guidelines present information on waste minimisation and resource recovery as well as information on commonly used waste management provisions. The guidelines also provide benchmarks for assessing waste production rates in Australia.
NSW EPA (2014) NSW Waste Avoidance and Resource Recovery Strategy 2014-21	The NSW Waste Avoidance and Resource Recovery Strategy 2014-21 is aimed at ultimately 'improving environment and community well-being by reducing the environmental impact of waste and using resources more efficiently' by presenting a framework intended to avoid and reduce waste generation, increase recycling, divert more waste from landfill, manage problem wastes better, reduce litter and reduce illegal dumping.
NSW EPA Resource Recovery Orders and Resource Recovery Exemptions	The NSW EPA has issued a number of resource recovery orders and resource recovery exemptions under the POEO (Waste) Regulation 2014 for a range of wastes that may be recovered for beneficial re-use. These wastes typically include those from demolition and construction works, as well as ongoing wastes such as food waste. • Resource recovery orders present conditions which generators and processors of waste must meet to supply the waste material for beneficial re-use. • Resource recovery exemptions contain the conditions which consumers must meet to use waste for beneficial re-use.
NSW EPA's Waste Classification Guidelines 2014	The NSW EPA Waste Classification Guidelines assists waste generators to effectively manage, treat and dispose of waste to ensure the environmental and human health risks associated with waste are managed appropriately and in accordance with the *POEO Act 1997* and is associated regulations.
Protection of the Environment Operations Act (POEO) 1997 and *Amendment Act 2011*	The POEO Act 1997 and POEO Amendment Act 2011 are administered by the NSW EPA to enable the NSW Government to establish instruments for setting environmental standards, goals, protocols and guidelines. They outline the regulatory requirements for lawful disposal of wastes generated during the demolition, construction and operational phases of a development, as well as the system for licencing waste transport and disposal.
The Work Health and Safety Regulation 2011	The Work Health and Safety Regulation 2011 provide detailed actions and guidance associated with the topics discussed in *The Work Health and Safety Act 2011*. The primary aim of the regulation is to protect the health and safety of workers and ensure that risks are minimised in work environments. Workplaces are to ensure that they are compliant with the requirements specified in the regulations. The regulations discuss items such as actions that are prohibited or obligated in work environments, the requirements for obtaining licences and registrations, and the roles and responsibilities of staff in workplaces.
Waste Avoidance and Resource Recovery Act 2001	The *Waste Avoidance and Resource Recovery Act 2001* aims to promote waste avoidance and resource recovery and repeals the *Waste Minimisation and Management Act 1995*. Specific objectives of the *Waste Avoidance and Resource Recovery Act 2001* include: • encouraging efficient use of resources • minimising the consumption of natural resources and the final disposal of waste by encouraging the avoidance of waste and the reuse and recycling of waste • ensuring industry and the community share responsibility in reducing/dealing with waste, and • efficiently funding of waste and resource management planning, programs and service delivery. As of 2016, the addition to the Act of Part 5 defines the legislative framework for the 'Return and Earn Container Deposit Scheme' whereby selected beverage containers can be returned to State Government authorities for a monetary refund.

6 Site Clearance and Construction Waste and Recycling Management

6.1 Targets for Resource Recovery

The construction of each development should aim to contribute to the following target in accordance with the NSW EPA (2014) *NSW Waste Avoidance and Resource Recovery Strategy 2014-21*:

- 80%[7] of total construction and demolition waste diverted for reuse and recycled, with receipts sufficient in demonstrating the achieved target.

In addition, construction at the Project is to contribute to the following goal from the BDCP, Part G – Site Waste Management and Minimisation:

- Maximise reuse and recycling of building and construction materials.

In accordance with the BDCP, the objective of waste management at demolition and construction stages is to reuse and recycle as much generated waste as possible and minimise waste output. This is done through planned work staging, on-site waste storage and waste separation at the source.

It is anticipated that the waste minimisation measures in the following sections will assist the Project to meet these targets. Waste reporting and audits can be used to determine the actual percentage of wastes that are being, or have been, recycled during the site preparation and construction stages of the Project.

6.2 Waste Streams and Classifications

The construction phase of the Project is anticipated to generate the following broad waste streams:

- Site clearance wastes, as outlined in **Section 6.3** and **Section 6.4**;
- Construction waste, as outlined in **Section 6.5**;
- Plant maintenance waste;
- Packaging waste; and
- Work compound waste from on-site employees.

A summary of likely waste types generated from site preparation and construction activities, along with their waste classifications and proposed management methods are provided in **Table 4**. The BDCP Part G details some examples of these methods in Forms 2 and 3.

[7] NSW EPA, NSW Waste Avoidance and Resource Recovery Strategy 2014-21, dated December 2014, available from: https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/wastestrategy/140876-warr-strategy-14-21.pdf

For further information on how to determine a waste's classification refer to the NSW EPA (2014) *Waste Classification Guidelines*[8]. Further information on managing site preparation and construction wastes is available from the NSW EPA website[9] and details of reuse recommendations for wider Western Sydney are available in the Western Sydney Recycling Directory – Construction and Demolition Waste 2017[10].

Disposal suggestions are also available at Council's search directory on the 'B informed' waste and recycling application.[11]

Table 4 Potential waste types, classifications and management methods

Waste Types	NSW EPA Waste Classification	Proposed Management Method
Demolition		
Green waste including timber, pine and particle board	General solid waste (non-putrescible) (garden waste)	Separated, some chipped and stored on-site for landscaping, remainder to landscape supplies or off-site recycling; stumps and large trees to landfill.
Clean fill	General solid waste (non-putrescible)	On-site re-use
Contaminated fill	To be classified subject to the results of testing	Off-site treatment or disposal to landfill
Excavated natural material (ENM) or Virgin excavated natural material (VENM)	General solid waste (non-putrescible)	On-site re-use of topsoil for landscaping of the site; off-site beneficial re-use or send to landfill site.
Construction		
Sediment fencing, geotextile materials	General solid waste (non-putrescible)	Reuse at other sites where possible or disposal to landfill
Concrete	General solid waste (non-putrescible)	Off-site recycling for filling, levelling or road base
Bricks and pavers	General solid waste (non-putrescible)	Cleaned for reuse as footings; broken bricks for internal walls; crushed for landscaping or driveway use; off-site recycling
Gyprock or plasterboard	General solid waste (non-putrescible)	Off-site recycling or returned to supplier
Sand or soil	General solid waste (non-putrescible)	Off-site recycling
Metals such as fittings, appliances and bulk electrical cabling, including copper and aluminium	General solid waste (non-putrescible)	Off-site recycling at metal recycling compounds and remainder to landfill
Conduits and pipes	General solid waste (non-putrescible)	Off-site recycling

[8] Available online from https://www.epa.nsw.gov.au/your-environment/waste/classifying-waste/waste-classification-guidelines

[9] Available online from http://www.epa.nsw.gov.au/your-environment/waste/industrial-waste/construction-demolition

[10] https://www.blacktown.nsw.gov.au/files/content/public/services/waste/demolition-and-construction-waste/western-sydney-recycling-directory-cd-updated-nov-2017.pdf

[11] https://www.blacktown.nsw.gov.au/Services/Waste/B-informed-waste-and-recycling-app

Waste Types	NSW EPA Waste Classification	Proposed Management Method
Timber	General solid waste (non-putrescible)	Off-site recycling; Chip for landscaping; Sell for firewood *Treated*: reused for formwork, bridging, blocking, propping or second-hand supplier *Untreated*: reused for floorboards, fencing, furniture, mulched second hand supplier, and remainder to landscape supplies.
Doors, Windows, Fittings	General solid waste (non-putrescible)	Off-site recycling at second hand supplier
Insulation material	General solid waste (non-putrescible)	Off-site disposal
Glass	General solid waste (non-putrescible)	Off-site recycling; glazing or aggregate for concrete production
Asbestos	Hazardous waste	Off-site disposal at a licenced landfill facility.
Fluorescent light fittings and bulbs	Hazardous waste	Off-site recycling or disposal; contact *FluoroCycle* for more information[12]
Paint	Hazardous waste	Off-site recycling, Paintback collection[13] or disposal
Synthetic Rubber or carpet underlay	General solid waste (non-putrescible)	Off-site recycling; reprocessed and used in safety devices and speed humps
Ceramics including tiles	General solid waste (non-putrescible)	Off-site recycling at a crushing and recycling company
Carpet	General solid waste (non-putrescible)	Off-site recycling or disposal; reused for landscaping, insulation or equestrian uses
Plant Maintenance		
Empty oil and other drums or containers, such as fuel, chemicals, paints, spill clean ups	Hazardous waste: Containers were previously used to store Dangerous Goods (Class 1, 3, 4, 5 or 8) and residues have not been removed by washing or vacuuming. General solid waste (non-putrescible): Containers have been cleaned by washing or vacuuming.	Transport to comply with the transport of Dangerous Goods Code applies in preparation for off-site recycling or disposal at licensed facility Note: Discharge to sewer subject to Trade Waste Agreement with local Council
Air filters and rags	General solid waste (non-putrescible)	Off-site disposal
Oil filters	Hazardous waste	Off-site recycling
Batteries	Hazardous waste	Off-site recycling, Contact the Australian Battery Recycling Initiative[14] for more information
Packaging		

[12] Available online from http://www.fluorocycle.org.au/ or http://www.environment.gov.au/settlements/waste/lamp-mercury.html

[13] Available online from https://www.paintback.com.au/

[14] http://www.batteryrecycling.org.au/home

Waste Types	NSW EPA Waste Classification	Proposed Management Method
Packaging materials, including wood, plastic, including stretch wrap or LLPE, cardboard and metals	General solid waste (non-putrescible)	Off-site recycling
Wooden or plastic crates and pallets	General solid waste (non-putrescible)	Reused for similar projects, returned to suppliers, or off-site recycling. Contact *Business Recycling* for more information[15]
Work Compound and Associated Offices		
Food Waste	General solid (putrescible) waste	Compost on-site or dispose to landfill with general garbage
Recyclable beverage containers (glass and plastic bottles, aluminium cans), steel cans	General solid waste (non-putrescible)	Co-mingled recycling at off-site licensed facility or at a local NSW container deposit scheme 'Return and Earn' facility[16]
Clean paper and cardboard	General solid waste (non-putrescible)	Paper and cardboard recycling at off-site licensed facility
General domestic waste generated by workers (soiled paper and cardboard, food stuffs, polystyrene)	General solid waste (non-putrescible) mixed with putrescible waste	Disposal at landfill

6.3 Site Preparation Waste Types and Quantities

As the site is currently vacant, site preparation waste is expected to be primarily green waste, excavated fill, soil and/or rock. From the architectural plans featured in the SEARs documentation, SLR understands that some excavation is anticipated to level the foundations of the data centres[17]. Communication from civil engineer Anthony Mancone provides the cut and fill quantities for the Project[18]. These are shown in Table **5** below.

Based on communication with the Applicant, SLR understands that the management of the removal of trees from the site will be detailed in the arboreal assessment for the Project[19].

Table 5 Estimated bulk earthwork quantities (m^3)

Total Cut	Total Fill	Balance
38,593	40,843	2,250

Care should be taken to minimise site disturbance and limit unnecessary excavation.

[15] Available online from http://businessrecycling.com.au/search/

[16] Available online from http://returnandearn.org.au/

[17] Urbis Pty Ltd (2019). Request For Secretary's Environmental Assessment Requirements Warehouse And Distribution Centre At 17 Roberts Road, Eastern Creek. Sydney, P.33.

[18] Email communication from Jeremy Pepper, 'RE: 610.18883 - Eastern Creek Data Centre Office Area', dated 16 August 2019.

[19] Email communication from Jeremy Pepper, 'RE: 610.18883 Eastern Creek - vegetation waste and timing etc', dated 16 August 2019.

All excavated spoil is to be classified by an appropriately experienced environmental consultant and separated into contaminated materials, if any, uncontaminated fill or ENM. Refer to **Section 6.8** for management of stockpiles. Uncontaminated fill or ENM should be retained on site and managed appropriately for beneficial re-use for filling earthworks. **Table 5** shows that there is a net input requirement for fill so no ENM is expected to be removed from the site.

For contaminated material management, refer **Section 6.9** of this WMP. Excavated sandstone is to be sold for beneficial re-use.

6.4 Demolition Waste Types and Quantities

The demolition activities for the Project are anticipated to include:

- Removal of the carpark at the street entrance;
- Removal of the carpark below the existing data halls; and
- Removal of some internal roads circling the existing data centre.

Based on communication with Hindmarsh[20], SLR understands that the existing carparks consist of asphalt and road base. SLR has assumed that the internal roads are constructed of similar material.

Council's guidelines do not provide waste generation rates for demolition activities and demolition waste generation rates for carparks and roads constructed of asphalt and road base are not readily available. In order to calculate the waste generated from the removal of the structures, the volume of the carparks and internal roads was calculated. The surface areas of the structures are based on NearMaps site measurements[21], and the depth is based on assumptions of common depth for similar structures.

Based on these assumptions, the volume of waste generated from the removal of the asphalt and road base in the carparks and internal roads was calculated. These estimated are shown in **Table 6** below.

Table 6 Estimated quantities of demolition waste

Site Component	Material	Surface Area (m^2)	Depth (m)	Volume (m^3)
Street entrance carpark	Asphalt	1,238	0.05	65
	Road base	1,238	0.1	125
Data hall carpark	Asphalt	1,536	0.05	80
	Road base	1,536	0.2	310
Internal roads	Asphalt	1,511	0.05	80
	Road base	1,511	0.2	305

Waste quantity estimates have been rounded up to the nearest 5 m^3.

Road base should be reused on site where possible.

SLR recommends that a demolition quantities survey be conducted by a qualified professional on the existing site should further information on types and quantities of demolition waste be required.

[20] Email received from Emily Morrow at Hindmarsh, titled "RE: 610.18883 Eastern Creek Data Centre – Final WMP", dated 17 October 2019

[21] Floor areas estimated from NearMaps site projection dated 21 July 2019.

6.5 Construction Waste Types and Quantities

The construction activities for the Project include the construction of the data halls, offices, plants, store building, internal and access roads and car parking spaces, as described in **Section 3.2.**

Council's guidelines do not provide waste generation rates for construction activities. In the absence of readily available construction waste generation rates from Council, SLR has adopted the 'Factory' and 'Office' waste generation rates from Appendix A of The Hills Development Control Plan 2012 for estimating the type and quantities of waste generated from construction of the Project.

In the absence of readily available published information for 'Carpark' construction waste generation rates, SLR has developed 'Carpark' (**Table 7**) construction rates based on the 'Office' rates by:

- Removing timber, bricks and gyprock as these materials are unlikely to be present in significant quantities in a modern carpark structure; and
- Increasing the rates for concrete, sand or soil, metal and 'other', in proportion, to maintain the total assumed tonnage per 1000 m^2 of construction.

Table 7 Waste generation rates applied to the Project's construction

Rate Type	Floor Area (m^2)	Waste types and quantities (m^3)						
		Timber	Concrete	Bricks	Gyprock	Sand or Soil	Metal	Other
Factory	1,000	0.25	2.10	1.65	0.45	4.80	0.60	0.50
Office	1,000	5.1	18.8	8.5	8.6	8.8	2.75	5
Carpark	1,000	--	30.6	--	--	14.3	4.5	8.1

These waste generation rates are used to estimate the waste generated from the construction of the Project.

The generation rates for 'Factory' are applied to calculate the waste quantities from the construction of the warehouses, the roof plants, the loading areas and the store buildings, the rates for 'Office' are applied to calculate the waste quantities from the construction of the offices and the 'Carpark' waste generation rates are applied to calculate the waste quantities from the construction of all access roads and carparks. These estimates are provided in **Table 8**.

Actual waste quantities and composition will vary; however, this estimate is provided so that the Construction Site Manager can make provision for on-site or off-site re-use and recycling opportunities.

Table 8 Anticipated types and estimated quantities of construction waste

Site Area	Location	Area (m^2)	Waste types and quantities (m^3)						
			Timber	Concrete	Bricks	Gyprock	Sand or Soil	Metal	Other
Building 3	Building 3 Roof Plant	5,388	5	15	10	5	30	5	5
Building 4	Warehouse	12,173	5	30	25	10	60	10	10
	Office	4,806	25	95	45	45	45	15	25
	Internal Roads	6,657	0	205	0	0	100	30	55
	Loading	431	5	5	5	5	5	5	5
	Plant	7,811	5	20	15	5	40	5	5
	Terrace	1,947	10	40	20	20	20	10	10

Site Area	Location	Area (m²)	Waste types and quantities (m³)						
			Timber	Concrete	Bricks	Gyprock	Sand or Soil	Metal	Other
	Car parking	2,773	0	85	0	0	40	15	25
	Vertical Circulation	385	5	5	5	5	5	5	5
Building 5	Warehouse	11,989	5	30	20	10	60	10	10
	Office	303	5	10	5	5	5	5	5
	Loading	266	5	5	5	5	5	5	5
	Plant	7,817	5	20	15	5	40	5	5
	Terrace	1,964	15	40	20	20	20	10	10
	Vertical Circulation	310	5	5	5	5	5	5	5
Building 6	Warehouse	12,060	5	30	20	10	60	10	10
	Office	290	5	10	5	5	5	5	5
	Loading	280	5	5	5	5	5	5	5
	Plant	7,711	5	20	15	5	40	5	5
	Terrace	1,937	10	40	20	20	20	10	10
	Vertical Circulation	355	5	5	5	5	5	5	5
Other	Warehouse	423	5	5	5	5	5	5	5
	Office	28	5	5	5	5	5	5	5
Out Buildings	Warehouse	514	5	5	5	5	5	5	5
	Office	79	5	5	0	0	5	5	5
Totals		**88,698**	**155**	**740**	**280**	**210**	**635**	**200**	**245**

Floor areas estimated based drawings provided by EJE Architecture dated 16 April 2020.

Waste quantity estimates have been rounded up to the nearest 5 m³.

6.6 Waste Avoidance

The Building Contractor, Building Designer and/or equivalent roles should follow better practice waste management and the principles of Ecologically Sustainable Development.

Recommendations for the Building Designer include:

- Using prefabricated components;
- Avoiding printing where possible;
- Using low formaldehyde wood products, post-consumer reused timber and/or Forest Stewardship Council certified timber;
- Using fittings and furnishings that have been recycled, are made from or incorporate recycled materials and have been certified as sustainable or environmentally friendly by a recognised third party certification scheme;
- Preferentially using building materials, fittings and furnishings, including structural framing, roofing and façade cladding, that have longer life and better re-use and recycling potential;
- Reducing the use of polyvinyl chloride products;
- Preferentially using paints, floor coverings and adhesives with low VOC (volatile organic compound) content;

- Avoiding unsustainable timber imports including western red cedar, oregon, meranti, luan or merbau;
- Selecting materials based on low embodied energy properties that suit the Project, such as recycled materials including recycled steel and glass-wool insulation, or concrete with slag and fly ash content;
- Centralising wet areas together to minimise piping; and
- Designing for deconstruction rather than demolition.

Recommendations for the Building Contractor include:

- Applying practical building designs and construction techniques;
- Minimising excavation works;
- Investigating leased equipment and machinery rather than purchase and disposal;
- Sorting and segregating site preparation and construction wastes to ensure efficient recycling of wastes;
- Preferentially selecting building materials, fittings and furnishings, including structural framing, roofing and façade cladding, that have longer life and better re-use and recycling potential;
- Store wastes on-site appropriately to prevent cross-contamination and/or mixing of different waste types;
- Reducing packaging waste by:
    - Returning packaging to suppliers where practicable to reduce waste further along the supply chain;
    - Purchasing in bulk;
    - Requesting cardboard or metal drums rather than plastics;
    - Requesting metal straps rather than shrink wrap; and
    - Using returnable packaging such as pallets and reels.
- Arranging deliveries ‘as needed’ to mitigate degradation, weathering or moisture damage; and
- Ensure subcontractors are informed of and implement site waste minimisation and management procedures.

6.7 Re-use, Recycling and Disposal

Effective management of construction materials and construction and demolition waste, including options for reuse and recycling where applicable and practicable, will be conducted. Only wastes that cannot be cost effectively reused or recycled are to be sent to landfill or appropriate disposal facilities.

Refer to **Table 4** for an outline of the proposed reuse, recycling and disposal methods for potential site preparation and construction waste streams generated by the Project.

In accordance with the BDCP and best practice waste management, the following specific procedures should be implemented:

- Facilitate on-site source separation to ensure efficient recycling, as outlined in **Section 6.8.1;**
- Concrete, tiles and bricks will be reused or recycled off-site;
- Steel will be recycled off-site, and all other metals will be recycled where economically viable;
- Framing timber will be recycled off-site;

- Windows, doors and joinery will be recycled off-site, where possible;
- Waste oil will be recycled or disposed of in an appropriate manner;
- All glass that can be economically recycled will be recycled;
- All solid waste timber, brick, concrete, rock that cannot be reused or recycled will be taken to an appropriate facility for treatment to recover further resources or for disposal to landfill in an approved manner;
- Facilitate re-use of materials on-site;
- Provide separate waste bins for recyclable and non-recyclable general wastes;
- Assess excavation spoil for contamination status and beneficial re-use;
- Retain used crates for storage purposes unless damaged;
- Recycle cardboard, glass and metal wastes;
- Provide sufficient space for storage of garden waste and other waste materials on-site;
- Dispose of all asbestos, hazardous and/or intractable wastes in accordance with SafeWork NSW and NSW EPA requirements;
- Deliver batteries to drop off-site recycling facility; and
- Where source separation is utilised, materials are to be kept uncontaminated to guarantee the highest possible re-use value.

6.8 Waste Segregation, Storage and Servicing

6.8.1 Waste Segregation and Storage

Waste materials produced from site preparation and construction activities are to be separated at the source and stored separately on-site. It is anticipated that the Project will provide enough space on-site for separate storage, for example, separate skip bins or appropriately managed stockpiles, of the following waste types:

- Bricks, concrete and scrap metal;
- Metal and steel, in a condition suitable for recycling at metal recycling facilities;
- Timber;
- Glass;
- Hardstand rubble;
- Uncontaminated excavation spoil, if present;
- Contaminated excavation spoil, if present;
- Hazardous waste, if present;
- Paper and cardboard;
- General co-mingled recycling waste; and
- Non-recyclable general waste.

If there is insufficient space on-site for full segregation of waste types, the Site Manager, or equivalent role, should consult with the waste and recycling collection contractor to confirm which waste types may be co-mingled prior to removal from the site.

6.8.2 Waste Storage Areas

Waste storage areas will be accessible and allow sufficient space for storage and servicing requirements. The storage areas will also be flexible in order to cater for change of use throughout the project. Where space is restricted, dedicated stockpile areas are to be delineated on the site, with regular transfers to dedicated skip bins for sorting.

All waste placed in skips or bins for disposal or recycling will be adequately contained to ensure that the waste does not fall, blow, wash or otherwise escape from the site. Waste containers and storage areas are to be kept clean and in a good state of repair.

Areas designated for waste storage should:

- allow unimpeded access by site personnel and waste disposal contractors;
- take into account environmental factors which could potentially cause an impact to the waste storage, such as slope, drainage and the location of watercourses and native vegetation;
- allow sufficient space for the storage of garden waste and other waste materials on-site;
- employ adequate environmental management controls to prevent off-site migration of waste materials and contamination from the waste. For example, consideration of slope, drainage, proximity relative to waterways, stormwater outlets and vegetation;
- consider visual amenity, safety and accessibility in their selection; and
- not present hazards to human health or the environment.

6.8.3 Waste Servicing and Record Keeping

The Site Manager or equivalent role is to:

- Arrange for suitable waste collection contractors to remove any construction waste from site;
- Ensure waste bins are not filled beyond recommended filling levels;
- Ensure that all bins and loads of waste materials leaving site are covered;
- Maintain waste disposal documentation detailing, at a minimum:
    - Descriptions and estimated amounts of all waste materials removed from site;
    - Details of the waste and recycling collection contractors and facilities receiving the waste and recyclables;
    - Records of waste and recycling collection vehicle movements, for example, date and time of loads removed, licence plate of collection vehicles, tip dockets from receiving facility; and
    - Waste classification documentation for materials disposed to off-site recycling or landfill facilities.
- Ensure lawful waste disposal records are readily accessible for inspection by regulatory authorities such as Council, SafeWork NSW or NSW EPA; and
- Remove waste during hours approved by Council.

If skips and bins are reaching capacity, removal and replacement should be organised as soon as possible. All site generated building waste collected in the skips and bins will leave the site and be deposited in the approved site lawfully able to accept them.

6.9 Unexpected Finds and Contaminated and Hazardous Wastes

During the site preparation and construction phases, SLR recommends that a qualified and certified contractor is engaged to remove all contaminated or hazardous materials, for example, asbestos, and dispose of all contaminated or hazardous waste at an appropriately licenced facility.

All asbestos and other hazardous waste must be handled according to appropriate legislation and regulation including the Work Health and Safety Regulation 2011.

For further details on asbestos handling and storage, please see the Western Sydney Recycling Directory – Construction and Demolition Waste 2017[22].

6.10 Signage

For best practice, standard signage is to be posted in all waste storage and collection areas. All waste containers should be labelled correctly and clearly to identify stored materials.

Signs approved by the NSW EPA for labelling of waste materials are available online[23] and should be used where applicable. A selection of signs prepared by NSW EPA is provided in **Figure 4.**

Figure 4 Examples of NSW EPA labels for waste skips and bins

6.11 Site Inductions

All staff, including sub-contractors and labourers, employed during the site preparation and construction phases of the Project must undergo induction training regarding waste management for the Site.

Induction training is to cover, as a minimum, an outline of the WMP including:

[22] https://www.blacktown.nsw.gov.au/files/content/public/services/waste/demolition-and-construction-waste/western-sydney-recycling-directory-cd-updated-nov-2017.pdf

[23] NSW EPA approved waste materials signage https://www.epa.nsw.gov.au/your-environment/recycling-and-reuse/business-government-recycling/standard-recycling-signs

- legal obligations and targets;
- emergency response procedures on-site;
- waste priorities and opportunities for reduction, reuse and recycling;
- waste storage locations and separation of waste;
- procedures for suspected contaminated and hazardous wastes;
- waste related signage;
- the implications of poor waste management practices; and
- responsibilities and reporting, including identification of personnel responsible for waste management and individual responsibilities.

It is the responsibility of the Site Manager or Building Contractor to notify Council of the appointment of waste removal, transport or disposal contractors.

6.12 Monitoring and Reporting

As part of Council's Guidelines, Industrial developments require forms to be completed as part of the monitoring of waste generated during construction and demolition work. The forms are attached in **Appendix B**.

In addition, the following monitoring practices are to be undertaken to improve demolition and construction waste management and to obtain accurate waste generation figures:

1. Conduct waste audits of current projects where feasible.
2. Note waste generated and disposal methods.
3. Look at past waste disposal receipts.
4. Record this information to track waste avoidance, reuse and recycling performance and to help in waste estimations for future waste management plans.

Records of waste volumes recycled, reused or contractor removed are to be maintained. Additionally, it is recommended that dockets or receipts verifying recycling and disposal in accordance with this WMP are kept and presented to regulatory bodies when required.

Daily visual inspections of waste storage areas will be undertaken by site personnel and inspection checklists and logs recorded for reporting to the Site Manager on a weekly basis or as required. These inspections will be used to identify and rectify any resource and waste management issues.

Waste audits are to be carried out by the Building Contractor to gauge the effectiveness and efficiency of waste segregation procedures and recycling and reuse initiatives. Where audits show that the above procedures are not carried out effectively, additional staff training will be undertaken and signage re-examined.

6.13 Roles and Responsibilities

All personnel have a responsibility for their own environmental performance and compliance with all legislation. It will be the responsibility of the Site Manager, or equivalent role, to implement the WMP and the responsibility of employees and subcontractors to ensure that they comply with the guideline at all times.

Suggested roles and responsibilities for waste management at the site are provided in **Table 9**. Where possible, a construction environmental manager, or equivalent role, should be appointed for the site preparation and construction work. An equivalent construction environmental manager role is defined to be a person dedicated to overseeing the environmental compliance and performance of a development. Where a construction environmental manager is not appointed, responsibilities in **Table 9** for the construction environmental manager will become those of the Site Manager.

Table 9 Suggested roles and responsibilities for site preparation and construction waste management

Role	Responsibilities
Site Manager	• Ensuring plant and equipment are well maintained • Ordering only the required amount of materials • Keeping materials segregated to maximise reuse and recycling • Ensuring that waste sorting and storage areas are maintained in a tidy and functional state and do no present hazards to human health or the environment • Ensure hazardous or contaminated materials are appropriately managed and disposed • Ensure site records and documentation is kept and is complete • Ensure this WMP are implemented, and • Liaise with Council and regulatory authorities as required.
Construction Environmental Manager or equivalent	• Ensuring staff and contractors are aware of site requirements for waste management • Establishing separate skips and stockpiles and recycling bins for effective waste segregation and recycling purposes • Developing or identifying, and using, local commercial opportunities for re-use of materials where re-use on-site is impractical • Facilitate correct waste collection • Engage suitable waste collection and disposal contractors • Approval of off-site waste disposal locations and checking licensing requirements • Arranging for the assessment of potentially hazardous or contaminated materials • Arranging for appropriate contaminated waste management and approval of off-site waste transport, disposal locations and checking licensing requirements • Monitor and maintain site environmental controls and • Monitoring, inspection and reporting requirements.

Daily visual inspections of waste storage areas may be delegated to other on-site staff. All contractors will be responsible for ensuring that their work complies with the WMP through the project induction and contract engagement process. It is the responsibility of the Site Manager to notify the relevant regulatory authorities of the appointment of waste removal, transport or disposal contractors.

7 Ongoing Waste and Recycling Management

7.1 Targets for Resource Recovery

The waste management performance of each new development should contribute to the overall NSW State targets for recycling outlined in the *NSW Waste Avoidance and Resource Recovery Strategy 2014-21*. The targets include increasing waste diverted from landfill to 75% and recycling 70% of commercial, industrial and municipal solid waste[24]. Each commercial and industrial development has the ability to contribute to this NSW State target through an effective waste management plan.

It is anticipated that the waste minimisation measures in the following sections will assist the Project to achieve this recycling rate. Waste reporting and audits can be used to determine the actual percentage of wastes that are being or have been recycled during operation.

7.2 Broad Waste Streams and Classifications

Operation of the Project is anticipated to generate the following broad waste streams:

- General waste and commingled recycling;
- Food and organic waste;
- Bulk packaging wastes, including polystyrene and cardboard boxes;
- E-waste;
- Bulky waste items, such as furniture; and
- Plant and general maintenance wastes.

Potential waste types, their associated waste classifications, and management methods are provided in **Table 10**. For further information on how to determine a waste's classification, refer to the NSW EPA (2014) *Waste Classification Guidelines*[25]. Suggestions for appropriate disposal methods for a given waste are available through Council's 'B informed' waste and recycling application for smartphones[26]. Recycling drop off locations and contacts can be found on https://businessrecycling.com.au/ for each waste type.

[24] NSW EPA, NSW Waste Avoidance and Resource Recovery Strategy 2014-21, dated December 2014, available from: https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/wastestrategy/140876-warr-strategy-14-21.pdf

[25] Available online from https://www.epa.nsw.gov.au/your-environment/waste/classifying-waste/waste-classification-guidelines

[26] https://www.blacktown.nsw.gov.au/Services/Waste/B-informed-waste-and-recycling-app

Table 10 Potential waste types, classifications and management methods – operational waste

Waste Types	NSW EPA Classification	Proposed Management Method
Clean office paper	General solid (non-putrescible) waste	Paper recycling at off-site licensed facility
Cardboard including bulky cardboard boxes	General solid (non-putrescible) waste	Cardboard recycling at off-site licensed facility
Recyclable beverage containers, glass and plastic bottles, aluminium cans, steel cans	General solid (non-putrescible) waste	NSW container deposit scheme 'Return and Earn'; container recycling at off-site licensed facility
Food waste	General solid (putrescible) waste	Donate, if suitable, alternatively compost on or off-site or dispose to landfill with general garbage
Batteries	Hazardous waste	Off-site recycling; alternatively contact the Australian Battery Recycling Initiative for more information
Mobile Phones	Hazardous waste	Off-site recycling; can be taken to a number of locations in the Blacktown Councils area, through the Mobile Muster program. Contact Mobile Muster for more information
Bulky polystyrene	General solid (non-putrescible) waste	Off-site recycling or disposal at landfill
Furniture	General solid (non-putrescible) waste	Off-site reuse or disposal to landfill
E-waste	Hazardous waste	Off-site recycling
Printer toners and ink cartridges	Hazardous waste	Off-site recycling, free disposal box or bags and pickup service exists for printer toners and ink cartridges
General garbage, including non-recyclable plastics	General solid (putrescible and non-putrescible) waste	Disposal at landfill
Spent smoke detectors[27]	General solid (non-putrescible) waste, or Hazardous waste (some commercial varieties)	Disposal to landfill, or off-site disposal at licensed facility

[27] The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) require that when more than 10 smoke alarms (particularly americium-241 sources) are collected for bulk disposal they must be treated as radioactive waste and the requirements of the National Health and Medical Research Council's Code of practice for the near-surface disposal of radioactive waste in Australia (1992) must be met.

Waste Types	NSW EPA Classification	Proposed Management Method
Glass, other than containers	General solid (non-putrescible) waste	Off-site recycling
Light bulbs and fluorescent tubes	Hazardous waste	Off-site recycling or disposal, contact FluoroCycle for more information
Air-conditioning parts and filters	General solid (non-putrescible) waste	Off-site recycling or disposal to landfill
Cleaning chemicals, solvents, area wash downs, empty oil or paint drums, chemical containers	Hazardous waste if containers used to store Dangerous Goods (Class 1, 3, 4, 5 or 8) and residues have not been removed by washing or vacuuming. General solid (non-putrescible) waste if containers cleaned by washing or vacuuming.	Transport to comply with the transport of Dangerous Goods Code applies in preparation for off-site recycling or disposal at licensed facility. Discharge to sewer likely to be subject to Trade Waste Agreement with Sydney Water.
Garden organics - lawn mowing, tree branches, hedge cuttings, leaves	General solid (non-putrescible) waste	Reuse on-site or contractor removal for recycling at licenced facility

7.3 Waste Management Overview

General and recycling waste generation will primarily occur in the office and amenities areas. Due to the expected operational procedures of data centres, SLR does not anticipate the data centre rooms will produce any general or recycling waste. Waste that will be generated in the data halls and corridor areas includes e-waste and packaging waste. This will be handled either through a separate contract for e-waste collection and recycling or by returning packaging materials to the product suppliers.

The operational waste management for the office areas is proposed to comprise:

- Buildings 3, 4, 5 and 6 are to have one communal waste storage room for the storage of general waste, paper and cardboard recycling, recyclable containers and bulky waste.
- Bins are to be stored in the waste storage room and labelled for general waste, paper and cardboard recycling and recyclable containers.
- General waste and recycling bins to be collected from office and amenities areas at the end of each day and transferred by cleaners to the waste storage room.
- The general waste and recycling bins are to be collected by a Council or a private waste contractor from the waste storage room.

7.4 Estimated Quantities of Operational Waste

Council's guidelines do not provide waste generation rates for operational activities. In the absence of waste generation rates provided by Council, SLR has adopted waste generation rates for 'Office' presented in Appendix A of the NSW EPA Better Practice Guidelines for Waste Management and Recycling in Commercial and Industrial Facilities. This rate, shown below, will be applied to the administrative buildings of the site.

- Office: Maximum 16 L of general waste and 12 L of recycling per 100 m^2 of floor area per day.

The estimated quantities of operational waste generated by the Project are shown in **Table 11**. Operational waste generation from the data halls and corridor areas have not been included as these primarily constitute e-waste and packaging waste, which are handled separately and are discussed in **Section 7.4.1**.

Quantities shown in **Table 11** are based on:

- The floor areas as presented on the architectural drawings shown in **Appendix A**
- The inclusion of all areas labelled ''OFFICE'' and ''AMENITY'' as per the architectural drawings to account for changes in use
- The waste and recycling generation rates listed above
- A week comprising seven days of operation, and
- General recycling consisting of approximately 60% paper and cardboard, and 40% other recycling[28].

[28] https://www.epa.nsw.gov.au/~/media/EPA/Corporate%20Site/resources/warrlocal/140442-audits-2011.ashx

Table 11 Estimated quantities of operational waste and recycling

Building	Area Type	General Waste (L/week)	Recycling Paper and Cardboard (L/week)	Recycling Other (L/week)
Building 3	Office	2,450	1,120	735
Building 4	Office	5,390	2,450	1,645
	Amenity	140	35	35
Building 5	Office	350	175	105
	Amenity	140	70	35
Building 6	Office	350	175	105
	Amenity	105	70	35
Total		**8,925**	**4,095**	**2,695**

Waste quantity estimates have been rounded up to the nearest 5 L.

'Other Recycling': comingled recycling excluding paper and cardboard.

Scheduled waste audits can be undertaken approximately one month into the operational phase of the Project to quantify actual waste generation rates generated by the Project. The assessment of generated waste volumes will be influenced by management and employee attitudes to recycling and disposal, and the adequacy of signage and education provided for occupants.

7.4.1 Additional operational waste

In addition to the estimated quantities of waste and recycling listed in **Table 11**, the Project is anticipated to produce:

- Minimal quantities of green landscaping waste
- Significant quantities of electronic waste or e-waste, and
- Cardboard packaging waste from electronic products for the data halls

Less than 100 L of green garden organic landscaping waste is estimated to be generated per week. This waste will be taken by a landscaping contractor who will dispose of it at a garden organics processing facility.

The Project is likely to generate significant quantities of e-waste, which could exceed 240 L per week, such as computer parts, keyboards, and cabling. For this reason, a waste collection and recycling contract should be established to collect all e-waste for recycling and ensure it is not landfilled. SLR recommends this contract is established with the supplier of the electronic equipment used. Waste may be stored in the waste storage room or in a room designated for bulky and hazardous wastes.

Packaging waste for electronic products will be returned to the supplier.

7.5 Waste Storage Areas

In accordance with the BDCP, source separation and re-use of materials should be facilitated and undertaken on-site and transfer of materials off-site should only be considered as a last resort, when reuse of materials is not feasible anymore.

7.5.1 Waste Storage Area Size

In accordance with the BDCP, the Project must contain a waste and recycling storage area large enough to adequately store all quantities of operational waste and recycling between collections and also provide enough additional storage space for storage of an additional e-waste collection bin. The waste storage area will service only the proposed four data buildings and associated office space (buildings 3, 4, 5 and 6) discussed in this WMP and not the existing data centre located to the east of the site. The location of this space is to be convenient for all tenants.

The estimated number of bins required for weekly storage of operational waste and recycling generated by the Project is shown in **Table 13** and is based on:

- The estimated quantities of operational waste and recycling as shown in **Table 11**
- Bin dimensions from the BDCP and SLR's internal database[29] as shown in **Table 12**
- The assumption that the four buildings will have one communal waste storage room, and
- Garbage and recycling collection frequency of three times per week.

Table 12 Dimensions and approximate footprint of bins

Dimension	Height (mm)	Depth (mm)	Width (mm)	Gross Floor Area (GFA) (m^2)
3 m^3 Bin	1,225	1,505	1,805	2.72
240 L Bin	1,140	715	580	0.41

To allow for ready movement of bins into and out of the bin storage area, the bin storage area will provide a floor area of at least twice the total minimum bin GFA, as recommended in **Table 13**. This can also act as a contingency in the event of spikes in waste generation.

Table 13 Minimum number of bins and storage area required for weekly operational waste

Building	Bins Required			Total Number of Bins	Recommended Storage Area (m^2)
	General Waste	Paper and Cardboard Recycling	Comingled Recycling		
Waste storage room	1 x 3 m^3	6 x 240 L	4 x 240 L	11	15

Any additional bins in the storage room may be used to service other waste streams, including e-waste.

SLR notes that the recommended storage area identified in **Table 13** does not include consideration for the storage of bulky and hazardous waste. For the additional storage space for bulky and hazardous waste, refer to **Section 7.5.1.1** below.

7.5.1.1 Bulky and Hazardous Waste

In accordance with the BDCP, Part G Site Waste Management and Minimisation Section 3.4, an area is to be provided in the garbage and recycling room for the storage of large or bulky items and hazardous wastes that cannot be disposed of in the general waste or recyclable streams, such as broken pallets, furniture, disused equipment, broken electronic equipment and other bulky waste.

[29] In the absence of Council's 1,500 L bin dimensions, SLR has assumed the largest dimensions in our SLR internal database.

Council's guidelines do not provide storage area dimensions for bulky waste. In the absence of dimensions provided by Council, SLR has adopted storage area dimensions for bulky waste presented in The City of Sydney's Guidelines for Waste Management in New Developments. For non-residential developments, the recommended space for storing bulky wastes should be at least:

- 4 m^2 for developments between 100 m^2 and 2,000 m^2, and
- An additional 4m^2 for developments over 2,000 m^2 and for every 20,000 m^2 of office space.

Based on the dimensions above, SLR recommends 8 m^2 to be allocated for bulky and hazardous waste storage in the waste storage room. Hence in addition to the recommended waste storage areas noted in **Table 13**, the total waste storage area recommended for the Project is identified in **Table 14**.

Table 14 Total recommended storage area for operational waste

Building	Recommended Storage Area (m^2)		
	General Waste and Recycling	Bulky waste	Total Storage Area
Bin enclosure	15	8	23

The BDCP recommends disposal of hazardous materials be undertaken as detailed by the relevant authority.

Building management may consider organising a separate casual collection service to remove bulky waste items or engaging a contractor to collect and transport these items for reuse, recycling or disposal.

In accordance with Council's requirements, the architectural drawing "DA-001" shows that the Project has its own allocated waste storage room labelled "Bin Enclosure". The drawing is attached in **Appendix A**. Review of the architectural drawing "DA-001" indicates that the allocated area for the "Bin Enclosure" 23 m^2, the same as recommended in **Table 14**. Hence the allocated waste storage area is sufficient to store the estimated quantities of operational waste, recycling and bulky waste in between collections and also provide enough additional storage space for storage of an additional e-waste collection bin.

7.5.1.2 Waste Cupboards

The BDCP specifies that waste cupboards are to be installed in new developments. Council defines waste cupboards as a temporary storage area within each delineated dwelling of size adequate enough to accommodate a single day's waste. This must facilitate source separation into general waste, recyclables and compostable material. Waste cupboard are typically installed in kitchen areas.

SLR anticipates that waste cupboards will be placed in the office areas on the ground floor and first floor and the amenity rooms if their designated use is appropriate. As per the BDCP, these will be designed and located so that they are accessible and useable and cater to changes of use over time.

7.5.1.3 Recycling Bale Storage

In accordance with the BDCP, volume reduction equipment is to be considered for large developments. If considered feasible, a baler may be implemented to compact the packaging waste that comes from the purchase of e-waste. In accordance with better practice management however, the waste management hierarchy, and given the small quantity of estimated operational waste, SLR recommends returning packaging materials to the suppliers through the services of the supplier delivery trucks, allowing the reduction of waste further along the supply chain.

If a baler is considered, it is important to note that bales of recyclable material are susceptible to degradation by exposure to the elements and vermin. Therefore, if used, recycling bales should be stored indoors for no longer than two weeks until collection.

An indoor bale storage area for the Project should:

- Be clean and well-maintained
- Be of sufficient size to store the required number of bales
- Be sufficiently lighted with vermin control measures
- Have appropriate security measures to prevent theft of bales, and
- Be equipped with a high-volume sprinkler system to retard the spread of fire.

The bales themselves should be stored with the following considerations:

- Bales should be placed on storage pallets, not directly on the floor or ground
- Bales should be stacked and secured in accordance with relevant SafeWork Australia Codes of Practice, and any other relevant legislation or guidance to prevent bales from presenting a risk of harm to workers
- Bales should not be stacked too close to sprinkler systems to avoid compromising the effectiveness of the fire suppression system, and
- Although not generally recommended, if bales are stored outdoors, they should be covered with plastic sheeting, or similar, as protection from exposure to the elements.

7.5.2 Waste Storage Room Location

Council should be consulted if the Applicant intends to undertake waste collections on-site. Council should be informed that the design for the waste storage areas has taken into consideration better practice waste management and recommendations from the BDCP. In accordance with better practice waste management and the BDCP, the waste storage area should be located so that:

- It is at street frontage on site
- It is convenient, safe, functional and directly accessible to users and servicing collection staff, but inaccessible to the public.
- It is integrated with the use, form and arrangement of the Project.
- Adverse impacts, such as odour and noise, are minimized to neighbouring properties and the streetscape.
- Servicing vehicles can enter and exit the premises in a forward direction.
- Servicing can be efficiently conducted without impeding general access in the site.
- Access and the path for wheeling bins between storage and collection is level free from ramps and gradients in accordance with SafeWork Occupational Health and Safety requirements.
- The area can accommodate general waste, comingled recycling and paper and cardboard bins together but with enough space to minimise cross-contamination, and
- Litter and contamination of the stormwater drainage system is avoided.

Review of the architectural drawing "DA-001", attached in **Appendix A**, indicates the waste storage room is located in accordance with Council's requirements. In email communication[30], the architects of the Project have indicated that the waste room is located fronting the internal road network to support heavy vehicle access to the waste storage rooms and achieve Council's requirement of waste storage rooms being located at street frontage.

7.5.3 Waste Storage Area Features

In accordance with better practice waste management and the BDCP, the waste storage areas should have the following features:

- Be constructed in accordance with the requirements of the National Construction Code 2016 and ensuring impervious floors and ceilings, and fire safety and resistant provisions
- Suitable strength and geometric driveway design, to accommodate collection servicing vehicles
- Can accommodate a sufficient number of bins for the anticipated operational waste and recycling generated between collection services
- Have adequate spacing between bins to enable ease of servicing
- Have space to allow bulky waste
- Be accessible to all users
- Unobstructed, easy access to the waste collection point
- Have smoke detectors be installed in accordance with Australian Standards and connected to the fire prevention system of the building
- Path for wheeling bins between storage and collection is level, free from steps, and all gradients compliant with SafeWork NSW
- Flooring must be smooth and durable
- Flooring must be graded with an approved drainage outlet and sewer connection to Sydney Water
- Roof drainage must be funnelled to the stormwater system
- Equipped with a hot and cold tap-based water supply centralised mixing valve
- Hose cock must be protected from the waste bins and be located for easy accessibility when the area is filled with waste bins
- Walls or fencing enclosures must extend to at least the height of the tallest waste or recycling bin
- Doors or gates are to be durable and able to be opened from both inside and outside of the storage area
- Doors or gates must be wide enough to permit easy passage of waste and recycling bins
- Adequate signage, as addressed in **Section 7.9**
- Adequate vermin prevention
- Blend in to the design of the wider development and be well-ventilated
- Not incorporate incinerators

[30] Email from Daniel Roberts – EJE Architecture, "Re: SSDA - waste", dated 30 September 2019

- Have protection from weather conditions, including those which compromise the integrity of the bins and site, and
- Adequate security and is able to be locked.

7.6 Waste Servicing

General waste and recycling bins are to be collected from office and amenities areas at the end of each day and transferred by cleaners to each waste storage room.

The collection point must be accessible for waste collection vehicles. The Project is zoned IN1 General Industrial[31]. In accordance with Section 3.4 of the BDCP, buildings in this zone must have on-site waste servicing.

SLR expects that a private waste contractor will be engaged for waste collection. Most likely, collection will be by a rear-lift system in which case:

- Turning circles on-site and surrounding roads should be a minimum of 25 m in diameter.
- Overhead clearance for servicing of bins should be 6.4 m at a minimum.
- A rear lift waste collection vehicle must have convenient access to the bins and be able enter and exit the site in a forward direction.

Once a private waste contractor is engaged, a valid waste and recycling collection contract is recommended to demonstrate disposal at a waste facility lawfully able to accept it. Written evidence of the valid contract should be kept on-site.

The following additional waste servicing access requirements should be implemented:

- Waste will be removed regularly.
- Arrangements should be in place so that the waste and recycling storage rooms are not accessible to the general public.

7.7 Waste Avoidance, Re-use and Recycling

7.7.1 Waste Avoidance

Waste avoidance measures include:

- Returning packaging materials like cardboard to the suppliers through the services of the supplier delivery trucks, allowing the reduction of waste further along the supply chain
- Providing ceramic cups, mugs, crockery and cutlery rather than disposable items
- Presenting all waste reduction initiatives to staff as part of their induction program, and
- Leasing equipment and machinery rather than outright purchase and disposal.

[31] https://www.legislation.nsw.gov.au/maps/e87d008d-b99e-4698-a60f-1615e20a61c1/0750_COM_LZN_009_020_20180306.pdf

7.7.2 Re-use

Possible re-use opportunities include establishing systems with in-house and supply chain stakeholders to transport products in re-useable packaging where possible.

7.7.3 Recycling

Recycling opportunities include:

- Collecting and recycling e-wastes
- Printer toners and ink cartridges, if purchased, are collected in allocated bins for appropriate contractor recycling
- Paper recycling trays provided in communal and staff areas for scrap paper collection and recycling
- Providing separate receptacles for general waste, recycling and paper and cardboard throughout public areas, as well as within staff areas, to encourage source-separation of waste streams
- Separating, by a reasonable distance, the storage areas for recyclables from the general waste storage areas to avoid cross contamination, and
- Development of 'buy recycled' purchasing policy.

7.8 Communication Strategies

Education and communication on waste management initiatives and measures should be clearly conveyed to building managers, tenants and cleaners on a regular basis. This assists in overcoming the transient nature of contractors and tenants. Benefits of providing this communication include:

- Improved satisfaction with services
- Increased ability and willingness to participate in recycling
- Improved amenity and safety
- Improved knowledge and awareness through standardisation of services
- Increased awareness or achievement of environmental goals and targets
- Reduced contamination of recyclables stream which can incur a collection contractor penalty fee
- Increased recovery of recyclables and organics material, if implemented, and
- Greater contribution to state-wide targets for waste reduction and resource recovery.

To realise these benefits, the following communication strategies is recommended for each building manager:

- Use consistent signage and colour coding throughout the Project
- Ensure all tenants are informed of correct waste separation and management procedures
- Provide directional signage to show locations and routes to waste storage areas
- Repair signs and labels promptly to avoid a breakdown in communication
- Clearly label general and comingled waste bins to ensure no cross contamination and to identify the types of waste that may be disposed of in each bin, and

- Educate all tenants and contractors associated with the Project, ensuring they adhere to this WMP.

7.9 Signage

Signs which clearly identify waste management procedures and provisions to contractors, tenants and visitors should be distributed around the Project.

The design and use of safety signs for waste rooms and enclosures should comply with Australian Standard *AS 1319 Safety Signs for the Occupational Environment* and clearly describe the types of materials designated for each bin.

Colour-coded and labelled bin lids are necessary for identifying bins and the Australian Standard *AS 4123.7-2006 (R2017) Mobile waste containers Part 7: Colours, markings, and designation requirements* provides recommendations for the designated colours for waste bins depending on the type of waste the bins are to receive. The colours anticipated to apply to ongoing waste generated by the Project are:

- Blue: Paper and cardboard
- Yellow: Recyclables (other than paper and cardboard)
- Red: General waste
- Green: Food waste and garden organics

All bin signage should also follow the NSW EPA's standard signage[32].

Additionally, key signage considerations are:

- Clear and correct labelling on all waste and recycling bins, indicating the correct type or types of waste that can be placed into a given bin, as shown in **Figure 5**
- Signposts and directions to location of waste storage areas, including the composting facilities on-site, as per the BDCP
- Clear signage in all waste storage areas to instruct users how to correctly separate waste and recycling
- Maintaining a consistent style colour scheme and system for signs throughout the Project, and
- Emergency contact information for reporting issues associated with waste or recycling management.

Figure 5 An example of bin labels that may be used for ongoing waste

[32] NSW EPA waste signs/posters http://www.epa.nsw.gov.au/wastetools/signs-posters-symbols.htm

7.10 Monitoring and Reporting

As part of Council's Guidelines, industrial developments require forms to be completed as part of the monitoring of waste generated during ongoing use. The forms are attached in **Appendix B**.

Monitoring is recommended to ensure waste and recycling management arrangements and provisions for the Project are functional, practical and are maintained to the standard outlined in this plan, at a minimum.

Visual assessments of bins and bin storage areas should be conducted by the building manager, at minimum:

- Weekly, in the first two months of operation to ensure the waste management system is sufficient for the operation, and
- Every six months, to ensure waste is being managed to the standards outlined in this document.

In addition, audits are to be conducted on a half-yearly basis to ensure WMP provisions are maintained.

Quantities of waste and recycling associated with disposal of waste and recycling, including dockets, receipts and other physical records should be recorded by the Building Manager. This is to allow reviews of the waste management arrangements and provisions at the site over time. Records of waste disposal should also be available to regulatory authorities such as the NSW Environmental Protection Authority and SafeWork NSW, upon request.

Any deficiencies identified in the waste management system, including, but not limited to, unexpected waste quantities, is to be rectified by the Building Manager as soon as it is practical. Where audits show that recycling is not carried out effectively, management should carry out additional staff training, signage re-examination and reviews of the waste management system where the audit or other reviewing body has deemed necessary. If this waste management plan no longer sufficiently meets the needs of the Project, review and updates to maintain suitability must be undertaken.

7.11 Roles and Responsibilities

It is the responsibility of the Building Manager, or equivalent role, to implement this WMP and a responsibility of all warehouse tenants and staff to follow the waste management procedures set out by the WMP. SLR recommends that all subcontractors enlisted by the Applicant are to have roles and responsibilities identified and the Project's waste management system clearly explained. Where the BDCP does not prescribe regulations, SLR has outlined recommended management practice. A summary of recommended roles and responsibilities are provided in **Table 15**.

Table 15 Delegated waste-related roles and responsibilities for the Project.

Responsible Person	General Tasks
Building Managers or equivalent role	Ensure the WMP is implemented throughout the life of the operation.
	Update the WMP as needed to ensure the plan remains applicable to the site.
	Undertake liaison and management of contracted waste and recycling collections with Council, contractors and any relevant authorities.
	Regularly conduct waste audits to review system performance and identify any additional materials that could be recovered.
	Manage any complaints and non-compliances reported through waste audits and other sources.

Responsible Person	General Tasks
	Ensure all monitoring and audit results are well documented and conducted as specified in this WMP.
	Conduct regular waste sorting, physical condition and cleanliness inspections of bins, waste storage rooms and all other waste management equipment for functionality, hygiene and safety.
	Organise cleaning and maintenance requirements for waste management equipment as required
	Ensure waste and recycling storage rooms are kept tidy.
	Monitor bins to ensure no overfilling occurs and manage unexpected waste quantities to mitigate waste overflow in storage areas
	Ensure effective signage, communication and education is provided to alert visitors, employees, site management staff and cleaners about the provisions of this WMP and waste management equipment use requirements.
	Monitor and maintain signage to ensure it remains clean, clear and applicable.
	Manage ongoing education on correct source separation and waste management at least every three months.
	Ensure that regular cleaning and daily transfer of bins is correctly being undertaken by the cleaners.
	Ensure all waste compactors and balers, if obtained, are maintained and operational.
	Ultimately responsible for the management of all waste management equipment, cleaning requirements, waste transfer and collection arrangements.
Building cleaners and caretakers	Transfer general waste, recyclables, cardboard waste and hazardous waste to centralised waste and recycling collection rooms on a daily basis or as required.
	Maintain and operate compactors and balers, if obtained, and ensure no overfilling occurs.
	Cleaning of all bins and waste and recycling rooms as per the direction of the site manager, or equivalent role.
	Monitor bins to ensure no overfilling occurs.
	Ensure bins and waste storage areas are kept tidy and clean.
	Compliance with the provisions of this WMP.
Building occupants	Adhere to all waste management directions as given by the site manager.

8 Mitigation measures

The SEARs require an environmental risk analysis to identify potential environmental impacts associated with the Project. The following represents the way in which risks, impacts and mitigation measures are identified and quantified in relation to waste management at the Project.

This analysis comprises a qualitative assessment consistent with AS/NZS ISO 31000:2009 *Risk Management–Principles and Guidelines* (Standards Australia 2009). The level of risk was assessed by considering the potential impacts of the Project prior to application of any mitigation or management measures.

Risk comprises the likelihood of an event occurring and the consequences of that event. For the Project, the descriptors shown in **Table 16** were adopted for 'likelihood' and 'consequence'.

Table 16 Risk Descriptors

Likelihood		Consequence	
A	Almost certain	1	Widespread and/or irreversible impact
B	Likely	2	Extensive but reversible (within 2 years) impact or irreversible local impact
C	Possible	3	Local, acceptable or reversible impact
D	Unlikely	4	Local, reversible, short term (<3 months) impact
E	Rare	5	Local, reversible, short term (<1 month) impact

The risk levels for likely and potential impacts were derived using the risk matrix shown in **Table 17**.

Table 17 Risk Matrix

Consequence	Likelihood					
	A	B	C	D	E
1	High	High	Medium	Low	Very Low
2	High	High	Medium	Low	Very Low
3	Medium	Medium	Medium	Low	Very Low
4	Low	Low	Low	Low	Very Low
5	Very Low	Very Low	Very Low	Very Low	Very Low

The risk assessment and mitigations measures are shown in **Table 18.**

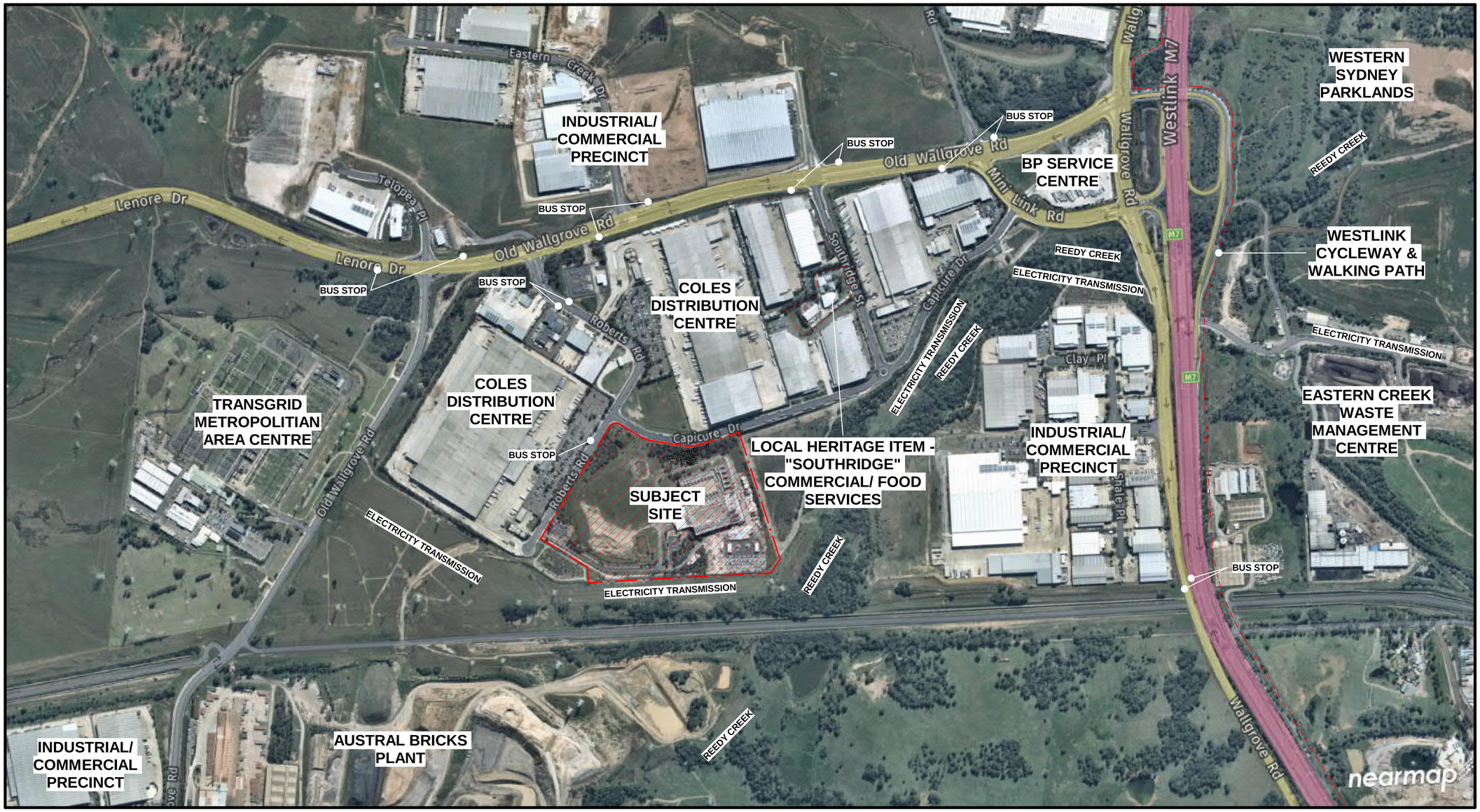
Table 18 Risk Assessment and Mitigation Measures

Matter	Potential Impact	Likelihood	Consequence	Risk Level	Proposed Mitigation Measures
Waste Management	Fire spreading of green waste	D	2	Low	The Applicant to: • Implement the WMP. • Consider developing a fire management plan, with consideration for green waste management. • Implement appropriate segregation and signage for green waste.
	Potential for people to be in the vicinity of waste collection heavy vehicles and be injured by waste collection traffic	C	1	Medium	The Applicant to: • Implement the WMP. • Consider developing a site traffic management plan determining waste collection times and heavy vehicle traffic. • Consider undertaking a traffic analysis study by a qualified traffic consultant. • Implement appropriate signage for pedestrian traffic.
	The spread of pest species attracted to food waste	D	4	Low	The Applicant to: • Implement the WMP. • Provide and label appropriate waste storage containers in suitable numbers and locations for the collection and storage of putrescible waste. • Engage cleaners to undertake daily cleaning services at the site. • Assigning a member of staff to monitor the suitability, location and emptying of the containers at regular intervals. • Ensure that Council or a private waste contractor is engaged for the collection of putrescible waste and disposal at a facility lawfully able to accept the material.

Matter	Potential Impact	Likelihood	Consequence	Risk Level	Proposed Mitigation Measures
	Uncontrolled release or spill of hazardous non mineral waste materials during construction activities	C	3	Medium	The Applicant to: • Implement the WMP. • Consider developing a Construction Environmental Management Plan (CEMP) detailing hazardous waste management during construction activities. • Properly store and maintain storage areas of construction waste in accordance with the WMP. • Consider engaging a qualified specialist for hazardous material management. • Ensure that a private waste contractor is engaged for the collection of hazardous waste and disposal at a facility lawfully able to accept the material.
	Windblown litter and cosmetic impact	B	5	Very low	The Applicant to: • Implement the WMP. • Implement appropriate signage showing allocated waste storage areas. • Engage cleaners to undertake daily cleaning services at the site. • Educate tenants and encourage good waste management practices.

APPENDIX A

Architectural Drawings



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0 25mm 100mm 200mm ON ORIGINAL A1

REV	DATE	COMMENTS
P1	28/08/2019	PRELIM. SSDA ISSUE
P2	30/08/2019	PRELIM. SSDA ISSUE
A	13/09/2019	FOR SSDA SUBMISSION
B	16/04/2020	REVISED SSDA SUBMISSION

DRN	CHKD	VRFD
DJR	JC	
DJR	JC	
DJR	JC	
MV	SS	

PROJECT : SURFSIDE E3

CLIENT : CANBERRA DATA CENTRES

SITE : ROBERTS ROAD, EASTERN CREEK, NSW 2766

DRAWING : LOCALITY/CONTEXT PLAN

WORK IN FIGURED DIMENSIONS IN PREFERENCE TO SCALE. CHECK DIMENSIONS AND LEVELS ON SITE PRIOR TO THE ORDERING OF MATERIALS OR THE COMPLETION OF WORKSHOP DRAWINGS. IF IN DOUBT ASK. REPORT ALL ERRORS AND OMISSIONS.

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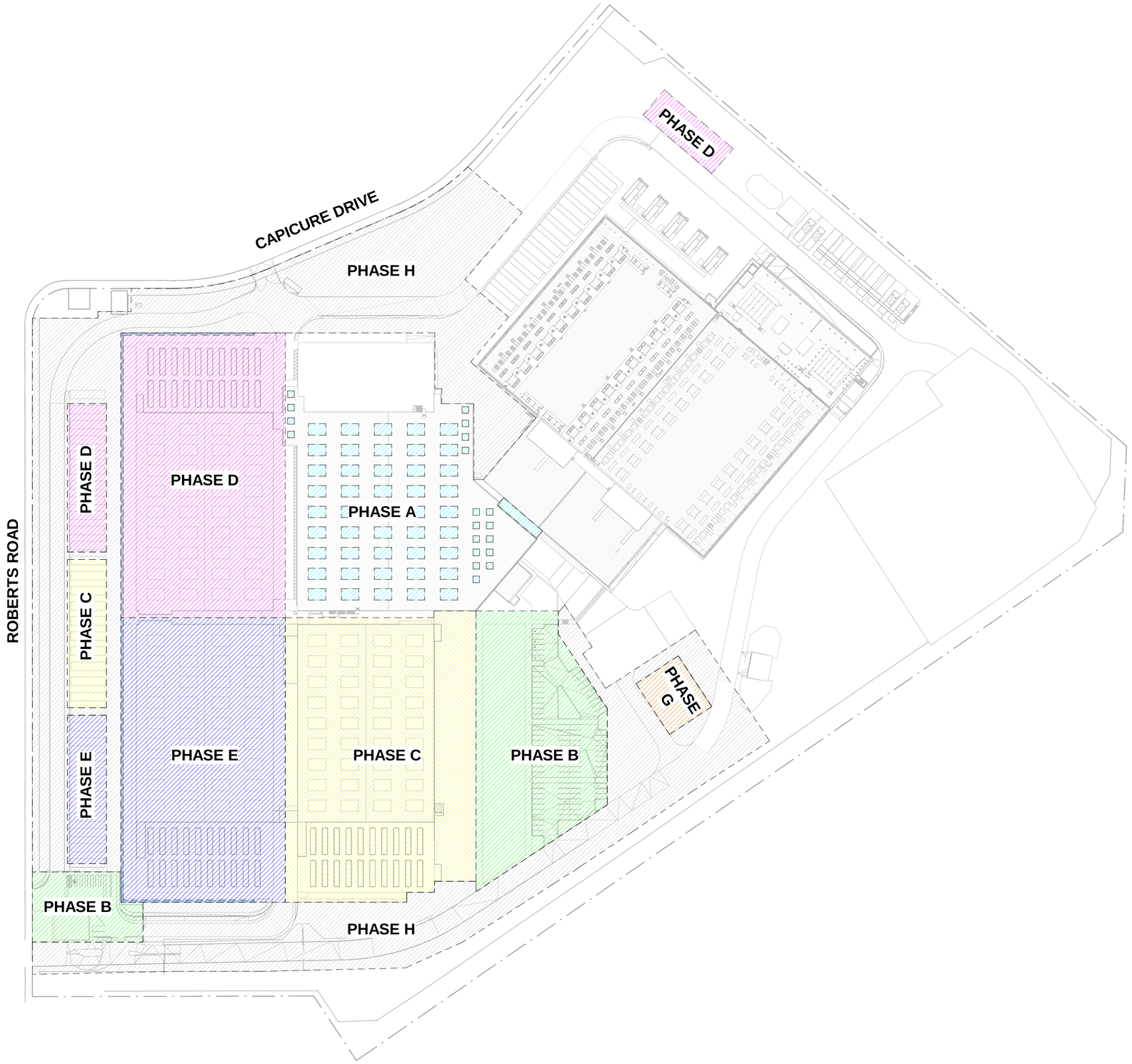
DRAWN :	DATE :	SCALES :
DJR	08/28/19	1 : 5000 @ A1 1:10000 @ A3

PROJECT No :	PHASE :	DRAWING No :	REV :
12706	SD	DA-010	B

EJE architecture



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REV	DATE	COMMENTS	DRN	CHKD	VRFD
P1	27/09/2019	ISSUED FOR REVIEW	DJR	JC	
A	08/10/2019	FOR SSDA SUBMISSION	DJR	JC	
B	16/04/2020	REVISED SSDA SUBMISSION	MV	SS	

PROJECT : SURFSIDE E3

CLIENT : CANBERRA DATA CENTRES

SITE : ROBERTS ROAD,
EASTERN CREEK, NSW 2766

DRAWING : PHASING PLAN

WORK IN FIGURED DIMENSIONS IN PREFERENCE TO SCALE. CHECK DIMENSIONS AND LEVELS ON SITE PRIOR TO THE ORDERING OF MATERIALS OR THE COMPLETION OF WORKSHOP DRAWINGS. IF IN DOUBT ASK. REPORT ALL ERRORS AND OMISSIONS.

DRAWN :	DATE :	SCALES :
MV	16/04/2020	1 : 1000 @A1 @A3

PROJECT No :	PHASE :	DRAWING No :	REV :
12706	SD	DA-800	B

EJE architecture

ROBERTS ROAD, EASTERN CREEK

STATE SIGNIFICANT DEVELOPMENT APPLICATION

ARCHITECTURAL DRAWING LIST

NO.	TITLE	REV
DA-000	COVER SHEET	G
DA-001	SITE PLAN	F
DA-002	SSDA - 3D SITE PLAN	C
DA-010	LOCALITY/CONTEXT PLAN	B
DA-011	SSDA - SD LOCALITY/CONTEXT PLAN	C
DA-100	SSDA GROUND FLOOR PLAN	E
DA-101	SSDA LEVEL 1 PLAN	E
DA-102	SSDA -LEVEL 2 PLAN	E
DA-103	SSDA ROOF PLAN	F
DA-200	ELEVATIONS	E
DA-300	SECTIONS	E
DA-501	SECURITY BOOTH	C
DA-502	STORE	B
DA-800	PHASING PLAN	B

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A	09/10/2019	FOR SSDA SUBMISSION	DJR	JC	JC
B	10/10/2019	FOR SSDA SUBMISSION	DJR	JC	JC
C	15/10/2019	FOR SSDA SUBMISSION	DJR	JC	JC
D	18/10/2019	FOR SSDA SUBMISSION	DJR	SS	SS
E	22/10/2019	ISSUE FOR SSDA	DJR	SS	SS
F	17/04/2020	REVISED SSDA SUBMISSION	MV/DJR	SS	SS
G	08/05/2020	REVISED SSDA SUBMISSION	TB	ss	

PROJECT : SURFSIDE E3

CLIENT : CANBERRA DATA CENTRES

SITE : ROBERTS ROAD,
EASTERN CREEK, NSW 2766

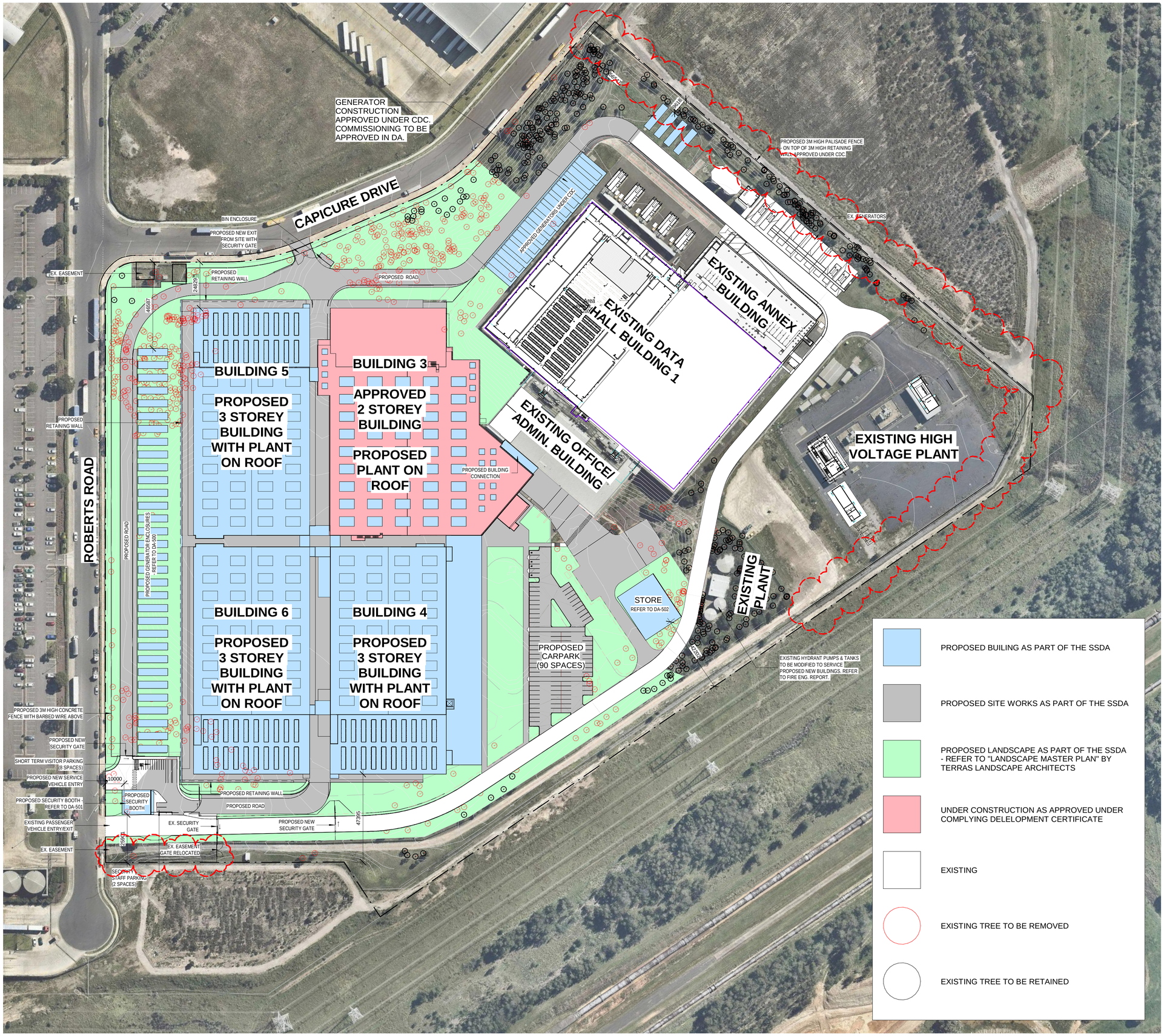
DRAWING : COVER SHEET

WORK IN FIGURED DIMENSIONS IN PREFERENCE TO SCALE. CHECK DIMENSIONS AND LEVELS ON SITE PRIOR TO THE ORDERING OF MATERIALS OR THE COMPLETION OF WORKSHOP DRAWINGS. IF IN DOUBT ASK. REPORT ALL ERRORS AND OMISSIONS.

DRAWN :	DATE :	SCALES :
TB	08/05/2020	@A1 @A3

PROJECT No :	PHASE :	DRAWING No :	REV :
12706	SD	DA-000	G

EJE architecture



EJE ARCHITECTURE

ACN 002 912 843| **ABN** 82 644 649 849
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REV	DATE	COMMENTS	DRN	CHKD	VRFD
P1	01/08/2019	PRELIM. FOR INFOMATION	DJR	JC	JC
P2	13/08/2019	ISSUED FOR INFORMATION	DJR	JC	JC
P3	16/08/2019	FOR INFOMATION	DJR	JC	JC
P4	23/08/2019	PRELIM. SSDA ISSUE	DJR	JC	JC
P5	30/08/2019	PRELIM. SSDA ISSUE	DJR	JC	JC
P6	09/09/2019	ISSUED FOR INFORMATION	DJR	JC	JC
P7	11/09/2019	ISSUED FOR INFORMATION	DJR	JC	JC
A	13/09/2019	FOR SSDA SUBMISSION	DJR	JC	JC
P8	19/09/2019	ISSUED FOR INFORMATION	SB	JC	JC
P9	26/09/2019	ISSUED FOR INFORMATION	SB	JC	JC
P10	03/10/2019	ISSUED FOR INFOMATION	DJR	JC	JC
B	08/10/2019	FOR SSDA SUBMISSION	DJR	JC	JC
C	10/10/2019	FOR SSDA SUBMISSION	DJR	JC	JC
D	15/10/2019	FOR SSDA SUBMISSION	DJR	SS	SS
P11	27/03/2020	ISSUED FOR INFOMATION	DJR	SS	SS
P12	31/03/2020	ISSUED FOR INFOMATION	DJR	SS	SS
P13	31/03/2020	ISSUED FOR INFOMATION	DJR	SS	SS
P14	01/04/2020	ISSUED FOR INFOMATION	DJR	SS	SS
E	16/04/2020	REVISED SSDA SUBMISSION	MV	SS	SS
F	06/05/2020	REVISED SSDA SUBMISSION	DJR	SS	SS

PROJECT : SURFSIDE E3

CLIENT : CANBERRA DATA CENTRES

SITE : ROBERTS ROAD,
EASTERN CREEK, NSW 2766

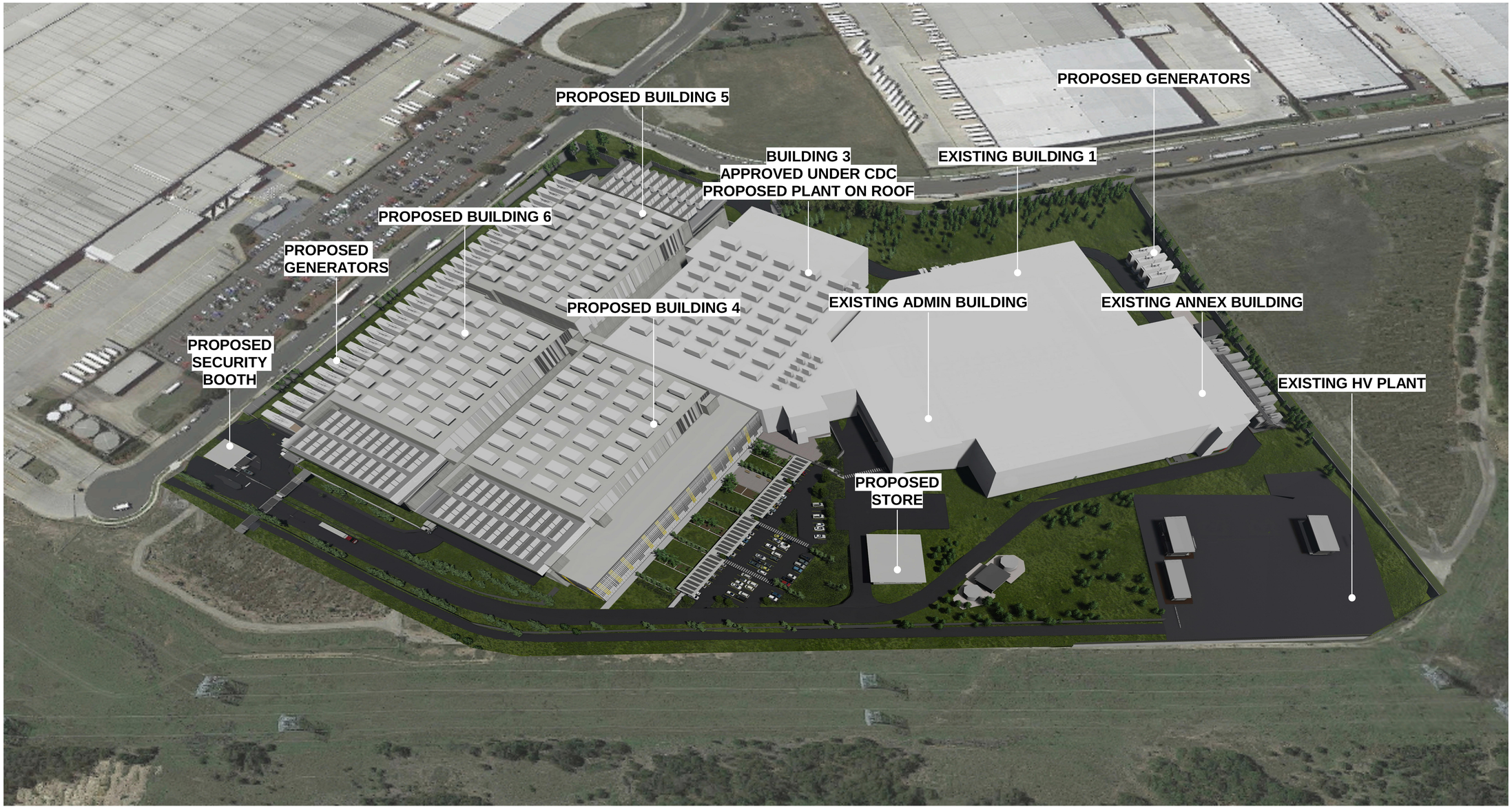
DRAWING : SITE PLAN

WORK IN FIGURED DIMENSIONS IN PREFERENCE TO SCALE. CHECK DIMENSIONS AND LEVELS ON SITE PRIOR TO THE ORDERING OF MATERIALS OR THE COMPLETION OF WORKSHOP DRAWINGS. IF IN DOUBT ASK. REPORT ALL ERRORS AND OMISSIONS.

DRAWN :	DATE :	SCALES :
DJR	06/05/2020	1 : 1000 @A1 1 : 2000 @A3

PROJECT No :	PHASE :	DRAWING No :	REV :
12706	SD	DA-001	F

EJE architecture



EJE ARCHITECTURE
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REV	DATE	ISSUE FOR SSDA	DRN	CHKD	VRFD
A	22/10/2019	REVISED SSDA SUBMISSION	DJR	SS	SS
B	17/04/2020	REVISED SSDA SUBMISSION	MV/DJR	SS	ss
C	08/05/2020		TB		

COMMENTS

PROJECT : SURFSIDE E3

CLIENT : CANBERRA DATA CENTRES

SITE : ROBERTS ROAD,
EASTERN CREEK, NSW 2766

DRAWING : SSDA - 3D SITE PLAN

WORK IN FIGURED DIMENSIONS IN PREFERENCE TO SCALE. CHECK DIMENSIONS AND LEVELS ON SITE PRIOR TO THE ORDERING OF MATERIALS OR THE COMPLETION OF WORKSHOP DRAWINGS. IF IN DOUBT ASK. REPORT ALL ERRORS AND OMISSIONS.

DRAWN :	DATE :	SCALES :
TB	08/05/2020	@A1 @A3

PROJECT No :	PHASE :	DRAWING No :	REV :
12706	SD	DA-002	C

EJE architecture

EJE ARCHITECTURE
ACN 002 912 843 | **ABN** 82 644 649 849
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REV	DATE	COMMENTS	DRN	CHKD	VRFD
A	22/02/2019	ISSUE FOR SSDA	DJR	SS	
B	16/04/2020	REVISED SSDA SUBMISSION	MV	SS	
C	08/05/2020	REVISED SSDA SUBMISSION	TB	ss	

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PROJECT : SURFSIDE E3

CLIENT : CANBERRA DATA CENTRES

SITE : ROBERTS ROAD,
EASTERN CREEK, NSW 2766

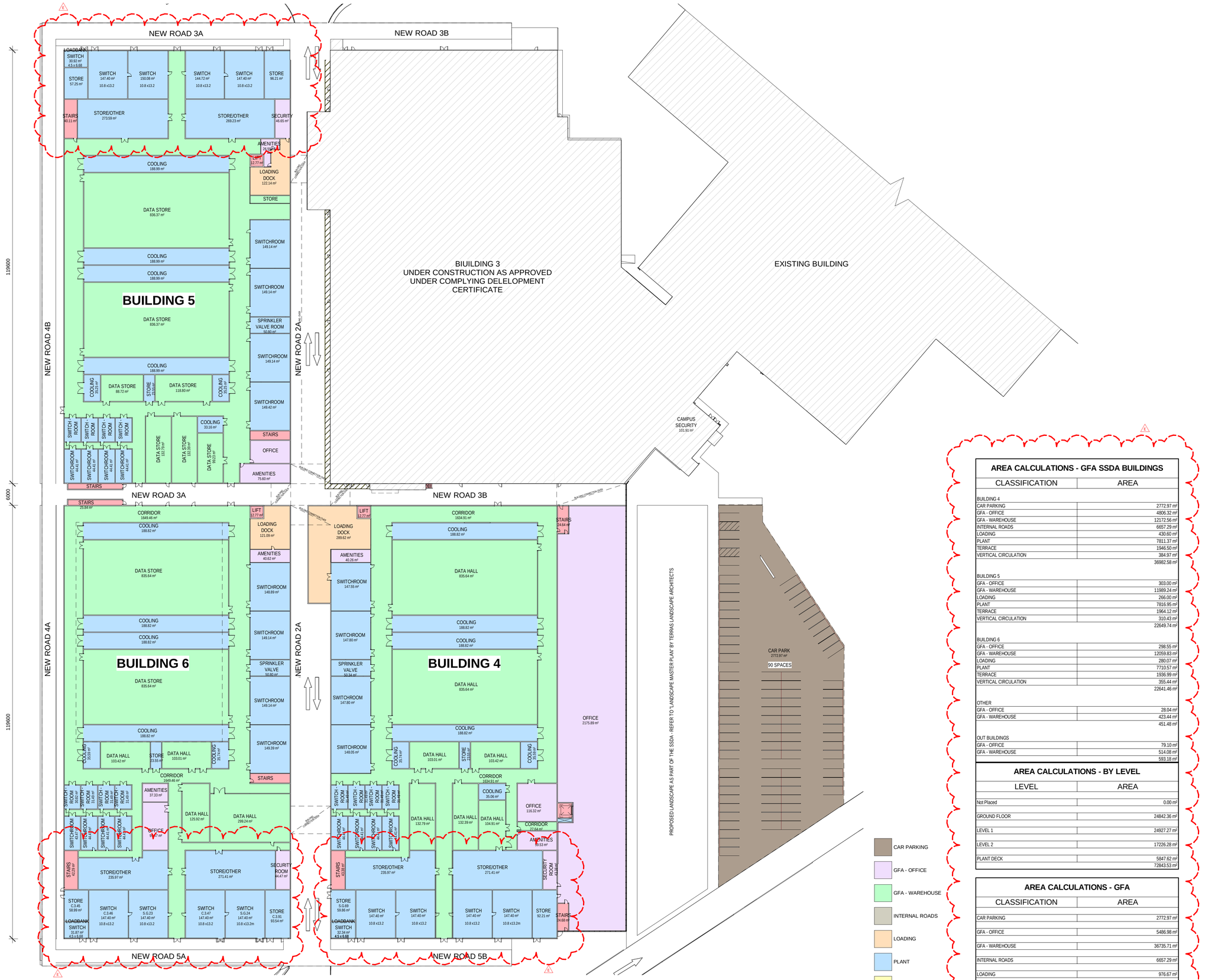
DRAWING : SSDA - SD
LOCALITY/CONTEXT PLAN

WORK IN FIGURED DIMENSIONS IN PREFERENCE TO SCALE. CHECK DIMENSIONS AND LEVELS ON SITE PRIOR TO THE ORDERING OF MATERIALS OR THE COMPLETION OF WORKSHOP DRAWINGS. IF IN DOUBT ASK. REPORT ALL ERRORS AND OMISSIONS.

DRAWN :	DATE :	SCALES :
TB	08/05/2020	@A1 @A3

PROJECT No :	PHASE :	DRAWING No :	REV :
12706	SD	DA-011	C

EJE architecture



AREA CALCULATIONS - GFA SSDA BUILDINGS	
CLASSIFICATION	AREA
BUILDING 4	
CAR PARKING	2772.97 m²
GFA - OFFICE	4806.32 m²
GFA - WAREHOUSE	12172.56 m²
INTERNAL ROADS	6657.29 m²
LOADING	430.60 m²
PLANT	7811.37 m²
TERRACE	1946.50 m²
VERTICAL CIRCULATION	384.97 m²
	36982.58 m²
BUILDING 5	
GFA - OFFICE	303.00 m²
GFA - WAREHOUSE	11989.24 m²
LOADING	266.00 m²
PLANT	7816.95 m²
TERRACE	1964.12 m²
VERTICAL CIRCULATION	310.43 m²
	22649.74 m²
BUILDING 6	
GFA - OFFICE	298.55 m²
GFA - WAREHOUSE	12059.83 m²
LOADING	280.07 m²
PLANT	7710.57 m²
TERRACE	1936.99 m²
VERTICAL CIRCULATION	355.44 m²
	22641.46 m²
OTHER	
GFA - OFFICE	28.04 m²
GFA - WAREHOUSE	423.44 m²
	451.48 m²
OUT BUILDINGS	
GFA - OFFICE	79.10 m²
GFA - WAREHOUSE	514.08 m²
	593.18 m²

AREA CALCULATIONS - BY LEVEL	
LEVEL	AREA
Not Placed	0.00 m²
GROUND FLOOR	24842.36 m²
LEVEL 1	24927.27 m²
LEVEL 2	17226.28 m²
PLANT DECK	5847.62 m²
	72843.53 m²

AREA CALCULATIONS - GFA	
CLASSIFICATION	AREA
CAR PARKING	2772.97 m²
GFA - OFFICE	5486.98 m²
GFA - WAREHOUSE	36735.71 m²
INTERNAL ROADS	6657.29 m²
LOADING	976.67 m²
PLANT	23338.89 m²
TERRACE	5847.62 m²
VERTICAL CIRCULATION	1050.84 m²

CAR PARKING
GFA - OFFICE
GFA - WAREHOUSE
INTERNAL ROADS
LOADING
PLANT
TERRACE
VERTICAL CIRCULATION

EJE ARCHITECTURE
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REV	DATE	COMMENTS	DRN	CHKD	VRFD
P1	01/08/2019	PRELIM. FOR INFOMATION	DJR	JC	JC
P2	02/08/2019	PRELIM. FOR INFOMATION	DJR	JC	JC
P3	23/08/2019	PRELIM. SSDA ISSUE	DJR	JC	JC
P4	30/08/2019	PRELIM. SSDA ISSUE	DJR	JC	JC
P5	05/09/2019	ISSUED FOR REVIEW	DJR	JC	JC
A	13/09/2019	FOR SSDA SUBMISSION	DJR	JC	JC
P6	27/09/2019	ISSUED FOR REVIEW	DJR	JC	JC
B	08/10/2019	FOR SSDA SUBMISSION	DJR	JC	JC
C	15/10/2019	FOR SSDA SUBMISSION	DJR	JC	JC
D	15/10/2019	FOR SSDA SUBMISSION	DJR	JC	JC
E	16/04/2020	REVISED SSDA SUBMISSION	DJR	JC	SS
			MV		

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PROJECT : SURFSIDE E3

CLIENT : CANBERRA DATA CENTRES

SITE : ROBERTS ROAD, EASTERN CREEK, NSW 2766

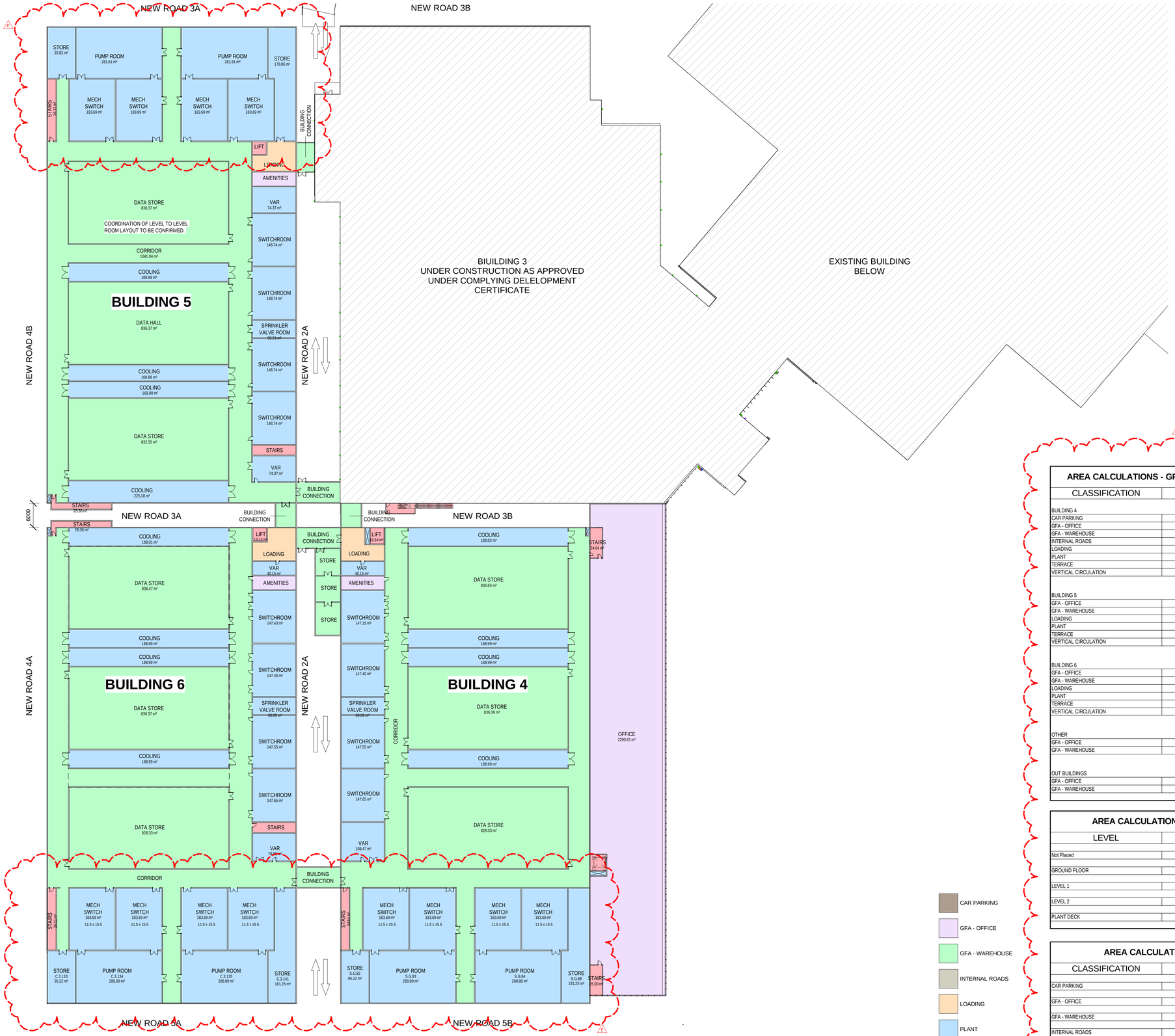
DRAWING : SSDA GROUND FLOOR PLAN

WORK IN FIGURED DIMENSIONS IN PREFERENCE TO SCALE. CHECK DIMENSIONS AND LEVELS ON SITE PRIOR TO THE ORDERING OF MATERIALS OR THE COMPLETION OF WORKSHOP DRAWINGS. IF IN DOUBT ASK. REPORT ALL ERRORS AND OMISSIONS.

DRAWN :	DATE :	SCALES :
MV	16/04/2020	1 : 500 @A1 @A3

PROJECT No :	PHASE :	DRAWING No :	REV :
12706	SD	DA-100	E

EJE architecture



CAR PARKING	
GFA - OFFICE	
GFA - WAREHOUSE	
INTERNAL ROADS	
LOADING	
PLANT	
TERRACE	
VERTICAL CIRCULATION	

AREA CALCULATIONS - GFA SSDA BUILDINGS

CLASSIFICATION	AREA
BUILDING 4	
CAR PARKING	2772.97 m²
GFA - OFFICE	4806.32 m²
GFA - WAREHOUSE	12172.56 m²
INTERNAL ROADS	6657.29 m²
LOADING	430.60 m²
PLANT	7811.37 m²
TERRACE	1946.50 m²
VERTICAL CIRCULATION	384.97 m²
	36982.58 m²
BUILDING 5	
GFA - OFFICE	303.00 m²
GFA - WAREHOUSE	11989.24 m²
LOADING	266.00 m²
PLANT	7816.95 m²
TERRACE	1964.12 m²
VERTICAL CIRCULATION	310.43 m²
	22649.74 m²
BUILDING 6	
GFA - OFFICE	298.55 m²
GFA - WAREHOUSE	12059.83 m²
LOADING	280.07 m²
PLANT	7710.57 m²
TERRACE	1936.99 m²
VERTICAL CIRCULATION	355.44 m²
	22641.46 m²
OTHER	
GFA - OFFICE	28.04 m²
GFA - WAREHOUSE	423.44 m²
	451.48 m²
OUT BUILDINGS	
GFA - OFFICE	79.10 m²
GFA - WAREHOUSE	514.08 m²
	593.18 m²

AREA CALCULATIONS - BY LEVEL

LEVEL	AREA
Not Placed	0.00 m²
GROUND FLOOR	24842.36 m²
LEVEL 1	24927.27 m²
LEVEL 2	17226.28 m²
PLANT DECK	5847.62 m²
	72843.53 m²

AREA CALCULATIONS - GFA

CLASSIFICATION	AREA
CAR PARKING	2772.97 m²
GFA - OFFICE	5486.98 m²
GFA - WAREHOUSE	36735.71 m²
INTERNAL ROADS	6657.29 m²
LOADING	976.67 m²
PLANT	23338.89 m²
TERRACE	5847.62 m²
VERTICAL CIRCULATION	1050.84 m²

EJE ARCHITECTURE
ACN 002 912 843| **ABN** 82 644 649 849
Nominated Architect - Bernard Collins | NSW Architects Registration No: 4438
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REV	DATE	COMMENTS	DRN	CHKD	VRFD
P1	01/08/2019	PRELIM. FOR INFOMATION	DJR	JC	JC
P2	02/08/2019	PRELIM. FOR INFOMATION	DJR	JC	JC
P3	23/08/2019	PRELIM. SSDA ISSUE	DJR	JC	JC
P4	30/08/2019	PRELIM. SSDA ISSUE	DJR	JC	JC
P5	05/09/2019	ISSUED FOR REVIEW	DJR	JC	JC
A	13/09/2019	FOR SSDA SUBMISSION	DJR	JC	JC
P6	27/09/2019	ISSUED FOR REVIEW	DJR	JC	JC
B	08/10/2019	FOR SSDA SUBMISSION	DJR	JC	JC
C	15/10/2019	FOR SSDA SUBMISSION	DJR	JC	JC
D	15/01/2020	FOR SSDA SUBMISSION	DJR	JC	JC
E	16/04/2020	REVISED SSDA SUBMISSION	DJR	JC	SS
					MV

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PROJECT : SURFSIDE E3

CLIENT : CANBERRA DATA CENTRES

SITE : ROBERTS ROAD,
EASTERN CREEK, NSW 2766

DRAWING : SSDA LEVEL 1 PLAN

WORK IN FIGURED DIMENSIONS IN PREFERENCE TO SCALE. CHECK DIMENSIONS AND LEVELS ON SITE PRIOR TO THE ORDERING OF MATERIALS OR THE COMPLETION OF WORKSHOP DRAWINGS. IF IN DOUBT ASK. REPORT ALL ERRORS AND OMISSIONS.

DRAWN :	DATE :	SCALES :
MV	16/04/2020	1 : 500 @A1 @A3

PROJECT No :	PHASE :	DRAWING No :	REV :
12706	SD	DA-101	E

EJE architecture

EJE ARCHITECTURE
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REV	DATE	COMMENTS	DRN	CHKD	VRFD
P1	01/08/2019	PRELIM. FOR INFOMATION	DJR	JC	JC
P2	02/09/2019	PRELIM. FOR INFOMATION	DJR	JC	JC
P3	23/09/2019	PRELIM. SSDA ISSUE	DJR	JC	JC
P4	30/09/2019	PRELIM. SSDA ISSUE	DJR	JC	JC
P5	05/09/2019	ISSUED FOR REVIEW	DJR	JC	JC
A	13/09/2019	FOR SSDA SUBMISSION	DJR	JC	JC
P6	27/09/2019	ISSUED FOR REVIEW	DJR	JC	JC
B	08/10/2019	FOR SSDA SUBMISSION	DJR	JC	JC
C	15/10/2019	FOR SSDA SUBMISSION	DJR	JC	JC
D	15/11/2019	FOR SSDA SUBMISSION	DJR	JC	SS
E	16/04/2020	REVISED SSDA SUBMISSION	MV		

AREA CALCULATIONS - GFA SSDA BUILDINGS

CLASSIFICATION	AREA
BUILDING 4	
CAR PARKING	2772.97 m²
GFA - OFFICE	4806.32 m²
GFA - WAREHOUSE	12172.56 m²
INTERNAL ROADS	6657.29 m²
LOADING	430.60 m²
PLANT	7811.37 m²
TERRACE	1946.50 m²
VERTICAL CIRCULATION	384.97 m²
	36982.58 m²
BUILDING 5	
GFA - OFFICE	303.00 m²
GFA - WAREHOUSE	11989.24 m²
LOADING	266.00 m²
PLANT	7816.95 m²
TERRACE	1964.12 m²
VERTICAL CIRCULATION	310.43 m²
	22649.74 m²
BUILDING 6	
GFA - OFFICE	298.55 m²
GFA - WAREHOUSE	12059.83 m²
LOADING	280.07 m²
PLANT	7710.57 m²
TERRACE	1936.99 m²
VERTICAL CIRCULATION	355.44 m²
	22641.46 m²
OTHER	
GFA - OFFICE	28.04 m²
GFA - WAREHOUSE	423.44 m²
	451.48 m²
OUT BUILDINGS	
GFA - OFFICE	79.10 m²
GFA - WAREHOUSE	514.08 m²
	593.18 m²

AREA CALCULATIONS - BY LEVEL

LEVEL	AREA
Not Placed	0.00 m²
GROUND FLOOR	24842.36 m²
LEVEL 1	24927.27 m²
LEVEL 2	17226.28 m²
PLANT DECK	5847.62 m²
	72843.53 m²

AREA CALCULATIONS - GFA

CLASSIFICATION	AREA
CAR PARKING	2772.97 m²
GFA - OFFICE	5486.98 m²
GFA - WAREHOUSE	36735.71 m²
INTERNAL ROADS	6657.29 m²
LOADING	976.67 m²
PLANT	23338.89 m²
TERRACE	5847.62 m²
VERTICAL CIRCULATION	1050.84 m²

CAR PARKING
GFA - OFFICE
GFA - WAREHOUSE
INTERNAL ROADS
LOADING
PLANT
TERRACE
VERTICAL CIRCULATION

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Environmental Management - ISO14001 Global-Mark.com.au®

PROJECT : SURFSIDE E3

CLIENT : CANBERRA DATA CENTRES

SITE : ROBERTS ROAD,
EASTERN CREEK, NSW 2766

DRAWING : SSDA -LEVEL 2 PLAN

WORK IN FIGURED DIMENSIONS IN PREFERENCE TO SCALE. CHECK DIMENSIONS AND LEVELS ON SITE PRIOR TO THE ORDERING OF MATERIALS OR THE COMPLETION OF WORKSHOP DRAWINGS. IF IN DOUBT ASK. REPORT ALL ERRORS AND OMISSIONS.

DRAWN :	DATE :	SCALES :
MV	16/04/2020	1 : 500 @A1 @A3

PROJECT No :	PHASE :	DRAWING No :	REV :
12706	SD	DA-102	E

EJE architecture

AREA CALCULATIONS - GFA SSDA BUILDINGS

CLASSIFICATION	AREA
BUILDING 4	
CAR PARKING	2772.97 m²
GFA - OFFICE	4806.32 m²
GFA - WAREHOUSE	12172.56 m²
INTERNAL ROADS	6657.29 m²
LOADING	430.60 m²
PLANT	7811.37 m²
TERRACE	1942.60 m²
VERTICAL CIRCULATION	384.97 m²
	36978.68 m²
BUILDING 5	
GFA - OFFICE	303.00 m²
GFA - WAREHOUSE	11989.24 m²
LOADING	266.00 m²
PLANT	7816.95 m²
TERRACE	1964.12 m²
VERTICAL CIRCULATION	310.43 m²
	22649.74 m²
BUILDING 6	
GFA - OFFICE	298.55 m²
GFA - WAREHOUSE	12059.83 m²
LOADING	280.07 m²
PLANT	7710.57 m²
TERRACE	1931.86 m²
VERTICAL CIRCULATION	355.44 m²
	22636.33 m²
OTHER	
GFA - OFFICE	28.04 m²
GFA - WAREHOUSE	423.44 m²
	451.48 m²
OUT BUILDINGS	
GFA - OFFICE	79.10 m²
GFA - WAREHOUSE	514.08 m²
	593.18 m²

AREA CALCULATIONS - BY LEVEL

LEVEL	AREA
Not Placed	0.00 m²
GROUND FLOOR	24842.36 m²
LEVEL 1	24927.27 m²
LEVEL 2	17226.28 m²
PLANT DECK	5838.58 m²
	72834.49 m²

AREA CALCULATIONS - GFA

CLASSIFICATION	AREA
CAR PARKING	2772.97 m²
GFA - OFFICE	5486.98 m²
GFA - WAREHOUSE	36735.71 m²
INTERNAL ROADS	6657.29 m²
LOADING	976.67 m²
PLANT	23338.89 m²
TERRACE	5838.58 m²
VERTICAL CIRCULATION	1050.84 m²

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REV	DATE	COMMENTS	DRN	CHKD	VRFD
P1	28/08/2019	PRELIM. SSDA ISSUE	DJR	JC	JC
P2	05/09/2019	REVISED FOR SSDA ISSUE	DJR	JC	JC
P3	09/09/2019	ISSUED FOR REVIEW	DJR	JC	JC
A	13/09/2019	FOR SSDA SUBMISSION	DJR	JC	JC
P4	27/09/2019	ISSUED FOR REVIEW	DJR	JC	JC
B	08/10/2019	FOR SSDA SUBMISSION	DJR	JC	JC
C	15/10/2019	FOR SSDA SUBMISSION	DJR	JC	JC
D	16/10/2019	FOR SSDA SUBMISSION	DJR	JC	JC
E	18/04/2020	REVISED SSDA SUBMISSION	MW	JC	SS
F	06/05/2020	REVISED SSDA SUBMISSION	DJR	JC	SS

PROJECT : SURFSIDE E3

CLIENT : CANBERRA DATA CENTRES

SITE : ROBERTS ROAD,
EASTERN CREEK, NSW 2766

DRAWING : SSDA ROOF PLAN

WORK IN FIGURED DIMENSIONS IN PREFERENCE TO SCALE. CHECK DIMENSIONS AND LEVELS ON SITE PRIOR TO THE ORDERING OF MATERIALS OR THE COMPLETION OF WORKSHOP DRAWINGS. IF IN DOUBT ASK. REPORT ALL ERRORS AND OMISSIONS.

DRAWN :	DATE :	SCALES :
DJR	06/05/2020	1 : 500 @A1 @A3

PROJECT No :	PHASE :	DRAWING No :	REV :
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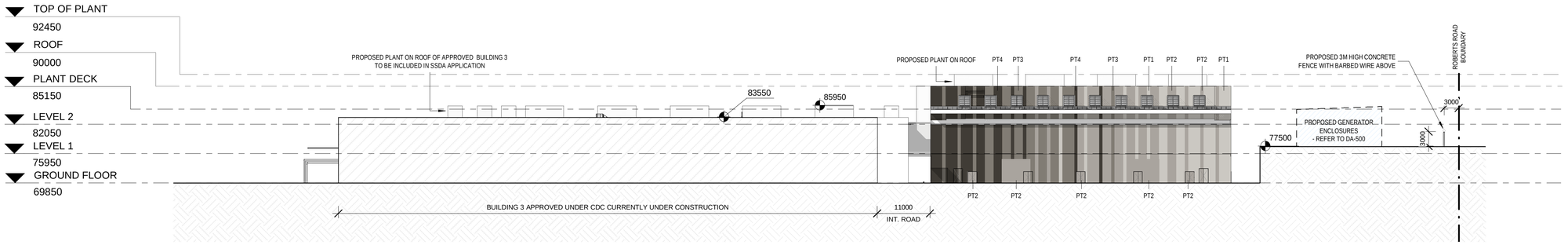
EJE architecture



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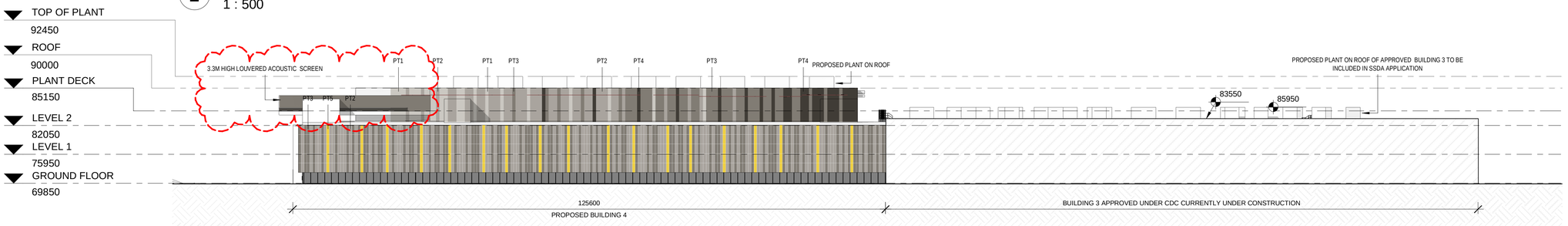
1 : 500



2 EASTERN ELEVATION

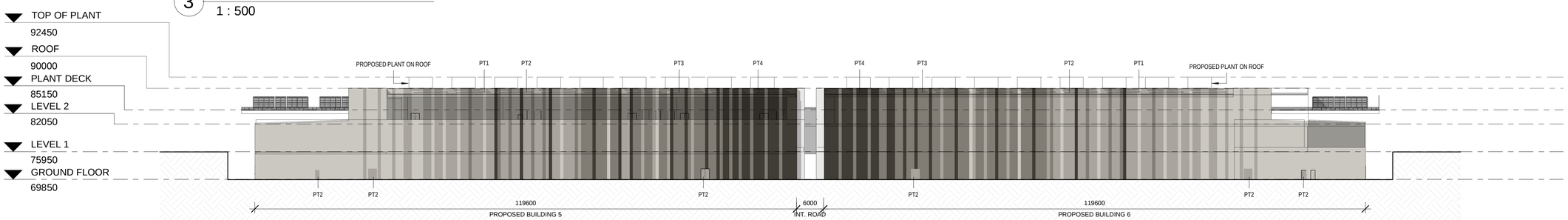
1 : 500

5 BUILDING CONNECTION

1 : 500

3 SOUTHERN ELEVATION

1 : 500



4 WESTERN ELEVATION

1 : 500

EXTERNAL MATERIALS & FINISHES

ITEM	FINISH	
PT1 - PRECAST CONCRETE WALLS	DULUX 'VANILLA QUAKE'	
PT2 - PRECAST CONCRETE WALLS	DULUX 'DOE'	
PT3 - PRECAST CONCRETE WALLS	DULUX 'RICOCHET'	
PT4 - PRECAST CONCRETE WALLS	DULUX 'COUNTRY HIDEAWAY'	
PT5 - FEATURE ELEMENTS	DULUX 'MOONLIGHT'	
EXTERNAL EXPOSED STEEL	PLAIN HOT DIPPED GALVANISHED	
ROOFING & RAINWATER GOODS	COLORBOND 'SHALE GREY'	
ALUMINIUM GLAZING FRAMING	UNIVERSAL ANODISERS ' SATIN CHARCOAL GREY' ANODISING	

0 5 10 20 30 40 50
GRAPHIC SCALE 1:500

EJE ARCHITECTURE
ACN 002 912 843 | **ABN** 82 644 649 849
Nominated Architect - Bernard Collins NSW Architects Registration No: 4438
P +61 2 4929 2353 | **F** +61 2 4926 3069 | **E** mail@eje.com.au | **W** www.eje.com.au
A 412 KING STREET, NEWCASTLE, NSW 2300

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REV	DATE	COMMENTS
P1	23/08/2019	PRELIM. SSDA ISSUE
P2	30/08/2019	PRELIM. SSDA ISSUE
P3	05/09/2019	ISSUED FOR REVIEW
A	13/09/2019	FOR SSDA SUBMISSION
P4	27/09/2019	ISSUED FOR REVIEW
B	08/10/2019	FOR SSDA SUBMISSION
C	10/10/2019	FOR SSDA SUBMISSION
D	16/04/2020	REVISED SSDA SUBMISSION
E	06/05/2020	REVISED SSDA SUBMISSION

DRN	CHKD	VRFD
DJR	JC	
DJR	JC	
DJR	JC	
DJR	JC	
DJR	JC	
DJR	JC	
DJR	JC	
DJR	JC	
MV	SS	
DJR	SS	

PROJECT : SURFSIDE E3

CLIENT : CANBERRA DATA CENTRES

SITE : ROBERTS ROAD, EASTERN CREEK, NSW 2766

DRAWING : ELEVATIONS

WORK IN FIGURED DIMENSIONS IN PREFERENCE TO SCALE. CHECK DIMENSIONS AND LEVELS ON SITE PRIOR TO THE ORDERING OF MATERIALS OR THE COMPLETION OF WORKSHOP DRAWINGS. IF IN DOUBT ASK. REPORT ALL ERRORS AND OMISSIONS.

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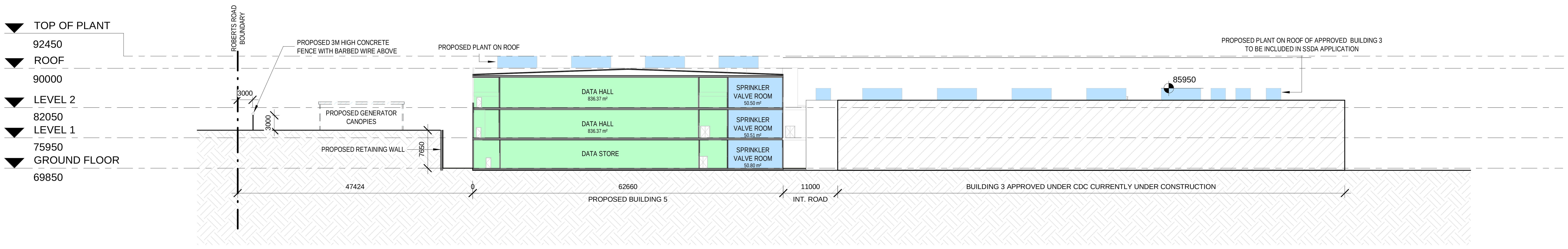
DRAWN : DJR
DATE : 07/30/19
SCALES : 1 : 500 @ A1, 1:1000 @ A3

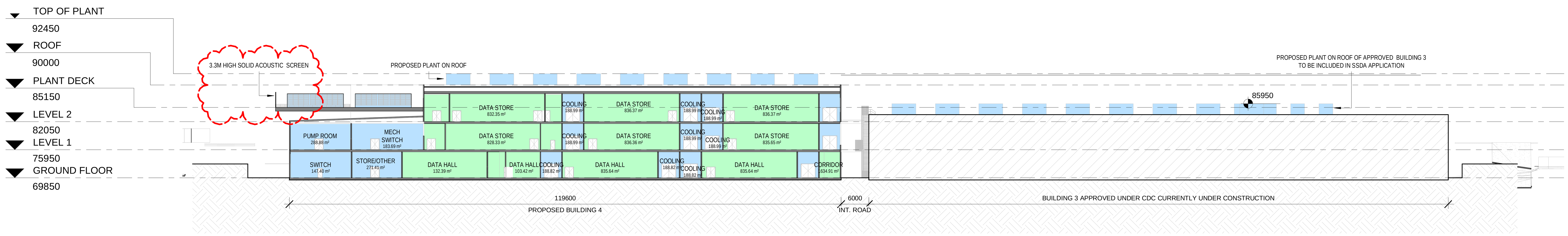
PROJECT No : 12706
PHASE : SD
DRAWING No : DA-200
REV : E

EJE architecture



1 SSDA SECTION AA
1 : 500

- CAR PARKING
- GFA - OFFICE
- GFA - WAREHOUSE
- INTERNAL ROADS
- LOADING
- PLANT
- TERRACE
- VERTICAL CIRCULATION



2 SSDA SECTION BB
1 : 500

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ACN 002 912 843 | **ABN** 82 644 649 849
Nominated Architect - Bernard Collins | NSW Architects Registration No: 4438
P +61 2 4929 2353 | **F** +61 2 4926 3069 | **E** mail@eje.com.au | **W** www.eje.com.au
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0 | 25mm | 100mm | 200mm ON ORIGINAL A1

REV	DATE	COMMENTS	DRN	CHKD	VRFD
P1	23/08/2019	PRELIM. SSDA ISSUE	DJR	JC	
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P3	05/09/2019	ISSUED FOR REVIEW	DJR	JC	
A	13/09/2019	FOR SSDA SUBMISSION	DJR	JC	
P4	27/09/2019	ISSUED FOR REVIEW	DJR	JC	
B	08/10/2019	FOR SSDA SUBMISSION	DJR	JC	
C	10/10/2019	FOR SSDA SUBMISSION	DJR	JC	
D	16/04/2020	REVISED SSDA SUBMISSION	MV	SS	
E	06/05/2020	REVISED SSDA SUBMISSION	DJR	SS	

PROJECT : SURFSIDE E3

CLIENT : CANBERRA DATA CENTRES

SITE : ROBERTS ROAD, EASTERN CREEK, NSW 2766

DRAWING : SECTIONS

WORK IN FIGURED DIMENSIONS IN PREFERENCE TO SCALE. CHECK DIMENSIONS AND LEVELS ON SITE PRIOR TO THE ORDERING OF MATERIALS OR THE COMPLETION OF WORKSHOP DRAWINGS. IF IN DOUBT ASK. REPORT ALL ERRORS AND OMISSIONS.

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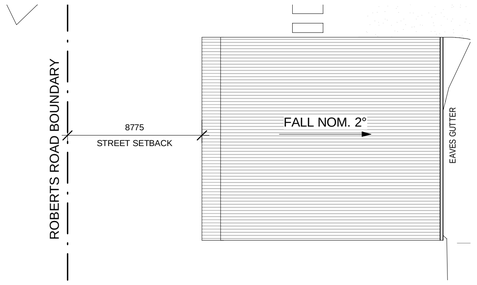
DRAWN :	DATE :	SCALES :
DJR	07/30/19	1 : 500 @ A1 1:1000 @ A3

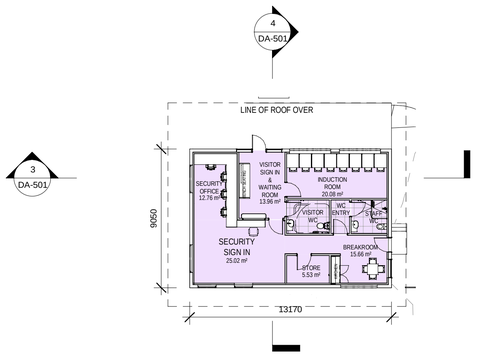
PROJECT No :	PHASE :	DRAWING No :	REV :
12706	SD	DA-300	E

EJE architecture

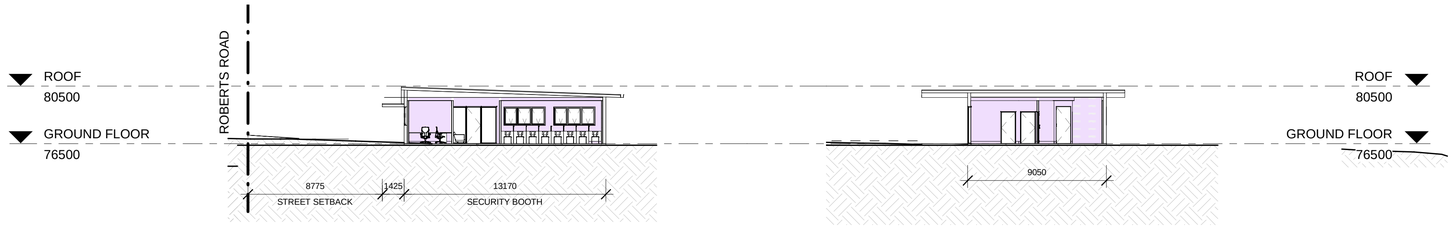


1 SECURITY BOOTH - ROOF PLAN
1 : 200

EXTERNAL MATERIALS & FINISHES		
ITEM	**FINISH**	
PT1 - PRECAST CONCRETE WALLS	DULUX 'VANILLA QUAKE'	
PT2 - PRECAST CONCRETE WALLS	DULUX 'DOE'	
PT3 - PRECAST CONCRETE WALLS	DULUX 'RICOCHET'	
PT4 - PRECAST CONCRETE WALLS	DULUX 'COUNTRY HIDEAWAY'	
PT5 - FEATURE ELEMENTS	DULUX 'MOONLIGHT'	
EXTERNAL EXPOSED STEEL	PLAIN HOT DIPPED GALVANISHED	
ROOFING & RAINWATER GOODS	COLORBOND 'SHALE GREY'	
ALUMINIUM GLAZING FRAMING	UNIVERSAL ANODISERS ' SATIN CHARCOAL GREY' ANODISING	



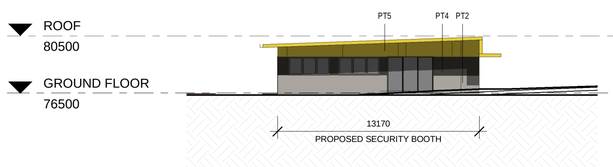
2 SECURITY BOOTH
1 : 200



3 SECURITY SECTION AA
1 : 200

4 SECURITY SECTION BB
1 : 200

- CAR PARKING
- GFA - OFFICE
- GFA - WAREHOUSE
- INTERNAL ROADS
- LOADING
- PLANT
- TERRACE
- VERTICAL CIRCULATION



5 NORTH ELEVATION
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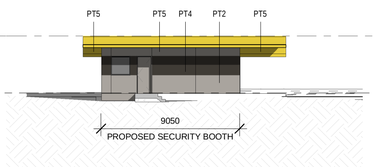

6 EAST ELEVATION
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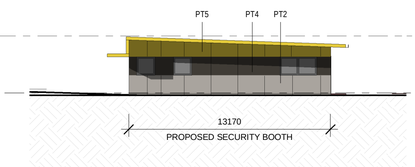

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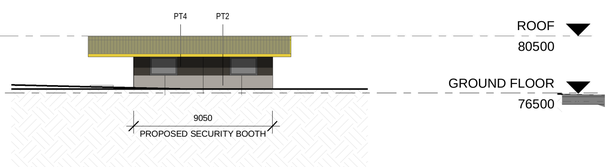
1 : 200



8 WEST ELEVATION
1 : 200

EJE ARCHITECTURE
ACN 002 912 843 | **ABN** 82 644 649 849
Nominated Architect - Bernard Collins | NSW Architects Registration No: 4438
P +61 2 4929 2353 | **F** +61 2 4926 3069 | **E** mail@eje.com.au | **W** www.eje.com.au
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REV	DATE	COMMENTS
A	08/10/2019	FOR SSDA SUBMISSION
B	15/10/2019	FOR SSDA SUBMISSION
C	16/04/2020	REVISED SSDA SUBMISSION

DRN	CHKD	VRFD
DJR	JC	
DJR	JC	
MV	SS	

PROJECT : SURFSIDE E3

CLIENT : CANBERRA DATA CENTRES

SITE : ROBERTS ROAD, EASTERN CREEK, NSW 2766

DRAWING : SECURITY BOOTH

WORK IN FIGURED DIMENSIONS IN PREFERENCE TO SCALE. CHECK DIMENSIONS AND LEVELS ON SITE PRIOR TO THE ORDERING OF MATERIALS OR THE COMPLETION OF WORKSHOP DRAWINGS. IF IN DOUBT ASK. REPORT ALL ERRORS AND OMISSIONS.

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DJR	09/16/19	As indicated @ A1 @ A3

PROJECT No :	PHASE :	DRAWING No :	REV :
12706	SD	DA-501	C

EJE architecture

0 25mm 100mm 200mm ON ORIGINAL A1

APPENDIX B

Blacktown City Council Waste Management Plan Forms

Appendix 1 Forms

Form 1 - Waste management plan

Waste management plan

Outline of proposal:

The SSDA proposes the construction of a new Data Centre and ancillary office space to expand the operation of the existing Data Centre to the east of the site. The proposed Data Centre including three large warehouse buildings and ancillary office space, which will deliver economic benefits and employment generation for Western Sydney and the Greater Sydney Region.

Site address: 17 Roberts Road, Eastern Creek, Sydney NSW, 2766.

Applicant's name and address:

Canberra Data Centres Pty Ltd. PO BOX 304 JERABOMBERRA NSW 2619.

Telephone: 02 6260 2277 **Facsimile:** 02 6260 2278

Mobile:

Buildings and other structures currently on site:

The site contains an existing data centre on the eastern side of the site with attached administrative building, a plant structure to the south of the site, a car park at the site entrance, a car park south of the eastern data centre and internal roads around the perimeter of the data centre and providing access to the street.

The details on this form are intentions for managing waste related to this project.

Signature of applicant: **Date:**

SAMPLE

Form 2 – Demolition phase

Materials on-site			Destination		
			Reuse and recycling		Disposal
Type of materials	Estimated		On-site	Off-site	Specify landfill or waste processing site
	Vol (m^3)	Wt (t)	Specify proposed reuse or on-site recycling materials	Specify contractor and recycling outlet	
Excavation material	38,593	48,241	Reuse on-site as fill material as part of the earthworks for the site		
Garden waste	To be detailed in the arboreal assessment and biodiversity assessment for this development				
Asphalt	225	153			Disposed at a landfill facility lawfully able to accept the material, to be specified.
Road base	740	-	Reused on-site where possible	Off-site recycling at a lawfully compliant recycling facility, to be specified.	Disposed at a landfill facility lawfully able to accept the material, to be specified.

Form 3 – Construction phase

Materials on-site			Destination		
			Reuse and recycling		Disposal
Type of materials	Estimated		On-site	Off-site	Specify landfill or waste processing site
	Vol (m^3)	Wt (t)	Specify proposed reuse or on-site recycling materials	Specify contractor and recycling outlet	
Excavation material	-	-	-	-	-
Timber	155	31	Untreated timber: reuse for floorboards, fencing or furniture. Treated timber: reuse for formwork, bridging, blocking or propping.	Off-site recycling at a lawfully compliant facility to be specified, for landscaping, wood chipping or firewood supplies.	-
Concrete	740	614	-	Off-site recycling for filling, levelling or road base at a lawfully compliant facility, to be specified.	Disposed at a landfill facility lawfully able to accept the material, to be specified.
Bricks	280	232	Reuse on-site as footings, broken bricks for internal walls, crushed for landscaping or driveway use.	Off-site recycling at a contractor to be specified.	-
Gyprock	210	48	-	Returned to supplier or off-site recycling at a lawfully compliant facility to be specified.	-
Sand or Soil	635	1,016	-	Off-site recycling at a lawfully compliant facility to be specified.	-
Metal	200	28	-	Off-site recycling at a lawfully compliant metal recycling compound.	Disposed at a landfill facility lawfully able to accept the material, to be specified.
Other	255	-	-	-	Disposed at a landfill facility lawfully able to accept the material, to be specified.

Form 4 – Ongoing management of waste

Type of waste to be generated	Expected volume per week (L)	Proposed on-site storage and treatment facilities	Destination
Clean office paper	4,095	Placed into the paper and cardboard recycling waste stream. The storage bins for this stream are located in the communal waste storage room.	Sent to recycling facility lawfully able to accept it, to be specified.
Cardboard including bulky cardboard boxes		Placed in the paper and cardboard recycling waste stream. The storage bins for this stream are located in the communal waste storage room.	Sent to recycling facility lawfully able to accept it, to be specified, or collected by a contractor to transport these items for reuse, recycling or disposal.
E-waste	Over 240	Stored in the waste storage room for collection by a private contractor responsible for e-waste recycling.	To be collected by a licensed contractor to be specified.
Garden organics - lawn mowing, tree branches, hedge cuttings, leaves	Under 100	Garden will be serviced by a landscaping contractor, to be specified.	A garden organics processing facility to be specified.
General garbage, including non-recyclable plastics	8,925	Placed into the general waste stream. The storage bins for this stream are located in the communal waste storage room.	Disposed at a landfill facility lawfully able to accept it to be specified.
Recyclable beverage containers, glass and plastic bottles, aluminium cans, steel cans	2,695	Placed into the recyclable container waste stream. The storage bins for this stream are located in the communal waste storage room.	Sent to recycling facility lawfully able to accept it to be specified.

Form 5 – Ongoing management of waste

Describe how you intend to ensure ongoing management of waste on-site (e.g., lease conditions, caretaker/manager on-site)

Will collection occur on private or public land? .....

Collections will occur on the internal road network of the Project. The architects of the Project have indicated that the waste room is located fronting the internal road network to support heavy vehicle access to the waste storage room and achieve Council's requirement of waste storage room being located at street frontage.

.....

.....

.....

What size waste bins will be used? .....

Refer to Section 7.5.1, Table 14 of the Waste Management Plan. The waste bins will range between 240 L bins and 3 m^3 bins. The four buildings will have a communal waste storage room that will consist of the number of bins and bin sizes allocated to the Project.

.....

.....

.....

.....

.....

.....

SAMPLE

ASIA PACIFIC OFFICES

BRISBANE
Level 2, 15 Astor Terrace
Spring Hill QLD 4000
Australia
T: +61 7 3858 4800
F: +61 7 3858 4801

CANBERRA
GPO 410
Canberra ACT 2600
Australia
T: +61 2 6287 0800
F: +61 2 9427 8200

DARWIN
Unit 5, 21 Parap Road
Parap NT 0820
Australia
T: +61 8 8998 0100
F: +61 8 9370 0101

GOLD COAST
Level 2, 194 Varsity Parade
Varsity Lakes QLD 4227
Australia
M: +61 438 763 516

MACKAY
21 River Street
Mackay QLD 4740
Australia
T: +61 7 3181 3300

MELBOURNE
Suite 2, 2 Domville Avenue
Hawthorn VIC 3122
Australia
T: +61 3 9249 9400
F: +61 3 9249 9499

NEWCASTLE
10 Kings Road
New Lambton NSW 2305
Australia
T: +61 2 4037 3200
F: +61 2 4037 3201

PERTH
Ground Floor, 503 Murray Street
Perth WA 6000
Australia
T: +61 8 9422 5900
F: +61 8 9422 5901

SYDNEY
2 Lincoln Street
Lane Cove NSW 2066
Australia
T: +61 2 9427 8100
F: +61 2 9427 8200

TOWNSVILLE
Level 1, 514 Sturt Street
Townsville QLD 4810
Australia
T: +61 7 4722 8000
F: +61 7 4722 8001

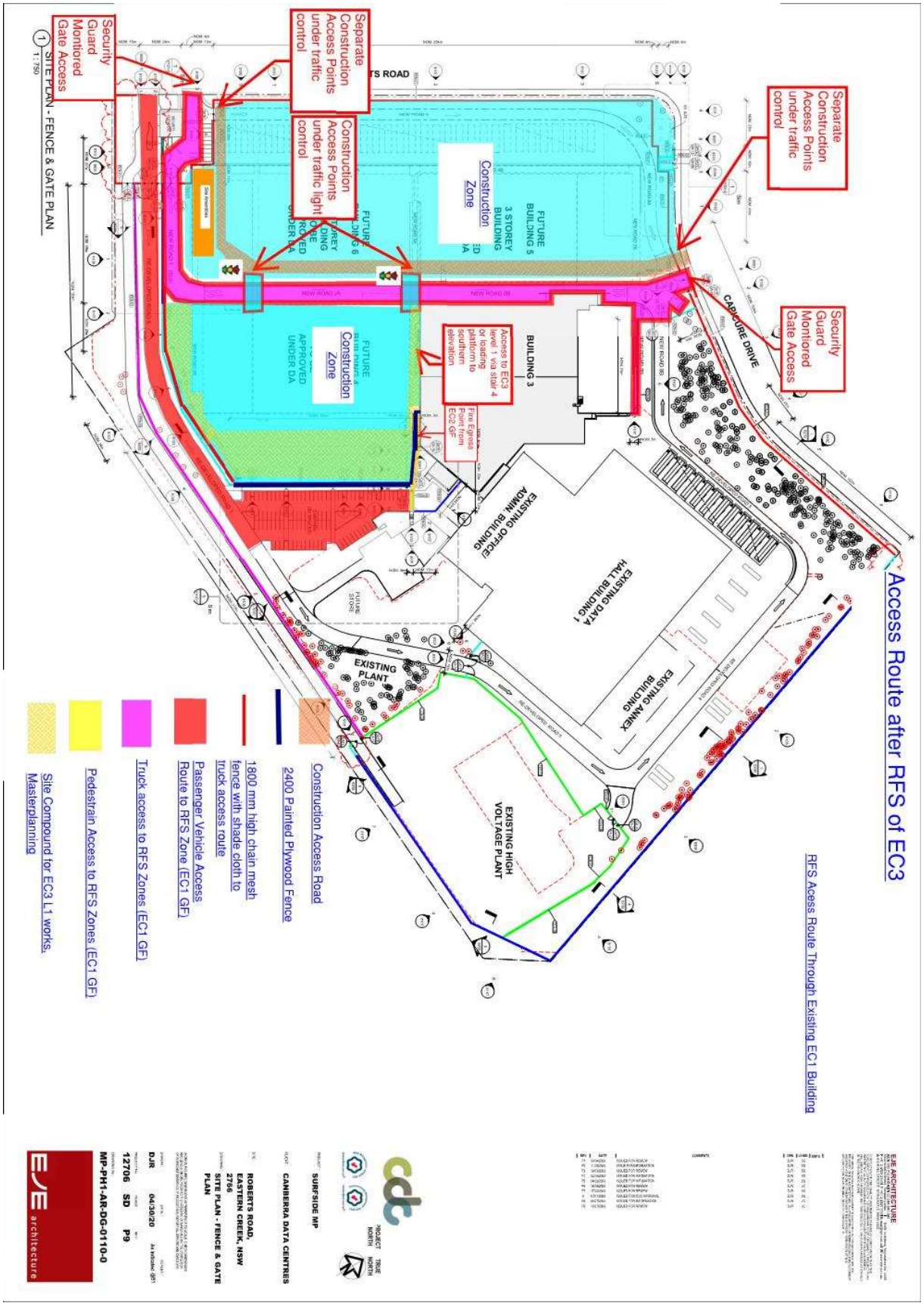
TOWNSVILLE SOUTH
12 Cannan Street
Townsville South QLD 4810
Australia
T: +61 7 4772 6500

WOLLONGONG
Level 1, The Central Building
UoW Innovation Campus
North Wollongong NSW 2500
Australia
T: +61 404 939 922

AUCKLAND
68 Beach Road
Auckland 1010
New Zealand
T: +64 27 441 7849

NELSON
6/A Cambridge Street
Richmond, Nelson 7020
New Zealand
T: +64 274 898 628

APPENDIX S: ACCOMMODATION AND AMENITIES MANAGEMENT PLAN



APPENDIX T:
STORMWATER MANAGEMENT PLAN

STORMWATER MANAGEMENT PLAN

CANBERRA DATA CENTRES
17 ROBERTS ROAD, EASTERN CREEK

REPORT NO. R02104.SMP

REVISION A

OCTOBER 2019

C&M Consulting Engineers Pty Ltd
Suite 26, 11-13 Brookhollow Avenue, Norwest, NSW, 2153
P: 9680 3100 F: 9634 6989 E: info@cmce.com.au

PROJECT DETAILS

Property Address: 17 Roberts Road, Eastern Creek

Development Proposal: Data Centre

REPORT CERTIFICATION

Report prepared by:

ANTHONY MANCONE
Civil Engineer – Director
BE(Civil),Hons., MIEAust, CPEng,
NER (Civil), NER (Building Services),
APEC Eng, IntPE(Aust)

Report reviewed by:

EDWARD SHIN
Civil Engineer – Director
B.E.(Civil) , MIEAust, CPEng,
RPEQ, NER (Civil), APEC Eng,
IntPE(Aust)

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DOCUMENT CONTROL

REVISION	ISSUE DATE	ISSUED TO	ISSUED FOR
DRAFT	9 September 2019	Urbis / Hindmarsh	Review
A	20 October 2019	Urbis / Hindmarsh / CDC	Review

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TABLE OF CONTENTS

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1. INTRODUCTION

1.1 Background

This Stormwater Management Plan & Report has been prepared in accordance with Blacktown City Councils Development Control Plan to support SSDA 10330 for a new data centre facility at 17 Roberts Road, Eastern Creek.

The scope of this report includes a comprehensive assessment of the stormwater management requirements for the proposed development as requested in the SEARS. Accordingly, this report includes findings of the assessment and proposes a best practice stormwater management strategy.

The report describes the principles and operation of the proposed stormwater systems as well as the primary components of the drainage system. As the assessment is required under the conditions of consent, the final stormwater system layout may need to be revised in the future during the application for a Construction Certificate.

The following information and documents were utilised in this investigation:

- Concept Civil Engineering Drawings for the SSDA submission prepared by C&M Consulting Engineers;
- Architectural Plans by EJE Architects;
- Survey Plan by CMS Surveyors;
- Blacktown City Council Development Control Plan (2015);
- “Australian Rainfall and Runoff – A Guide to Flood Estimation”, Institute of Engineers, Australia (1987);
- “Australian Runoff Quality – A Guide to Water Sensitive Urban Design”, Engineers Australia (2006);

The increase in impervious areas and alteration of the natural topography due to land development has the potential to increase and concentrate peak storm flows. This has the potential to impact on flow regimes and cause erosion of the downstream drainage network and associated waterways.

To avoid any adverse impact on the downstream drainage systems, the site’s stormwater management system must be designed to ensure the safe conveyance of flows throughout the site and within the capacity of the downstream trunk drainage systems in a healthy environmental state for Ecological Sustainable Development.

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2. STORMWATER MANAGEMENT

2.1 Background

The objective is to provide stormwater controls, which ensure that the proposed development does not adversely impact on the stormwater flows and water quality of flow paths within, adjacent and downstream of the site.

Increased impervious surfaces and alteration of the natural topography due to land development has the potential to increase peak storm flows and tend to concentrate these flows. This has the potential to impact on flood regimes and erosion of the downstream drainage system.

To avoid any adverse impact on the downstream drainage systems, the site stormwater system is required to be planned correctly to ensure safe conveyance of flows through the site and within the capacity of the downstream trunk drainage systems.

2.2 Key Issues

The key issues and the mitigating measures to be employed within the proposed development site are:

- **Water Quantity** – Increased impervious surfaces (such as roofs, driveways, etc) have the potential to increase the stormwater flows from the site during storm events. To avoid impacting on the downstream drainage system, the sit e stormwater system has been planned to safely convey the flows through the site and within the capacity of the downstream system.

- **Water Quality** – Urban developments have the potential to increase gross pollutants, sediments and nutrient concentrations in storm water runoff. To limit impact on the downstream water quality, pollution control measures will be provided at each storm water outlet prior to discharging to the downstream drainage system.

2.3 The Site

The site is located at 17 Roberts Road, Eastern Creek (Lot 2 DP 1159804). It is bound by Roberts Road to the west, Capicure Drive to the north, Transgrid easement to the south and Council's detention basin to the east.

There is currently an existing data centre building and associated roads, car parking and services infrastructure on the eastern part of the site (Refer to Figure 1).

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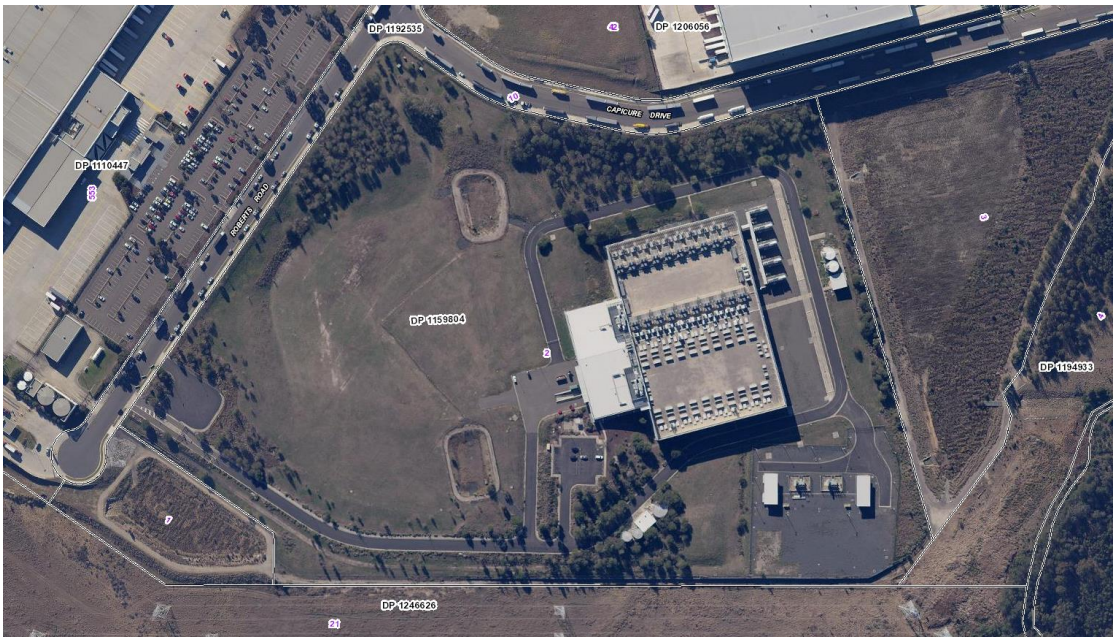

Figure 1 - Aerial Photo of Existing Site
(Source: maps.six.nsw.com)

New data centre buildings and associated works are proposed on the vacant western part of the site.

2.4 Design Guidelines

The site based stormwater management and planning elements are to be designed and constructed in accordance with the following:

Water Quantity

Guidelines: Blacktown City Council Development Control Plan (2015);

The proposed development increases the total impervious area of the existing site and therefore may increase the discharge rate to the downstream drainage network and waterways. The main objective is to achieve a natural water balance which seeks to approximate the pre-development site conditions to maintain existing conditions as well as controlling erosion and sediment removal.

Water Quality

Guidelines: Blacktown City Council Development Control Plan (2015);

The main objective for stormwater quality is to minimise the impacts on downstream water bodies. Blacktown City Council has adopted a stormwater management policy that incorporates “best practice” principles of Water Sensitive Urban.

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2.5 Objectives and Targets

The objective is to provide stormwater controls that ensure that the proposed development does not adversely impact on the quantity or quality of stormwater flows within, adjacent and downstream of the site.

Compatible with the legislation, policy and requirements, the objectives and targets for stormwater management are as provided in Table 1.

Table 1 - Stormwater Management Objectives

STORMWATER MANAGEMENT	OBJECTIVES	TARGET
Quantity	▪ The existing runoff flow regimes for the full storm events should be maintained, and provide safe conveyance system for the major storm events.	▪ Limit post development flow from the proposed development site to less than or equal to the pre-development flows. ▪ Rainwater harvesting and reuse to provide 80% of the potable water demand for the development.
Quality	▪ The full range of typical urban stormwater pollutants shall meet Council requirements	▪ Runoff from site to achieve minimum reductions in total pollutant loads in accordance with Council's requirements.

2.6 Overall Strategies

The proposed stormwater management strategies to manage runoff and ensure no detriment to the receiving environments have been summarised in Table 2.

Table 2 - Stormwater Management Strategies

STRATEGY	DESCRIPTION
Short Term Strategies	Short term strategies generally refer to control of soil and water erosion during the construction phase. The primary risk occurs while soils are exposed during construction works when suspended sediment and associated pollutants can be washed into downstream waterways. The strategies to prevent this potential degradation include adequate provision of sediment and erosion control measures that should be documented prior to commencement of the works in a Soil and Water Management Plan (S&WMP). The controls will limit movement of sediment in disturbed areas, and will be designed to remove sediment from runoff prior to discharge from site.

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Long Term Strategies	Long term strategies to maintain stormwater quantity and quality discharged from the site include utilisation of a number of permanent treatment measures to remove pollutants effectively. The main measures to be implemented include rainwater tanks to collect roof water for water re-use and gross pollutant traps. It is important to note the site is immediately adjacent to Council's catchment detention basin which provides stormwater detention and treatment for the area.

This report addresses the long term impacts of the proposed works. For short term effects (i.e. during the construction phase) water quality control is achieved by implementing the measures in the Sedimentation & Erosion Control Plans.

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3. STORMWATER QUANTITY CONTROL

3.1 Introduction

The main criterion for the stormwater quantity control is to ensure that the post-developed peak flows do not cause detriment to the downstream waterways and Council's existing drainage network.

3.2 Proposed Drainage System

The drainage system for the proposed development will be designed to collect the majority of concentrated flows from impermeable surfaces such as access ways, parking areas and buildings. Where possible (and practical), runoff from pervious areas will also be collected.

The proposed stormwater management system for the development includes:

- A pit and pipe network to collect minor storm runoff from areas;
- Overland flow paths to carry major storms through the site.

3.3 Stormwater Detention

Council has a regional detention and bio-retention basin immediately adjacent to the eastern boundary of the site which provides stormwater detention and stormwater quality improvement for the full development of the catchment. Therefore on-site stormwater detention is not required for this site.

The existing site currently drains to the adjacent Council detention basin via a 900mm pipe (northern catchment area) and a 1350mm pipe (southern catchment area). These pipe outlets were sized for the entire development of the site when originally installed. It is proposed to connect the new development to the existing site drainage system.

3.4 Rainwater Harvesting & Reuse (Water Balance)

As required by Blacktown City Council, a rainwater harvest and reuse strategy has been provided for the development.

The development adopts a WSUD strategy to reduce the loading placed on water and wastewater infrastructure. This strategy will give opportunities to reduce demand on potable water and to reduce wastewater discharged from the site.

Council generally requires rainwater reuse to replace a minimum of 80% of potable water demand for industrial areas. The following systems could potentially be supplied from a non-potable water source such as rainwater reuse:

- Irrigation of landscape areas during dry weather periods;
- Toilet flushing;

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- Mechanical misting systems and replenishment of depleted water for mechanical systems.

A MUSIC model for the proposed development was created (in accordance with Blacktown City Council's MUSIC modelling requirements) to perform a water balance to determine the most efficient rainwater tank size and roof catchment area to achieve the objective.

The following demands were input into the model:

- Irrigation – 2,000m^2 of irrigated landscape area at a usage of 0.4kl/year/m^2 = 800kl/year (Distribution: PET-Rain);

- Toilet Flushing – maximum population of the fully developed site is 41 people. Therefore conservatively allow 41 toilets at a usage of 0.1kl/day/toilet = 4.1kl/day (Distribution: Uniform);

- Mechanical Systems – assume 2kl/day/building = 8kl/day (Distribution: Uniform);

It was assumed that water would be harvested from 2,500m^2 of roof from each new building.

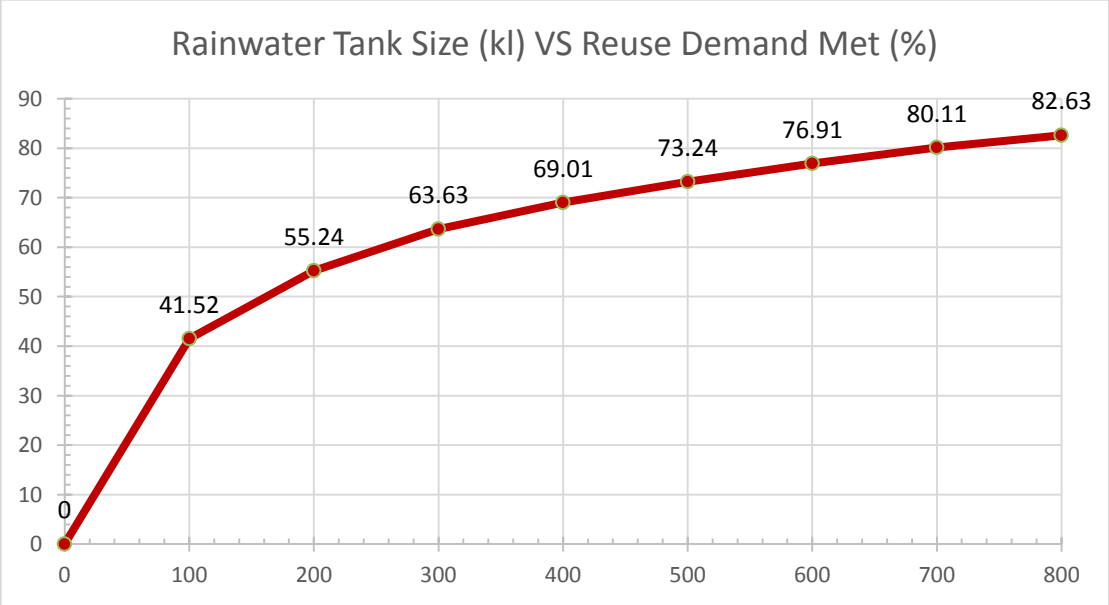

Figure 2 - Water Balance Results

The results are summarised in Figure 2 and indicate that an 80% reduction in potable water usage can be achieved by harvesting rainwater from 2,500m2 of each building roof from the proposed development (4 buildings) and providing a minimum storage of 700kl for the harvested rainwater.

This means that 175kl of rainwater storage is required for each building within the proposed development.

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4. WATER QUALITY CONTROL

4.1 Introduction

The quality of runoff from a catchment depends upon many factors such as land use, degree of urbanisation, population density, sanitation, waste disposal practices, landform, soil types, and climate. Pollutants typically transported by runoff include litter, sediment, nutrients, oil, grease, and heavy metals. Whilst these pollutants have a negative impact on the receiving water quality, suspended solids and nutrients cause the highest detrimental impact to the environment. Litter, oils, and other surfactants have an aesthetic impact.

Activity within a catchment during urbanisation includes the disturbance of vegetation, removal of topsoil, land shaping, road construction, installation of services, and building works. It is during this phase that the sediment movement is greatest and is estimated that the sediment production levels may be up to 6 times higher than under the existing conditions. However, once development is completed, the sediment loading may return to the existing level depending on land management practices.

As with all development projects, soil erosion during the construction phase presents a potential risk to water quality. The primary risk occurs while soils are exposed during earthworks when suspended sediment and associated pollutants can be washed into downstream watercourses.

This section of the report addresses the long term impacts of the development on water quality. For short term effects (i.e. during the construction phase) water quality control is achieved by implementing the measures in the Sedimentation & Erosion Control Plans and Soil & Water Management Plan included with the SSDA submission.

4.2 Water Quality Control

There are number of measures that can reduce pollutant loadings, however, each different type has its own effectiveness in reducing pollutant loadings that depends on land use type, topography and the target control.

Council has a regional detention and bio-retention basin immediately adjacent to the eastern boundary of the site which provides stormwater detention and stormwater quality improvement for the full development of the catchment. Therefore site specific stormwater quality treatment is not required for this site.

However, in this catchment, Council does require the installation of a gross pollutant trap (GPT) to provide some pre-treatment prior to stormwater being discharged from the site.

Currently there are two existing GPTs on the site. There is a Rocla CDS P1012 installed on the 900mm northern outlet and a Rocla CDS P1015 on the 1350mm southern outlet (refer to Appendix B for Drawings from the existing development).

These existing GPTs are appropriate for the full development of the site and no additional treatment is required.

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5. OTHER CONSIDERATIONS

5.1 Flooding

The development site is approximately 80m west of Reedy Creek.

Figure 3 - Site Location Relative to Items of Significance

The development site:

- Is not affected by main stream flooding;
- Is not within an area subject to local overland flow.

The proposed development will not cause nor cause any impact on flooding.

5.2 Groundwater Impacts

The geotechnical assessment for the project prepared by Douglas Partners (Report No. 868500.00.R.001) indicates that the site is a former quarry that has been filled. The original groundwater at the site is likely to have been impacted by the quarrying activities.

Since the quarrying has ceased and the quarry has been filled, it is unlikely that groundwater is now affected.

The earthworks for the project consist of cut to fill to create the building platforms and roads for the project. At the proposed excavation depths, the geotechnical advice concludes that building levels are unlikely to be affected by the building construction. Therefore, the proposed development does not impact on ground water or groundwater dependent communities.

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Furthermore, the project does not seek to extract groundwater and therefore groundwater licensing is not required.

5.3 Watercourse and Riparian Area Impacts

The site drains to Council's catchment basin located immediately east of the site. Council's basin drains to Reedy Creek which approximately 40m east of the basin. The development site is approximately 80m west of Reedy Creek and is well clear of the riparian area.

The stormwater quantity and quality controls described within this report will ensure the proposed development will have no impact on the downstream watercourse and riparian areas.

5.4 Warragamba Pipeline Corridor

The Warragamba Pipeline Corridor is approximately 110m south of the development site and generally runs parallel to the southern boundary of the development site.

The development site drains to Council's catchment basin located immediately east of the site. Council's basin drains to Reedy Creek which approximately 40m east of the basin.

The Warragamba Pipeline Corridor is not impacted by the proposed development and there will be no additional stormwater runoff from the development site to the pipeline corridor.

As the corridor is not impacted by the proposed development works we are of the opinion that consultation with Water NSW is not required for this SSDA.

5.5 Sydney Water Assets

The following Sydney Water assets are near to the development site:

- 200mm diameter watermains in Roberts Road and Capiture Drive (located within the footway of the road reserve).
- 225mm diameter sewermain in the north east corner of the development site.

None of these mains are impacted by the proposed development works and therefore we are of the opinion that consultation with Sydney Water is not required for this SSDA.

We expect that Sydney Water's standard conditions relating to obtaining a Section 73 Development Compliance Certificate and Building Plan Approval will be required as part of the development consent and that these will be complied with during the Construction Certificate application phase of the project.

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6. RECOMMENDATIONS

The proposed development of the site could potentially lead to significant changes in water quantity if a water sensitive urban design approach is not adopted as part of the development strategy. The traditional stormwater management and investigation that only considers impacts of flooding and flood mitigation is a thing of the past. Stormwater management practices must now also consider water quality, aquatic habitats, riparian vegetation, recreation, aesthetic and economic issues.

The key strategies to be adopted for this development include the following:

1. A pit and pipe network to collect minor storm runoff from surface areas which will minimise nuisance flooding;

2. Overland flow paths to carry major storms through and around the site without causing damage to property from flooding;

3. Connection to the existing site drainage system to utilise the two existing Rocla CDS GPTs on the site;

4. Rainwater harvesting from 2,500m^2 of roof area of each new building (10,000m^2 in total) to 175kl of rainwater storage for each new building (700kl in total) Harvested rainwater can be reused for landscape irrigation, toilet flushing, misting and mechanical systems.

By adopting the above recommendations, the proposed development can provide a safe and ecologically sustainable environment in terms of stormwater management.

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7. REFERENCES

- Concept Civil Engineering Drawings for the SSDA submission prepared by C&M Consulting Engineers
- Blacktown City Council Development Control Plan (2015)
- Architectural Plans by EJE Architects
- Survey Plan by CMS Surveyors;
- “Australian Rainfall and Runoff – A Guide to Flood Estimation”, Institute of Engineers, Australia (1987);
- “Australian Runoff Quality – A Guide to Water Sensitive Urban Design”, Engineers Australia (2006);

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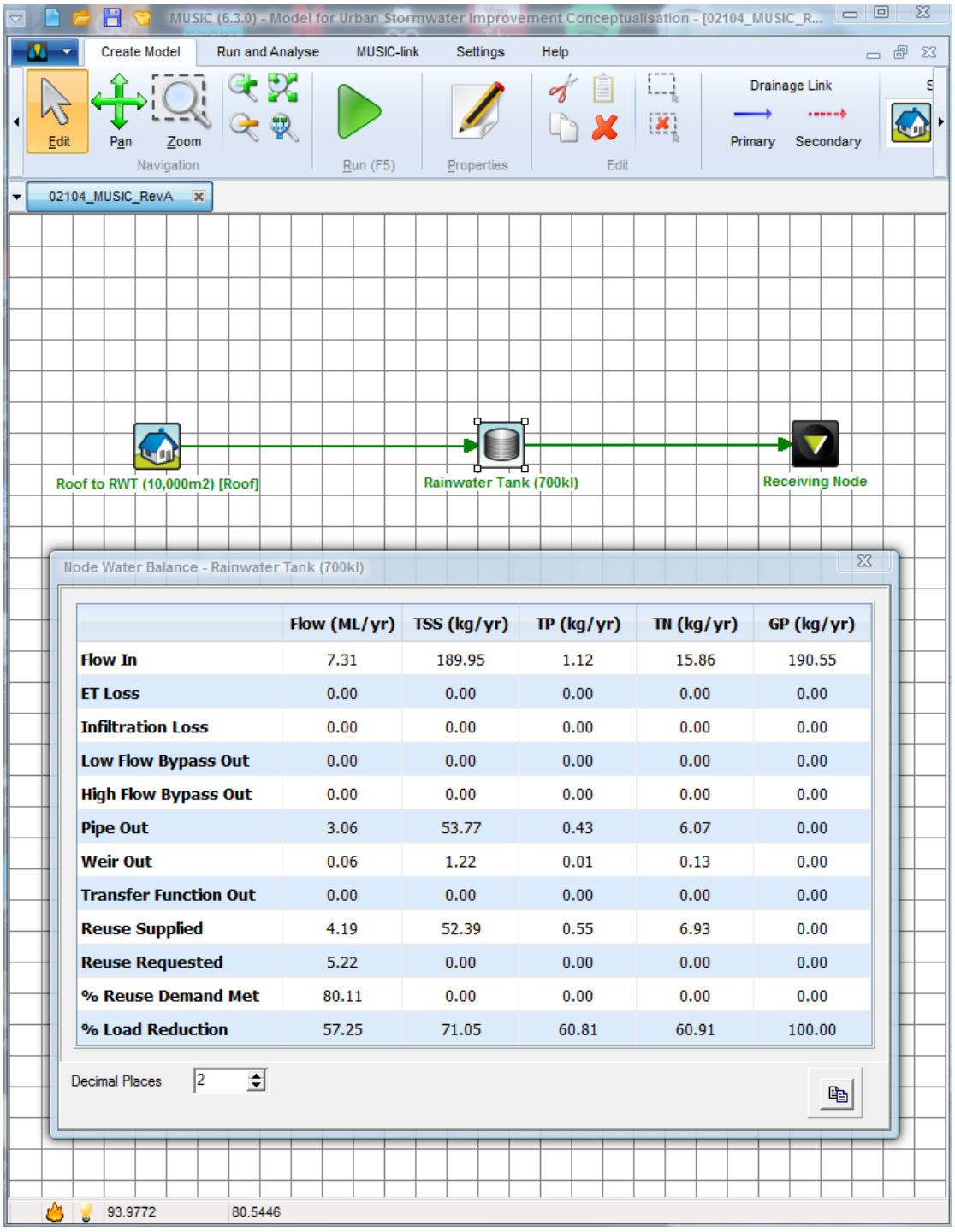
APPENDIX A

WATER BALANCE MODEL & RESULTS



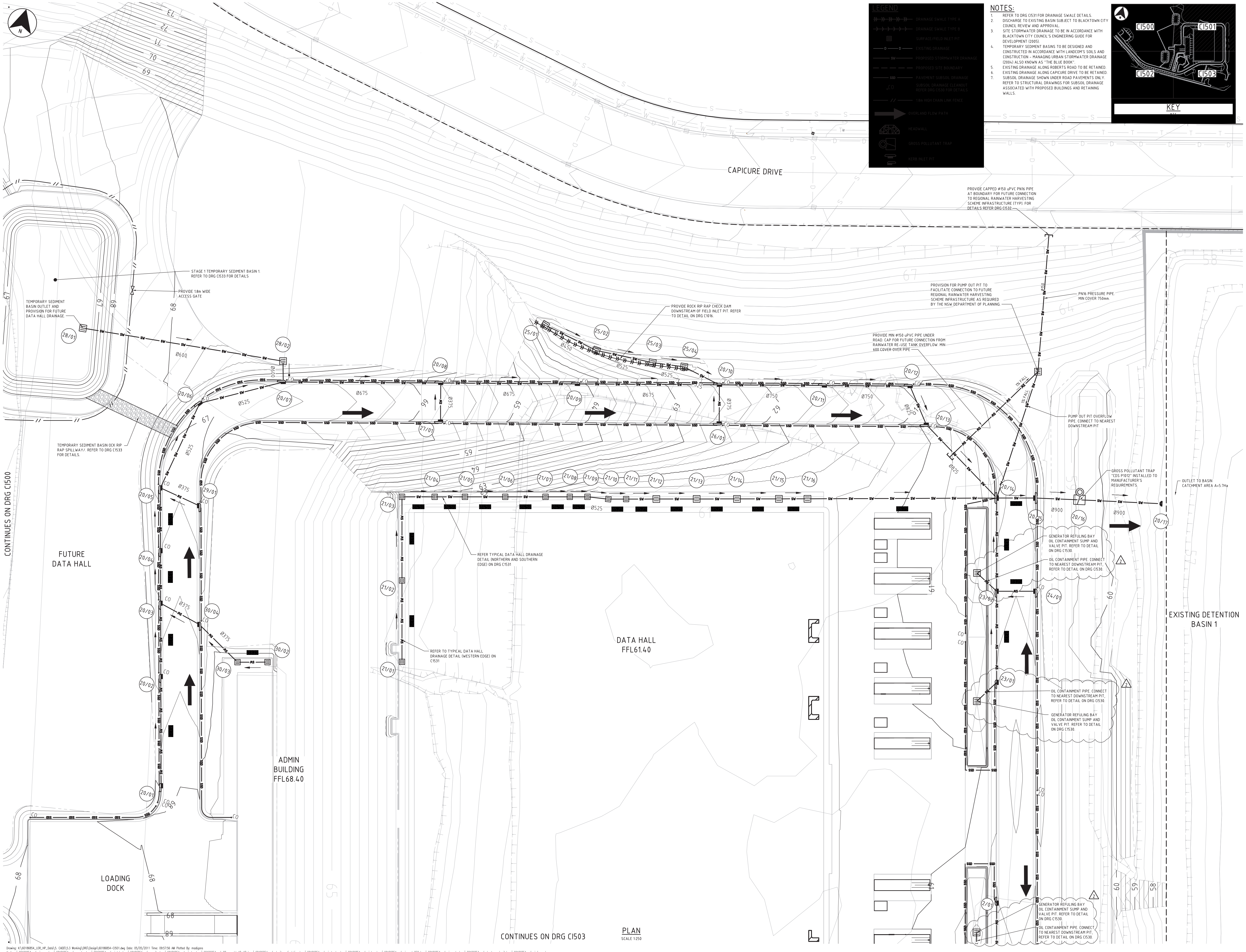
Node Water Balance - Rainwater Tank (700kl)

	Flow (ML/yr)	TSS (kg/yr)	TP (kg/yr)	TN (kg/yr)	GP (kg/yr)
Flow In	7.31	189.95	1.12	15.86	190.55
ET Loss	0.00	0.00	0.00	0.00	0.00
Infiltration Loss	0.00	0.00	0.00	0.00	0.00
Low Flow Bypass Out	0.00	0.00	0.00	0.00	0.00
High Flow Bypass Out	0.00	0.00	0.00	0.00	0.00
Pipe Out	3.06	53.77	0.43	6.07	0.00
Weir Out	0.06	1.22	0.01	0.13	0.00
Transfer Function Out	0.00	0.00	0.00	0.00	0.00
Reuse Supplied	4.19	52.39	0.55	6.93	0.00
Reuse Requested	5.22	0.00	0.00	0.00	0.00
% Reuse Demand Met	80.11	0.00	0.00	0.00	0.00
% Load Reduction	57.25	71.05	60.81	60.91	100.00

Decimal Places 2

APPENDIX B

DRAWINGS FROM EXISTING DEVELOPMENT



NOTES:

1. REFER TO DRG CI531 FOR DRAINAGE SWALE DETAILS.
2. DISCHARGE TO EXISTING BASIN SUBJECT TO BLACKTOWN CITY COUNCIL REVIEW AND APPROVAL.
3. SITE STORMWATER DRAINAGE TO BE IN ACCORDANCE WITH BLACKTOWN CITY COUNCIL'S ENGINEERING GUIDE FOR DEVELOPMENT (2005).
4. TEMPORARY SEDIMENT BASINS TO BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH LANDCOM'S SOILS AND CONSTRUCTION – MANAGING URBAN STORMWATER DRAINAGE (2004) ALSO KNOWN AS "THE BLUE BOOK".
5. EXISTING DRAINAGE ALONG ROBERTS ROAD TO BE RETAINED.
6. EXISTING DRAINAGE ALONG CAPICURE DRIVE TO BE RETAINED.
7. SUBSOIL DRAINAGE SHOWN UNDER ROAD PAVEMENTS ONLY. REFER TO STRUCTURAL DRAWINGS FOR SUBSOIL DRAINAGE ASSOCIATED WITH PROPOSED BUILDINGS AND RETAINING WALLS.

Key Plan / North

Issue	Description	Date
0	ISSUED FOR CONSTRUCTION	28.01.11
1	RE-ISSUE FOR CONSTRUCTION	22.02.11
2	RE-ISSUE FOR CONSTRUCTION	15.04.11

2.5 0 2.5 5 7.5m
1 : 250 FULL SIZE A0

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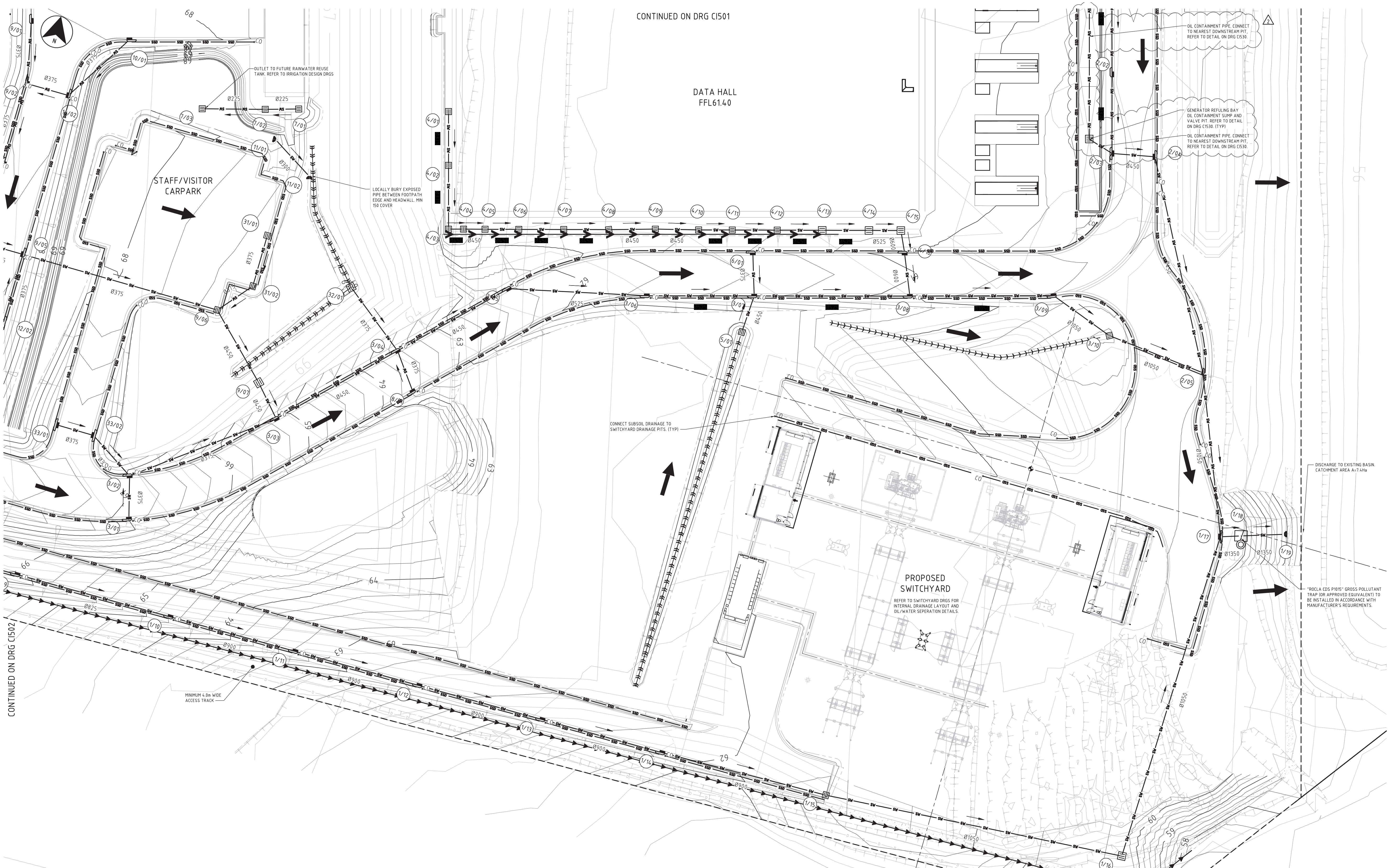
CONSTRUCTION

Title
CIVIL
DRAINAGE LAYOUT PLAN
SHEET 2

Drawn	Designed	Checked	Scale
S.M.	S.K.	C.A.S.	

Project Number	Issue
60186854	2

HP-CI-DW-CI501



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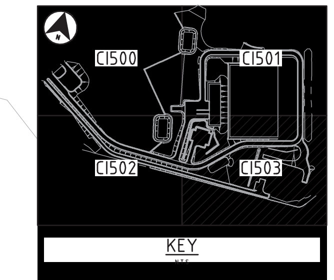
5. EXISTING DRAINAGE ALONG ROBERTS ROAD TO BE RETAINED.
6. EXISTING DRAINAGE ALONG CAPICURE DRIVE TO BE RETAINED.

LEGEND

- DRAINAGE SWALE TYPE A
- DRAINAGE SWALE TYPE B
- SURFACE/FIELD INLET PIT
- EXISTING DRAINAGE
- PROPOSED STORMWATER DRAINAGE
- RETAINING WALL DRAIN
- PROPOSED SITE BOUNDARY
- PAVEMENT SUBSOIL DRAINAGE
- SUBSOIL DRAINAGE CLEANOUT REFER DRG CI530 FOR DETAILS
- OVERLAND FLOW PATH
- HEADWALL
- GROSS POLLUTANT TRAP



KEY

PLAN
SCALE 1:250

Key Plan / North

Issue	Description	Date
0	ISSUED FOR CONSTRUCTION	28.01.11
1	RE-ISSUE FOR CONSTRUCTION	22.02.11
2	RE-ISSUE FOR CONSTRUCTION	15.04.11

2.5 0 2.5 5 7.5m
1 : 250 FULL SIZE A0

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CONSTRUCTION

Title
CIVIL
DRAINAGE LAYOUT PLAN
SHEET 4

Drawn	Designed	Checked	Scale
S.M.	S.K.	C.A.S.	

Project Number	Issue
60186854	2

HP-CI-DW-CI503

Drawing: K:\60186854_LOR_HP_Data\5. CADD\5.3 Working\DRG\Design\60186854-CI503.dwg Date: 05/05/2011 Time: 09:58:17 AM Plotted By: modigons

APPENDIX U:
SOIL AND WATER MANAGEMENT PLAN

SOIL & WATER MANAGEMENT PLAN

CANBERRA DATA CENTRES
ROBERTS ROAD, EASTERN CREEK

REPORT NO. R02104.S&WMP

REVISION A

OCTOBER 2019

C&M Consulting Engineers Pty Ltd
Suite 26, 11-13 Brookhollow Avenue, Norwest, NSW, 2153
P: 9680 3100 F: 9634 6989 E: info@cmce.com.au

PROJECT DETAILS

Property Address: Roberts Road, Eastern Creek

Development Proposal: Data Centre

REPORT CERTIFICATION

Report prepared by:

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Civil Engineer – Director
BE(Civil),Hons., MIEAust, CPEng,
NER (Civil), NER (Building Services),
APEC Eng, IntPE(Aust)

Report reviewed by:

EDWARD SHIN
Civil Engineer – Director
B.E.(Civil) , MIEAust, CPEng,
RPEQ, NER (Civil), APEC Eng,
IntPE(Aust)

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DOCUMENT CONTROL

REVISION	ISSUE DATE	ISSUED TO	ISSUED FOR
DRAFT	2 September 2019	Urbis / Hindmarsh	Review
A	20 October 2019	Urbis / Hindmarsh / CDC	Review

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Table of Contents

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Preface

This Soil and Water Management Plan (SWMP) has been prepared to supplement the Environmental Assessment (EA) for the Canberra Data Centre project at Roberts Road, Eastern Creek.

This SWMP has been written in accordance with the requirements of "Managing Urban Stormwater – Soils and Construction, 4th Edition (2004)" by Landcom. This SWMP shall be applied to the construction activities carried out for the development site.

Measures outlined in this Soil and Water Management Plan must be implemented prior to and maintained during and after the construction works.

It is the Contractor's responsibility to design the sedimentation and erosion control plan for the site such that it is accordance with this Soil and Water Management Plan and the Civil Works Specification.

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General Instructions

1. The Soil and Water Management Plan (SWMP) is to be read in conjunction with the engineering plans, and any other plans or specifications that may be issued in relation to the Project.

2. Contractors shall ensure that all soil and water management works are undertaken as instructed in this specification and constructed following the guidelines stated in "Managing Urban Stormwater – Soils and Construction, 4th Edition (2004)" by Landcom.

3. The Contractor shall ensure that all subcontractors are informed of their responsibilities in minimising the potential for soil erosion and pollution to downslope areas.

Site Constraints and Characteristics

1. The following design parameters have been assessed for the site :

Constraint	**Value**	**(Source)***
Rainfall Erosivity (R-factor)	2500	
Soil Erodibility (K-factor)	0.038	
Length/Slope Gradient Factor, LS	2.00	Table A1
Erosion Control Practice Factor (P-Factor)	1.3 (Compacted)	Table A2
Cover Factor (C-Factor)	1.0 (During Earthworks) 0.1 (Temporary Seeding – Post-Earthworks Operation)	Table A3
Calculated Soil Loss, A (RUSLE equation)	191 t/Ha/yr (During Earthworks) 19 t/Ha/yr (Post-Earthworks)	A = R K LS P C
Soil Loss Class	2 – Low	(Table 4.2)
Soil Hydrologic Group	C	(Table C29)
75th Percentile 5-day Rainfall Event	19.4mm (Blacktown)	(Table 6.3b)
Volumetric Runoff Coefficient, Cv	0.25	(Table F2)

* (NSW Landcom Managing Urban Stormwater Manual Reference)

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2. The sediment basin sizing has been conducted on a rate per hectare of disturbed area basis and has been sized in accordance with the requirements of the Landcom manual "Managing Urban Stormwater - Soils and Construction", for Type D soils. The disturbed area within this catchment at any one time should be limited to an area for which each sediment basin can handle.

Sediment Basin Sizing Calculation for Type D Soil*:

	TOTAL
Volumetric Runoff Coefficient, Cv	0.25 (Table F2)
75th percentile 5 Day total rainfall depth	19.4mm
Catchment Area (A_c)	1.0 (i.e. per hectare of disturbed area)
Settling Zone Volume (per hectare), V_{sett} = 10 x Cv x A_c x R75th	49 m^3/ha
Disturbed Catchment Area (A_d)	1.0 (i.e. per hectare of disturbed area)
R K LS P C	191 t/ha/yr
30% of Settling Zone Volume	15 m^3
Sediment Zone Volume, V_{sed} = 0.17 A_d (R K LS P C) / 1.3 V_{sed} should be >30% of V_{sett}	25 m^3/ha > 30% V_{sett}
Total Sediment Basin Volume Required:	**74 m^3/ha of disturbed area**

*(NSW Landcom Managing Urban Stormwater Manual Reference)

3. The basins have been sized to accommodate the 75th percentile of 5 day continuous storm. The total volume of the basins required is given in m^3 per hectare of disturbed area.

4. Stormwater runoff from the non-disturbed portion of the catchment outside of operating area is to be bypassed around the basins by physical means such as catch drains.

Basin Management

1. The captured stormwater in the settling zone should be drained to meet the minimum storage capacity required within a five (5) day period following rainfall, provided the acceptable water quality (NFR) and turbidity have been achieved.

2. Chemical flocculent such as gypsum may be dosed to aid settling within 24 hours of conclusion of each storm. The applied dosing rates should achieve the target quality within 36 to 72 hours of the storm event.

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Land Disturbance Conditions

1. Where practicable, the soil erosion hazard shall be kept as low as possible. Limitations to access are to be in accordance with the following table:

Land use	Limitation
Access Areas	Access is to be limited to the designated work zones.
Truck Cleaning Areas	Any truck exiting out of the site shall be thoroughly cleaned and limit the exportation of soil and sediment on public roads.
Remaining Lands (Undisturbed Areas)	Entry is prohibited to remaining lands. Access is only permitted with permission from the Project Manager and/or Superintendent, to allow for thinning of growth in the interests of fire protection and/or flora and fauna management.

Construction Sequence

Works shall be undertaken in the following sequence:

1. Install sediment fencing and cut drains to meet the requirements of the SWMP. Waste collection bins shall be installed adjacent to site office.

2. Construct stabilised site access in location nominated by the Contractor and in accordance with the Specification.

3. Install sediment control protection measures at all natural and man-made drainage structures. Maintain until all the disturbed areas are stabilised.

4. Redirect clean water around the construction site (earthworks areas).

5. Construct sediment basin(s) for disturbed areas in accordance with the rate per hectare provided in the SWMP. Install risers and two pegs in the floor of the basin and have them marked to show the top of the sediment storage zone. Ensure the basin is cleared of sediment once the design capacity is reached.

6. Clear and strip the work areas. Minimise the damage to the grass and low ground cover of non-disturbed areas.

7. Any disturbed areas, other than grading areas, shall immediately be covered with site topsoil within 7 days of clearing. Re-graded areas shall be covered with bitumen emulsion as specified.

8. Apply permanent stabilisation to the site if necessary.

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Erosion Control Requirements

1. Clearly visible barrier fencing shall be installed at the discretion of the site superintendent to ensure traffic control and prohibit unnecessary site disturbance. Vehicular access to the site shall be limited to only that essential for construction work and shall enter the site only through the stabilised access points.

2. All disturbed areas are to be stabilised within 14 working days of the completion of land shaping. All disturbed areas are to be protected so that the land is permanently stabilised within six months. Topsoil shall be respread over the site, other than re-grading areas, to a minimum depth of 100mm on bare but tyned soil surfaces and the site shall be revegetated in accordance with the following:

Sowing season	**Seed mix**
Autumn/Winter	oats@40kg/ha + Japanese millet@10kg/ha
Spring/Summer	oats@20kg/ha + Japanese millet@20kg/ha

Note: These plant species are for temporary revegetation only. They will only provide protection from erosion for six months. Where the lots are to be left undeveloped for a longer period, the Contractor shall seek advice from the site superintendent as to more appropriate revegetation methods.

Revegetation in accordance with the above table will be enhanced by adding lime at a rate of 4kg/tonne of topsoil and 7.5kg/tonne of subsoil.

3. The long term ground cover factors for the construction works is not to exceed the following limits :

Land	**Maximum C-factor**	**Remarks**
Waterways and other areas of concentrated flows, post construction	0.05	Applies after 10 working days of completion of formation and before concentrated flows are applied. Foot and vehicular traffic is prohibited in this area and 70% ground cover is required.
Stockpiles, post construction	0.10	Applies after 10 working days from completion of formation. 60% ground cover is required.
All lands, including waterways and stockpiles, during construction.	0.15	Applies after 20 days of inactivity, even though works may be incomplete. 50% ground cover is required.

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Sediment Control Conditions

1. Proprietary silt fencing shall be installed by the Contractor in accordance with their approved Sediment and Erosion Control Plan and elsewhere at the discretion of the site superintendent to contain coarser sediment fractions as near as possible to their source.

2. Sediment removed from any trapping device shall be relocated where further pollution to downslope lands and waterways cannot occur.

3. Stockpiles shall be located by the Contractor in accordance with their approved Sediment and Erosion Control Plan and elsewhere at the discretion of the Project Manager and/or Superintendent. Where stockpiles are to be in place longer than 30 days they shall be stabilised by covering with mulch or with temporary vegetation.

4. Water shall be prevented from entering the permanent drainage system unless it is sediment free. Drainage pits are to be protected in accordance with the Contractor's approved Sediment and Erosion Control Plan.

5. Temporary sediment traps at pits shall be retained until after lands they are protecting are completely rehabilitated.

Site Maintenance Requirements

1. Waste bins are to be provided for all construction refuse. They are to be emptied at least weekly and refuse is to be disposed in accordance with the site manager's recommendations.

2. The site manager shall inspect the site at least weekly and shall;

    a. Ensure that all drains are operating effectively and shall make any necessary repairs;

    b. Remove any spilled material from area subject to runoff or concentrated flow;

    c. Remove trapped sediment where the capacity of the trapping device falls below 60%;

    d. Inspect the sediment basins after each rainfall event and/or weekly. Ensure that all sediment is removed once the sediment storage zone is full (refer to pegs installed in basins in accordance with the SWMP). Ensure that outlet and emergency spillway works are maintained in a fully operational condition at all times.

    e. Ensure rehabilitated lands have effectively reduced the erosion hazard and initiate upgrading or repair as appropriate;

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f. Construct additional erosion or sediment control works as may be appropriate to ensure the protection of downslope lands and waterways;

g. Maintain erosion and sediment control measures in a fully functioning condition at all times until the site is rehabilitated;

h. Ensure that the revegetation scheme is adhered to and that the all grass covers are kept healthy, including watering and mowing;

i. Remove temporary soil conservation structures as the last activity in the rehabilitation program.

Air Quality / Dust Management

1. Prior to construction, the Contractor shall prepare an Environmental Management Plan (EMP), which will include a section on Air Quality and/or Dust Management). The EMP will include but not be limited to:

   a. Plant and equipment emissions shall be as per the relevant regulations and standards

   b. Areas of exposed soil shall be minimised and long term stockpiles shall be stabilized with vegetation or covered.

   c. A water cart shall be available at all times for surface spraying exposed soil surfaces to reduce dust generation.

   d. The site compound and haul roads are to be covered with gravel or kept moist (by spraying with water cart) to reduce dust generation.

   e. Materials transported in open trucks shall be covered to prevent possible dust generation.

   f. Tailgates of all vehicles transporting soil materials to and from the construction site shall be securely fixed so as to prevent soil spilling which in turn could generate dust.

   g. The burning of materials is not permitted on site at any time.

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